

Manuela Ingaldi¹, Marta Jagusiak-Kocik²

VALUE STREAM IMPROVEMENT OF FOOD PRODUCT

Abstract: This chapter contains a discussion of the value stream mapping concept. Shows the analyzed company, which is engaged in the production of fruits and vegetables preserves. As part of the research presented a SWOT analysis with graphical interpretation and presentation of strategic position, in which the establishment is located. It also presents the manufacturing process object of study - tomato concentrate depicted technologically and value stream map of the present state and the future state.

Key words: value stream mapping, fruits and vegetables preserves, SWOT analysis, production process depicted technologically, current state map, future state map

1. Introduction

Value Stream Mapping (CZERSKA J. 2009, JONES D., WOMACK J. 2002, ROTHER M., SHOOK J. 2009) is mapping the flow of material and information in the enterprise system. Is a record of the steps that are taken in the production process (from raw material to the finished product), or in the process of the service (from the beginning to the end of the contract). With maps the process begins to be seen "through the eyes client" because the projects cash flows include all activities involved in delivering value to the customer.

Value stream mapping is a shot of flows throughout the production system. The essence of the approach is the analysis of the actions taken in the production process of the same or similar technology, performed with the same equipment (systems) production. The choice of product family runs so according to the criterion of technology. The result is an image organizational and technological steps, which make up the finished product.

The information necessary for the preparation of maps should be obtained directly on the production floor. This ensures the reliability and

¹ dr inż., Czestochowa University of Technology, Faculty of Management, Institute of Production Engineering, e-mail: manuela@gazeta.pl

² mgr inż., Czestochowa University of Technology, Faculty of Management, Institute of Production Engineering, e-mail: m.jagusiak-kocik@o2.pl

validity will be analyzed information. Map consists of a set of information and accompanying graphic symbols. The essence of the interpretation of the map is noticing places where material flow is stopped and are accumulated stocks (raw materials, work in progress, finished goods). Their existence is, in fact, production problems (long retooling, unstable process, the distance between successive operations et al.), long duration of production orders, and consequently wear additional resources for activities not create value from the point of view of the customer.

Value stream mapping can bring us great benefits, including:

- assists in illustrating the value stream, not only at the level of single process - it helps to see the flow, by means of which you can respond quickly to changing customer needs,
- helps not only to discern the waste, but also its source,
- provides appropriate language, common to the entire organization, to discuss the various processes (graphic language).
- integrate the concepts and techniques of Lean Management, prevents the ad hoc application and determine the correct order of their implementation.

2. Presentation an object and a subject of research

Company X is a manufacturing company, which has its headquarters in the Silesian voivodship. This company produces fruits and vegetables preserves. They offer vegetables salads (Swedish, Greek, outstanding, lunch, mild vegetables, red cabbage), compotes, canned cucumbers, luxury, with chili, pickles, gourmet pickles, marinated mushrooms, beetroot, grated horseradish, red-beet-and-horseradish sauce, sauerkraut, sorrel, canned peppers, mayonnaise, cucumbers puree, sorrel purees and tomato concentrates. The entire range of products consists of over 80 products.

The company supplies its products to a wide range of foreign markets, among others, to Lithuania, Latvia, Estonia, England, Ireland, Belgium, Holland, Germany, Hungary, Spain, Italy and Sweden. Exports account for about 40% of total sales.

The aim of the company is: continuous expansion of business, the implementation of new manufacturing technologies, which will increase the

efficiency and productivity of the company and advertising and promotion.

The object of research is the tomato paste, which is partially dehydrated tomato puree. Through the process of pasteurization protects it from bacteria and extended its expiration date. The main ingredient of concentrate are tomatoes. The finished product has a distinctive flavour of tomatoes. Distinguished salty and sour smell and a dark red color. Additional components may be spice flavors, aromas, vegetables. Company X manufactures two types of tomato concentrate: 20% of the content of the extract and containing 30% of extract. The manufacturing concentrate is spilled into jars with a capacity of 0.2 l and 0.9 l

