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## **IDENTYFIKACJA PROBLEMÓW I ICH ROZWIĄZAŃ W ZARZĄDZANIU PROJEKTAMI W OBSZARZE PRODUKCJI**

**Streszczenie:** Celem przedstawionych rozważań jest identyfikacja problemów w zarządzaniu projektami gdyż zawsze należy działać właściwie. Koniecznym jest poszerzenie obecnej wiedzy z zakresu zarządzania projektami ponieważ to pomoże ulepszyć system zarządzania projektami na poziomie przedsiębiorstwa, w ogólności. Ponadto, w pracy omówiono efektywne rozwiązania problemów w praktyce zarządzania projektami. Na początku, rozważamy pewien specyficzny projekt. Po drugie, badamy/analizujemy obecny stan procesu produkcyjnego. Po trzecie, w odniesieniu do tych danych, staramy się zaproponować rozwiązania. W ostatniej części dokonano ewaluacji rozwiązań, podsumowano całą analizę oraz zweryfikowano spełnienie celów całej procedury. W oparciu o te rezultaty, dokonano większej redukcji kosztów oraz zapewniono maksimum satysfakcji klienta.

**Słowa kluczowe:** projekt, produkcja i montaż, propozycja rozwiązań

## **IDENTIFICATION OF PROBLEMS AND THEIR SOLUTIONS IN PROJECT MANAGEMENT IN THE PRODUCTION AREA**

**Summary:** The study aims to identify problems within project management since it is vital for developing a good project. It is necessary to broaden current project management knowledge because it helps to improve a company's project management system. Furthermore, the study outlines the effective solutions to problems within project management. Firstly, we introduce the specific project. Secondly, we investigate the current state of the production processes. Thirdly, in this context, we try to propose solutions. The last part seeks to evaluate solutions, summarize the study, and fulfillment of the goal of the study. Based on these results, more costs are saved, and maximum customer satisfaction is ensured.

**Keywords:** project, production and assembly, proposal of solutions

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## 1. Introduction

Nowadays, companies have to face more and more new challenges and demanding customer requirements. For the company to be able to comply with these requirements, this company must ensure the simplicity of all processes, from the receipt of the request from the customer to the delivery of the required outputs to the customer. The course of the project itself and the level of project management in the organization are important to ensure the smooth operation of these processes [1, 5].

Project management is a common tool for managing changes and approaching complex tasks in large companies. Therefore, this trend is gradually starting to develop even in medium and small companies. Regardless of how big the company is or what industry it operates in every business faces increasing pressure to manage its resources more efficiently and the need to reduce costs. Also for these reasons, the need to introduce professional project management or at least its elements will grow in small companies. Companies can use project management to manage their resources more effectively: finance, time, human capital, know-how, and technology [2].

The specificity is the improvement of project management in production and production enterprises, where unexpected events and problems are usually solved through projects, aiming to identify problems and find an adequate solution [2].

## 2. Project assignment (case study)

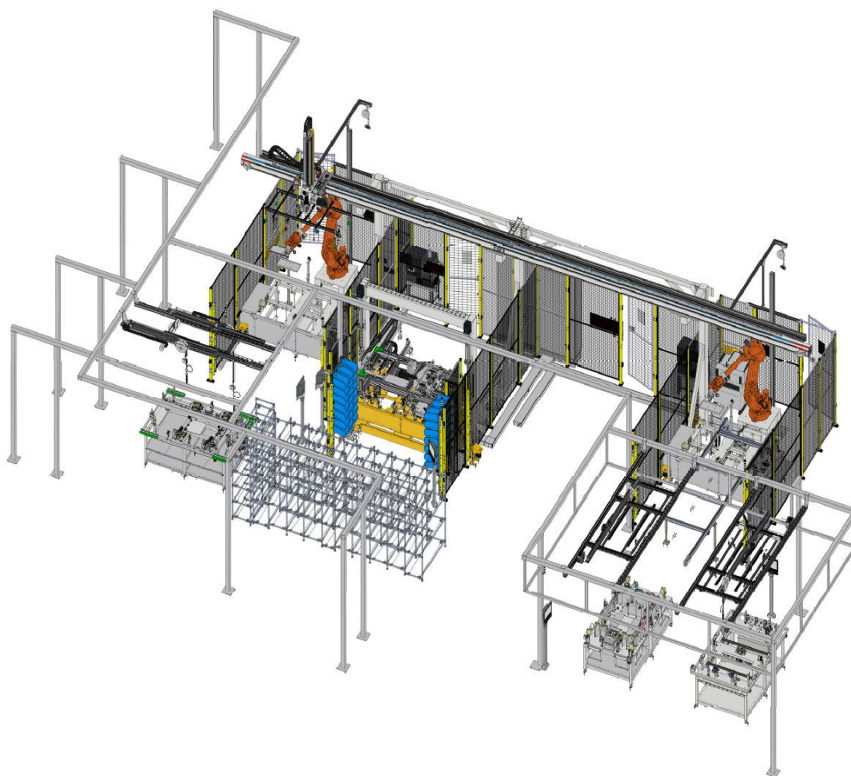
As part of the project assignment, a case study was defined, the aim of which was to compile a proposal for improving the project management system in the company. The case study was conducted in an unnamed company (X) within the Production Automation division. It is a company dedicated to innovation in the field of automation, digitization, and robotization.

