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PROJECT MANAGEMENT OF SAP ERP IMPLEMENTATION PROCESS

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ABSTRACT

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This paper's aim is primarily to identify and analyze critical success factors of SAP ERP implementation process. Secondary aim is to provide an overall summary of all topics directly related to SAP ERP implementation, including project management. The overall target is to address the issue of the implementation process management.

The theoretical part provides an overview of project management concepts as well as the specifics of IS/IT implementation. SAP ERP system is presented. ERP systems, and particularly SAP, have become a vital part of well-functioning businesses, ranging from SMEs to large businesses, therefore an insight into this exciting cross-dimensional field is presented.

In order to reach the primary aim of the thesis, survey and interviews have been made. All respondents have significant experience in SAP ERP implementation. The target of the research was either to help support the theoretical outcomes or provide aditional first-hand knowledge. The research brings value and understanding into the complex issue of cross-dimensional and extensive SAP ERP implementation projects.

Key words
ERP, implementation process, project management, SAP

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1 INTRODUCTION

Projects have become a common part of our lives. Already during elementary school education, students are asked to work on complex assignments, both individually and in groups. In business world, projects allow the realization and implementation of innovation activities and development of new products or services. Furthermore, wide and complex structures are built in the form of projects and similarly, process changes are implemented in organizations.

Using the methods and principles of project management, a project can be any nonrecurring, unrepeated human activity, limited in time and needed to be planned and implemented with planned costs in a way that supports the achievement of desired goals.

Project management in a specific information technology settings represents a variety of complex activities, especially when ERP (Enterprise Resource Planning) systems implementation is involved.

ERP system is an information system which integrates and automatizes significant amount of processes related to typical business activities. To be more specific these activities include production, logistics, distribution, asset administration, billing/invoicing and accounting. SAP is an ERP system which has the biggest share on the market.

SAP ERP implementation projects are an interesting mix of several fields with particular attention to IS/IT (Information Systems and Information Technology) and project management. As ERP systems are used to manage company's resources, most business disciplines are involved as well.

The aim of the thesis

The aim of this thesis is primarily to identify and analyse critical success factors of SAP ERP implementation projects. Secondary aim is to provide an overview of all concepts directly related to SAP ERP implementation projects. In order to reach those aims, it is firstly needed to provide an overview and explanation of several concepts regarding the implementation projects.

Methodology used

To reach both aims of the thesis, it is firstly needed to present the theoretical part in order to explain and provide a deeper insight into disciplines directly related to SAP ERP implementation projects. This includes project management, where overall insight into project management and specifics of IS/IT implementation projects is presented. The system itself is presented as well, including explanation of concepts necessary to grasp the specifics of SAP ERP implementation process. Afterwards, SAP ERP implementation process is presented in detail, followed by identification and analysis of critical success factors using mainly publications like books and articles.

After presentation and explanation of all concepts, a research part of the thesis is presented. The research consists of both qualitative and quantitative parts. The qualitative research consists of two in-depth interviews with experts on SAP ERP implementation projects. The interviews were conducted in order to assess and analyse the reliability of theoretical findings as well as provide practical insight into the issue of critical success factors of SAP ERP implementation process.

The quantitative part consists of an online survey that included 10 question and has been sent to people who have been working on various SAP ERP implementation projects. 30 professionals have responded to the questionnaire, which yielded interesting and valuable results. The main purpose of the survey was to support the qualitative research findings as well as theoretical findings and if possible, provide additional information on SAP EPR implementation projects.

2 PROJECT MANAGEMENT

In order to provide comprehension of SAP ERP implementation process, it is necessary to understand that every SAP ERP implementation process is a project. Therefore, project management and SAP ERP implementation process are closely related. This chapter aims at providing deeper understanding of project management elements, such as project management processes, the usage of resources during a project, project life-cycle and finally methods and techniques used in project management. Lastly, a deeper insight into IS/IT projects will be provided in this chapter in order to grasp the concepts and particularities of such projects.

2.1 Definition

There is an infinite amount of definitions for the term 'project management', but the term itself is mostly used in the sense of a plan, a design or a solution of a problem or a task, no matter how difficult it is. The meaning of the term basically includes all life cycle phases of a project, starting with innovation phase, going through the creative phase and finally reaching the final phase. By this realization in the past, the meaning of the term 'project' has been significantly expanded, as previously the concept of a project was limited only to the final phase.

