Acta Simulatio - International Scientific Journal about Simulation
Volume: 1 2015 Issue: 1 Pages: 1-6 ISSN 1339-9640

APPLICATION OF GRAPHICAL METHODS IN PRODUCTION OPTIMIZING

Miriam Pekarčíková
TU of Košice, Faculty SjF, Institute of Technologies and Management, Department of Industrial Engineering and Management, Němcovej 32, 042 00 Kosice, e-mail: miriam.pekarcikova@tuke.sk
Peter Trebuňa
TU of Košice, Faculty SjF, Institute of Technologies and Management, Department of Industrial Engineering and Management, Němcovej 32, 042 00 Kosice, e-mail: peter.trebuna@tuke.sk
Marek Kliment
TU of Košice, Faculty SjF, Institute of Technologies and Management, Department of Industrial Engineering and Management, Němcovej 32, 042 00 Kosice, e-mail: marek.kliment@tuke.sk
Radko Popovič
TU of Košice, Faculty SjF, Institute of Technologies and Management, Department of Industrial Engineering and Management, Němcovej 32, 042 00 Kosice, e-mail: radko.popovič@tuke.sk

***Keywords*:** optimization, flow, efficiency, diagram, graph
Abstract: Paper deals with the use of graphical methods in industrial practice. In the case study gives concrete expression to the use of a Gantt chart and CPM method for improving the efficiency of logistic support in company which implements a new production line. It is a way to optimize various related activities, which creates conditions for the overall effective project management in company.

1 Introduction

Management of the process itself is a complex and in addition dynamic operation for the planning, management, evaluation results and feedback control. The holder of these activities is usually chief executive, whose role is to ensure target system behaviour. To effectively manage multiple projects is necessary systemic approach and adequate availability of equipment and software in company. In this case may be helpful just the graphical project management method, shown below.

The main precondition for effective use of graphical methods in project management is to meet all the technical and methodological conditions as the definition of the subject, the objectives, resources, capacity, financial security and other related matters. What is important is the positive attitude of the management for the use of such methods in the business and correct staff motivation in this area.

In the lower part of the article is prepared case study in which was used just graphical tools in the context of optimizing the logistics flow in the company.

2 Stages of preparation the logistic flow optimization

Table 1 describes the various activities to be carried out prior to completion of logistic flow optimization. Therein are specified tasks which include individual stages of realization, the sources from which they derive the information necessary to ensure that the sub-targetsto will be direct to fulfill the main objective. Who is responsible for fulfilling the tasks of the stages, through which it ensures that no one shy away from responsibilities and duration of each stage.

These preliminary stages of implementation of logistic flow optimization are general and lasting 58 days.

Stages of implementation the production line to logistic flow optimization

In following table (Table 2) are proposed stages that describe the individual actions to be taken to realize the intro Duration of activities introducing the production line in order to optimize logistic flow is 27 days.

Tab. 3 shows the timetable for the introduction of the production line in order to optimize logistic flow, which contain the individual actions to be taken to realize the introduction of a new production line. It is necessary to observe the sequence of individual steps, duration of operation, the beginning and end of each activity.

Subsequently was the Tab. 3 displayed using a Gantt chart (Fig.1), which shows processed the forward scheduling? It is scheduling to the earliest possible starting date.

Also was through the method CPM created the network diagram (Fig. 2) of the process in which is shown the critical path. Critical path shows the activities to be carried out on time, if there is a delay in the implementation of some of the activities

of non-compliance occurs upon completion of the introduction of the production line designed to optimize material flow. And it's activities: 1, 2, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17. The duration of action is 85 days.

Tab. 1 Phases of preparation of the introduction of the production line

	Title	**Task**	**Resources**	**Result**	**Responsible**	**Time/days**
1.	creation of a project team	people's choice	database of company	team of project	director	5
2.	goal setting	getting to know definition of work results	Debate	matrix powers and responsibilities, targets for implementation	team leader	3
3.	analysis	analysis of the external environment Analysis of the internal environment analysis of future processes	Internet, documentation	description of processes	team leader	10
4.	variants of solutions	proposals	computer simulations, documents	variants	team leader	20
5.	analysis of options	analysis of financial, personnel, time, risk intensity	results of its own analysis, documentation	selection of the most suitable alternative	team leader, director	12
6.	method of implementation	establish the budget, personnel, time	documentation	implementation plan	team leader, director	8

Tab. 2 Phases of logistic flow optimization

	Title	**Task**	**Resources**	**Result**	**Responsible**	**Time/days**
1.	preparation for the introduction of the production line	request for bank loan salutation of production equipment suppliers salutation of persons interested in old production equipment salutation of supplier of handling equipment negotiation of contracts	internet documentation		team leader, director	13
2.	removal of production facilities	supply of handling equipment removal of old production facilities production facilities for the manufacture of aluminum products, transfer to storage	documentation		team leader	3

