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MASTER THESIS

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Efficient project launch in automotive companies without R&D

A Master's Thesis submitted for the degree of
"Master of Business Administration"

supervised by

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Affidavit

I, **PETER SABO**, hereby declare

1. that I am the sole author of the present Master's Thesis, "EFFICIENT PROJECT LAUNCH IN AUTOMOTIVE COMPANIES WITHOUT R&D", 65 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted this Master's Thesis as an examination paper in any form in Austria or abroad.

Vienna, 28.08.2016

Signature

Abstract

The target of selected master thesis, "Efficient project launch in automotive companies without R & D" is to map the problems in project management in small companies without R & D in the Slovak Republic and in case of confirmation of hypotheses suggesting recommendations for improvement. The theoretical part describes in detail the history, overview of project management and related business. It also aims to map the Slovak automotive region, explain important concepts in project management as well as clarifying the importance of R & D nowadays. Furthermore own work based on the previous experience and the results of the questionnaire is aimed at assessing the set of hypotheses, either to confirm or refuse them. The sample of the companies, where a questionnaire was sent, has been carefully selected to subsequently confirm the added value of the chosen topic. If the findings will not be implemented, then at least the recommendations for improvement will be presented. All recommendations coming out of the master thesis can serve as a guidance for people dealing with new project launch or for people who need to improve their competencies in project management.

Key words : project management, improvement, hypotheses, project launch, automotive company, questionnaire

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ABBREVIATIONS LIST

R&D: Research and development

APQP: Advanced Product Quality Planning

PPAP: Production Part Approval Process

FMEA: Failure Mode and Effects Analysis

DFMEA: Design Failure Mode and Effects Analysis

PFMEA: Process Failure Mode and Effects Analysis

WBS: Work Breakdown Structure

MSA: Measurement System Analysis

OEM: Original Equipment Manufacturer

DOE: Design of Experiments

CPM : Critical Path Method

PERT: Program Evaluation and Review Techniques

1. Introduction

The automotive industry is a key industry and economic pillar in several countries of Central and Eastern Europe. Car manufacturers use educated, productive and relatively cheap labor and easy access to the Western European markets as well as convenient location for export to the East. In the automotive industry, thousands of people are working either directly for the car manufacturers, or in the supply chain.

1.1 Background of the problem

No matter in which industry we operate, project management is the driving force of the organization and strives to make the most of the invested resources, because business and organizational results are achieved mainly due to the successful implementation of projects. Conscious approach to project management starts at the portfolio level, which is a materialized strategic vision of the organization through a whole range of investments, planned and realized. Good combination of strategy and project management at all levels, that is at the level of portfolio, program and individual projects, will cover the entire value-driven organization and secure proper management at each hierarchical level. More and more companies and organizations are aware that it pays off to invest time and money to build professional project methodologies and processes that will ultimately reduce costs and risks, improve efficiency and customer satisfaction as well as the relationship between business parties involved, thus helping to build competitive advantage.

As mentioned above, projects and programs are the engine of change and build competitive advantage of the organization. All automotive companies must consider project management to be crucial for the performance of the business, growth and organizational success. However, it is confirmed by experience, that some organizations are not aware of the true value of project management, despite the fact that the result of the project is crucial for the organization. Organizations, that fail to manage the project to

its successful end, waste money and opportunities. Failure of the project has an impact on the creation of competitive advantage and production capacity. When the stakes are high, then it is logical that the project management can not be underestimated, but it must be entrusted to highly qualified experts, who will ensure expected results of the project and thus the success of the entire organization. Underestimating the importance of project management by local production plants may be one of the explanations, why the project success rate is declining despite the fact, that there has been a worldwide implementation of processes in the form of approved methodologies and best practices.

Within the automotive market, millions of euros are spent annually on failed projects. The current market environment is characterized by fierce competition, shorter product life cycles and shorter time between innovation. Western companies now take knowledge of project management for granted and routinely use it. If Slovak businesses want to succeed in a highly competitive environment, which was formed after our accession to the EU, then implementation of good project management strategies is a necessity. Projects are often a crucial part of the strategic management of the company. Project management is a complex process that requires a professional approach and support of top management of the organization, as well as effective teamwork. The most important problems of Slovak automotive plants can be detected based on the detailed analysis of the current situation. By using appropriate analytical methods, we are able to find root cause of the problems and suggest the recommendations to deal with them.

1.2 General statement of the problem

In this Master thesis we will focus on the identification and analysis of the main problems of automotive production plants without R&D in the Slovak Republic linked to the project management and factors directly or indirectly influencing it, and on the definition of the proposals for improvement.

1.3 Main objective and partial objective of the thesis

The main target of the thesis is to analyze the project management in automotive production plants in the region of Slovak Republic where R&D activities are executed in the headquarters and offer definitions of improvement proposals to eliminate main problems in the phase of project implementation in production. Except for eliminating the current issues, the implementation of the proposals can have impact on overall efficiency improvement, employees environment and motivation and also on the final cost reduction and it can enhance market competitiveness.

1.4 Hypothesis statements

Based on the literature research and previous personal experience, the following hypotheses have been chosen:

- manufacturing plants are insufficiently involved in the projects prior to their arrival to the plant
- production plants do not have available project documentation when transferring the project to the plant
- most problems, that occur at the beginning of production (feasibility study, timetable...), are caused by insufficient development
- local production plants do not feel like equal partners with the headquarters and they consider them only production locations (underestimating them)
- nobody measures overload of employees on projects, overload feeling
- project management in manufacturing plants is being replaced by operative
- small to no evaluation of project success and weak capitalization Lessons Learned
- people are not satisfied with the training program within project management

1.5 Research methods

In this thesis, we have decided to approach respondents with a questionnaire that was chosen as the main instrument for collecting information on the research. The questionnaire is fast, economical, and the process of collecting the required data can be made in a more efficient way. Another advantage is more detailed statistical analysis of the results. It is also possible to answer questions fast, which gave us more chance to collect as much data as possible. We selected a closed questionnaire type, which is less personal compared with the open one, and forces the respondent to choose an option that is closest to their understanding of the issue. Within the evaluation, this type of a questionnaire is more progressive and more convincing. On the basis of an open questionnaire we would be able to say more accurately what individuals think, but we would not be able to combine their conclusions in homogeneous groups from which we can derive a definition of the current status of the issue on the basis of the group size.

The questionnaire was created online and sent via e-mail sufficiently in advance in order to have a time reserve for resending. More factors which could have been an obstruction to filling in the questionnaire had to be taken into account. These would be busy respondents, holiday period or sick leave. A large number of respondents operating in car production companies in the territory of the Slovak Republic were approached. Contacts were collected by way of own resources from previous work of the thesis author in the automotive sector, as well as with the help of previous contacts who did not hesitate to provide help for this project. Combination of all these factors gave us an opportunity to approach a wide range of respondents operating in large companies, but also those several times smaller in terms of turnover. This is what finally helped us to get a global picture on the issues and to offer solutions to achieve better effectiveness.

1.6 Questionnaire structure

The questionnaire that was used had a fixed structure. Its content was first of all purposefully designed in a simple way and with a clear concept of questions and their options. The goal was to offer respondents options to answer naturally without long thinking, in line with their current opinion and understanding of the issues.

For each hypothesis, one question was prepared with four or five options for response. It was necessary to answer each question, otherwise it was not possible to complete the questionnaire. The questionnaire was sent in Slovak language and was designed so that respondents did not have to invest much time to complete the whole questionnaire. Both the questions and the response options were carefully selected based on the area that the hypothesis was related to, and thoroughly discussed by several parties until their final version.

2. Review of the literature

2.1 Automotive industry in Slovak Republic

The automotive industry is one of the key industries and economic pillars in several countries of Central and Eastern Europe. The sector has been a major source of foreign direct investment in the region for 25 years. Car manufacturers use mainly productive, educated and cheaper labor, compared to western countries. There is also a quality connection to Western European markets as well as a convenient location to export to the East.

Nowadays, Slovakia is an important strategic partner for the global automotive industry, and produces the highest number of cars per capita in the world. Its position is mainly due to the presence of three modern automakers plants Volkswagen (Bratislava); PSA Peugeot Citroën (Trnava) and Kia Motors (Zilina) and global supply businesses. However, we must mention also the Jaguar Land Rover (Nitra), whose construction is planned for 2016 and is considered as one of the largest investments in the last seven years in Europe. First cars should roll off the production line in the middle of 2018, which will strengthen the position of Slovakia in the automotive industry.

Slovakia's integration in the global automotive markets and the development of automotive industry started in early the 90's. It all started with German automaker's company Volkswagen AG, which launched a factory for car production near Bratislava in Devínska Nová Ves. This significant investment helped with the development of Slovak economy after the demise of industrial production that Slovakia was known for. Arrival of automotive company Volkswagen in Slovakia started to automatically build the supply chain, which meant arrival of more investments into the country. Slovakia thus began its new way of industrial production in the motor transport industry. Other significant investments in the automotive industry followed in the years 2003 to 2005, due to the arrival of two other global automakers

PSA Peugeot Citroen and KIA Motors. These car manufacturers have chosen Slovakia for its good location and transport infrastructure.

After the launch of production lines, the car production in Slovakia increased so much, that Slovakia automatically ranked among the first 20 world producers. In 2015, the number of passenger cars produced in the Slovak manufacturing and assembly plants, stopped at number higher than 1 000 000, which represented an increase compared to 2010 by almost 70%, about 400 000 more cars. These data indicate that Slovakia produced 178 cars per 1,000 capita and the country became the largest producer of cars per capita in the world. In Figure 1 we can see the evolution of increased car production in Slovakia from 2005 until planned for 2020.

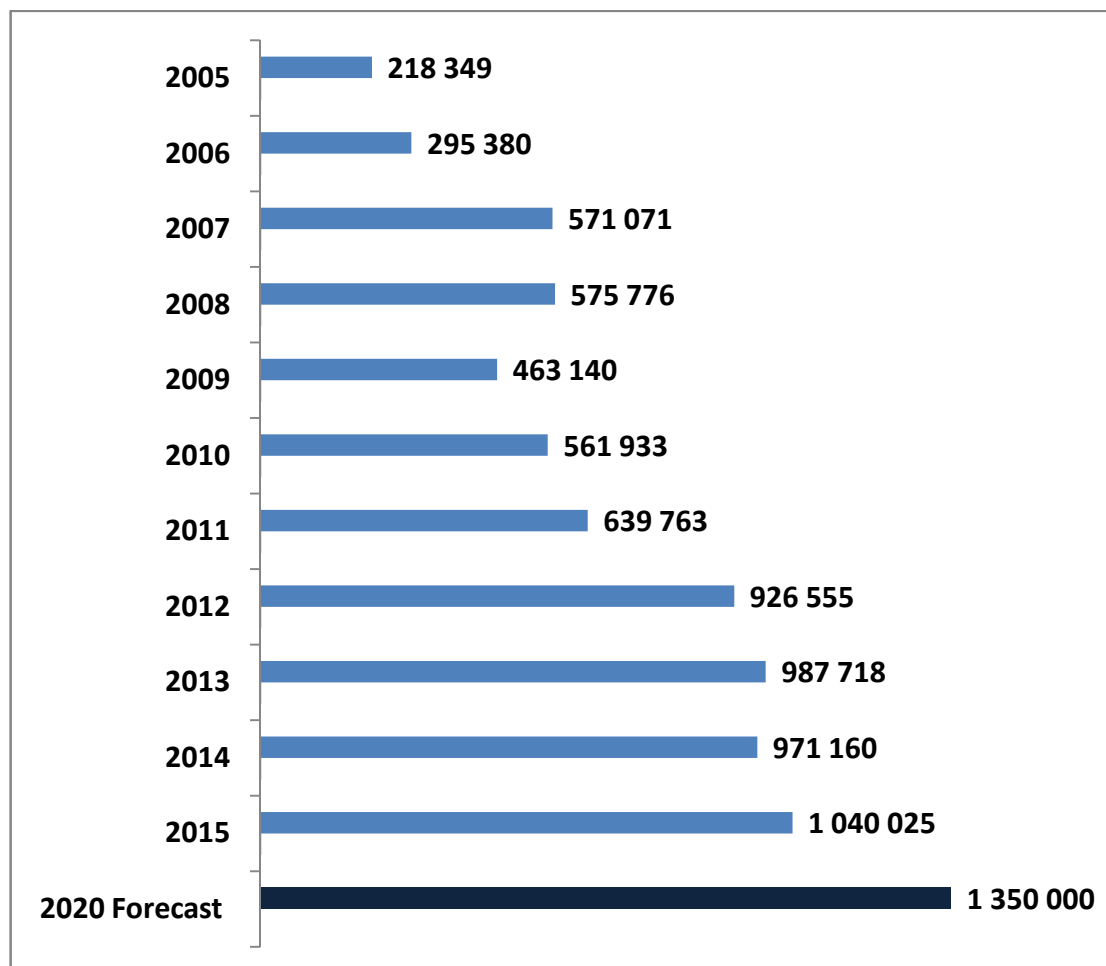


Figure 1 - Car production in Slovakia

(<http://www.sario.sk> – accessed on:04.07.2016)

In the next figure, we can see the current status of car production per capita in each country as well as forecast for Slovakia until year 2020.