In previous project practice, the word project was used more generally as a theme, design, plan and complex solution of the task at hand. Contemporarily, the meaning of this word includes activities such as planning and managing extensive operations. The underlying meaning of this is that the ultimate goal is not only about the result and project documentation, but most importantly it is a creative process. (Němec 2002, 11.)

One way we could define the term 'project' is:

> A project is a goal-oriented draft for realization of a specific innovation in established dates of commencement and termination. (Němec 2002, 11)

More detailed definitions can be found as well. In fact, there is a very specific definition for projects.

> A project is a sequence of unique, complex, and connected activities that have one goal or purpose and that must be completed by a specific time, within budget, and according to specification. (Wysocki, Kaikini & Sneed 2014, 4)

However, the previous definitions failed to focus on the most important part of a project from business-focused point of view, and that is the purpose of a project. The purpose of a project is to deliver business value to the client and to the organization. An example of an intriguing business-focused definition of a project would be:

> A project is a sequence of finite dependent activities whose successful completion results in the delivery of the expected business value that validated doing the project. (Wysocki et al. 2014, 7)

2.2 Project management

Now that the term project is understood, project management can be described. Project management is a complex field that has recently received a lot of attention.

> Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements. (Project Management Institute 2013)

The task of project managers is to meet specific scope, time, cost and quality goals of projects. In addition, they must facilitate the whole process to meet the needs and expectations of people affected by or involved in project activities. (Schwalbe 2014, 9.)

It can be said that project management involves a mix of five interdependent project management processes:

- Initiating (correct formulation of project objectives)
- Planning (how to manage the 'triple constraint')
- Executing (proper allocation, coordination and management of resources – human, material and financial, output of this phase is referred to as project deliverables)
- Monitoring and controlling (actions and processes undertaken to observe the execution of a project in order to intercept potential problems in time and take corrective action, measuring ongoing project activities and monitoring project resources)

- Closing (project acceptance and termination, finalizing all activities)

These processes also correspond to project management life cycle model, which will be discussed further in this chapter. (Larson & Gray 2011, 16-17.)

The objective of project management is to secure quality planning and implementation of a successful project. A successful project means that the project objectives were met in planned time frame and with planned costs, and that the project implementation is not causing negative reactions among the staff. Projects are very specific in a way that a project implementation causes change. Usually, the change is not a direct effect of project implementation, but it is assumed that the project implementation will give rise to the implementation of change. Quality project management comes from knowing that once the scope, unfamiliarity, complexity, difficulty and riskiness of a project exceed a certain level, it is necessary to use appropriate methods to manage the whole operation. Project management uses a wide variety of methods in order to increase the probability of a successful project. These methods consist of verified and described procedures which deal with the issues of project planning and implementation. One of the key elements for successful projects is a quality work done by the project team, which is led by an experienced project manager. (Larson & Gray 2011, 16-17.)

Project management has indeed evolved during the past couple of years, and currently there are powerful forces contributing to the expansion of approaches of project management to various business problems and/or opportunities. The key to effective project management starts with the selection and prioritization of projects that are in line with the company's mission and strategy. Successful execution of a project requires both technical and social skills. The role of a project manager in this sense is to plan, budget and properly use all of project resources. (Larson & Gray 2011, 16-17.)

If project management is high-quality and professional, the project objective will be completed in established deadline and will not exceed planned costs. (Lewis 2000, 185.)

2.3 The iron triangle vs. the scope triangle

The term 'iron triangle' refers to the relationship between time, cost and scope (see FIGURE 1 below). These variables form the sides of a triangle and they are an interdependent set, which means that when any one of them changes, one or more variables must be changed as well in order to restore balance to

the project. However, Wysocki makes a point in his work that in fact more constraints should be considered, and those are:

- Scope
- Quality
- Cost
- Time
- Resources
- Risk

Wysocki's idea says that except for risk, these constraints form interdependent set, so if a change occurs in one constraint, a change in one or more of the other constraints might be necessary in order to restore equilibrium of the project. This means that in this context, the set of five parameters form a system that has to remain in balance for the project to be in balance. These parameters are crucial to the success or failure of a project, which is why every constraint will be further examined. FIGURE 2 below depicts graphical representation of this idea.

