Development of a logistics center with the VE

Ariella Janka TARJANI – Istvan TARJANI

Abstract

In the economy, on the competitive market there are a lot of very perspective fields for Value Engineering (VE) projects. For VE experts it is always exciting to have insight to others' VE projects. Sharing the experiences is one of the most valuable elements not only in Hungary but also in other parts of the world. VE methodology is regularly applied in the EU countries too, during the preparation phase of investments. On the following paragraphs the author sums up his thoughts. Development of the Logistic-driven Production Model based on a VE project. During the VE case study it will be visible on the importance, the topic, the advantages, the project environment and the project objectives.
During the functional analysis, the team completed the FAST model. Same time, the team edited a lot of special diagrams. Based on it, the team identified the weak points, the critical functions. The paper contains diagrams, photos.
The VE project was very successful. Significant value improvement can be reached in the field of logistics.

The importance of the topic

The production facility of a multinational company in German ownership has been present in Hungary since 2006. The company does not have such an efficient, transparent and fast-responding warehousing technology, suitable for storing goods on pallets.
The volume of orders from existing and new customers is continuously growing. To improve efficiency, a high level of automation and the utilization of the least possible human resources are essential, which is also needed for joining the Hungarian Government's Industrial Program 4.0.
Extra labor force need to be provided for the fields of production with a significant shortage of workforce. Furthermore, extra labor is needed in the field of intra-logistics, which satisfies the logistical needs of production.

The topic

Several Value Engineering projects have been implemented at the company before. Currently 16 of the employees have AVS qualifications. Based on the needs specified by the top management of the company, a decision has been made to have the subject developments realised in the framework of a Value Engineering Project.

The advantages of the concept:

- The efficiency of the employees can be increased.
- Efficiency improvements at products with the need of so-called small-commodity warehousing, which cannot be automated.
- The material flow can be optimised.
- Storage on pallets can be optimally adjusted to the specific needs of the product.
- The storage capacity demand can be provided.
- Appropriate service area can be provided.
- The optimal space utilisation of the building can be achieved.
- Service time can be minimised.
- Sufficient resources and flexibility can be provided for the expanding logistic tasks.

Disadvantages of the concept:

- A need for a new building appears.
- Plans need to be prepared to obtain a building permit. The permitting procedure needs to be carried out successfully.
- Investment costs are high.

Introduction of the environment

The company is located in the middle of Hungary, in the area of Jaszarokszallas. The Group employs over 7,000 people globally. The parent company is based in Fridolfing, Germany.
The number of people employed by the company in Hungary is over 2,000. The majority of its products are typically exported to Europe, North-America and South-America. The production plant is specialised in manufacturing cables and connection elements for the telecommunication and automotive industry. New directions in the production of connection elements and cables are the fields of health care and military industry as well as the production of data transfer antennas. All of their product family elements can be applied to various technical solutions in telecommunication, electronics (including the automotive industry) and data transfer.

The company is planning an extension and update of their current storage system. In order to realise it, an investment project has been launched. As the number of customers and products are growing, the quantity of logistic tasks keep increasing. To achieve an efficient utilisation of the new building and carry out the tasks of the “European Logistic Centre”, which is to be allocated in the company, the entire warehousing system and the process of the material flow need to be redesigned.

Project objectives

Main objectives:

- The new warehouse storage system and the process of the material flow need to satisfy the demands of production.
- Let the proposed new logistic centre be established.

Partial objectives:

- Optimal space utilisation.
- The least possible human resources (transference of 120 people from the field of logistics). The released headcount should be transferred to the field of production.
- Space needs to be freed at the currently existing warehouse as well. Optimal material flow needs to be created in the entire warehouse.
- At the inbound and outbound areas of the warehouse (at the gates) appropriate material flow needs to be set up.
- Ergonomic working conditions need to be established for the workers.
- Shorter lead time (service time) needs to be realised.