	Title	Task	Resources	Result	Responsible	Time/ days
3.	supply of production facilities	supply of production facilities Installation and deployment of production facilities staff training importation and deployment of production facilities for the production of aluminum products painting of escape routes	documentation	production line	team leader, supplier	5
4.	trial operation	removal handling equipment testing of production facilities correct deficiencies	documentation standards	production line ready to run	team leader, quality controller	5
5.	start of production	full operation of the production line	documentation	increase of productivity	team leader, director	1

Tab 3. Timetable for the introduction of the production line to optimize logistic flow

	Activity	Predecessor	Duration	Start of the activity	Finish of the activity
1.	Project: new production line	-	58 days	20.4. 15	8.7. 15
2.	Request for bank loan	1	10days	9.7. 15	22.7. 15
3.	Salutation of production equipment suppliers	2	1day	23.7. 15	23.7. 15
4.	Salutation of persons interested in old production equipment	2	1day	23.7. 15	23.7. 15
5.	Salutation of supplier of handling equipment	2	1day	23.7. 15	23.7. 15
6.	Supply of handling equipment	2;5	1day	24.7. 15	24.7. 15
7.	Removal of old of production equipment	4;6	2days	27.7. 15	28.7. 15
8.	Removal of production equipment for the production of aluminum products into stock	4	2days	24.7. 15	27.7. 15
9.	Supply of production equipment	3;7;8	2days	29.7. 15	30.7. 15
processed 10.	Installation and deployment of production equipment	9	3days	31.7. 15	4.8. 15
11.	Staff training	3	5days	24.7. 15	30.7. 15
12.	Importation and deployment of production facilities for the production of aluminum products	10	1day	5.8. 15	5.8. 15
13.	Labelling of escape routes	12	1day	6.8. 15	6.8. 15
14.	Removal of handling equipment	12;13	1day	7.8. 15	7.8. 15
15.	Testing of production equipment	11;14	2days	10.8. 15	11.8. 15
16.	Correct deficiencies	15	2days	12.8. 15	13.8. 15
17.	Full operation of production line	11;15;16	1day	14.8. 15	14.8. 15

APPLICATION OF GRAPHICAL METHODS IN PRODUCTION OPTIMIZING

Miriam Pekarčíková; Peter Trebuňa; Marek Kliment; Radko Popovič

	Task name	Duration	Start	Finish	Predecessor
1	Project: new production line	58 dny	20.4. 15	8.7. 15	
2	Request for bank loan	10 dny	9.7. 15	22.7. 15	1
3	Salutation of production equipment	1 den	23.7. 15	23.7. 15	2
4	Salutation of persons interested in old production equipment	1 den	23.7. 15	23.7. 15	2
5	Salutation of supplier of handling equipment	1 den	23.7. 15	23.7. 15	2
6	Supply of handling equipment	1 den	24.7. 15	24.7. 15	2;5
7	Removal of old of production equipment	2 dny	27.7. 15	28.7. 15	4;6
8	Removal of production equipment for the production of aluminum	2 dny	24.7. 15	27.7. 15	4
9	Supply of production equipment	2 dny	29.7. 15	30.7. 15	3;7;8
10	Installation and deployment of of production equipment	3 dny	31.7. 15	4.8. 15	9
11	Staff training	5 dny	24.7. 15	30.7. 15	3
12	Importation and deployment of production facilities for the	1 den	5.8. 15	5.8. 15	10
13	Labeling of escape routes	1 den	6.8. 15	6.8. 15	12
14	Removal of handling equipment	1 den	7.8. 15	7.8. 15	12;13
15	Testing of production equipment	2 dny	10.8. 15	11.8. 15	11;14
16	Correct deficiencies	2 dny	12.8. 15	13.8. 15	15
17	Full operation of production line	1 den	14.8. 15	14.8. 15	11;15;16