FIGURE 1. Iron triangle (adapted from Marchewka 2013, 10)

FIGURE 2. Scope triangle (adapted from Wysocki et. al 2014, 14)

Scope

The scope constraint in general corresponds with the initiating project management process. Scope is a statement which basically describes what will be done and what will not be done in a project. This statement is a foundation for all further project work and it is critical to make sure that the scope is correct. However, a project's scope can change and in fact, noticing the change and deciding how to adapt the change into the project plan is one of the major project management challenges. (Wysocki et al. 2014, 11; Bachelet.)

Quality

All projects have the following two types of quality constraints:

- Product quality – this concerns the quality of the project deliverables. In this sense, the product includes tangible elements like hardware and software but also business processes. Traditional tools of quality control are used in order to secure product quality.
- Process quality – this term refers to the quality of the project management process. The main part of this term is focusing on how well the project management process works and how it could be improved. In order to measure process quality, continuous quality improvement and process quality management tools are in use.

A reliable quality management program that monitors the project work is always a good investment for obvious reasons – it contributes to customer satisfaction and it also helps an organization to use its resources in a more effective and efficient way. A solid quality management program raises the probability of a successful project and client satisfaction. (Wysocki et al. 2014, 12; Bachelet.)

Simply put, the objective of the quality constraint is to constantly monitor and if necessary redirect the activities in the right direction by using multiple relevant criteria and indicators. (Corbel 2012, 9.)

Cost

The cost of implementing a project is one of the key elements that define the project. It is commonly thought of as the budget that was created for the project. Cost is of course a major constraint and it is one of the first things to be discussed. Cost of a project is also one of the factors which determine whether the project is feasible. (Wysocki et al. 2014, 12; Bachelet.)

Time

A time frame or deadline date is specified and agreed to in the project preparation phase. There is an interesting relation between cost and time. The time to complete a project is sometimes possible to reduce, but as a result the costs increase. As for project managers, their objective is to use the future time that has been allocated to the project in the most efficient way. Time also decides the pace of a project – if some part of a project is falling behind, it is necessary to speed up, if possible, in order to meet the deadline. (Wysocki et al.,2014, 13; Bachelet.)

Resources

Resources are all assets that have limited availability and which can be scheduled and organised, such as people, equipment and various facilities and inventories. Resource management is crucial for scheduling and organising project activities. The importance of different resources varies depending on the business context in which the project is included. For instance, one of the most important resources for IT systems development projects is computer processing time (for testing purposes). (Wysocki et al. 2014, 13.)

Risk

Risk is not really an individual part of the scope triangle itself, but it is present in all parts of the project and inherently affects management of the aforementioned five constraints. Knowing all the constraints,

we can now explain what exactly is behind the idea of the scope triangle. The area inside the triangle relates to the scope and the quality of the project. The outer lines of the triangle represent time, cost and resource availability. When we break down individual lines, time is the limited time within which to project is set to be completed. Cost is the budget assigned to complete the project and resources are basically any consumables which are used during the project, for example people and facilities. (Wysocki et al. 2014, 13.)

During the planning process of a project, the main focus is on identifying the time, cost and resource availability which is required to deliver the scope and quality of a project. At the end of this phase, the project is in equilibrium. The scope triangle is particularly useful when considering how any changes, however big or small, affect the project equilibrium. An example of a change would be a client making additional requirements. As for who is control of the constraints, the project manager is in charge of resource utilization and work schedules. Management is in charge of cost and resource usage. The client is in charge of scope, quality and delivery dates. Another important aspect of the scope triangle is that it enables the project manager to determine which party owns the constraints. The client and senior management usually own time, budget and resources and the project team owns how time, budget and resources are used. During a project, any of these may be moved within the project in order to address issues that have arisen. Another important application of the scope triangle is as an assisting tool in the preparation of Project Impact Statement. This document is a statement that describes some of the possible ways of accommodating client's scope change request. The scope triangle is used when identifying the alternative ways of making the change possible. (Wysocki et al. 2014, 13-16; Bachelet.)