Definition of the problem

For mapping the exact situation and defining the problem, so-called „SPAGHETTI” diagrams of the warehouses have been created by the team. The diagrams display the routes the workers and transport equipment move along and the frequency they do it.

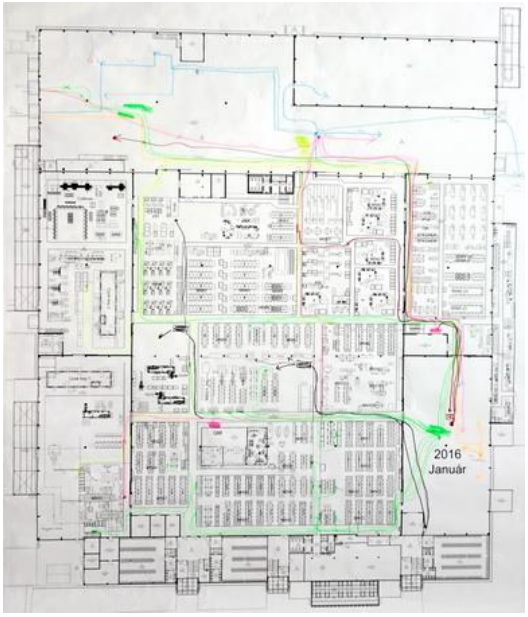

Figure 1.: Moving of the row material (SPAGHETTI diagram)

The diagram identifies the unnecessary material moving well in a picturesque way. With the help of the SPAGHETTI diagram the following losses are identified, for example:

Transportation: Moving of the raw materials, semi-finished and finished goods requires 50 forklift operations a day. Moving the forklift is not preliminarily planned. In many cases, it is one way only with no returning load.
Inventory: The area for storing is large. Due to the restricted amount of space available, there are external storage locations as well. The loss is not generated by the unorganised storage and the search for articles as its result.

Current situation

For the assessment of the current state and the complex of the needs besides the SPAGHETTI diagram, the VE team set up a questionnaire for 17 different identified stakeholders.
The questionnaires have been individually nominated; 32 people were questioned.
The general questions are:

1. What problems (returning daily, weekly, monthly or regularly) are generated around your range of work in the current warehousing system?
2. What are the hindrances of the specific local conditions (lack of tools, layout of the work place etc.)?
3. What are the difficulties caused by the insufficiencies of processes?
4. What are your proposals in connection with your work?
5. What are your further needs regarding your position of work?

Based on the SPAGHETTI analyses and the issues and needs returned by the questionnaires, the current state could be exactly defined. Based on the decision of the team, the set of requirements has been set up. Its purpose is to allocate specific parameters to the needs. Furthermore, it has been determined what expectations the system is to satisfy.

Dilemmas

- What intervention is necessary in the production field to reach a more efficient material flow?
- How should the placement of the released headcount be managed in production knowing the different capacities and competences?

Subject fields of the study

- raw material storage
- finished goods storage
- high storage
- cable storage
- packaging material storage
- Kanban storage
- commissioning
- rented storage spaces
- new storage area to be built

Function costs, function analysis

During the function analysis, the team examined 181 functions.
At the function and function-parameter examination, the following statements have been made:

- Due to the scattered warehousing pattern, the current storage area can be decreased and the rented distant storage locations can be left out.
- Due to the scattered warehousing pattern, the number of searches for products is high; however, it can be dropped to zero.
- Due to the unplanned forklift routes, the amount of free running by the forklifts is significant. At the same time, the responses from the returned questionnaires show that the number of forklifts is considered to be low.
- The stock records are inaccurate. It takes too much time to access the exact data. Collecting and checking the data consumes a considerably large amount of time.
- Stocks are not visually placed in their storage locations.
- The so-called storage navigation is completely missing.
- etc.

A decision has been made by the team and function compliance has been further assessed. Assessment of function costs has also been carried out.