The Production Automation division is a division that deals with automation itself, but also with engineering services at the same time. Robotization and automation in industry are important for increasing the efficiency of complete business systems, technologies, and workplace efficiency. Company X, and specifically the Production Automation division, ensures the development and construction of single-purpose equipment and machines in exact accordance with customer requirements. They are intended for the implementation of repeated activity in production, intensively saving time, reducing the rate of errors, and reducing the occurrence of risks in the workplace. They also help increase the quality and comfort of the operator or improve ergonomics at the workplace. This division also pays attention to the design of automated workplaces or entire production processes and systems. [3, 6]

This division works with [3]:

- Automated production lines.
- Handling and single-purpose machines and devices.
- Special assembly preparations.

Therefore, as a part of the improvement of the project management system for the division, I analyzed one particular project that Company X was carrying out for an unnamed Company Y. Within this project, the relevant processes were analyzed and improved. Company Y is a company involved in the production of ceiling panels for cars. Company X in this project was to ensure the construction of an assembly line, which will be used for the actual assembly of the ceiling panel for the interior element in cars, specifically the KIA SPORTAGE NQ5. The assembly of such a line took place at the premises of company X, specifically at the premises near Žilina in Slovakia. In the following Figure 1, you can see a 3D image of a sample part of the ceiling panel assembly line.



*Figure 1. 3D demonstration of the ceiling panel assembly line [Source: Authors]*

In the following Figure 2, it is possible to see parts of the assembly line assembly directly from the production process already in the Y company.

Figure 2 shows examples of the assembly line. This should be the result of the entire project. However, for the project to be completed and all its processes to function correctly, it is necessary to deal with the analysis of the current state of the project, specifically:

- Project management cycle.
- The current state of the material and inventory procurement process.

- The current state of the product production and assembly process (assembly line).
- Workplace layout.
- Project activity analysis.
- Key performance indicators of the project – current status.



*Figure 2. Demonstration of the assembly line – the second part [Source: Authors]*

However, due to the huge scale of the project, in the following sections, attention will be paid mainly to the process of procurement of material and supplies which is crucial in this project and has the largest share of bottlenecks in the project.

### **3. Identification of process – current state**

The process of manufacturing and assembling a product is a long process that consists of activities as follows [3]:

- Input from securing projects for practice.
- Complete equipment based on production documentation.
- Ensure the procurement of materials and supplies.
- Configure devices.
- Test devices.
- Verify the test result.
- Create accompanying documentation.
- Output to business case security.

The result of the analysis of the current state is the identification of problems. The identification of problems is determined through the Ishikawa diagram, where the main consequence is problematic project management.

The consequence of problematic project management arises caused by various causes, which were determined based on interviews and brainstorming with the buyer, the storekeeper, and the head of the Production Automation division. The various potential causes were scored within the team, with the cause with the highest number of points considered the root cause. [4].

### 3.1. Problematic implementation of several projects at the same time

The problematic execution of several projects at the same time in production and assembly is the cause that received the largest number of points. This cause as well as the other causes were scored within the team in an Ishikawa diagram and found to be the root cause and scored the highest number of points of all potential causes.

It often happens in the production hall that the production and assembly of several projects take place at the same time, and the storage in the production and assembly does not work and there is not enough space for the implementation of the given projects at the same time. Part of this area can be seen in the following Figure 3.



*Figure 3. Premises of the production hall – production and assembly – rear view  
[Source: Authors]*

Specifically, the following problems arise in this process:

- During the production and assembly of several projects at the same time, there is not enough space for the production and assembly itself.

- Storage in the production hall in production and assembly is not efficient.
- The material taken out of storage takes up space for the subsequent production and assembly of the relevant project.

In the images, Figure 3 and Figure 4, it is possible to see the premises of the production hall used for production and assembly.



*Figure 4. Premises of the production hall – production and assembly – front view  
[Source: Authors]*

From Figure 3 and Figure 4, it can be seen that the space in the production hall of company X, which is used for production and assembly, is large, but with several projects in the production and assembly phase, it is impossible to fully utilize this space. It regularly happens when it is necessary to work on four projects, the production and assembly process becomes very uncontrolled and almost non-functional, which mainly results in an extension of the total project time.

