

SELECTED PROBLEMS OF MANAGEMENT OF THE SUPPLY SUBSYSTEM IN THE ENTERPRISE OF THE FOUNDRY SECTOR: DETERMINATION OF CUSTOMER NEEDS AND PRODUCTION AND SALES LEVELS

KADŁUBEK Marta¹, INGALDI Manuela¹, DZIUBA Szymon²

¹*Czestochowa University of Technology, Czestochowa, Poland, EU*

²*Wroclaw University of Economics, Wroclaw, Poland, EU*

Abstract

The paper characterizes the tasks of the selected logistic subsystem in the area of the enterprise operations. The main aim of the study is to identify and analyse selected tasks of management of the supply subsystem in the Enterprise X operating in the foundry sector.

The theoretical approach to the supply subsystem in the systematic logistics concept was presented. Furthermore, the study provides a brief characterization of the object of activities of the Enterprise X from the foundry sector and identifies and analyses two problems of management of the supply subsystem in this entity: customers' needs in the area of products expected and the predicted production and sales levels.

The paper is based on the two items of the literature and author's own examinations conducted using the method of interviews with employees and customers in the Enterprise X. An important source of information was internal materials obtained through collaboration with authorities and employees of the enterprise.

Keywords: Supply subsystem, management, foundry sector

1. INTRODUCTION

The logistic systems are usually described by a number of components and relations as multistructural and multifaceted problems [1]. As a platform for the development of competitiveness between many organizations, logistics also plays a conceptual and instrumental role in the development of contemporary systems and their components, such as subsystems [2]. The use of the systematic approach in logistics allows enterprises to achieve many goals of strategic character, including reaching a higher level of services for customers in order to compensate for the current advantage of competitors or maintaining their own advantage [3].

This paper is devoted to characterization of the tasks of the selected logistic subsystem in the area of the enterprise operations. The main aim of the study is to identify and analyse selected tasks of management of the supply subsystem in the Enterprise X operating in the foundry sector.

The paper presents the theoretical approach to the supply subsystem in the systematic logistics concept. Furthermore, the study provides a brief characterization of the object of activities of the Enterprise X from the foundry sector and identifies and analyses two problems of management of the supply subsystem in this entity: customers' needs in the area of products expected and the predicted production levels and sales levels. The study will be continued with the paper with similar title, which identified and analysed another two problems of management of the supply subsystem in the entity: sources of purchasing in the Enterprise X and level of unit material consumption for production of cast products.

The paper is based on the two items of the literature and author's own examinations conducted using the method of interviews with employees and customers in the Enterprise X. An important source of information was internal materials obtained through collaboration with authorities and employees of the enterprise.

2. SUPPLY SUBSYSTEM IN THE SYSTEMATIC CONCEPT OF LOGISTICS

The logistics system is understood as purposefully organized and integrated processes of material and product flow in the area of a specific economic system and products with corresponding information [4]. Therefore, the logistics system means the arrangement of processes and transformation of specific resources that represent the wholeness that is aimed at achievement of specific goals in the enterprise.

The system contains components in the form of subsystems, which can be further subdivided using various classification criteria. With the phase division, the logistics systems contain the subsystems of supply, which focus on raw material, auxiliary materials and consumables and parts that should be made available to the enterprise [5].

The supply subsystem of logistics in the enterprise is responsible for supplies of any types of materials, raw materials or semi-finished products used for production of the goods offered by production enterprises [6]. Management of the supply subsystem involves the decisions and actions aimed at obtaining goods and final products [7]. It determines the form of the wholeness of the supply processes through determination of the customers' needs in terms of goods they expect, predicted production and sales levels, determination of the supply levels and purchasing. With regards to management of this subsystem, many decisions are made and they impact on the effective function of the enterprise, consequently affecting the level of costs [8].

3. PROFILE OF ACTIVITIES OF THE ENTERPRISE X

The Enterprise X is a limited company - a manufacturer with reach foundry tradition [9]. The first historical data date back to 1360, when Kuźnica Bogucka was set up in the area of contemporary Katowice (southern Poland), where iron and sheet metal was cast.

Nowadays, the operations of the Enterprise X are classified within the industry division, metallurgical industry and the foundry sector. The enterprise is an iron foundry with the division of mechanical processing and assembly of finished goods based on cast iron products.

The technologies used in the enterprise include:

- 1) flaskless moulding using the DISAMATIC system with automated mould filling with molten metal from the induction furnace (maximal dimensions of the casts of 500×330×200 mm),
- 2) moulding in the automated production line with wide-blade sand-slinger with automated mould filling (maximal dimensions of the casts 600×280×100 mm),
- 3) mechanical moulding with manual mould filling (maximal dimensions of the casts 520×400×150 mm),
- 4) manual moulding (casts with mass of up to 60 kg).