2.4 The Project Life Cycle

Every project has a very unique nature, however the concept of the project life cycle attempts to describe project phases in more detail. For some project managers, it is common practice to use the project life cycle phases as milestones for managing projects. (Larson & Gray 2011, 7.) The uniqueness of every project makes determining the best number of life-cycle phases quite difficult, as it depends on the nature of the project and the nature of the industry in which the project is being done. However, all project life cycles will include a beginning, a middle and an end. The reason why breaking down projects into phases

occurs is that it makes projects more manageable and it reduces risks at the same time. In the end, whatever methodology is being used, it must include some level of flexibility in order to make client adjustments possible. Kerzner proceeds to suggest on this matter that because of the uniqueness of contemporary projects and new approaches in project management, it may be better to focus on processes rather than phases or a framework approach that combines the best features of each. (Kerzner 2010, 172-173.)

Standard and widely accepted project life cycle phases are illustrated in FIGURE 3, which can be found below. The description of project life cycle phases is as follows:

1. Defining – this includes defining all specifications of the project, meaning establishing project objectives, forming project teams and assigning major responsibilities.
2. Planning – in this phase as we can observe on the figure, the level of effort is increasing. Activities in this phase include detailed plan development, scheduling, agreeing on the quality level that is to be maintained and determining the budget.
3. Executing – as we can deduce from the figure, this phase requires the most amount of effort and it is the phase where most of the actual project work is done. It is also the longest phase. This phase requires a lot of controlling in terms of time and costs.
4. Closing – this phase includes three main activities. Firstly, it concerns the delivery of the project product (or project deliverables) to the customer, which can include for instance training and document transfers. Secondly, it involves redeploying project resources, which normally involves releasing project equipment or project materials to other projects. The project team is dissolved and new assignments are found for the team members. The last activity is post-project review, which includes performance assessment.
   (Larson & Gray 2011, 7-10.)

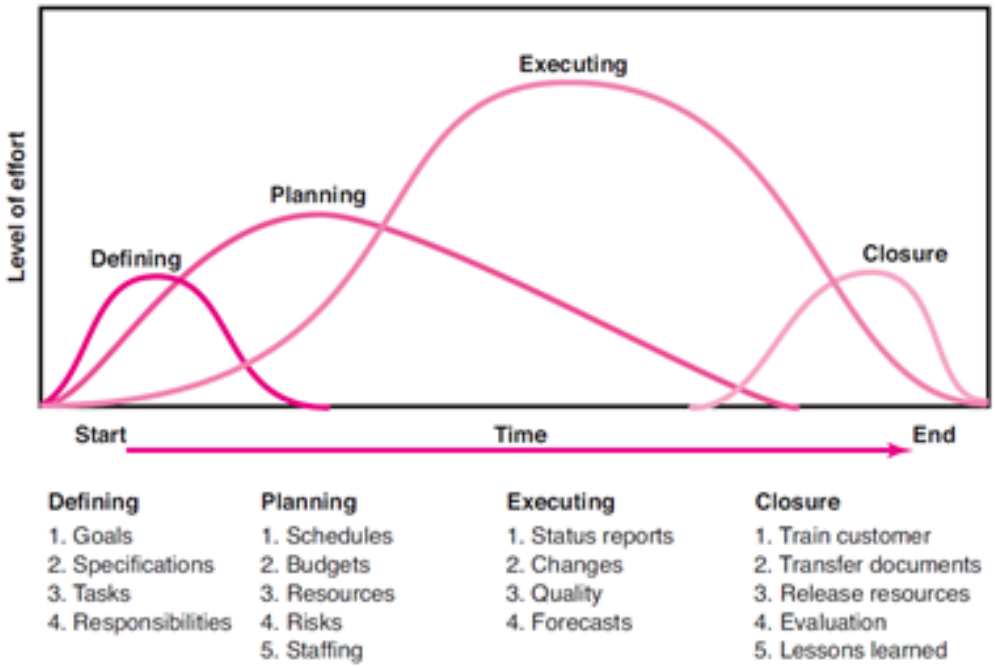


FIGURE 3. Project life cycle (Adapted from Larson & Gray 2011, 7)