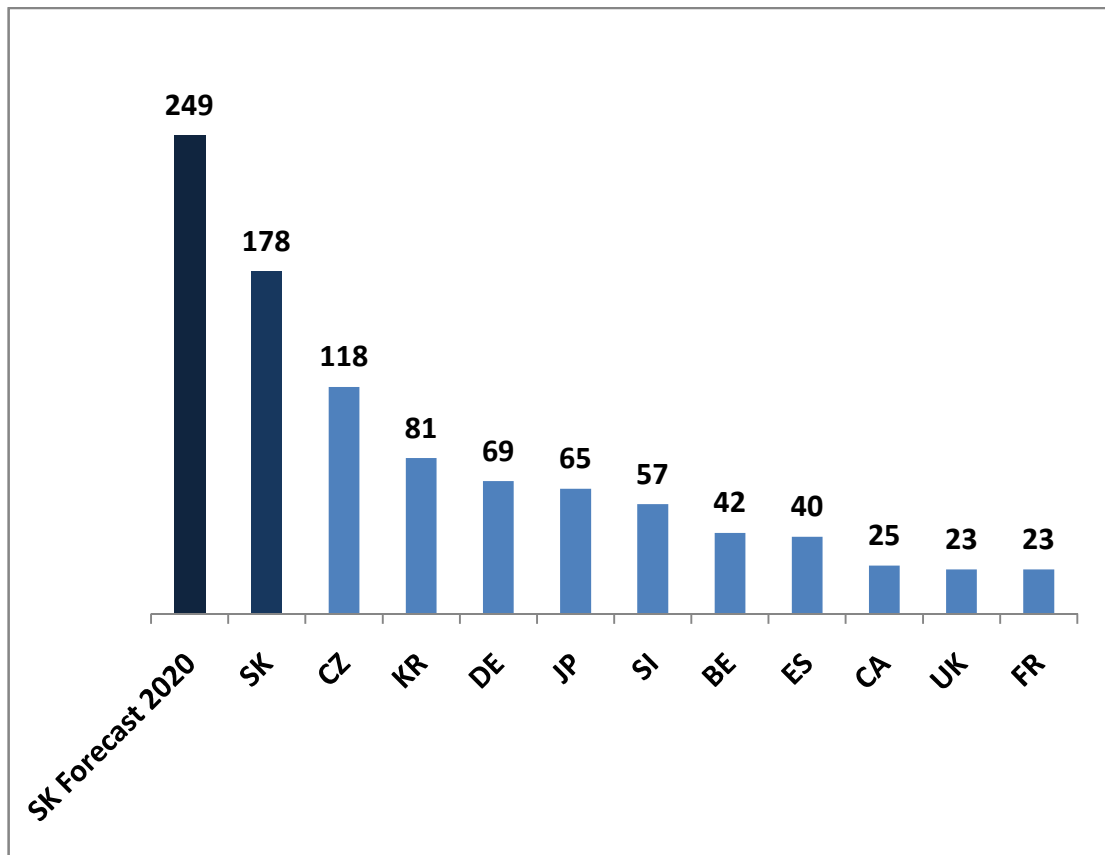


Figure 2- Car production per 1000 Inhabitants in Slovakia
(<http://www.sario.sk> – accessed on: 04.07.2016)

In the beginning, it was mentioned, that the automotive industry is a key sector of our industry. Of the total industrial production, the production of motor vehicles is nearly 30%. The largest players in this industry are not only Volkswagen, Kia and PCA, but also their entire supply chain. Currently, the total number of suppliers in the supply chain (categorized by network type as Tier1, Tier2, Tier3) of Slovak automotive industry registers 254 direct and 54 indirect suppliers.

In Figure 4 we can see the locations of suppliers Tier 1 and 2 in Slovakia. It is known that most of the suppliers are located in Žilina, Trnava and Bratislava region and it is confirmed by this distribution map. In the near

future, more suppliers will come to Nitra region due to arrival of Jaguar Land Rover car manufacturer.

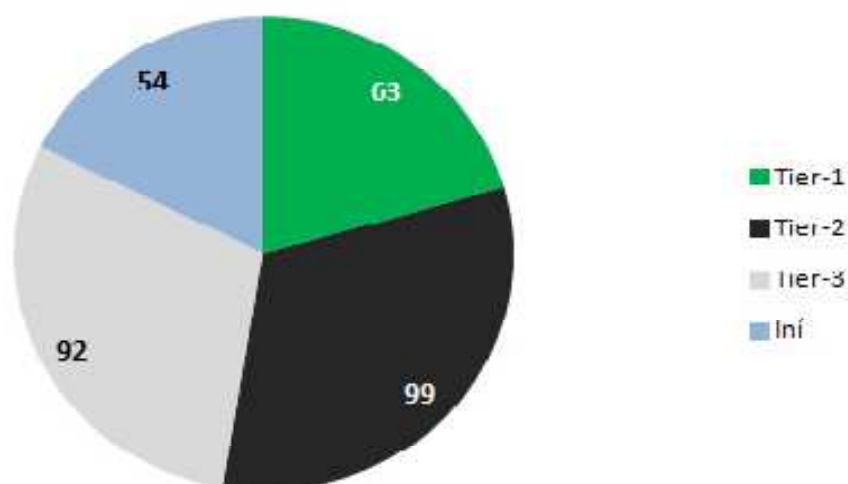


Figure 3– The number of companies in each tier category
(<http://www.okba.sk> – accessed on: 02.07.2016)

Automotive Suppliers in Slovakia

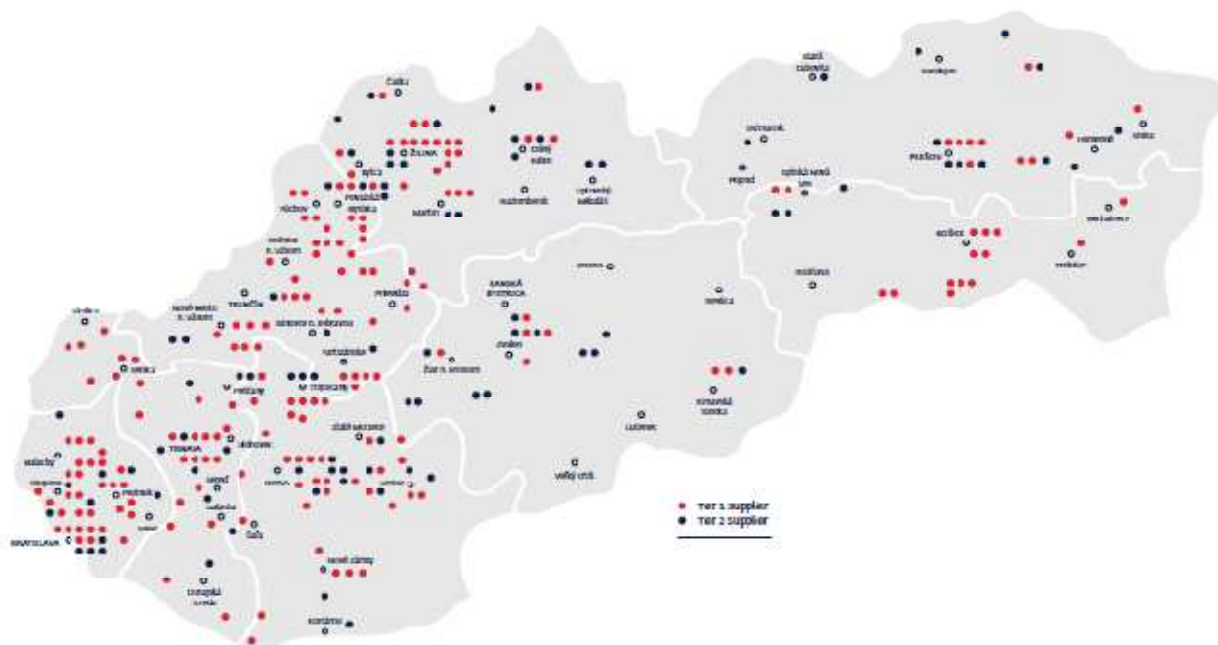


Figure 4– The location of companies in each tier category (red dot for Tier 1 and dark blue dot for Tier 2 supplier)
(<http://www.sario.sk> – accessed on: 02.07.2016)

2.2 Definition of the terms project, project management, R&D

Project

“A project is a problem scheduled for solution.”

-J.M.Juran

Quote above is also one of the options, how to explain the meaning of project, but the simplest definition of the project can be understood as a set of organized activities that have a beginning and an end. The project can be seen as a timed event, performed in varying environments with a particular purpose. It consists of organizational and technological follow-up activities carried out within the given limitations of duration, costs and resources. We can say that is significantly different from normal operations.

V. Dolanský et. al. (1996) is saying that due to nature and characteristics of the implementation of projects, it is not easy to determine an absolutely clear definition of a project, which would take into account all aspects of the project. Therefore, we describe a few more from multiple angles:

- It is a working process towards achieving the set objectives and the project goes during this process through several phases and stages.
- It is a unique set of activities, which may differ from the routine ones by target's orientation and also by content.
- Projects not only in the automotive industry require a shared effort and abilities of experts in various fields, because achieving the target state often brings new and unique problems.
- Each project has a temporary format, although it may take a very long duration. All the necessary human, material and financial resources are planned and managed only to meet the objectives of the project and after its attainment they are automatically terminated.
- Oftentimes, the project is seen as an effort to bring change, during which, a series of activities is conducted, leading to the introduction of

new technology or a new product. The objective must be achieved within the planned costs and resources, within a limited time and it has to achieve the desired quality characteristics.

According to Korenko et. al. (2014) a project can be characterized by several attributes:

- Purpose - project activity has a predetermined outcome. It is divided into sub-tasks that must be completed in order to achieve the project goals. The project calls for the coordination of management scheduling, interaction between inputs and outputs, costs and often must be coordinated with other projects.
- Correlation -an ongoing project usually has links to other projects and also has a relationship with other standards and processes in the organization. Project cooperation between departments is needed and they have clearly established connections with the project. The project leader has to maintain these relationships and deal with the relationship with the other environments.
- Conflicts- anyone who ever led a project and was responsible for its completion probably already knows this word. All parties in the project, whether its customer, organization or public, have differently defined objectives and interests. Someone wants change, someone profit, someone has other priorities. In every project it is necessary to reduce conflicts in the allocation of resources and managerial competences.
- Uniqueness - almost no projects are completely identical and everywhere we find elements that are unique. We mostly deal with it in the automotive research and development projects. Diversity of project is automatically associated with the existence of risk.
- Life cycle - all projects are characterized by life cycle. They begin with a slow onset, later gaining in importance during the construction process and after the target is completed they are closed.

Project management

When we want to understand the history of project management development, we have to go far back in past. The Cheops pyramid in Egypt was completed in Egypt 3000 years BC. According to experts this incredibly difficult work would not be effective without planning, organization and control. Project management is often seen as a philosophy of project management approach with the defined objective that must be achieved in due time, with defined costs and the required quality. It has its own peculiarities, which must always be respected, as their underestimation or ignorance can lead to substantial economic losses. Increase the importance of project management to a higher extent of globalization and internationalization of the automotive international environment is increasing its importance.

Verzuh (2011) says that main project management understanding begins with project environment understanding and every project requires project management. Correct project management goal setting and thoughtful planning of their implementation substantially increase the performance of companies in project execution. Many statistics from project management show that as long as the organization is not paying enough attention to the planning phase, inconvenience and complications occur in the next stages of the project.

According to Majtán (2009), the core of project management is a magic triangle which always consists of deadlines, costs and quality. With these three parameters, the evolution and success of a project is measured. To maintain the balance is not easy and it is said that it is one of the biggest challenges to master, that requires several years of managerial experience a proper assessment of the situation. In reality, there is often a distortion of one of the parameters, and while trying to rectify it, it often leads to a deterioration of another parameter output, that could significantly jeopardize the continuity of the project.



Figure 5– Magic triangle of project management

(<http://managementmania.com> – accessed on: 13.08.2016)

Project management in today's concept was created about fifty years ago and since then, it has developed a variety of tools, methods and techniques, including the area of project planning and realization. The first official company for project management was founded in Zurich. It actively began its operation in automotive industry few years later. Verzuh (2009) says that some of the techniques from a high level can be grouped into one diagram called three project management functions. Definition represents an approval of the project while planning represents all gathered details on how to meet the project's goals, within the given constraints. The last point control includes all actions that help the project to respect the project plan and manage deviations, if identified. Here we have progress measurement as a feedback mechanism, communication for keeping all the participants coordinated and aware of all changes and progress, and the last one is corrective actions, definition and implementation.

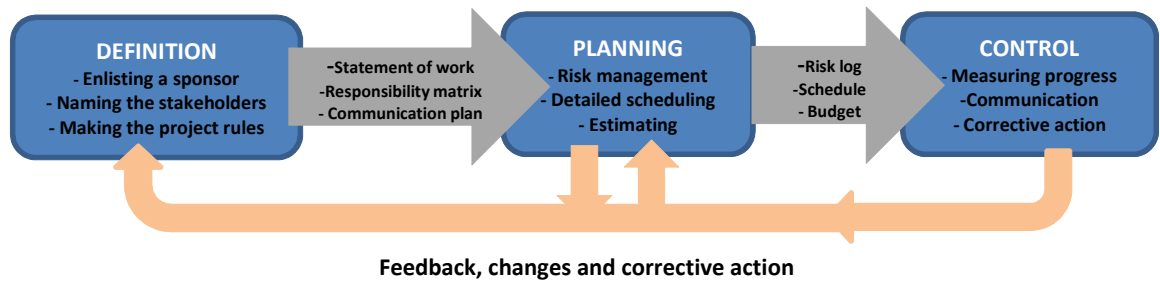


Figure 6– Project managing functions

R&D

R&D is a well known abbreviation, with which almost everyone meets, who works in the area that needs to move forward. Research and development is also known in Europe as research and technical development. It is a general term for action and activities in connection with governmental or corporate innovation. Research is used to identify new knowledge and ideas while development turns the ideas into specific products or processes. Industrial R&D began to have a more global character in the fifties and sixties, but only in large multinational companies. Access to technology and markets in the nineties allowed the expansion of R&D globally into smaller companies. Akhilesh (2014) says that research and development department is a very important field of management discipline. Innovation and development of new technologies is highly competitive advantage of the nation as well as the organizations. The overall organizational performance and growth is contributed by research and development activities.