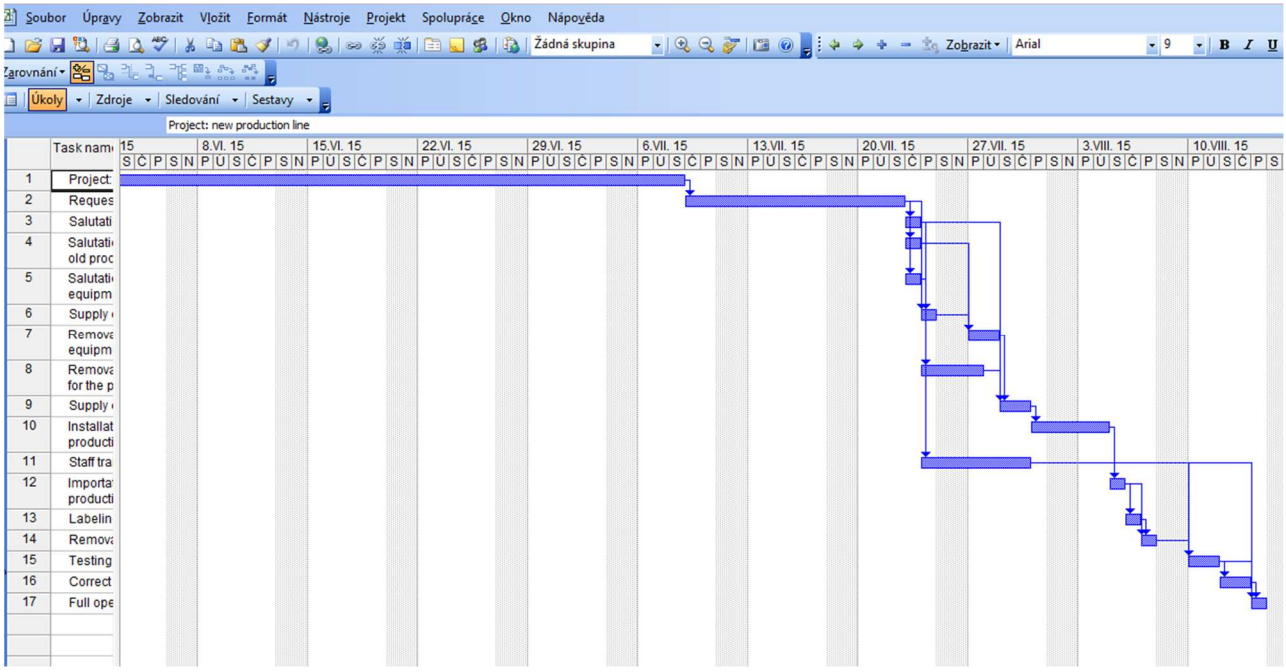

Fig. 1 Gantt Chart for the introduction of the production line to optimize logistic flow