2.5 Specifics of IS/IT implementation projects

When talking specifically about SAP ERP implementation, it is necessary to stress that those projects are not strictly IS/IT projects. As will be explained later on, SAP ERP projects are so diverse by nature that they usually involve people from every department of the organization. They could be therefore considered as a mix of business and IS/IT. However, much of the specifics in SAP implementation come from IS/IT projects, which is why explaining the specifics is critical to understanding the nature of SAP implementation projects. The diversification of IS/IT projects begins with acknowledgment of the fact that IS/IT projects can be very diverse. An example of a smaller project would be a small number of people who are in charge of installing purchased hardware and associated software. Other projects involve hundreds of people who all analyse the business processes of the organization and afterwards they develop new software to satisfy the needs of the business. In addition, a really wide array of hardware and network equipment is often used. Software projects are by nature more difficult than hardware projects, because they require higher amount of planning, coordination and overall effort. What is really interesting about IS/IT project is that currently they are able to support every possible industry and business function. It is precisely the diversity and the novelty the field of IS/IT Project Management introduces that makes developing and following best practices in managing these varied projects crucial

to the project success probability. The goal of IS/IT Project Management theory is to provide IS/IT Project Managers with a common starting point and methodology that they can follow, if needed, in every project. (Schwalbe 2014, 64-65.)

Even the characteristics of IT Project Team Members differ from other common project teams. As explained in the previous paragraph, IS/IT projects are currently a multidisciplinary ‘bridge‘ because contemporary IS/IT projects usually require not only IT expertise, but an expertise from various business fields as well (finance, logistics...). In fact, very diverse project teams are highly appreciated, since they are able to provide a significant advantage and a huge boost to the project’s success probability, because they are able to analyse project requirements from a more robust point of view. There are even IT companies who purposely hire people with different backgrounds, for example business or liberal arts. The degree of interdisciplinary involvement varies depending on the project requirements. One of contemporary issues in IS/IT projects is the rising amount of contract workers that company uses for projects, which can create special challenges for an IS/IT project manager. (Schwalbe 2014, 65.)

As previously mentioned, new methodologies for IS/IT project management are being constantly updated. One of these methodologies relates to interdependent project management processes, which were Initiating, Planning, Executing, Monitoring and controlling and Closing (see Chapter 1.2). Marchewka used a description matching these processes, except the description is adapted to fit the specifics of IS/IT project management. The phases will be now reviewed:

- Phase 1: Conceptualize and Initialize

  When it comes to IS/IT project methodology, the first stages put emphasis on the overall definition of the project objective. A project is always performed for a specific purpose, and the purpose is usually to add tangible value to the organization in question. Defining the goal of the project is the most important step in IS/IT project methodology, since it aids in definition of the project’s scope and assists in decision making throughout the project. It can also be used after the project has concluded to evaluate the project’s success. The next step is to analyse costs, benefits, feasibility and risk. From these analyses, a specific amount for project budget can be recommended. (Marchewka, 2013, 27-28.)

- Phase 2: Develop the Project Charter and Detailed Project Plan

  This phase involves working with a document called the project charter. This document is a key deliverable of the second phase. Its goal is to define the organisation of the project. In fact, the project charter also gives another opportunity to review the project's goal and objectives in terms of scope, schedule, budget and quality standards. It also enables to define in detail the project's scope, schedule, budget and quality objectives. The project plan includes all details concerning who will carry out the project work and when. Basically, the project charter and plan are designed to answer the following questions:

  - Who is the project manager?
  - Who is the project sponsor?
  - Who is on the project team?
  - What is the scope of the project?
  - What are the costs of the project?
  - How long will it take to complete the project?
  - What are the required resources and technology?
  - What approach, tools, methods and techniques will be used to develop the information system?
  - What tasks or activities will be necessary to perform the project work?
  - How much time will these tasks or activities take?
  - Who is responsible for the performance of these tasks or activities?
  - What is the benefit that the organization receives for the time, money, and resources committed to this project?

  (Marchewka 2013, 28-29.)