The effort of mankind since beginning of time has led to the development of new and improved goods and processes. The need for improvement of not only development, but also the research is nowadays one of the most discussed issues not only on the university ground, but also in the business environment. Despite the fact that Slovakia is gradually becoming an automotive superpower, the question of research and development is still lagging behind. According to domestic and foreign statistics, it is located on the bottom of the rankings. According to Švác

(2008), especially for the last 15 years, there were flawed policies regarding research, development and innovation in Slovakia. A well managed unified concept of the regulatory environment is needed, with a clear set of objectives and appropriate resources that could lead to harmonization of the current problems.

Jain (2010) says that there are a lot of challenges in R&D, which can be classified as external or internal. Regulators and regulating agencies, such as enforcement, policies of the government, belong to the external challenges. Usage of protected or scarce resources and sustainability following the public concern about environment is another challenge. In product design, research and development department needs to consider these external aspects. Effective execution of the project, competency development, resource mobilization, allocation of resources and at the end fast conversion of ideas into production services are factors influencing R&D from the internal point of view. Apart from the above internal or external aspects, it is necessary to deal also with other challenges R&D managers face. They need to face challenges when making effective decisions on developing or buying new technologies, attract and retain top talents and set short- and long-term priorities.

2.3 Project planning

We know statement "the project should follow its plan." describes the following section. Basic flow of automotive project planning is oriented on process, but mostly on customer satisfaction. The figure 7 explains the principles of project planning while applying the PDCA approach.

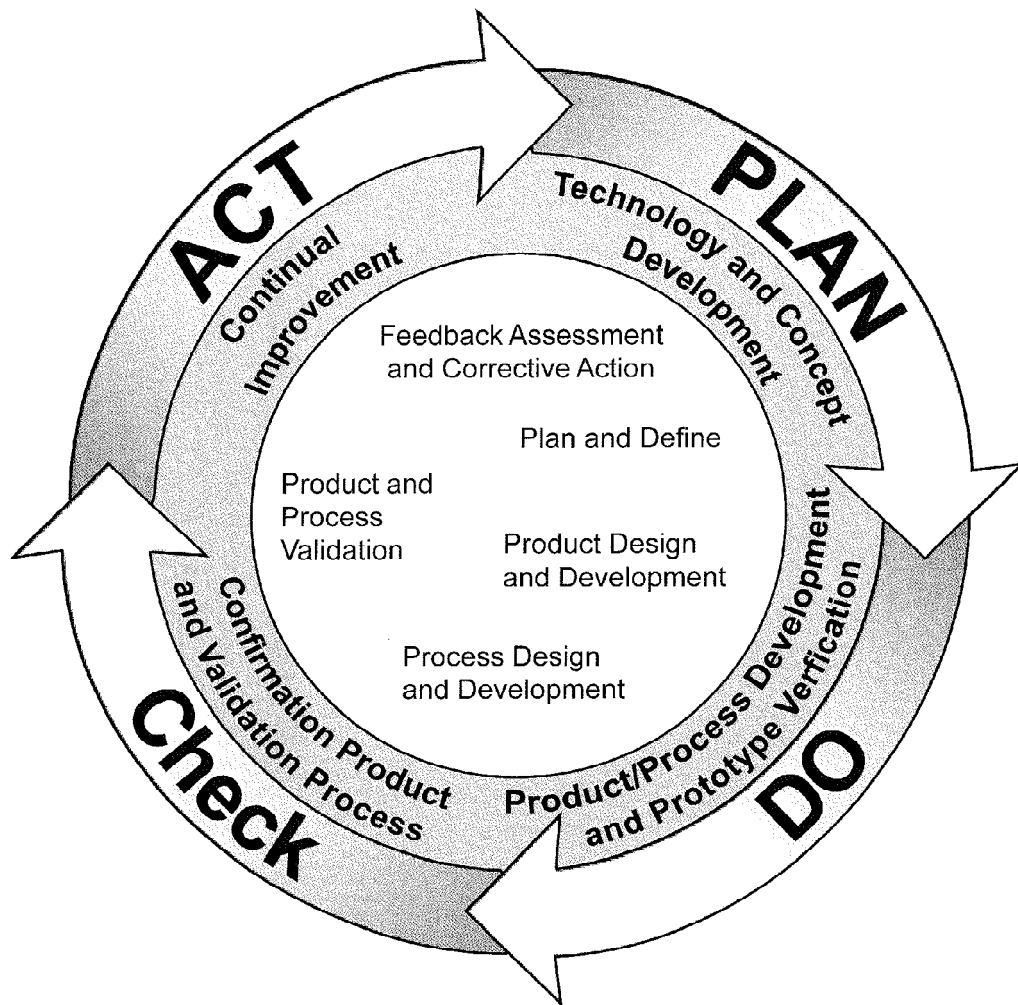


Figure 7– Project quality assurance planning
(Advanced Product Quality Planning - 2008)

The process of project planning in every sector is an integral part of project management. The main task of project planning is to set objectives and create a way to bring us there. The planning process of project is one of the most challenging parts of the project, which may greatly affect the whole effect of its realization. Good project planning is essential key for success. Despite this fact there are still companies even in the automotive industry that sometimes underestimate planning and replace it by operative approach. A lot of managers from this environment talk a lot about planning, but the reality is that they focus more on serial production, quality claims solving or payment of parts sorting due to a defect detected by the customer. The truth is that every organization needs a good methodology for planning projects if

it is to be successful. Lewis (1995) states, that the vast majority of project management is focused on tactical planning. Nevertheless, if company choose the wrong strategy, tactics do not help us much. It's the same as when company choose the right approach to solve the wrong problem.

Before we get into the project life cycle, it is necessary to get through preliminary phase when the supplier wants to get the project from the customer. Following questions needs to be answered:

- Where and in what situation are we in?
- For how much money it's worth to do it?
- Do we have the required resources for the project?
- What risks needs to be considered about this project?

Planning in automotive sector typically contains these steps and activities which may vary by customer and the tools used in planning:

- Define the problem to be solved by the project – In this section needs to be specify the target state of the project. Clearly define objectives and establish a framework strategy. We can include here project activities and also required technical parameters.
- Develop a risk management framework – The three main steps have to be as follows: identify, evaluate, define actions and control.
- Develop a description of the work using a work breakdown structure (WBS) – it is a tool used to identify all tasks in a project. Sometimes it is referred as a task list.
- Prepare the project master schedule and budget - Like scheduling of all milestones, budgeted planning is also very important in planning activities. Milestones must be designed so that they reflect the most important events in the project and close each project phase. Planning costs must be as accurate as possible and must count with all the sources that you need for the project.
- Establish a project team, the hierarchy and the necessary knowledge - At this point it is necessary to select the right team of people, taking

into account individual knowledge, experience and also provide clear definition of competences.

- Get the plan approval by stakeholders – It is very important to inform stakeholders about the plan.

According to Advanced Product Quality Planning (2008) all phases of product project planning should be linked as follows:

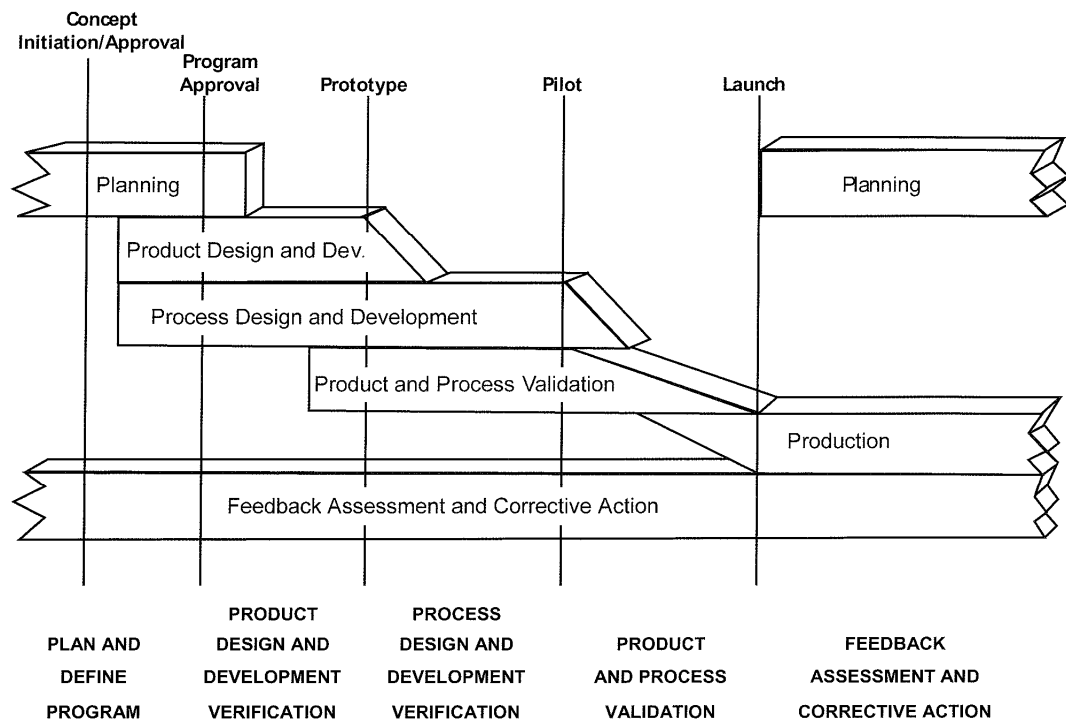


Figure 8– Quality assurance planning chart in project management
(Advanced Product Quality Planning - 2008)

First phase, planning and defining program, deals with linking customer needs and expectations with planning. The first step in the planning process must ensure that the expectations, requirements and needs are understood. Inputs and outputs at each stage may vary depending on customer needs and expectations. The following inputssould always be in the first phase:

- Customer voice and inputs
- Product / process benchmarking and assumptions

- Reliability study of product
- Business plan and marketing strategy

The outputs of this phase are the following:

- Preliminary bill of material, process flow chart and listing of special characteristics
- Design, reliability and quality goals
- Product assurance plan
- Management support
- Product assurance plan

The above outputs are input to the second phase of product design and development. At this stage, all design features and characteristics are frozen. There is a need to carry out a preliminary analysis to assess the feasibility and potential problems that could threaten the product at the manufacturing stage. According to Advanced Product Quality Planning (2008) this phase generates APQP and design inputs for the next phase, which are as follows:

Design:

- DFMEA – Design Failure Mode And Effects Analysis
- Design verifications, reviews and design for manufacturability
- Engineering specifications and drawings
- Drawing and specifications changes
- Control plan
- Material specifications

APQP:

- Process and product special characteristic
- New facilities, tooling and equipment requirements
- Requirements for gages
- Management support and team feasibility commitment

Afterwards the phase of design and development process follows and operates with the outputs of the previous phase. At this stage, everything is focused on the main features of the production system development and its monitoring and management. Production system must be adjusted to meet the customers requirements, needs and expectations on final product quality. In this section, outputs for the validation phase of the product are created in this list:

- PFMEA – Process Failure Mode and Effect Analysis
- Process instructions and flow chart
- Layout of floor plant
- Measurement System Analysis Plan
- Pre-launch control plan
- Management support
- Characteristics matrix
- Standards and specifications of packaging
- Preliminary process capability activities
- Process and product system review

The above elements are used in the penultimate stage of product and process validation. It is necessary to carry out a first production test to verify that the production process is able to produce parts according to customer specifications and in required quantity. If some risks are identified that might jeopardize quality of product, we must eliminate them before serial production. From this phase input emerge, that will be used later for feedback, corrective action and review. They are as follows:

- Production control plan, validation testing and part approval
- Significant production run
- Measurement system evaluations
- Packaging evaluation
- Preliminary process capability study
- Sign off and management support

Product quality planning can never end only with the validation of product and process. As the last and very important never-ending step, activities related feedback, corrective actions and assessment must be carried out. Process should focus on improving customer satisfaction, delivery and service, reducing its variability and especially the efficient use of acquired knowledge. The phases and inputs may vary depending on the type of the final customer. In the picture below we can see an example of quality assurance planning flow in practice.

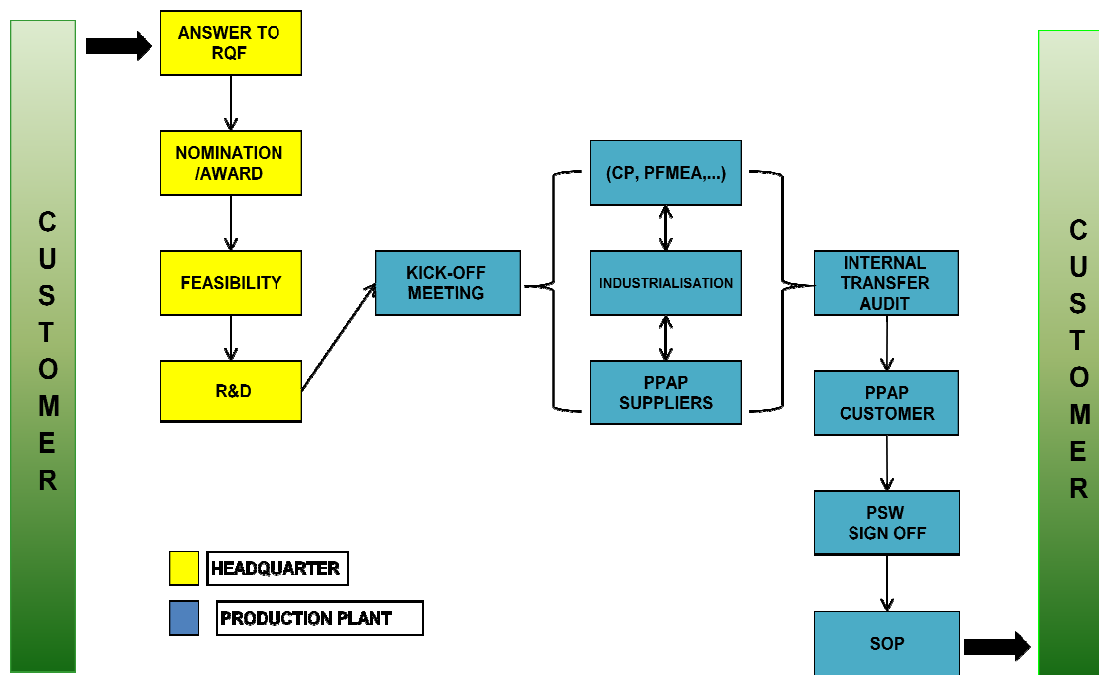


Figure 9 – Example of quality assurance planning chart

2.4 Tools of project management

Feuntes (2013) says, that in recent years, methods of project management achieved great development and application. It can be said that their classification is still not settled, but nevertheless they can be divided:

- according to the application stage
 - tactics
 - strategy

- evaluation
- implementation
- according to project concepts
 - ideological
 - technical
 - business and engineering

One of the most powerful technique in the project management is the work breakdown structure also known by the abbreviation WBS. WBS has not been developed for the automotive industry, but for the Navy in the United States in the fifties. After its defining by the Project Management Institute, it began to expand globally, and today it is an irreplaceable part of project management.