Casts are made of grey cast iron of ZL 150÷250, and, since 1996, of ductile cast iron and alloy cast iron. The tool shop prepares wooden, metal and plastic casting models. The products are protected from corrosion by painting with the paint hardened at the temperature of 130 °C, powder coating or hot-dip tinning.

The Enterprise X offers:

- casts of grey cast iron ZL150÷250,
- cast iron heaters for central heating T-1, TA-1, TB-1 and DIN,
- household goods: manual meat mincers, manual machines for meat mincing, machines for fruit and vegetable must pressing, cereal mills, coffee mills, pots, frying pans,
- cast iron low-voltage box switching stations of the S system,
- cast iron branch joints for sewerage installations (four-way and three-way branches with diameter of 30 to 1,500 mm),
- other products, e.g. cast iron stoves, garden furniture elements, dumbbells, flowerbeds etc.

The Enterprise X is involved in series production and unit production at special requests of customers and according to their requirements. With the use of high-quality materials and advanced technological processes performed under supervision of highly-qualified personnel, the products are characterized by a standard confirmed by certificates awarded by many reputable research institutes. A broad range of applications and quality of the product offered by the enterprise allow the enterprise to meet the requirements and expectations of customers from many sectors of the industry, such as construction, machinery, energy, automotive, food processing, mining, chemical and household goods sectors.

4. DETERMINATION OF THE NEEDS OF CUSTOMERS IN THE ENTERPRISE X IN THE AREA OF DEMANDED PRODUCTS

Of the broad range of products offered by the Enterprise X, one of the most important items in the national and international market is household goods, which include e.g. manual meat mincers - the product which can be used for identification and analysis of the tasks of the logistic subsystem of the entity in this paper. Furthermore, while taking opportunities of the logistic subsystem of the Enterprise X based on the selected product (manual meat mincer) it will be redesigned and modernized. The equipment manufactured by the Enterprise X will be modified after conclusions drawn based on the analysis of internal materials of the enterprise X and, first and foremost, the interviews made with customers and employees.

The range of products will be extended to seven types of equipment manufactured in two main variants. Four types, different in their mass and performance, will represent the type A of the manual meat mincer attached to the tabletop by means of the fixing bolt. Three other types, also differing in weight and performance will represent the type B, attached permanently to the tabletop by means of four bolts.

Therefore, with regards to the fixation method, the Enterprise X manufactures:

- 1) portable machines attached to tabletop by means of the fixing bolt (type A),
- 2) machines fixed to tabletop by means of four bolts (type A),

Due to the size of the mincing chamber, mass and performance of the machines, the range of products of the Enterprise X is differentiated according to the data contained in **Table 1**.

Table 1 Size of the mincing chamber, mass and performance of machines of type A and B

TYPE: A				TYPE: B			
No.	Mixing chamber size [No.]	Mass [kg]	Performance [kg/min]	No.	Mixing chamber size [No.]	Mass [kg]	Performance [kg/min]
1	5	2.20	0.3	1	5	3.35	0.5
2	5	2.85	0.4	2	8	6.30	0.6
3	5	3.60	0.5	3	8	9.85	0.7
4	8	7.40	0.6	-			

The manufactured machines are equipped in three types of mesh plates with different mesh (from 2.5 to 19 mm). During the purchase, the customer chooses the mesh plates from the plates available for the specific type of the machine. Mesh diameters for the mesh plate are presented in **Table 2** for the machine of type A and B.

The equipment offered should also include the additional part that allows for changing the purpose of the machine. During a single purchase transaction, the customers choose from one of the following components:

- the bushing for making sausages,

- assembly for must pressing,
- mould used to make cakes.

Two other parts and more mesh plates can be purchased separately in any product sales point and in the Enterprise X.

Table 2 Mesh diameters for the mesh plates in machines of type A and B

TYPE: A												
No.	Mesh diameter [mm]											
	2.5	4	4.5	6	8	10	12	13	14	6	18	19
1	x	x		x	x	x	x	x	x			
2	x	x		x	x	x	x	x	x	x		
3	x			x	x	x	x	x	x	x	x	
4	x		x	x	x	x	x	x	x	x	x	x
TYPE: B												
No.	Mesh diameter [mm]											
	2.5	4	4.5	6	8	10	12	13	14	6	18	19
1	x	x		x	x	x	x	x	x	x		
2	x		x	x	x	x	x	x	x	x	x	x
3	x		x	x	x	x	x	x	x	x	x	x

The above design assumptions for the modernized products of the enterprise from the foundry sector represent the response of the enterprise to the specific needs of the customers in terms of demanded goods. They are connected with the analysis of the market of foundry products, which is conducted through planning of the demand for the incoming season. With this analysis, the enterprise should be able to assess whether products which are already included into the range of services are popular among their users and whether there is a market demand for such products. Additional benefits of market analysis include familiarizing with the products manufactured by competitors, its strengths and weaknesses and opportunities for finding a product niche and filling the gap.