### **3.2. Proposal of recommended solutions**

To eliminate the occurrence of problems, it is necessary to apply the following suggestions:

- Remove unused material to free up space.
- Take out material for production and assembly only when it is used, thus freeing up space for more projects running at the same time.
- Division of production and assembly into relevant assembly sections or phases or workplaces (workplace 1, workplace 2, workplace 3, etc.) which ensures efficient storage and saving of space, i.e. j. phases: mechanical, pneumatic, hydraulic, and

electrical, while the assembly of each phase takes place at a different time and, accordingly, the material is removed from storage.

- Introduce a pre-assembly zone in production and assembly.
- Division of production into technological units.
- To ensure the job position of production planning coordinator, who is currently absent from the company.

Competences and duties of the production planning coordinator:

- Ensure the coordination of individual projects.
- Ensure production scheduling.
- Ensure communication with suppliers.
- Find out which material is needed in individual phases.
- Ensure the management of individual projects itself.
- Ensure the planning of materials needed for predefined inputs.

The gross monthly salary of a production planning coordinator is estimated at approximately €2050 per month. And therefore the procurement costs for the employer and their estimate within this proposal is approximately €2771.59 per month.

#### 4. Evaluation of the solutions

It is very important to ensure the elimination of problematic project management during the production and assembly process. The reason for this result is mainly that the management of several projects in production is problematic. Therefore, individual proposals have been introduced and it is important to evaluate their benefits and costs.

The benefits and costs of the proposed solutions can be seen in the following Table 1.

*Table 1 Evaluation of the proposed solution – benefits and costs [Source: Authors]*

<b>Solution design</b>	<b>Benefits</b>	<b>Costs</b>
Proposal of a solution for the execution of several projects in parallel in production and assembly.	<ul style="list-style-type: none"> <li>• Freeing up physical space for multiple projects at the same time.</li> <li>• Divide production into assembly sections and phases.</li> <li>• Introduce a pre-assembly zone.</li> <li>• Divide production into technological units.</li> <li>• Introduction to the position of production planning coordinator.</li> </ul>	<ul style="list-style-type: none"> <li>• The costs of introducing a pre-assembly zone.</li> <li>• Costs for the position of production planning coordinator – an estimate of the employer's monthly costs per employee: €2771.59.</li> </ul>

From Table 1, it is possible to see the evaluation of the design solutions within the production and assembly of the product. As a part of the solution to the proposal for the sudden removal of material for production and assembly, it is necessary to introduce the removal of material according to the need and the relevant phases

of the project. When proposing the implementation of several projects simultaneously in production and assembly, production must be divided into assembly sections or phases and introduce a pre-assembly zone, which saves space for the execution of several projects at the same time. It is also necessary to adjust or take advantage of space in production and assembly effectively and correctly.

## 5. Conclusion

The main goal of the project study was to identify problems within the project that are related to the process of manufacturing and assembling the product. The quality tool Ishikawa diagram was used to identify problems within the project. From the Ishikawa diagram, it was found that problematic project management is caused by various causes. The reasons were determined based on interviews and brainstorming with the buyer, the storekeeper, and the head of the Production Automation division. Within the team, these potential causes were ranked, with the cause with the highest number of points considered the root cause. The root cause in this case was the problematic management of several projects at the same time. As part of this cause, several problems were revealed that have a direct impact on project management in the company. If the other projects are carried out with established designs, the overall project management system in the company will be improved and the final product will be handed over to the customer in the shortest possible time. Also, from a long-term perspective, it is assumed that costs related to the project will be reduced.

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## REFERENCES

1. FURDYGIEL P., PLINTA D.: Production process improvement system. Wydawnictwo Naukowe Akademii Techniczno-Humanistycznej w Bielsku-Białej. Bielsko-Biała 2020.
2. GREGOR T., MAJOR M., GREGOR M.: Štíhly podnik - princípy, stavebné kamene a zásady implementácie. In: Časopis ProIN 5 – 6, 2016. ISSN 1339-2271. str. 25-29.
3. Interné materiály spoločnosti X, 2022.
4. ZUŽIK, J.: Zlepšenie systému projektového riadenia: diplomová práca. Žilina: Žilinská univerzita v Žiline, 2022. 114 s.
5. GRZNÁR, P., et al. An optimization methodology for sustainable development of production lines. In: Zarządzanie Przedsiębiorstwem. Vol. 22, No. 4 (2019), pp. 2-6, 2019.
6. TREBUŇA P., PEKARČÍKOVÁ M., KLIMENT M., TROJAN, J.: Metódy a systémy riadenia výroby v priemyselnom inžinierstve. Košice: Technická Univerzita v Košiciach, 2019. 210 s. ISBN 978-80-553-3280-2.