3. Analysis of strengths and weaknesses of the company using SWOT analysis

The SWOT analysis (GIERSZEWSKA G., ROMANOWSKA M. 1997, JAGUSIAK M., ULEWICZ R., ŚWIDER A. 2009, KONSTANCIAK M., JAGUSIAK-KOCIK M. 2012, INGALDI M., JAGUSIAK-KOCIK M. 2013) is a method of evaluation the position of the company (its strengths and weaknesses) against the opportunities and threats from the environment. Supports selection of the best strategy, and estimates the extent to which company resources meet the needs and requirements of the environment in which it operates and competes. The name comes from the first letters of groups of factors:

- strengths - everything that is an asset, predominance, advantage of the analyzed object,
- weaknesses - everything that is a weakness, barrier, defect of the analysed object,
- opportunities - everything that makes a favourable opportunity, chance, change for the research object,
- threats - everything that makes risk of unfavourable changes for the research object.

SWOT analysis for the research company was presented in Table 1.

Table 1. SWOT analysis for the research company

Internal factors	
Strengths	Weakness
<ul style="list-style-type: none"> ○ lack of critical situations in existing operations, ○ well-developed their own system of internal communication, ○ system of motivating employees ○ system of training for employees, ○ favourable financial situation, ○ strong position in the market. 	<ul style="list-style-type: none"> ○ lack of qualified staff, ○ poor condition of the old equipment, ○ high costs of maintaining employee ○ lack of opportunities for business expansion ○ rising costs of maintaining employees.
External factors	
Opportunities	Threats
<ul style="list-style-type: none"> ○ good reputation about the company as an employer, ○ selection of loyal employees, ○ good relationship with the environment, ○ flexible adaptation to external conditions, ○ the possibility of training, ○ the involvement of employees, ○ developed brand ○ long history, ○ innovation, ○ cooperation with foreign countries, ○ collaboration with partners in the area, ○ good location, ○ extensive structure ○ implemented management standards include quality, ○ numerous certifications, ○ valuing a business. 	<ul style="list-style-type: none"> ○ growing requirements of customers and counterparties, ○ requirements of the law, ○ need to adapt to the requirements of the European Union ○ high rate of inflation, ○ legal requirements, ○ nature of the business, ○ competition, ○ costs of maintaining the level of the product, ○ financial penalties imposed for price fixing.

Source: own study

The result analysis of the environment, health and property of the company and any other factors affecting the situation of the company is based on interviews with employees.

Can be drawn from the following conclusions:

- in spite of adequate financial resources the company can save some funds that come from a change management strategy and allocate them to the growing investment needs and requirements such as environmental protection,

– significantly more external factors strengths supports the well-being of the company and shows them as strong in the environment.

A chance to improve, already the company is well positioned to continue the system of governance in the state. These threats are factors that can cause considerable difficulties, barriers and the danger for the company. Risks can not fully ensure a stable level of business activity. Summary of opportunities and threats of the strengths and weaknesses allows you to determine the current and future strategic situation of the company.

Figure 1 shows a graphical interpretation of the SWOT analysis and strategic position, in which it is being investigated company.

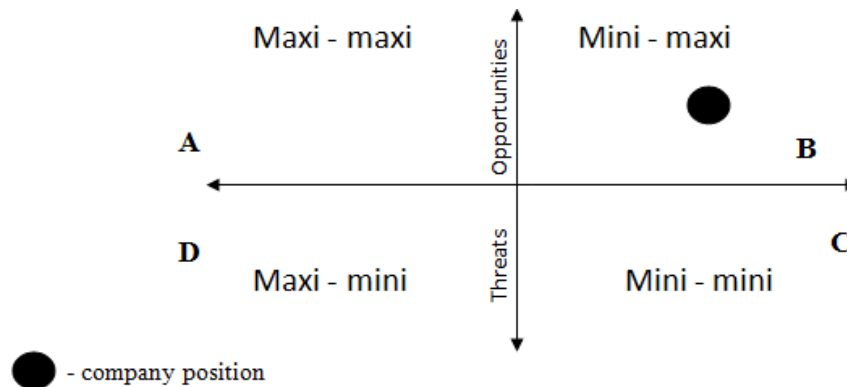


Fig. 1. Graphical interpretation of a SWOT analysis for the investigated company.