According to Rosenau (2007) the truth is that we may understand our project well enough to balance its quality, schedule and costs elements, but we also need to understand its phases, which means to be able to break it down. And that is exactly what this tool allows. Decompose the project task into its smaller manageable tasks. It is especially suitable for the implementation of demanding, large-scale projects where it is necessary to have an overview of all phases, tasks, subprojects and subtasks.

Render (2014) says that the typical WBS has three to six phases, but we have to say also that the one important question to ask is, when to stop breaking down the work. The general consensus is, that you stop, when you reach a point at which you can estimate the desired degree of accuracy or at which the work will take an amount of time equal to the smallest units you want to schedule. On the following picture we can see a simple example of work breakdown structure focused on new car project where each cell has its own work breakdown structure which is not displayed.

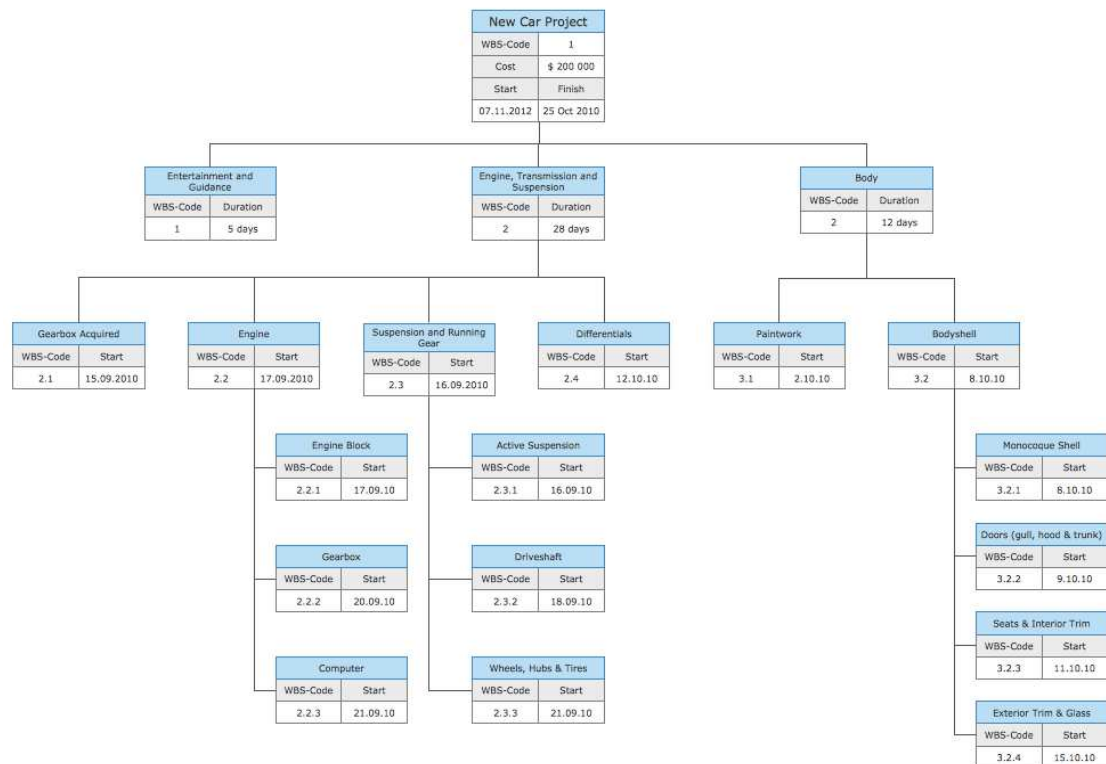


Figure 10– The work breakdown structure example of new car project.
(<http://www.conceptdraw.com> – accessed on: 21.08.2016)

Work breakdown structure is just one of many tools and techniques used in project management which divides project into various project activities.

2.5 Control and project management

The main commitment of every project is to satisfy stakeholders. The judges of each project success are the people who pay for it. Therefore, every effort should address the fact that at the end of the project these people are satisfied. This goes hand in hand with what is expected of a project manager - the person responsible of managing resources in such a way, that project objectives are achieved. Each project needs to be controlled and managed to avoid its not running on planned schedule.

According to Trávník (2012), plans tend to be inaccurate right from the beginning. They are actually models that try to capture the exact progress of

the project during its course. In the figure below we can see a simple flow diagram of the main elements of the control and management of projects.

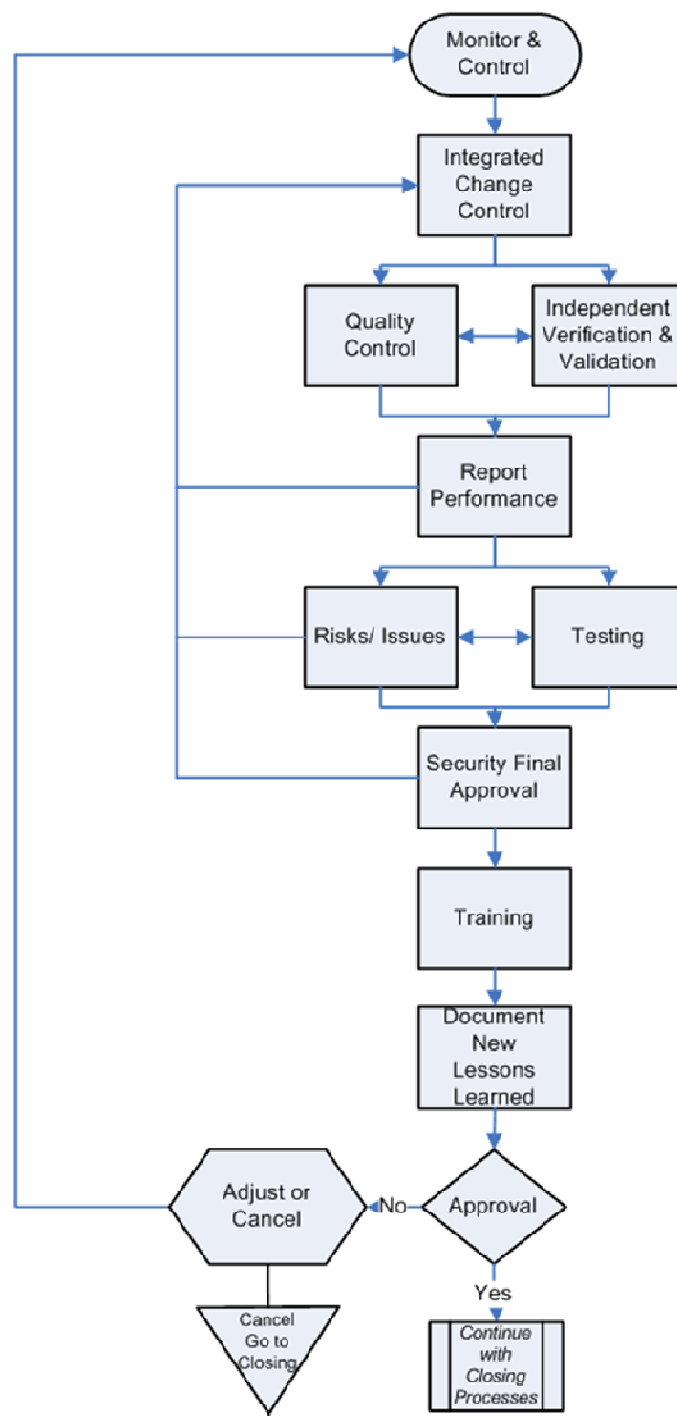


Figure 11 – Project management scheme
(<http://www.itplanning.org> – accessed on: 12.08.2016)

Management and control of the project in the automotive industry is seen as a complicated process. If we just looked at them through the life cycle phases we could miss important links, so we take a closer look at the following points, without which we could not bring the project to a successful end.

Controlling of project tasks achievement

During the control of individual tasks we must be really sure that obtained information is correct. We can check this several ways.

- Communication with project team, with the client and the management for the fast exchange of the most important information at the right frequency..
- Unannounced, scheduled and thematic meetings to discuss necessary issues with a predetermined program and the final meeting minutes as a output.
- Filling control documents pertaining to the project.

Change management

One of the most common project failure is constant occurring of changes and new requirements. The changes are and will be a part of every project and need to be managed. They can not be denied or ignored. The changes are almost always necessary, and each must be properly documented. Very often it is necessary to change the requirements for the product as a result of failed tests or the terms and conditions between the suppliers or customers. These are just a few examples. There can be many more reasons and they always depend mainly on the complexity of the project. It is very important, before starting the project, to approve the change management process and subsequently to follow agreed steps. Resistance is generally accompanied with every change. It's quite common because with every change comes more work and more responsibility, especially in automotive companies, with

insufficient money resources, where workload of employees could be a big problem. The changes, that are frequently encountered as a result of poor planning of the project, may be caused by the complexity of the project and inexperience of workforce.

Risk management

Nowadays the risk management is the prerequisite for successful completion of each project. This is an ongoing iterative process that takes place from the initial idea to the end of the project, what means all phases of the project lifecycle. Responsibility for risk management in the organization must be distributed within the whole project management department. The risk has always been, is and will be. It is actually a natural part of every project. It is necessary to know it well and as deep as possible to manage and eliminate it. Taylor (2007) says that each project is unique and therefore there is no universal list of risks. The project also involves a large number of people. It's a big social system and a lot depends from the actual relations. From experience we can say that most of the project risks are associated specifically with the technical and costs factor. The basic potential risks are:

- Risks related to the organizational structure of the project
- Risks associated with suppliers
- Risks related to project management
- Risks associated with the technical requirements of the project

The image below is a simple diagram of how risk management works in a project. In the first point, it is very important to identify risk with the tools for this purpose. Then we have to analyze the risk and in step three we will attempt to remove it or eliminate to the minimum. The last step is very important and means to control risk. There are a lot of tools used in automotive risk management process for risk identifying or reducing. The best known and most used are FMEA, DOE.

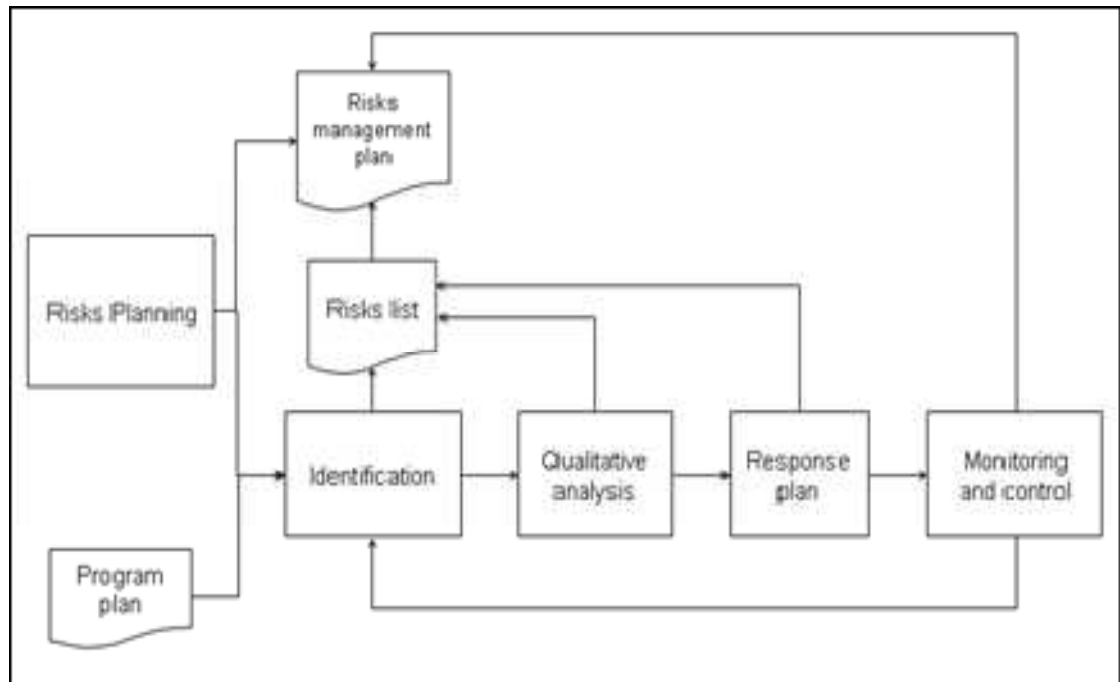


Figure 12 – Risk management process flow

(<http://www.moelichpm.com>– accessed on: 17.08.2016)

Project quality management

Project Quality Management deals with the project requirements, including product requirements and evaluates if they are validated and met. We can say that it is the approach, which proposes the necessary objectives, resources and provides organizational structure for the creation of the product.