5. EVALUATION OF THE EXPECTED PRODUCTION AND SALES LEVELS FOR ENTERPRISE X PRODUCTS

After interviews with employees and customers of the Enterprise X, analysis of the internal materials and the demand for previous sales levels for manual meat mincers and production capability, the level of production of meat mincers is expected as shown in **Table 3**.

Table 3 Expected level of production of meat mincers of types A and B

Product	Date of start of project financing	Period of start-up, initiation and growth				
		Year. Planned level of production [pcs]				
		2018	2019	2020	2021	2022
TYPE: A	01.01.2018					
1		45,000	60,000	85,500	90,000	78,500
2		50,000	72,000	101,200	95,000	92,500
3		30,000	36,000	45,000	42,000	39,500
4		10,000	11,500	14,200	13,500	12,500

Product (continue)	Date of start of project financing	Period of start-up, initiation and growth				
		Year. Planned level of production [pcs]				
		2018	2019	2020	2021	2022
TYPE: B	01.01.2018					
1		5,000	5,400	6,100	5,800	5,600
2		10,000	11,000	13,200	12,500	12,000
3		10,000	12,000	14,200	13,500	12,500
TOTAL		160,000	207,900	279,400	262,300	253,100

Expected levels of sales of meat mincers of type A and B are illustrated in **Figure 1**.

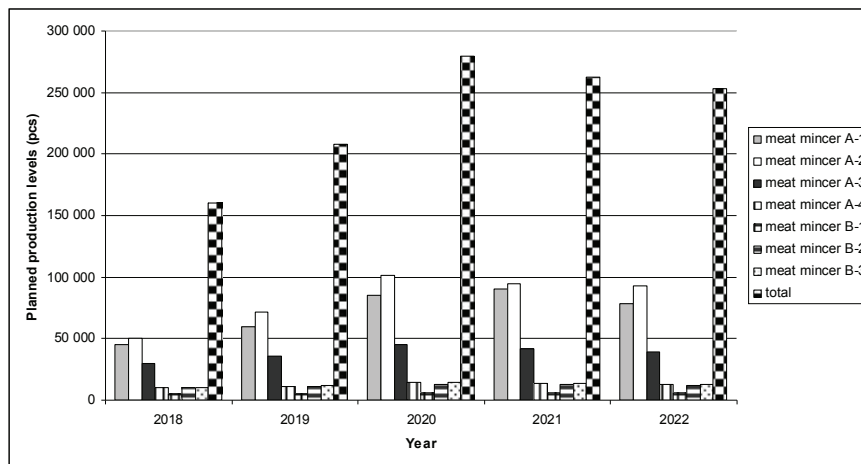


Figure 1 Expected levels of sales of meat mincers of type A and in 2018-2022

The initial data necessary to design products which are the basis for identification and analysis of the logistics system of the entity in this paper are presented in **Table 4**.

Table 4 Input data for designing of meat mincers as a basis for identification and analysis of the logistics subsystem in the Enterprise X

Design input data					
Product name: Meat mincer			Documentation No.: symbol MKA2-05863		
Demand for the finished products and deadlines					
1. Expected demand and production levels					
	2018	2019	2020	2021	2022
Demand [pcs/year]	150,000	210,000	280,000	265,000	250,000
Production level [pcs/year]	160,000	207,900	279,400	262,300	253,100
Frequency of the series, batches and supplies					
1. Finished product series	– 5000 pcs.				
2. Supply level	– 150-200 pcs.				
3. Frequency of batches and parts	– Possibly high frequency				
Target of unit costs of production					
1. Direct	a) labour 5-18 PLN				
	b) assembly 4-15 PLN				
2. Special	a) materials 3-10 PLN				
	b) of general use 10-34 PLN				
	c) cooperation parts 3 PLN				
TOTAL OF DIRECT COSTS 25-80 PLN					

Planned demand in the entity was evaluated based on the results of the previous market analysis concerning the products of the foundry sector. Planning of the demand concerns revision of the sold cast products in terms of the demand and planning of actions aimed at inclusion of attractive and high-quality new products into the range of products. Therefore, this is connected with indication of the expected level of production and level of sales of meat mincers, determination of the frequency of series, batches and supplies which affect the level of costs.

6. CONCLUSION

Initial tasks performed in the area of the supply subsystem in the Enterprise X from the foundry sector concerned:

- Determination of the needs of customers in the area of the demanded products, which is connected with the analysis of the market of foundry sector products and maintaining continuous contacts with customers. This involves the necessity of the analyses in order to determine which products in the future supply markets can contribute to solving the problems in the enterprise. The task of the supply subsystem is to ensure the development of future supply capabilities, which reveals a close correlation between the research and development division in the aspect of future products and their importance for the development of enterprise's own cast products;
- The demand should be evaluated for the incoming season, which is connected with the expected production levels in the foundry for the season and the expected sales levels. Consequently, it is possible to indicate the series of finished products, supply levels and, finally, evaluate the operating costs.

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