Source: own study

The designated position mini-maxi chance favors the opportunities and also the advantage of the weaknesses of the company's strengths. Management actions companies should therefore aim to improve the condition of the company in inefficient (non-competitive) areas, because without radical moves as possible to obtain satisfactory results in these areas by the company will not be possible. Exit opportunity for organizations turn out to be the right people in the right place. In another case investigated areas may lead the company to large losses.

4. Production process of the research subject depicted technologically

For the production of tomato paste is used ripe tomatoes. Production process of the tomato paste depicted technologically was presented in Figure 2.

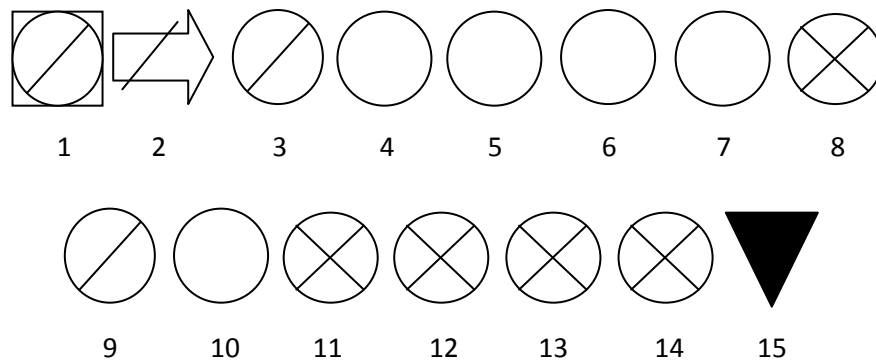


Fig. 2. Production process of the tomato paste depicted technologically.

Source: own study

Characteristics of the individual steps of the production process (BORKOWSKI S., ULEWICZ R. 2008, DURLIK I.1998, BURCHART-KOROL D., FURMAN J. 2007):

1. Acceptance and tomatoes control.
2. Tomatoes transport on the production floor.
3. Washing and sorting tomatoes.
4. Tomatoes grinding and removing seeds from tomatoes.
5. Heating the pulp.
6. Pulp ripping.
7. Puree condensing.
8. Paste pasteurization.
9. Preparation of packagings.
10. Paste bottling.
11. Closing packaging.
12. Re-pasteurization.
13. Labelling.
14. Bulk Packaging.
15. Storing.

5. Current state map and future state map presentation in the production of tomato paste

The production process starts from raw material control in pickup area. If the person responsible for the control approves the quality of tomatoes, they are transported to the pool. Tomatoes washing is carried out in water and air scrubber. Washing should ensure purification of the raw material of all unnecessary pollution, so at least once per shift should be cleaned of mud. After washing the tomatoes are sorting on the sorting belt roller. During the sorting are thrown rotten and green tomatoes.

Properly sorted tomatoes by roller conveyor wander to the crusher machine consisting of a seed separator, ripping and a shredder. In the separator followed by crushing of tomatoes, which causes separation of the seeds along with surrounding jelly-like substance which badly affects the color and flavor of paste. The effluent during squeezing the juice is recovered on the ripping machine and routed into pulp tank. Then the crushed tomatoes chopped in tearing machine. Ready pulp is heated in the heater tube. The aim of the heating process is the hydrolysis of protopectin, destruction enzymes, pasteurization, simplifying pulp chafing. Heating is carried out at a temperature of 65-75°C.

After the heating process followed by ripping the pulp. Ripping is a multistage. The diameter of the holes in the sieve of tearing machines is from 1.2 mm to 0.4 mm. Thanks ripping obtained puree with a uniform structure. Puree flowing from ripping machine is subjected to condensing. The purée is made to a density of 20% and 30% of extract. Condensing puree is fed to the tank and from there to the pasteurization in tubular pasteurizer at a temperature higher than 100°C.

Then, using dosing machine, paste is spilled into pre-prepared jars. Spilled jars paste is fed to the capping machine, which automatically closes the jars with the lids. Poured into jars paste is subjected to pasteurization again. Before labeling, the paste should be chilled to a lower temperature.