Sunchez (2007) says, that there are three main project quality management processes, which interact with each other. It includes all the features and management activities, that participated in the making of quality policy, objectives and responsibilities. They are realized through planning, quality improvement within the quality system and operational management.

- Plan quality management - The process of aggregating all standards and requirements related to the products and the determination of how these conditions are fulfilled.

- Perform quality assurance - Activities carried out in order to ensure the production of parts based on the customer requirements. The quality is produced and not control. The verification of the measurement results is quality control. Namely verification through control if quality assurance was really effective.

In the next picture, the particular processes with techniques and methods pertaining to them are described, which are normally encountered in automotive project management quality.

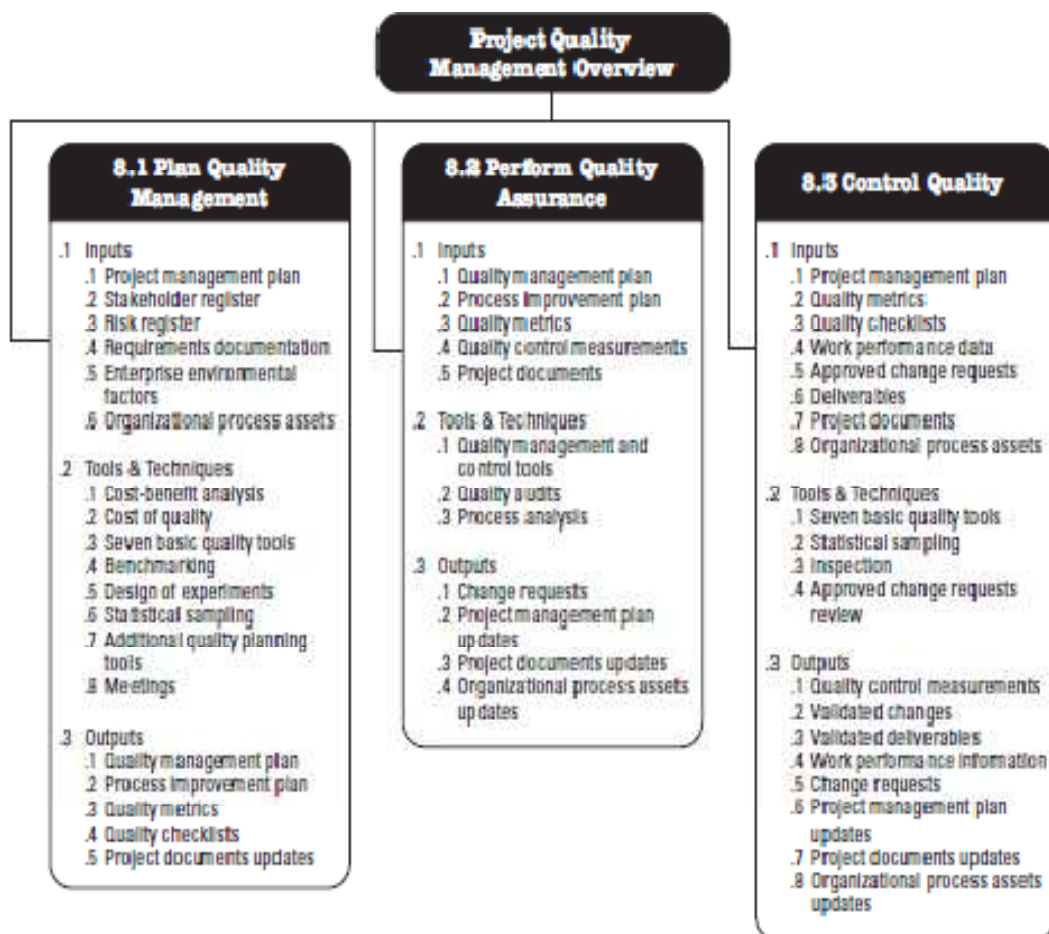


Figure 13 – Project quality management overview
(<http://www.globalspec.com> – accessed on: 11.08.2016)

2.6 R&D responsibilities in the project

It is known that the starting point for any project is to determinate the ultimate goal. Customer aproach in the automotive industry in respect to R&D department says, that its „customer“ is the production and it has to produce innovative solutions in the required quality, quantity and time. R&D must always be subordinated to the future strategy of the company. The main functions of a research and development department are to integrate in new project existing previous product updates, quality controls and innovation. The functions of this department are also closely related to the functions of the production and other divisions or departments. It is very important to cooperate with technical departments as maintenance, production, quality controlas well as with the support departments, marketing, sales. The department is crucial in developing new products through projects that are competitive through the experience andmarket research. Project success is highly dependent on the final product, which means the way its designedandhow are designed the actual processes of production. There are many responsibilities and tasks in relation to the project and final product. To the most important belong:

- Support the project launch
- Development of innovative solutions for customers
- Improve and correct the product(function, weight reduction, etc..)
- Gather all legal documents, including laws, regulations and patents, that are necessary for determining the projects feasibility
- Implement functional needs into specifications
- Help understand and analyse the positioning of theservice andproduct
- Set up the test and validation phases

Sometimes it is necessary to participate in benchmarking activities and test competitive products to get relevant information thatwe canapply later on to product specifications. Also one of the daily task is to gather any business

intelligence as patents and technologies to identify new scientific trends and strategic planning.

2.7 Production plant responsibilities in the project

Responsibilities of the production plant are oriented towards successful introduction of a product into production as much as possible. All responsibilities starting from the management up to the last person in the production are directed in this way. From the outset, it is very important to focus on elimination of any negative factors that could arise as a result of a failure to handle the pre-production phases and that could affect the end product. In a production plant, production verification phase and a phase of release into serial production takes place. A customer who validates a product and process by means of an audit is fully involved in the first phase following an internal verification and testing. If everything goes well in the second phase, it is followed by release of serial production and the associated feedback, final assessments and corrective measures in case shortcomings are detected. Responsibility of the production plant in these stages is to have serial tools, a trained production launch team and, in particular, performance standards of production.

In phases where the production plant starts to participate in the project in full, we can define these fundamental responsibilities or tasks:

- responsibility for production tests;
- measurement system evaluation;
- drawing up of provisional proficiency tests;
- approval of parts for serial production;
- supervision of validation trials of serial production;
- responsibility for packaging;
- responsibility for control plan;
- supervision of layout of production premises;

- responsibility for approval of quality planning and continuous management support;
- continuous reduction of variability;
- improvement of customer satisfaction;
- improvement of supply and service;
- continuous work with PFMEA

3. Research results, analysis and evaluation

116 people were approached, who work in the automotive production plants in Slovakia. In the table below you can see the list of selected production plants. Of these 116 approached people, we got 64 responses which represents a sample of 55.17% responses. Research was made through previous contacts, some of who also participated in the questionnaire circulated to be able to collect as many responses.

Plant	Focus on	Location	Headquarters
ESNASA	stamping and welding	Leopoldov	Spain
ESTAMP	stamping	Zlaté moravce	Spain
FARQUELL	stamping and welding	Nitra	Spain
MIBA	brake components	Vráble	Austria
FAURECIA	dashboards and dbumpers	Hlohovec	France
ZF	shock absorbers	Levice	Germany
PROKEŠ	rubberized components	Oravská Jasenica	Czech
FAURECIA	seatings	Trnava	France
ZF	powertrain module	Trnava	Germany
FAURECIA	interior and exterior systems	Hlohovec	France
VISTEON	components for dashboards	NITRA	USA
MIBA	steel discs	Vráble	Austria
Johnson Controls	seating systems	Lučenec	USA
MIBA	components for body and chassis	Dolný Kubín	Austria
HELLA	lights	Bánovce nad bebravou	Germany
PLASTIC OMNIUM	bumpers, spoilers	Lozorno	France
Inalfa Roof Systems	sun-roof systems	Piešťany	Netherlands
SAS Automotive	cockpit assembly	Bratislava	Germany
Kongsberg Automotive	components	Vráble	Norway
OSRAM	lights	Nové Zámky	Germany
MAGNA	exterior and interior mirrors	Nové Mesto nad Váhom	Canada
TOWER Automotive	metal components	Malacky	USA
TRW Automotive	safety systems	Nové Mesto nad Váhom	Germany
LEAR Corporation	seating systems	Voderady	USA
DURA Automotive	Body & Glass Systems	Stupava	USA
SEMECS	Electrical components	Vráble	Netherlands

Table 1 - List of selected production plants

3.1 Research results

Question 1: Is your plant sufficiently involved in the projects before their arrival in your plant ?

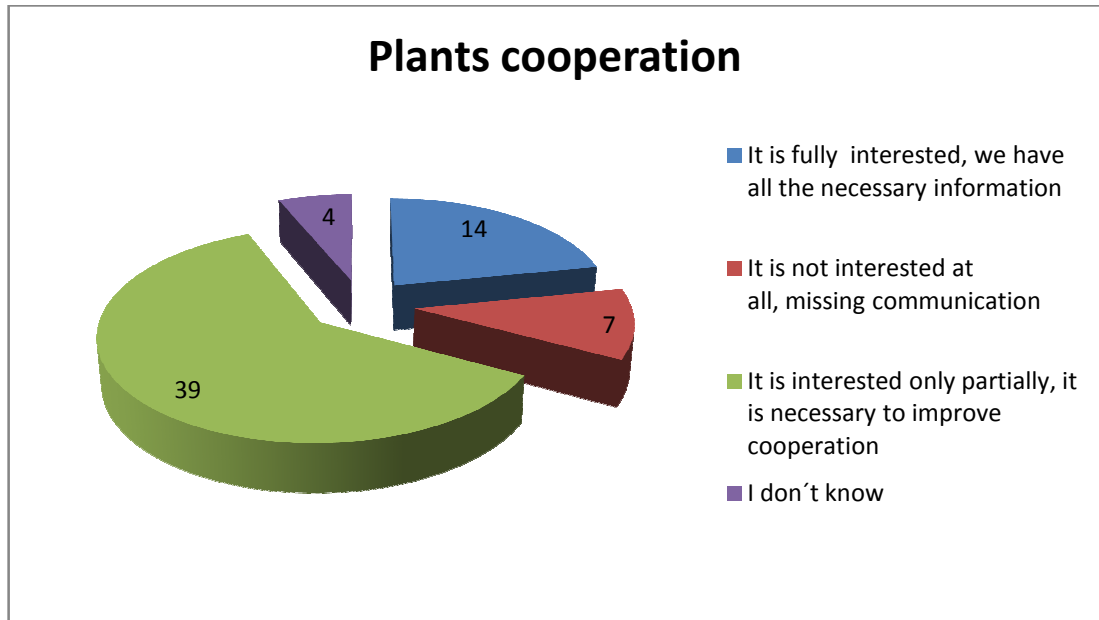


Figure 14 – Plants cooperation

To the first question many people (60.93%) answered, that the cooperation between plants is not sufficient and must be improved. 14 of respondents said that all works as it should (21.87%). The rest (10.97%) claimed that they are entirely not involved in the project until its arrival at the plant.

Question 2: Do you have available all the project documentation when transferring the project to the plant?

The second question focuses on the exchange of documentation between plants in the project transfer phase. We received the following sample of responses, which was more or less balanced. 37,5% (24 responses) responded that project documentation is always incomplete. 25% said that they will receive full documentation after additional request. More

than one third (34,37%) always have all the documentation and only two responders do not have any documentation available after the project transfer phase.

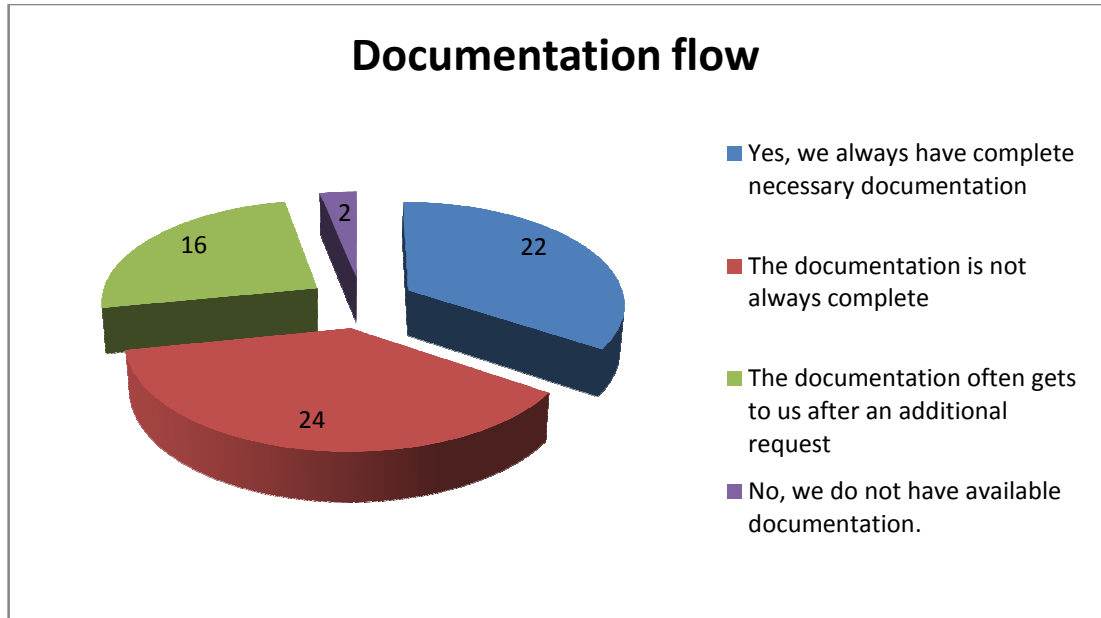


Figure 15 – Documentation flow

Question 3: Where do you think the source of the problems is, which you experienced in the start of production?

