Proceedings of the 17th International Conference on Manufacturing Systems – ICMaS
ISSN 1842-3183
University POLITEHNICA of Bucharest, Machine and Manufacturing Systems Department
Bucharest, Romania

PROCESS ALGORITHM OF ORDER PROCESSING

Peter TREBUŇA, Miriam PEKARČÍKOVÁ

Abstract: *Companies have a clear need for structured production management methods. A specification of requirements for production management identifying needs based on operational and administrative activities, can contribute significantly in the selection and implementation of a production management system.*

Key: *process algorithm, order conditions, delivery, procedure.*

1. INTRODUCTION

Order processing starts with the receipt of an order from a customer. It may be obtained by a salesperson, be telephoned in, or arrival by mail. Regular buyers and sellers are often linked electronically. As the buyer's inventories become low, an electronic purchase order is generated. It is communicated to the seller, whose computers will determine that the goods are available, and the seller will inform the buyer, still using electronic methods, that the order will be filled and shipped by a certain date. The first step in most order-processing systems is to verify the accuracy of the order-that is, to make certain that the document contains no internal errors that might mean the customer was uncertain about what he or she was ordering. The next step is to verify the customer's credit or ability to pay. After determining from which inventory point to ship the goods, instructions are sent to that warehouse to fill the order. At the warehouse an "order picking list" is given to a warehouse worker, who assembles the specific order. In the packing area, it is checked and packed for shipment, and the package is labeled. The traffic manager prepares the transportation documents and notifies a carrier to pick up the shipment. An invoice for the goods is sent to the buyer, and various inventory and financial records are updated. The shipper uses the term "order cycle" to indicate the span of time between receiving and shipping the order. The buyer uses the phrase to indicate the span of time between placing and receiving the order.

Order Processing – apturing, streamlining and fulfilling orders – is the critical link between front-office and back-office business processes.

2. PROCESS ALGORITHM OF ORDER PROCESSING HAS THE FOLLOWING STEPS

STEP 1: Orders recording

Orders records are done in the commercial division center to provide coordination of operative plans of individual production plants or to eliminate subjective approach in arranging of ordered products to planning periods. Before the planning period starts, the set of orders for next planning period must be closed. If the products are obligated to the same delivery term for the same customer, we call them a business transaction. Orders are recorded and a file (list of records) is made for each of them. The file is saved in the database of orders.
For a planning period of one month the requirement of three weight types could contain entries, which are being recorded, and then the file is done – e.g. according to the table 1.

STEP 2: Technical, technological and economical appraisal

Technical and technological appraisal comes out from the information about whether the requirement is defining a new or an already manufactured product. Appraisal comes out from the treatment of technological process in case of already manufactured product that is one of the basic information files necessary for production logistics. In case that the conditions have been changed, the question of possibility to produce the product must be solved. The economical appraisal is necessary for a new product. It decides about the disposal of order or about preparation of technological process. It is being considered if the new production is effective as to material, technology, and construction.

Order of weight 58 – 2 – 119 is in category of already produced products. But as a new weight type it requires economical appraisal and preparation of technological process.

STEP 3: Economical estimation

Economical estimation determines the product price and costs and profit connected with it. It is very important to calculate costs accurately following the calculated items, which are changed depending on the production process conditions. Mostly the cost pricing is influenced by the basic firm goals, price flexibility and discounts and price reduction, legislation, condition of market positioning, business and distribution solutions, competition, costs, demand and prices of comparable products. The basic approach of cost pricing follows the mentioned criteria and the character of production process.

Cost approach determines price following the calculated costs plus add-profit depending on calculation type.

Demand approach of cost pricing is created following the market entries and adaptation of demand situation.

Competitive approach is subjected to competition and takes its prices.

Calculated price is compared and modified according to the registered real costs. If the production seems to be non-profitable then the order is possible to decline.

The cost approach is the most suitable one for the economical appreciation of weights as it controls if the products costs are lower than the fixed price estimated by customer and if the profit fulfils the firm financial goals. Economical results are given in Table 2 and 3. Real calculated costs have to be smaller than the weight prices, then the production would not show loss.

Capacity planning is the last step in which the order could be refused in case the production capacity fails. Ordered production has its production process, which determines also the production cycle, i.e. the minimal time from the beginning of production process till its end. The ordered product has to be integrated to the production process of a production division for a certain planning period (quarter, month, decade) in advance, so that the delivery term is kept. Following that we will count capacity demands for the machines in production process. If the bottlenecks are determined then it is enough to calculate capacity demands for bottleneck places. The sale contracts are made after capacity calculation.

Aspiration of capacity planning of weights for the planning period of one month is:

- to fulfill delivery term of the 15th day of the following month,
- not to exceed capacity in planning period of 280 hours,
- to keep interlocking among production divisions,
- to keep production cycle of 174.99 hours.

The result is division of greater amounts to smaller ones. Batch size = several manipulative batches and increase of production capacity by changing one-shift process into two shifts. The automatic turning device is being adjusted with the same cycle times for all types of weights when there are no extreme measurement differences. That makes capacity planning much easier.