At the last stages of the production of tomato paste consisting of labeling, packaging in packaging and warehousing. The labeling should be noted that the label was affixed in a suitable and aesthetic way. Labeled packaging are packed in bulk and then set on pallets in such a way that they

can be safely transported to the warehouse.

To improve the production process launched a second machine to ripe the pulp and thanks to this solution was recovered some time savings. Lead time shortened by two days, also the time to add value has changed thanks to increased productivity.

Map of current state and future state of tomato paste production is shown in Figure 3 and 4.

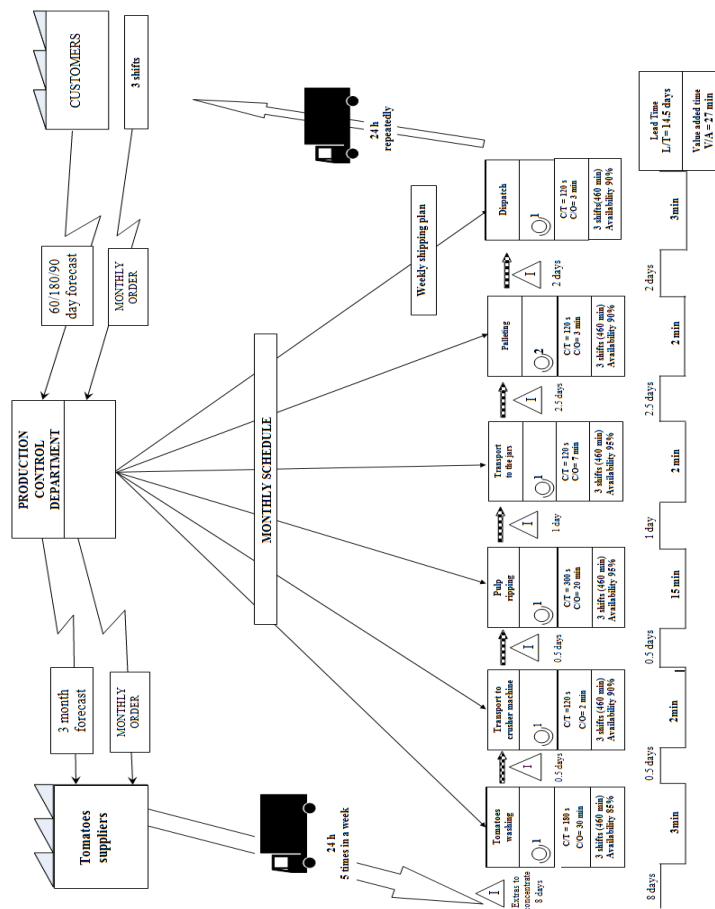


Fig. 3. Current state map of tomato paste production.