Featuring data regarding the Value Engineering project:
Building investment: 2.7 million USD.
Planned equipment purchase: 1.0 million USD
Rental of external storage facilities: 51,000 USD/year
Storage time in the external storage facility: 800 hours/year
Time taken by the group leaders for providing the necessary materials: 42,000 labor hours
Overtime on Saturdays to gather finished goods: 10 employees

The weak points have been identified using the function performance study and the set of requirements:

- F22 Move Materials
- F23 Serve Production
- F32 Fulfil Shipping-demands
- F4 Manage Supply-Chain

New solution, new bases

The team gathered a total of 75 ideas regarding the critical functions.
Based on the function performance study the underperforming functions were identified. The ideas collected for the functions gave the concept a new base.

Figure 2.: Teamwork photos (1.)

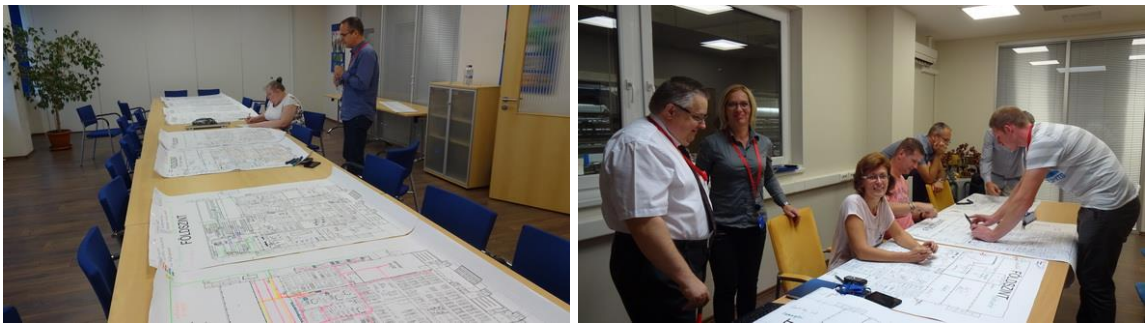

Figure 3.: Teamwork photos (2.)

Results

A total of 66 proposals have been made by the team.

Figure 4.: Participants of the project report presentation

Based on the proposals, the saving is
884,000 USD, 23.72 % of the project amount.

Based on the proposals, the total expenditure is 260,000 USD, 6.95 % of the project amount.
- 3 pallet feeding shelfs
- 3 scissor-lift trucks
- 5 trucks for the SERVUS-robot

The saving is 16.77% of the project amount.
The space demand and the utilisation of space:
The production area can be enlarged by 1,225 m^2.
The area of logistics can be enlarged by 721 m^2 due to the narrow- passage storage system which is not included in the original design.
The rented warehouse can be eliminated.

Production labor hours possible to save:
Production group leaders: 42,000 labour hours/year saving (approx. 21 people)

Logistics headcount saving due to the effect of the proposals:
Saturday overtime saving (10 people/Saturday)
Saving on the labour hours of employees involved in delivering: 3,000 labour hours/year

Available saving based on the project tasks:
33.85 people, which is 28% of the current headcount
It is necessary to introduce 21 intra-logistic employees and another 7 employees in order to maintain efficient service. The proposals DID NOT include any headcount reduction.

In the field of logistics, a larger number of tasks issued by the logistic centre can be completed without increasing the headcount.

With the above expenditure and by realising the proposals concerned, the utilisation rate of the SERVUS system can be improved from 65% to approx. over 90%.

The result of the function analysis work:
Following the function analysis, the “Move materials” function has been rationalized by the team based on a completely novel proposal gathered on the Idea Generating Day.

- Create the control system of the self-driven forklift.
- Optimise layout of the forklift routes.
- Serve the production area by launching a programmed “trolley” providing material transport on the way out and transport of finished products on the way back,
- etc.