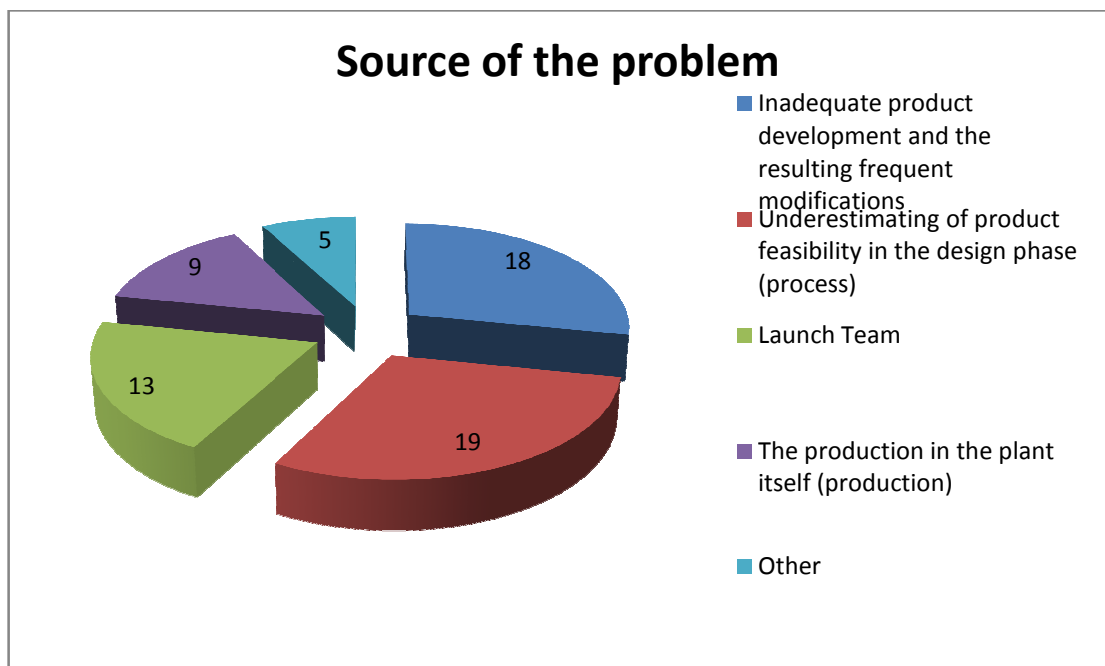


Figure 16 – Source of the problem

In this question we focused on finding sources, respectively root causes of the problem during the project start of production at the plant. Two options got almost the same number of votes. 18 people (28.12%) chose "Inadequate possibility of product development and the resulting frequent modifications" and 19 people (29.68%) chose the possibility of "Underestimating of product feasibility in design phase (process)". Response "Launch team" received 13 votes. "Actual production in the factory" got 8 votes (14.06%) and 7.81% of the people chose other sources.

Question 4: Do your colleagues in the headquarters consider you equal partners?

In the fourth question we focused and obtained answer to the question "Do your colleagues in the headquarters consider you equal partners?". Possibilities for a response were four and were answered with the following percentage. 42,18% (27 votes) feel as an equal partner to the headquarter plant. 34.37% think that they feel equal, but it depends on a particular person in the headquarters. 22 people responded like this. 21.87% (14 votes) think that they are not considered equal partners and are considered only cheap labor. The rest 1% (1 vote) could not say.

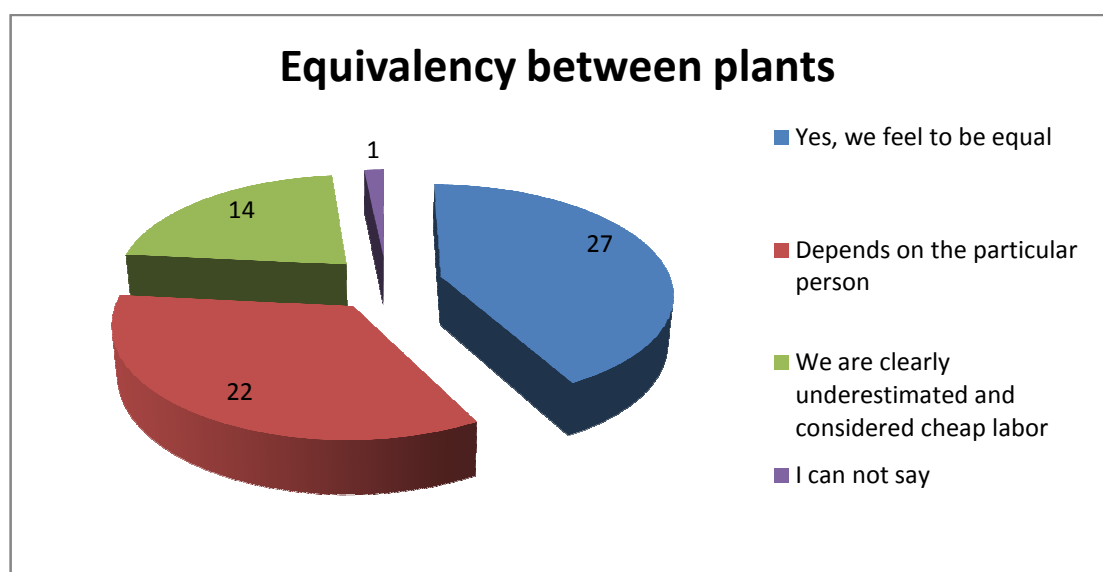


Figure 17 – Equivalency between plants

Question 5: How is your overload evaluated on projects within your work?

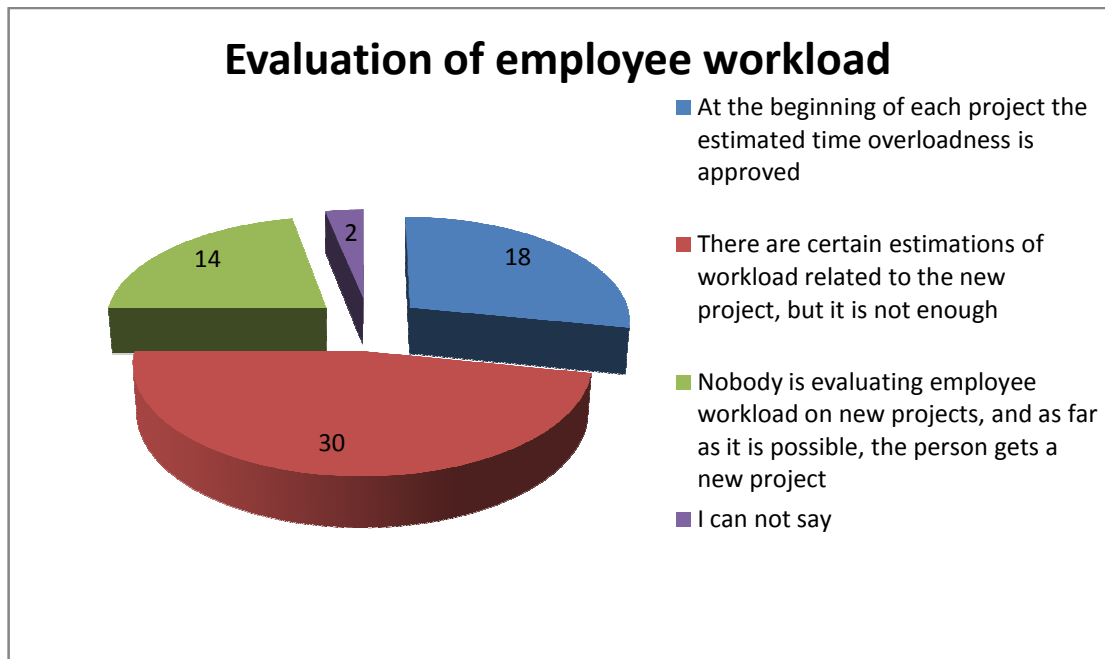


Figure 18 - Evaluation of employee workload

The fifth question examines workload of employees in project management and offers several options to answer questions and follow up on what is the real situation. 30 votes, which represents 46.87% respondents, chose option "There are certain estimations of workload related to the new project, but it is not enough". 21.87% of respondents (14 votes) agree with arguing that nobody is evaluating employee workload on new projects and as far as its possible the person gets a newproject. 28.12% chose the option "At the beginning of each project the estimated time overloadness is approved" which is 18 votes. 3.12% (2 votes) could not say.

Question 6: Do you apply, or is there an existing, projectslaunch in your production plant?

In this question we focused on the evaluation of whether the production plants have system of new projects launchand if so, whether it is fully in operation. The choise "The system might exist, but people do not know it" was picked by 29,68%, which is 19 votes. 48,43% of the respondents

decided for "System is in place and it is in operation" with 31 votes. 11 respondents (17,18%) think that no system exists, project launch is pure operativ. Three respondents did not know.

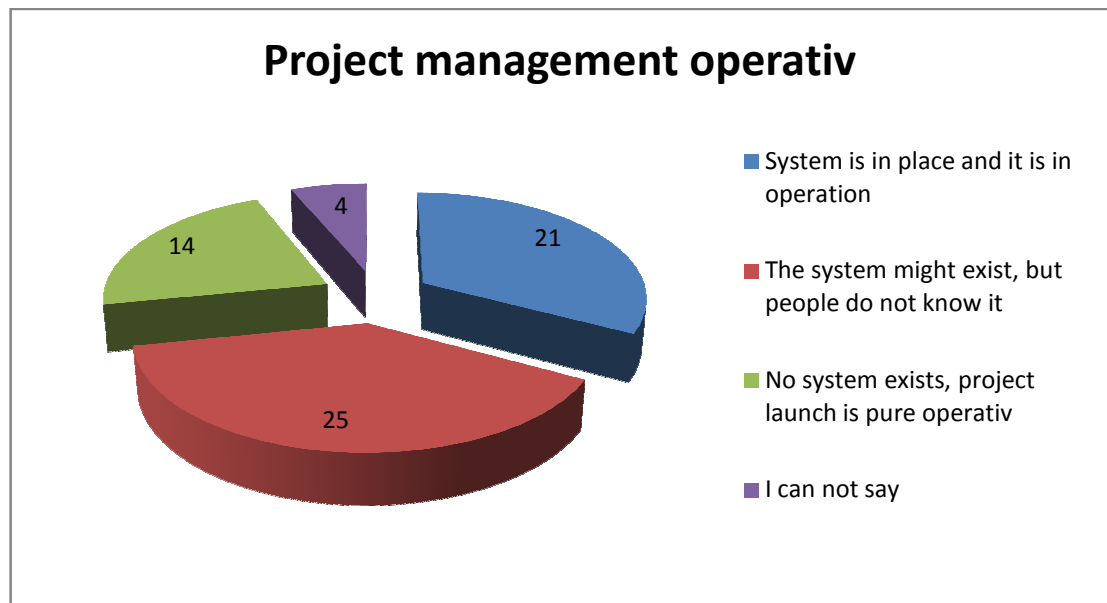


Figure 19 – Project management operativ

Question 7: How do you assess the evaluation of projects and capitalization of experience (Lessons Learned)?

In the seventh question we tried to look at the problem of projects evaluation and related applying of lessons learned on following projects. The choices were 5 options. Most respondents selected option "The end of the project is officially announced and the sources (people) release" 44.37% - 22 votes. 15 respondents argued that we learn from our mistakes, Lessons Learned system works (23.43%). As an answer "Lessons learned are not capitalized, constantly repeating the same mistakes" was picked by 21.87%, which is 14 votes. 11 respondents (17,18%) have aview that the projects are not evaluated at all. The last two votes were assigned to the "We barely know that the project officially ended" (3.12%).

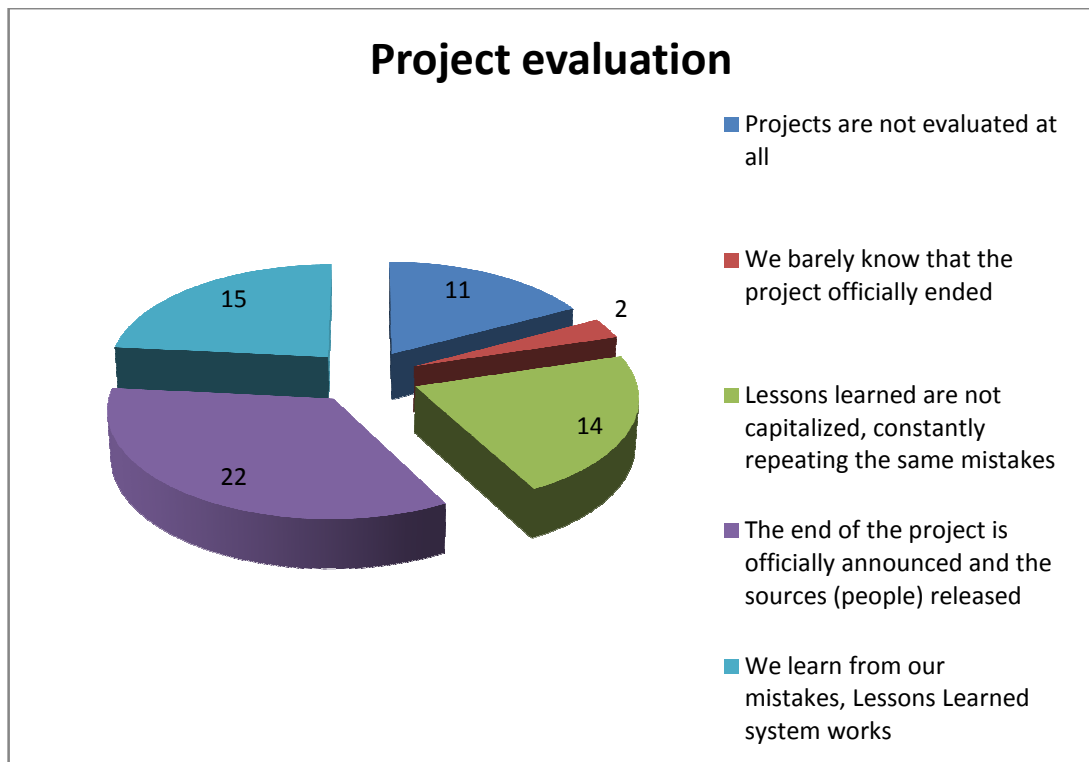


Figure 20 – Project evaluation

Question 8: How do you assess education in project management area in your company?