APPLICATION OF GRAPHICAL METHODS IN PRODUCTION OPTIMIZING

Miriam Pekarčíková; Peter Trebuňa; Marek Kliment; Radko Popovič

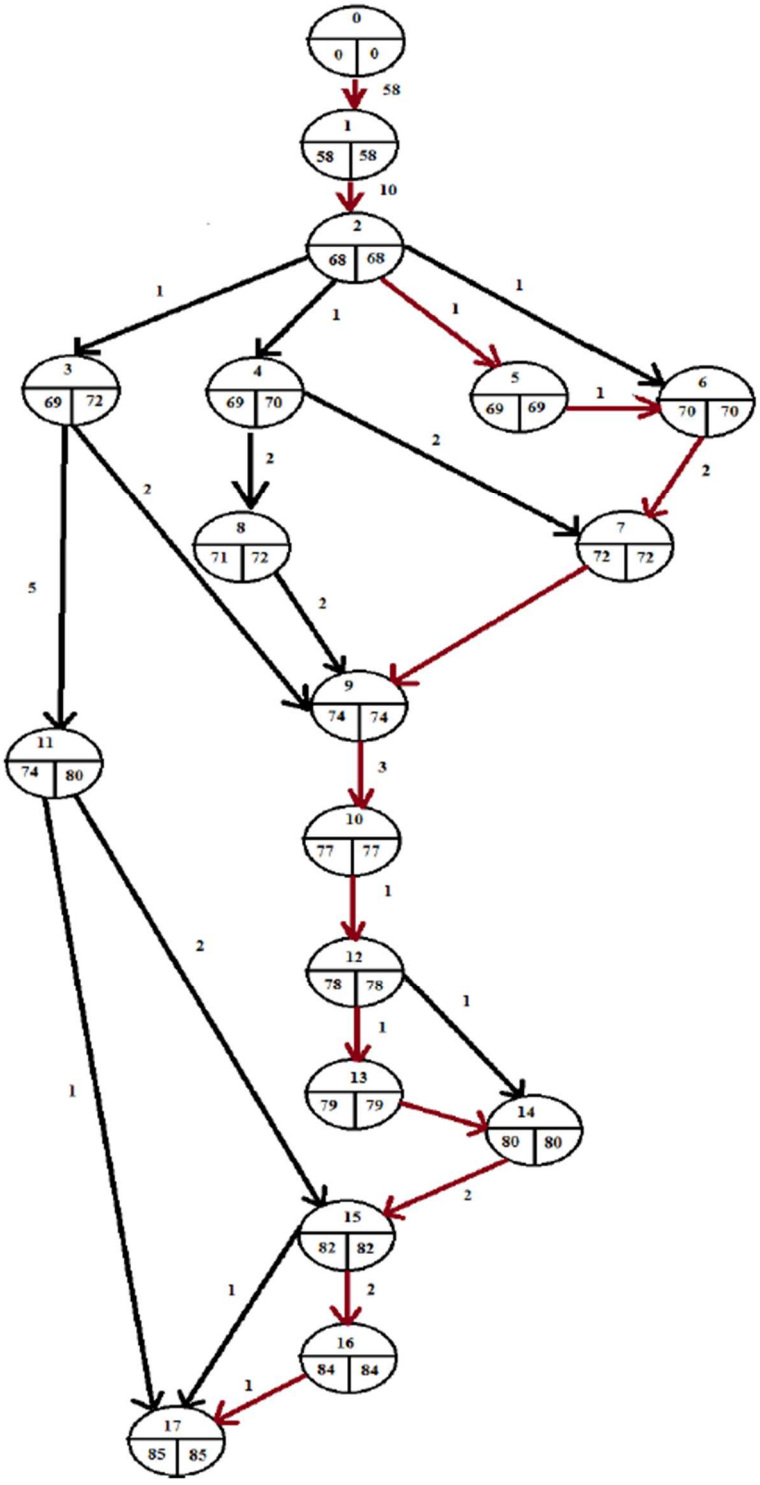

Fig. 2 Use of critical path method to optimize logistic flow

Conclusion

By the case study solving was applied Gantt chart to show during the various project activities and their ensuring in terms of resources - financial, personnel, time capacity. Activities are captured in horizontal line segments that are defined on the timeline. Graph depicts for each activity period in which this is done. The Gantt chart has been drawn up with the help of MS Project. This is a clear set of project management in company.

Acknowledgements

This article was created by implementation of the grant project KEGA 004TUKE-4/2013 "*Intensification of modelling in teaching II. and III. degree in the field of study 5.2.52 Industrial Engineering*".

References

[1] ALÁČ, P.: Modely rozhodovania v logistickom reťazci. In: MVK Logisticko-distribučné systémy. Zborník referátov. TU Zvolen, , 2007.
[2] DLOUHÝ, Martin et al.: Simulace podnikových procesŧ. Brno: Computer Press. 2007.
[3] KVIATKOVÁ, S.: Optimalizácia materiálového toku pri výrobe vybraného produktu, DP, SjF TU of Kosice, Kosice, 2012.
[4] STRAKA, M.: Diskrétna a spojitá simulácia v simulačnom jazyku EXTEND [online], Košice: TU F BERG, Edičné stredisko/AMS. 2007.
[5] MALINDŽÁK, D. a kol.: Modelovanie a simulácia v logistike /teória modelovania a simulácie/. Košice: TU-BERG, p. 181, 2009.
[6] MALINDŽÁK, Dušan: Simulácia procesov. Košice: TU-FB, p. 298, 1991.
[7] PAHOLOK, I.: Simulácia ako vedecká metóda. E-LOGOS. Electronic Journal for Philosophy. 2008.
[8] STRAKA, M.: Simulácia diskrétnych systémov a simulačné jazyky. Košice: Editačné stredisko / AMS, Fakulta BERG. 2005.
[9] SANIUK, S., SANIUK, A.: Rapid prototyping of constraint-based production flows in outsourcing, Advanced Materials Research, Vol. 44-46, pp. 355-360., 2008.
[10] SPIŠÁK, E.: Modelovanie a simulácia technologických procesov. Košice: TU, p. 51, 1995.
[11] SANIUK, S., SANIUK, A., LENORT, R., SAMOLEJOVA, A.: Formation and planning of virtual production networks in metallurgical clusters, Metalurgija, 53 (4), pp. 725-727, 2014.
[12] TREBUŇA, P., KLIMENT, M., MARKOVIČ, J.: PLM and its benefits and use in the management of complex business activities in the planning and optimization of production activities, 2013, In: Manažment podnikov. Vol. 3, Issue 2, p. 53-56, 2013.
[13] BOŽEK, P., KŇAŽÍK, M.: The new methodology for simulation of the production system, Izhevsk: Publishing House of Kalashnikov ISTU, In EQ-2014: In the framework of International Forum „Education Quality – 2014", Izhevsk, p. 245-248, 2014.

Review process
Single-blind peer reviewed process by two reviewers.