STEP 4: Cumulating, batching, assignation of priorities

Sale contract with customer closes the decision cycle about the order acceptation or refuse. Orders with the same products during one planning period are connected to bigger groups following certain criterion, which helps to reach higher serial production and productivity. The activity is called orders cumulation. It is convenient to make a production batch of cumulating quantity. Optimal batch quantity influences running time of production and capacity using. The higher the cumulating batch, the smaller the adjustment of machine, equipment or line is. It results in internal orders, i.e. production tasks. Owners and management of the firm have rights to assign higher priority to specific orders. It is desirable that the priorities are non-anonymous and their authors are recorded, because every outside priority makes constraints for optimization of operational planning.

Internal orders are the same as the ones coming from outside. Cumulating orders is impossible as every measurement-type needs a new machine adjustment.

Table 1

Example of order record

Product name Product N^{o}	Production Parameters	Quantity (pieces per month)	Delivery conditions	Term of delivery	Price (Skk per piece)
Weight 58 – 2 - 091	See appendix 1	5 000	- full transformator box - required hardness 180 HB - required to production defat	Every 15th day of following month	8.80
Weight 58 – 2 – 102	See appendix 2	6 000			12.80
Weight 58 – 2 - 119	See appendix 3	6 000			16.80

Table 2

Cost calculation items in the production firm

Production costs	Direct materials	Direct costs
	Direct wages	
	Others direct costs	
	Direct production burden	Indirect costs
Costs of realised output	Administrative expenses	
	Distribution costs	
Sales price	Profit	

Table 3

Resultant economical appreciation of weights

PRODUCT	COSTS (SKK/pc)	PRICE (SKK/pc)	PROFIT (SKK/pc)
091	8.308	8.80	0.50
102	9.971	12.80	2.83
119	13.09	16.80	3.71

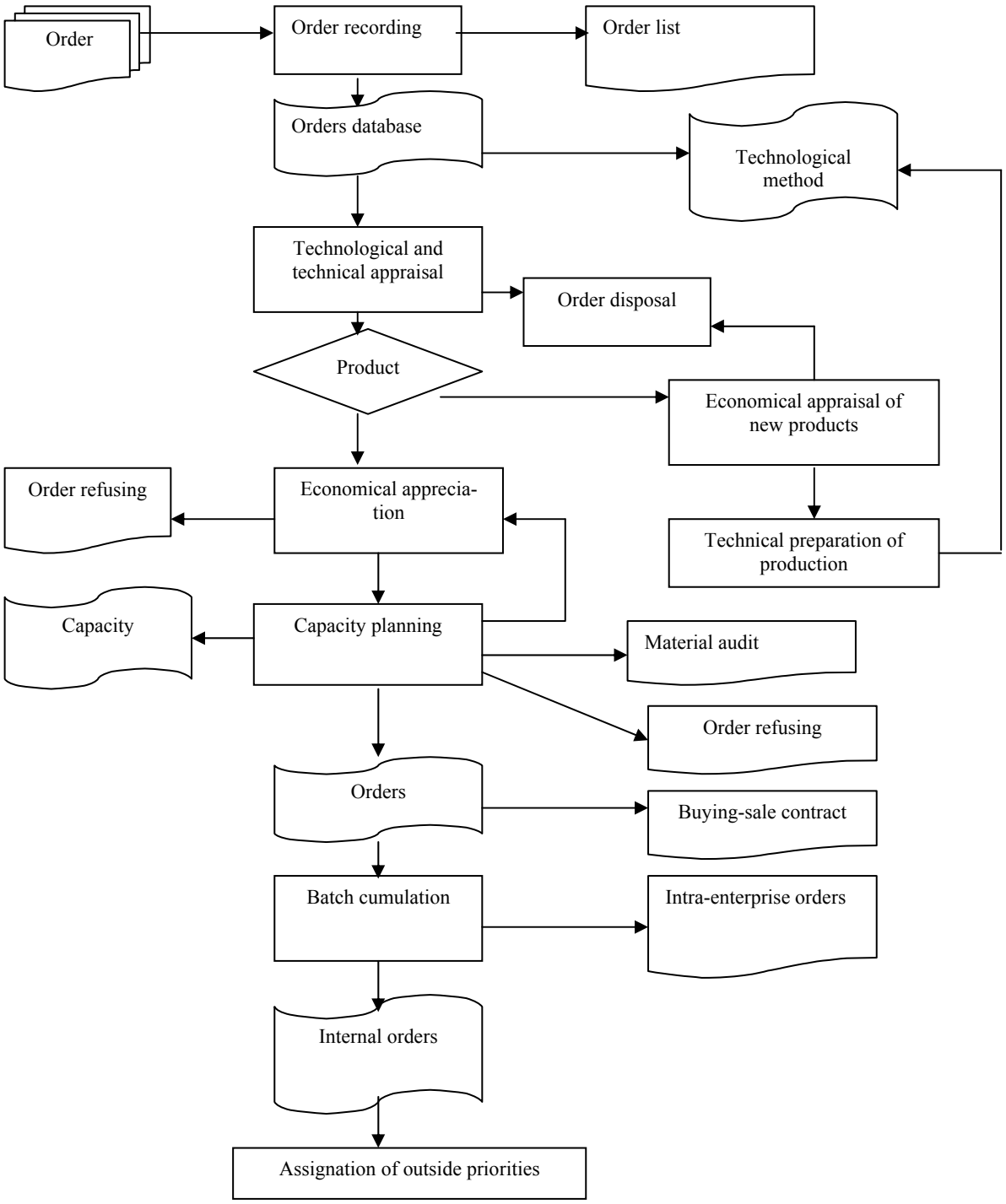

Fig. 1 Process algorithm of order processing.