Eighth question from the view of good project management is also very important. We examined here what is the real situation in the field of education focused on the area of project management in production plant. As in the previous questions we begin with answers that get the most votes. 22 votes (34.37%) as a response chose "Training is an exception, mostly as a response to a given situation (f.e. : auditor note, problem on the project)." 19 respondents argued that each project manager had a training in project management (29.68%). Option "Each member of the project team had a training in project management" was picked by 13 respondents, which represents 20.31%. 10 respondents (15.62%) said they never had a training in project management and apply system of work "learning by doing".

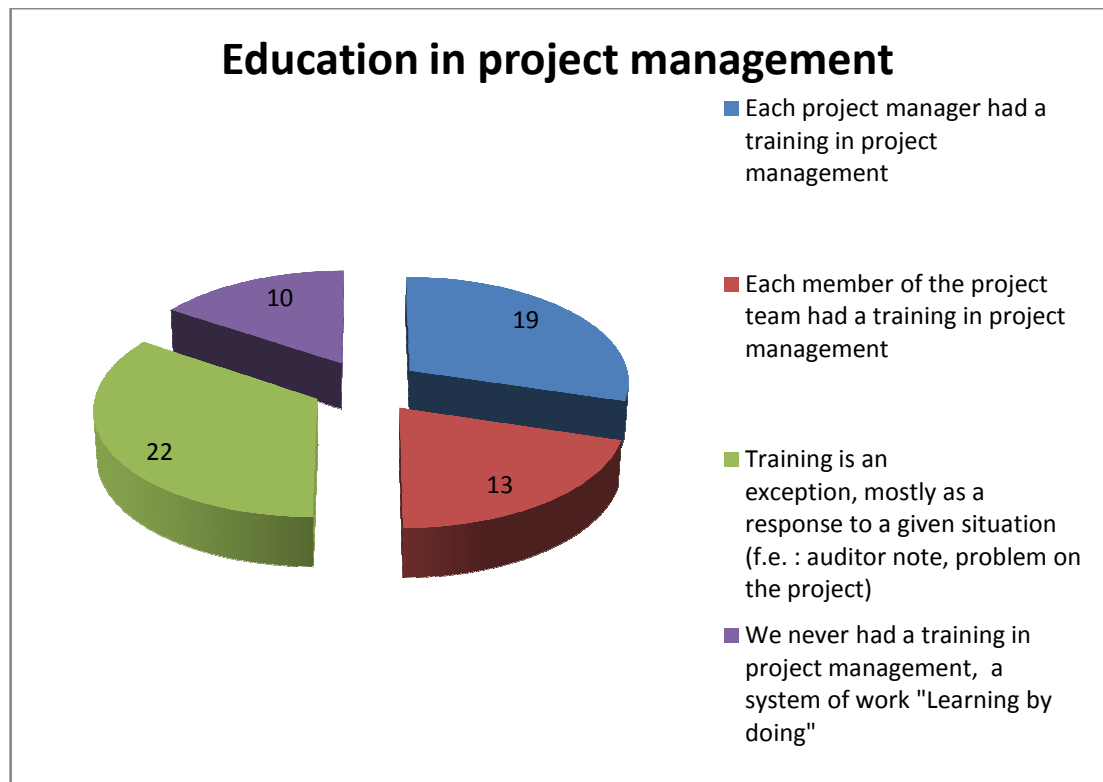


Figure 21 – Education in project management

3.2 Research analysis

The sample of respondents itself was broad. People participating in this research can be categorised from new young engineers to experienced experts formed by practice. The working environment in which they spend most of the time is very diverse as well, either in terms of size of the plant in which they work or in terms of the country where the main company is located. All these aspects were combined and we could expect that the responses obtained would cover as wide range of operation in the project sphere as possible. As we already know, the research objective was to confirm or refute the hypotheses that were designed on the basis of experience and current view of the topic by the author. Based on this, we will analyse the individual issues in more detail than only by a percentage.

In the first question we asked the respondents whether the plant that they work at is sufficiently involved in projects before their arrival at the plant. This is a very important point, because production plants are fully dependent

on the mother company and the information about the project that they get. The mother company must communicate with the production plant all the time and the plant must communicate with customers already in the pre-series stage in order to be able to subsequently meet all the requirements of the project. All this can be reflected in quality of the product and eventually lead to a customer downtime. Such case involves considerable finances, which can even lead to a plant closure in case of a major project. Almost two thirds of respondents claim that their plant is only involved in part and the cooperation should improve. When we add other 11% of respondents who say that cooperation with the mother company is very poor and there is no communication, the first problem that we should focus on and eliminate unconditionally appears. 22% of respondents replied that the communication takes place without any problems and they have all the necessary information before arrival of the project to the plant, which can be seen as an ideal condition.

After answering the first area we went on to documentation. Documentation is very important and should be worked on from the first phase of the project planning. The documentation should be summarized as a whole and submitted during transfer of the project to the production plant. Each missing document can eventually give rise to potential risk and endanger quality of the supplied product. All the relevant information and customer requirements relating to the product are transferred in the documentation so that the final product meets all the quality and safety features. One third of respondents claims that the documentation is not always complete and a second third claims that they have complete documentation always available. As only two respondents replied that they never have any documentation, one could say that, overall, the situation is balanced. However, there is a group of votes for the option that the documentation only arrives in the production plant upon additional request. This was the reply of one quarter of respondents. When we look at it globally, in most plants there is a problem with the documentation. It is either missing or submitted late.

In the next area we focused on what can be the source of unexpected problems in production launch. This is the question we asked the respondents. We all know very well that projects consist of several phases, a lot of time passes from request for quotation to feasibility study and production of first samples and every small underestimation of risk can lead to a problem in the final phase. There were five options to choose from. Two options received about one third of votes each. It was namely the answer that problems are due to insufficient product development and the resulting frequent modifications and the second answer was that problems were due to underestimated manufacturability of the part in the design phase. 20% say that the start-up team is accountable, and 14% claim that it is the production that is accountable. Five respondents gave other reasons. The options for the answer are diverse but related, and each of them has the same seriousness if we want to obtain a final product that meets customer expectations. However, if we were to find related issues, insufficient development and feasibility study are most related in the development phase and together they were chosen by two thirds of respondents, so they can form the core that can be cause of the problems in the future, during production launch.

Fourth question of our research dealt with the relationship between headquarter and production plants. A question arises whether mutual relationship based on trust and equality of these two units is necessary. It certainly is. Unless the cooperation works as best as possible, we are not able to achieve quality at the end of the chain of intracompany cooperation. Without mutual trust and equality we will not achieve the right chemistry of functioning of links between individual processes in the organization as a whole. I have myself faced this issue in practice and this question was asked with the view to verify the current situation and possible globalisation of this potential problem which in the end may be one of the elements of a failure to compete in the market. The question whether your colleagues at the head office treat you as equal partners was replied by 64 respondents as follows. Less than half say they feel to be equal partners to headquarter companies

and have no problem. One quarter replied that it depends on the particular person and the other 20% of respondents believe that colleagues at the headquarters obviously regard production plants merely as a source of cheap labour and underestimate their employees. Trust and equality between plants is one of the biggest pillars of success in the market and therefore, as in every fifth society people have mistrust of the mother company, this indicates another point to improve and become more effective from a global perspective on project management.

Next question was focused on workload of human resources in projects and presented accordingly. The human factor must be perceived as a source that can be depleted, rather than as a bottomless well. Practice confirms that it is the human factor that is related with a lot of project risks. Nowadays, each project is a major social system whose success largely depends on the people who are involved in its implementation. Without proper evaluation of time utilization and forces of each individual working on a project, number of erroneous decisions can increase very easily. Assessment of workload of each project team member must be an essential part of project planning in preliminary phases. People answered the question as follows. Almost half of respondents claim that workload is only measured very marginally and it is not sufficient in their plant. One third of respondents claim that everything works as it should in their company and workload is measured regularly before starting a new project and is approved. The remaining 21% say that in the plant, workload is not measured at all and as long as someone can keep up, they receive a new project. It is difficult to say whether it is enough to measure workload in the plant marginally. A deeper analysis of projects carried out in the plant and its results would be necessary. Clearly, however, attention must be drawn to the 21% of respondents who replied that their workload is not measured at all, which may eventually have a very bad impact on successful result of the project.

In the next part we looked at project production launch management. Beginning of serial production in a production plant has become an important performance criterion in recent times. This is due to not only a shorter life

cycle of products and an increasing number of possible variations, but also the related time reduction of product development in the automotive industry. The complexity of production launch management as an integration process between the product development and production can result in poor harmonisation of these two stages. In this stage important for the economy of the project, it can lead to inappropriate risk management and subsequent problems which can endanger the project. The question that was asked examined whether a project start-up system exists or is applied in the company. Half of the answerers claim that the process of launching new projects is implemented and applied. Focus, however, should be on the second half of the respondents. Part of them replied that the system is described in the plant, but nevertheless, no one hardly knows about it. The remaining 17% replied that the process of launching new projects in the plant is not in place and everything is solved operationally. In total, as much as 45% of respondents reported that they have not come across a project launch management process at all, or they are ill-informed.

The last one area of our examination is evaluation of project success. It is well known that each project lasts for a limited time. This means that it has an end point. The role of each project manager is to evaluate the project. This phase is very important and should be done despite the fact that due to competitive pressure to initiate new projects, not enough time is devoted to this area. A project should be evaluated from the perspective of meeting the objectives, compliance with the financial plan, as well as fulfilment of quality plan and experience capitalisation – lessons learned. It is very irresponsible to not utilize this knowledge in the following project and to not include it in know-how. Employees must feel management support in this area and they must be given sufficient time to make project evaluation a fully-fledged, controlled and applied process. In order to establish current status of the issue, we asked respondents how they assess project evaluation and experience capitalisation in their production plant. There were five options to choose from. The answerers should be divided in two categories. A bigger part indicated that the end of project is officially communicated and human

resources are released. They also learn from own mistakes, which means that the Lessons Learned system works in their plant. The focus, however, should be on the other, smaller part of respondents. They hold the opinion that in their plants, projects are not evaluated at all and the Lessons Learned system is not applied, which results in recurring errors. It should be noted that two respondents even claim that they hardly even know, when their project officially ended.

Last area of research was devoted to education of human resources in the area of project management. Automotive industry is moving rapidly forward and employees will find it difficult to get along with what they learned in the course of their school studies or previous experience. Education of employees has to be seen as a tool through which company can strengthen its competitiveness in the market. Human resources are a significant competitive advantage of an organization, and therefore their development cannot stagnate. It is also one of the great motivation factors to make sure that people deliver desired results. In today's project management it is necessary to ensure that every team member joining any project has an overview of basic instruments and principles of project management, knows all the product development phases and understands and is able to transfer customer requirements on a product. The question on how our respondents assess education in the field of project management in their company helped us map and understand the actual state of this field among Slovak suppliers without a R&D department. After analysis of the replies we discovered that exactly half of the respondents comment on the subject positively and the other half negatively. To be more precise, the first half says that each project manager, as well as each member of the project team, took a training in project management. What mattered in these answers was whether the questionnaire was filled out by a manager or only a member who did not keep track of their manager's training. In any case, we have to evaluate these answers positively. However, the other half indicated that training is exceptional, mostly as a reaction to a situation which can be an auditor's remark or a problem in the project. Some respondents from this half also say

that they never had any training in project management and their system of work is "Learning by Doing". These two answers should be assessed negatively from the education perspective and understood as a potential problem in a global view of project management.

3.3 Main problem identification

Until now, we have been dealing with research results and their more detailed analysis. In this chapter, we identify the biggest problems discovered in project management that car suppliers in manufacturing plants in Slovakia are faced with and that can have an impact on successful implementation of new projects.

After a thorough analysis of all answers we can define the main problems. Some of them were more serious based on the collected information and proportion of answers and after establishing links among questions, potential risks emerged from some answers as well. They are summarized and described in the following five points:

- Cooperation between headquarter and production plants - as we could see from the responses, a number of issues arises which, whether caused by busyness of individuals involved in the project on both sides or by presumptions "we are the headquarter - we are superior", eventually have a great potential to generate problems in the actual implementation of a project. Key to success is mutual understanding and the knowledge that the one without the other has no chance to compete in the market. A large number of people is often involved in projects, and therefore it has to be considered as a social system, whose success depends mainly on the respect for the same values across the organization and on mutual human relations.
- Project documentation - often forms the core of the whole project, contains long-term know-how in conjunction with the requirements on

the product and instructions on how to meet customer expectations. Omission or underestimation of any document, especially in the initial phase of development, has far-reaching negative impacts on the product. It is important for the production plant to have available all the necessary documentation approved by the customer in the project launch phases, as well as to not underestimate elaboration of any documents, such as a feasibility study, in the early stages of the development. The whole project and production team must keep a good track of main standards and documents of the customer.