Source: own study

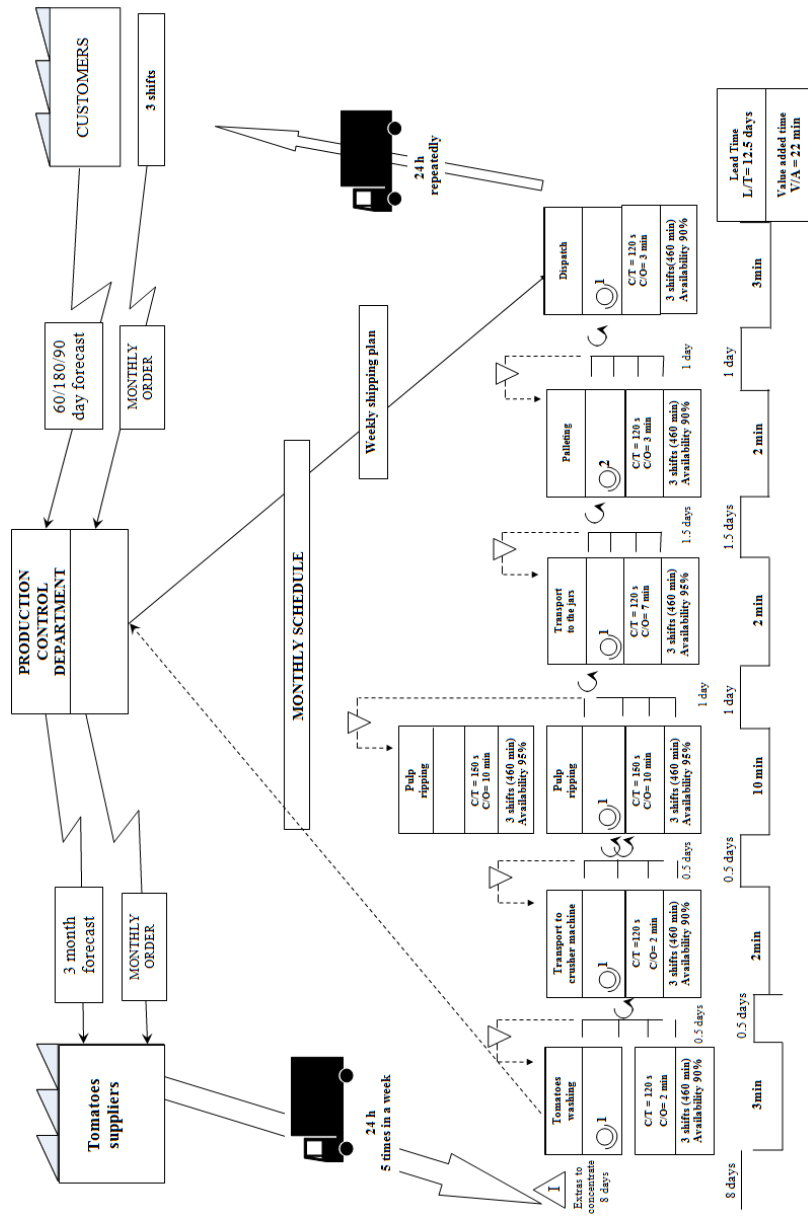


Fig. 4. Future state map of tomato paste production.

Source: own study

References

1. BORKOWSKI S., ULEWICZ R. 2008. *Zarządzanie produkcją. Systemy produkcyjne*. Oficyna Wydawnicza „Humanitas”. Sosnowiec.
2. BURCHART-KOROL D., FURMAN J. 2007. *Zarządzanie produkcją i usługami*. Wydawnictwo Politechniki Śląskiej. Gliwice.
3. DURLIK I. 1998. *Inżynieria zarządzania. Strategia i projektowanie systemów produkcyjnych Część I*. Wydawnictwo PLACET. Warszawa.
4. CZERSKA J. 2009. *Doskonalenie strumienia wartości*. Wydawnictwo Difin. Warszawa.
5. GIERSZEWSKA G., ROMANOWSKA M. 1997. *Analiza strategiczna przedsiębiorstwa*. Polskie Wydawnictwa Ekonomiczne. Warszawa.
6. INGALDI M., JAGUSIAK-KOCIK M. 2013. *SWOT analysis in the process improvement in the company producing electric sockets*. In: *Toyotarity. Evolution and Processes'/Products' Improvement*. BORKOWSKI S., INGALDI M. (ed.). Aeternitas Publishing House. Alba Iulia. Romania.
7. JAGUSIAK M., ULEWICZ R., ŚWIDER A. 2009. *Elements of visual control in metalwork*. Chapter 2. In: *Toyotarity. Visual Control*. BORKOWSKI S., TSOY E.B. (ed.). Publisher Yurii V. Makovetsky. Dnipropetrovsk.
8. JONES D., WOMACK J. 2002. *Zobaczyć całość. Mapowanie rozszerzonych strumieni wartości*. Wydawnictwo Lean Enterprise Institute. Warszawa.
9. KONSTANCIAK M., JAGUSIAK-KOCIK M. 2012. *Value Stream Analysis in the Production of Aluminium Product*. Chapter 2. W: *Quality Control as Process Improvement Factor*. Monography. Editing and Scientific Elaboration BORKOWSKI S., KONSTANCIAK M. Oficyna Wydawnicza Stowarzyszenia Menedżerów Jakości i Produkcji. Częstochowa.
10. ROTHER M., SHOOK J. 2009. *Naucz się widzieć. Eliminacja marnotrawstwa poprzez mapowanie strumienia wartości*. Wydawnictwo Lean Enterprise Institute. Warszawa.