Proposals based on the „Manage Supply-Chain” function:

- Creating a narrow passage pallet storage system.
- Stock recording upon arrival of materials and products by immediate bar code reading.
- Forklifts do not move between the buildings. No free running, fewer forklifts are needed.
- Visualized stock keeping is realised in the multiple ways stores.
- Navigation software implementation of the complete stores.
- etc.

The proposals were summarised by the team in a matrix.
The matrix lists the 7 objectives.
The relevant „Advantages / Disadvantages” have been reviewed (total of 1,050 relations).
Cost related information have been collected and analysed. The „Saving / Spending” value have been examined by the team in a total of 150 relations.

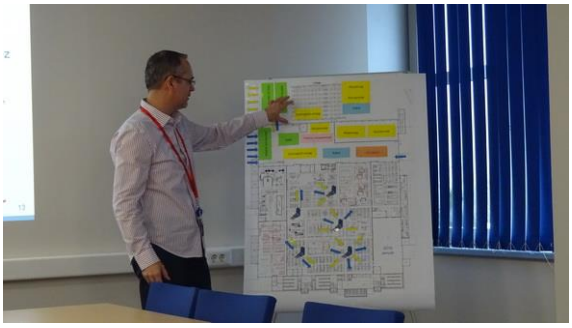

Figure 5.: The team leader presents the proposed layout

Increasing the value

As the result of the project, the external warehouse can be eliminated, the production area can be enlarged and the logistic centre can be established.
Value increment is realised through the following:

- the investment expense decreases,
- more tasks can be completed with the same labour force,
- the production area can be increased,
- production service is improved (prompt and accurate service).

Before and after pictures demonstrate the significant reductions in routes of both the service personnel and the material flow.

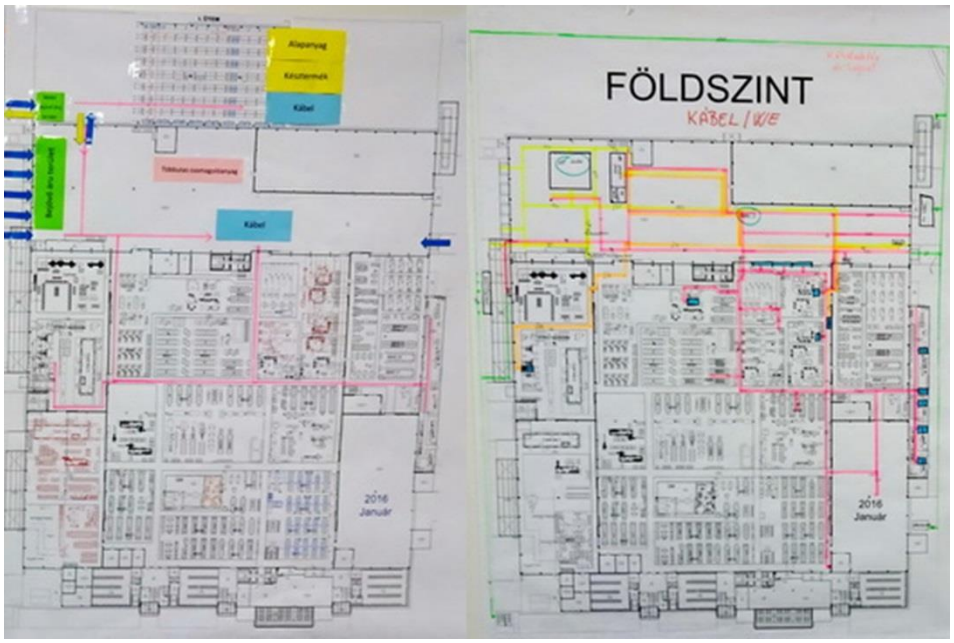

Figure 6.: Moving of the cables (SPAGHETTI diagram) — Before & After

Conclusions:

Oversizing as the result of planning is always a good starting point for Value Engineering.
Significant value improvement can be reached in the field of logistics.
The support from the owners and the management motivates the members of the Value Engineering team.