- Assessment and training of human resources - from the research, it is clear that plants do not pay enough attention to employee workload measurement and their training. To postpone training planning until the auditor gives an incentive to do so is a very careless approach, same as to expect that an employee will develop by working. Especially for management and leadership positions, such approach is inappropriate and poor working habits may spread across the whole department. Workload measurement must also be included in the first phases of project planning, in order to prevent uneven workload and the resulting risks. Thus, we can improve performance of teams and achieve project objectives without additional human resources.
- Evaluation of projects - even though almost two thirds of respondents replied that the project is always officially closed, all the resources released and the approach "we learn from own mistakes" works, we need to point out the other 30% of respondents who claim the opposite. Evaluation of projects and application of findings is the simplest form of how to eliminate a lot of potential risks in the following projects and in the end to reduce costs of non-quality during production launch phase, by eliminating both confusion and over-control.

- Production launch and operational management - it is very important to start devoting more space to this problem in organizations as well. In order to maintain competitiveness, it is necessary to have a production launch system in place in the production plant, and the associated continuous application and improvement of the system. If we add improvement of cooperation with the headquarter, we will achieve better understanding of the individual phases of the project before its arrival to the production, which translates in better management and elimination of risks in project launch.

3.4 Recomendations for improvement

The same way as we have described and analysed the research and problems defined by it above, it is necessary to describe and propose recommendations in order to get rid of or initially at least partially eliminate current problems. From the number of the defined and described problems it is clear that they should be seriously addressed. Environment in the automotive environment is largely competitive and a supplier with a misadjusted system of project management in the organization cannot withstand the associated constantly increasing pressure and requirements of OEM customers on quality and reduction of costs.

On the basis of experience and results of the research, the following actions and recommendations have been proposed:

- measure performance and workload management of employees working on projects;
- training of employees in project management within career growth;
- more effective communication between the mother company and the production plant;
- involvement of the production plant in the project in its earlier stages;
- create and apply a production launch system that would be respected by the R&D center and also the production plant;

- verify functioning of the production launch system for a new product by process audit;
- create a process for evaluation of projects and applying lessons learned in practice;
- fully include the production and launch team in earlier project phases and regularly share information;
- correct use of project tools within the whole project management;
- ensure timely and correct delegation of customer requirements throughout the project team and subsequently throughout the whole organization;
- manage the exchange and preparation of project documentation in a time schedule;
- personal take-over of a project by the production team in the mother company.

4. Conclusions and hypothesis evaluation

At the beginning of the research itself, we established eight hypotheses by an expert estimate and in this last part of the thesis, we focus on their evaluation. All hypotheses examined in this work were established on the basis of the author's expert forecast and are substantiated and justifiable, both by practice and by numerous consultations with contacts operating in the automotive industry. The collected data for each reply and the related hypothesis enabled us to confirm or refute them, which is summarised below.

- Hypothesis 1: *Manufacturing plants are insufficiently involved in the projects prior to their arrival to the plant* – considered as a confirmed.

Only a little more than 20% of respondents claim that their plant is fully involved in the project before its arrival, which clearly confirmed this hypothesis.

- Hypothesis 2: *Production plants do not have available project documentation when transferring the project to the plant* – can be considered as a confirmed.

Two thirds of respondents agreed with this claim in part and in choosing the options they supported the claim that the plant only gets the documentation upon additional request and often the documentation is not complete.

- Hypothesis 3: *Most problems that occur at the beginning of production (feasibility study, timetable ...) are caused by insufficient development* – considered as a confirmed.

Most respondents opted for the option which was directly related to insufficient development, which confirmed the hypothesis.

- Hypothesis 4: *Local production plants do not feel equal partners to the headquarter and take them only as production locations (underestimating)* – can be considered as a confirmed.

Less than half of respondents does not consider this claim to be true, but the rest of answerers confirmed that production plants are taken as cheap labour and the attitude of the headquarters to the production plant also depends on the particular person.

- Hypothesis 5: *Nobody does not measure overload of employees on projects, overload feeling* – considered as a confirmed.

The hypothesis was clearly confirmed by two thirds of respondents who claim that assessment is insufficient or none.

- Hypothesis 6: *Project management in manufacturing plants is being replaced by operative* – can be considered as a confirmed.

48% of respondents does not agree with the statement. The remaining part chose options which completely or partially confirm the hypothesis, so we can take it as confirmed.

- Hypothesis 7: *Mild to no evaluation of project success and weak capitalization Lessons Learned* – considered as a confirmed.

Two thirds of respondents claim that no assessment of projects takes place in the plant, or it is not sufficient. Sometimes the information on completion of the project does not reach them, which confirms the hypothesis.

- Hypothesis 8: *People are not satisfied with the training program within of project management* – considered as a confirmed.

This hypothesis is more difficult to evaluate, given that precisely one half of respondents stated that all project leaders and team members receive adequate training in project management. However, as 50% of respondents state that no education in the form of training or only in case of unforeseen circumstances takes place in their plant, we can say that the hypothesis is confirmed.

The quantity of collected responses and the number of companies surveyed gave us an opportunity to create a current and complete picture of the situation in production plants in the Slovak Republic, where all development activities are carried out in mother companies. It was also possible to clearly outline the issues being solved and to subsequently set out recommendations for improving areas, where weaknesses were identified. The possible corrective measures which we can determine from the proposed recommendations for improvement can finally bring benefits across an organization in the form of long-term savings of project costs, improvement of corporate strategy, more educated employees and their motivation, as well as an increase in competitiveness in the market.

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5. Bibliography

MAJTÁN, M., Projektový manažment. Bratislava:Elita2009. Prvé vydanie. ISBN 978-80-89393-05-3

ROSENAU, M.D., Rízení projektu. Praha:Computer Press, 2007.

DIETHELM, G., Projektmanagement. Band 2: Sonderfragen. Berlin: Verlag Neue Wirtschaftsbriefe, 2001.

MÁCHAL, P., KOPEČKOVÁ, M., PRESOVÁ, R., Svetové standardy projektového řízení pro malé i střední firmy.Praha:Grada Publishing, 2015 ISBN 978-80-247-5321-8

DOLANSKÝ, V., MEKOTA, V., NEMEC, V., Projektový management.Praha::Grada Publishing, 1996. ISBN 80-7169-287-5

KOONTY, H., WEIHRIH, H., Management.Vienna:Victoria Publishing, 1993

KORENKO, M., Riadenie projektov. Nitra:Slovenská poľnohospodárska univerzita v Nitre, 2014 Prvé vydanie. ISBN 978-80-552-1236-4

TAYLOR, J., Začíname rídit projekty. Brno:Computer Press, 2007. Prvé vydanie. ISBN 978-80-251-1759-0

TRÁVNIK,I., TAKÁČ,R.CH., Uzda na projekt. Príručka pre profesionálne riadenie projektov. Košice:Equilibria.2012. Prvé vydanie. ISBN 978-80=8143-024-4

Advanced product quality planning (APQP) and control plan. Chrysler Corporation, Ford Motor Company, General Motors Corporation (2008) Second edition. ISBN 978-1-60534-137-8

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7. Appendix

Questionnaire:

Slovak version of the questionnaire

Vážený respondent, Vážená respondentka,

dotazník, ktorý sa práve chystáte vyplniť, bol navrhnutý za účelom získania a následného vyhodnotenia údajov pre výskum realizovaný ako súčasť diplomovej práce „Efektívne spustenie projektov v spoločnostiach bez R&D“ programu MBA Automotive Industry Technickej univerzity Viedeň.

Ako určite viete, projekty sú často rozhodujúcou súčasťou strategického riadenia podniku a preto si akokomplexný proces vyžadujú neustálu analýzu, podporu vrcholového manažmentu a centrály, ako aj efektívnu tímovú spoluprácu. Ak chcú slovenské závody uspieť vo vysoko konkurenčnom prostredí, ktoré sa utvorilo po našom vstupe do EÚ, je ich úspešné zvládnutie a spolupráca s centrárou v projektovom riadení nutnosťou.

Účelom a cieľom dotazníka je získať poznatky o súčasnom stave projektového riadenia v slovenských závodoch bez oddelenia výskumu a vývoja (R&D) na vzorke viac ako 100 respondentov a na základe zistených podnetov navrhnúť možnosti zefektívnenia.

Rád by som Vás taktiež ubezpečil o plnej anonymite tohto dotazníka.

Ďakujem Vám za Váš čas a pomoc.

S pozdravom

Peter Sabo

Je Váš závod dostatočne zainteresovaný v projektoch pred ich príchodom do závodu?

- Je zainteresovaný v plnej miere, máme všetky potrebné informácie
- Nie je vôbec zainteresovaný, chýba komunikácia
- Je zainteresovaný len z časti, určite treba spoluprácu zlepšiť
- Neviem

Máte k dispozícii projektovú dokumentáciu pri transfére projektu do závodu?

- Áno ,vždy máme kompletnú potrebnú dokumentáciu
- Nie vždy je dokumentácia kompletná
- Často sa k nám dokumentácia dostane až po je dodatočnom vyžiadaní
- Nie, dokumentáciu nemáme k dispozícii

Kde je podľa Vás zdroj problémov, ktoré sa u Vás objavujú pri nábehu výroby?

- Nedostatočný vývoj produktu a z toho vyplývajúce časté modifikácie
- Podcenenie výrobitel'nosti dielu vo fáze dizajnu (proces)
- Nábehovým tímom (Launch Team)
- Samotnou výrobou v závode (výroba)
- Neviem posúdiť

Berú Vás kolegovia v centrále ako rovnocenných partnerov?

- Áno, cítime sa byť rovnocenní
- Závisí na konkrétnom človeku
- Sme jednoznačne podceňovaní, berú nás ako lacnú pracovnú silu
- Neviem posúdiť

Ako hodnotíte svoju vyťaženosť na projektoch v rámci Vašej práce?

- Na úvod každého projektu sa odhadne časová vyťaženosť, ktorá je schválená
- Určitý odhad vyťaženia v súvislosti s novým projektom existuje, ale nestačí to
- Nikto nemeria vyťaženosť na nových projektoch. Pokiaľ človek vládze, dajú mu nový projekt
- Nevieť posúdiť

Existuje, resp. je aplikovaný vo Vašej spoločnosti systém nábehu projektov?

- Systém existuje a funguje
- Systém môže existovať, ale ľudia ho nepoznajú
- Žiaden systém neexistuje, nábeh projektov je čistá operatíva
- Nevieť posúdiť

Ako hodnotíte vyhodnocovanie projektov a kapitalizáciu skúseností (Lessons Learned)?

- Projekty sa u nás nevyhodnocujú vôbec
- Ani nevieme, že projekt oficiálne skončil
- Lessons Learned nie sú kapitalizované, stále sa opakujú tie isté chyby
- Koniec projektu je oficiálne oznámený a zdroje (ľudia) uvoľnení
- Učíme sa na vlastných chybách, systém Lessons Learned funguje

Ako hodnotíte vzdelávanie v oblasti projektového riadenia vo Vašej spoločnosti?

- Každý Projektový manažér mal školenia na projektové riadenie
- Každý člen projektového tímu mal školenie na projektové riadenie
- Školenie je výnimočné, väčšinou ako reakcia na danú situáciu (poznámka audítora, problém na projekte)
- Školenie na projektové riadenie sme nikdy nemali, systém práce „Learning by doing“

English version of the questionnaire

Dear respondent,

the questionnaire, which you are about to complete, was designed to obtain a subsequent evaluation of the data for research conducted as a part of the thesis: "Effective project launch in companies without R&D", MBA Automotive Industryprogram of Technical University Vienna.

As you know, projects are often a crucial part of the strategic management of the company and therefore as a complex process, they require constant analysis, support of senior management and headquarters, as well as effective teamwork. If the Slovak production plants want to succeed in a highly competitive environment, which is formed after our accession to the EU, their successful management and collaboration with headquarters in project management is a necessity.

The purpose and objective of the questionnaire is to gain insight into the current state of project management in the Slovak plant without research and development (R&D) department on a sample of more than 100 respondents, and based on the findings suggest the possibility of streamlining.

I would like to also assure you of full anonymity of the questionnaire.

Thank you for your time and help.

Sincerely

Peter Sabo

Is your plant sufficiently involved in the projects before their arrival in your plant ?

- It is fully interested, we have all the necessary information
- It is not interested at all, missing communication
- It is interested only partially, it is necessary to improve cooperation
- I don't know

Do you have available all the project documentation when transferring the project to the plant?

- Yes, we always have complete necessary documentation
- The documentation is not always complete
- The documentation often gets to us after an additional request
- No, we do not have available documentation

Where do you think the source of the problems is, which you experienced in the start of production?

- Inadequate product development and the resulting frequent modifications
- Underestimating of product feasibility in the design phase (process)
- Launch Team
- The production in the plant itself (production)
- I can not say

Do your colleagues in the headquarters consider you equal partners?

- Yes, we feel to be equal
- Depends on the particular person
- We are clearly underestimated and considered cheap labor
- I can not say

How is your overload evaluated on projects within your work?

- At the beginning of each project the estimated time overloadness is approved
- There are certain estimations of workload related to the new project, but it is not enough
- Nobody is evaluating employee workload on new projects, and as far as it is possible, the person gets a new project
- I can not say

Do you apply, or is there an existing, projects launch in your production plant?

- System is in place and it is in operation
- The system might exist, but people do not know it
- No system exists, start-up projects is pure operative
- I can not say

How do you assess the evaluation of projects and capitalization of experience (Lessons Learned)?

- Projects are not evaluated at all
- We barely know that the project officially ended
- Lessons learned are not capitalized, constantly repeating the same mistakes
- The end of the project is officially announced and the resources (people) released
- We learn from our mistakes, Lessons Learned system works

How do you assess education in project management area in your company?

- Each project manager had a training in project management
- Each member of the project team had a training in project management
- Training is an exception, mostly as a response to a given situation (f.e. : auditor note, problem on the project)
- We never had a training in project management, a system of work "Learning by doing"