The results of the solution of batch size problem based on algorithm of process order running are:

1. Internal order and cumulating batches 5 000, 6 000 and 6 000 pieces, which are the same as outsides orders, but could be changed when thinking about the solution of production in future, because the two-shift production would allow it.

2. There are fields shown where the firm could make mistakes. With a very high probability there are economical and capacity calculations, which have been very optimistic in theoretical approach.

3. Need of operative and methodical approach of the firm to the order solution. Reliable estimation of optimal production batches is not only based on attributes and production standards but also on responsibility and real appreciation of orders before the start of production.

4. Aspiration for certification of products and the process of production according to ISO standards.

Order processing is a key element of Order fulfillment. Order processing operations or facilities are commonly called "distribution centers". "Order processing" is the term generally used to describe the process or the work flow associated with the picking, packing and delivery of the packed item(s) to a shipping carrier. The specific "order fulfillment process" or the operational procedures of distribution centers are determined by many factors. Each distribution center has its own unique

requirements or priorities. There is no "one size fits all" process that universally provides the most efficient operation. Some of the factors that determine the specific process flow of a distribution center are:

- The nature of the shipped product - shipping eggs and shipping shirts can require differing fulfillment processes
- The nature of the orders - the number of differing items and quantities of each item in orders
- The nature of the shipping packaging - cases, totes, envelopes, pallets can create process variations
- Shipping costs - consolidation of orders, shipping pre-sort can change processing operations
- Availability and cost and productivity of workforce - can create trade-off decisions in automation and manual processing operations
- Timeliness of shipment windows - when shipments need to be completed based on carriers can create processing variations
- Availability of capital expenditure dollars - influence on manual verses automated process decisions and longer term benefits
- Value of product shipped - the ratio of the value of the shipped product and the order fulfillment cost
- Seasonality variations in outbound volume - amount and duration of seasonal peaks and valleys of outbound volume
- Predictability of future volume, product and order profiles
- Predictability of distribution network - whether or not the network itself is going to change

This list is only a small sample of factors that influence the choice of a distribution centers operational procedures. Because each factor has varying importance in each organization the net effect is that each organization has unique processing requirements.

3. CONCLUSIONS

A production management system is a much more complex part of the company that it is to be embedded in than is usually perceived by its employee. It is not just a new technological investment, but a component which has to fit the company's culture. It has to be embedded in a network of other technologies, companies and individuals through which it will be used. A production management system cannot be fully utilized unless it will become an equivalent part of the organization and treated in the same manner as other resources in the company.

Paper was prepared within project AV 4/0005/07 Utilization of logistical networks by business process restructuralization in small and medium industrial companies.

REFERENCES

[1] Gregor, M., Košturiak, J. (1994). *Just-in-time,* Elita, Bratislava, ISBN 80-85323-64-8.

[2] Mihok, J., Malega, P. (2006). *Cost effectiveness analysis,* In: Social'no-ekonomičeskoje upravlenije: teorija i praktika, vol. 10, no. 2 pp. 32-35., ISSN 1813-7946.

[3] Bobková, D. (2007). *Zvyšovanie produktivity práce finálnych procesov v produkčných systémoch*, In: Transfer inovácií. č. 10 s. 243-245. Internet: http://web.tuke.sk/sjf-icav/stranky/transfer/10-2007/PDF/243-245.pdf.

[4] Turisová, R. (2003). *Modelovanie rizík v systémoch riadenia,* In: Transfer inovácií. č. 6 s. 178-181, ISBN 80-8075-075-X.

[5] Liberko, I., Trebuňa, P., et al. (2005). *Podnikové hospodárstvo*, Praktikum. 1. vyd.. Košice, TU, 177 s. ISBN 80-8073-287-6.

[6] Šutaj-Eštok, A., Trebuňa, P., et al. (2006). *Všeobecná ekonomická teória,* 1. vyd.. Košice, TU SjF, 220 s. ISBN 80-8073-741-X.

Authors:

Eng. Peter TREBUŇA, PhD., Assist. Prof., Technical University of Kosice, Faculty of Mechanical Engineering, Department of management and economics
E-mail: peter.trebuna@tuke.sk
Eng. Miriam Pekarčíková, Assist. Prof, Technical University of Kosice, Faculty of Mechanical Engineering, Department of management and economics
E-mail: miriam.pekarcikova@tuke.sk