- Execute and Control the Project

  This phase is focused on execution and control of the project – that means carrying out the project plan to deliver the IT product or solution and paying attention to the processes of the project in order to achieve the project's goal. Additionally, in this phase the project

manager must ensure that the environment and infrastructure to support the project includes:

- Workers with appropriate skills, experience and knowledge
- Technical infrastructure for development
- IS development methods and tools
- Proper work environment
- Monitoring and controlling of scope, schedule, budget and quality
- Detailed risk, quality and change management plans
- A procurement plan for vendors and suppliers
- Communications, testing and implementation plans
- A human resource system for evaluation and rewards

(Marchewka 2013, 29.)

- Close Project

After the development, testing and installing of the information systems, a transfer of control from the project team to the client or project sponsor takes place. Such transfer is called 'formal acceptance.' The project team's activities in this phase include preparing a final project report and presentation, in order to document and verify that all the project deliverables have been completed as it was defined in the project scope. It is also a suitable time for determining the final cost of the project. Other closing activities are closing all project accounts, archiving all project documents and filing and releasing project resources. (Marchewka 2013, 29-30.)

- Evaluate Project Success

This phase includes feedback to and from all parties regarding the project. Some publications suggest a project review by an outside third party might be of interest. This phase includes all varieties of post-project reviews, which should aim at answering these questions:

- What was the probability of the project achieving its goal?
- Did the project meet its scope, schedule, budget and quality objectives?
- Was everything that was promised to the project sponsor or client delivered?

- Is the project sponsor or client satisfied with the project work?
- Did the project manager and his team follow the processes outlined in the project and system development methodologies?
- What risks or challenges did the project team face? How well were the risks and challenges handled?
- Was there cooperation between the project sponsor, project team and project manager? If there were any conflicts, were they well addressed and well managed?
- Did the project manager and team act in a professional and ethical manner?

The last but very important part of this phase is to evaluate the project in order to determine if the project provided value to the organization. As for IS/IT, the value of such projects might not be clearly discernable immediately after the completion of the project, which is why time and resources should be allocated in order to determine whether the project met its intended objectives. (Marchewka 2013, 30.)

3 SAP ERP

Before the SAP ERP implementation process is discussed in detail, it is important to understand the specifics of SAP ERP system, its environment and its functionalities. This chapter aims at improving readers' understanding of SAP ERP system by providing valuable and crucial information and background details about the SAP EPR system.

3.1 Overview, history and development of SAP

SAP (Systems, Applications & Products in Data Processing) is a German multinational software corporation established in 1972 by four former IBM employees. SAP was focused on developing enterprise software to manage business operations and customer relations. A year later, their first product was designed for the purposes of accounting. This product formed a basis for SAP R/1 system (the letter R stands for Real Time Data Processing). (SAPa; Maassen 2007.)

The successor of this system was system R/2, which can be labelled as the first ERP (Enterprise Resource Planning) system. The system was substantially expanded, however its usage still required big mainframe computers located in one big room. (SAPa.)

In 1992, SAP started to distribute the next version of the system, called SAP R/3. In comparison to previous versions, this product had been completely reworked, based on client-server architecture (explained further in this chapter) and the usage of relational databases. In addition, the system had been adjusted for usage of hardware produced by various hardware producers. SAP R/3 server was also able to be installed on computers with different operation systems. Since the introduction of this system, SAP has become the world's leading vendor of standard application software. One of the main reason for such a success is that SAP is a standard package, which means that it can be configured in multiple areas and adapted to the specific needs of different companies in various industries. The flexibility (SAP leaves room for further functionalities and enhancements) and adaptability to the changes of business practices (SAP system is configurable and customizable) means that SAP manages to solve the information management problems of businesses, which is why the R/3 system is the clear market leader in the development of standard applications. (SAPa; Hernández 2000, 4.)

Since 2004, newly arranged components are distributed on the market by SAP, while the central product has become mySAP Business Suite. Technological components were completely separated from application components and are referred to as SAP NetWeaver.

SAP ERP is a part of SAP Business Suite, which is a bundle of business applications that provide integration of information and processes. SAP Business Suite so far constitutes of SAP ERP, SAP CRM (Customer Relationship Management), SAP SRM (Supplier Relationship Management), SAP SCM (Supply Chain Management), SAP PLM (Product Lifecycle Management), SAP BW (Business Information Warehouse), SAP GC (Governance and Risk Compliance) and SAP MII (Manufacturing Integration and Intelligence). (Boeder & Groene 2014, 1-5.)

The SAP R/3 system is targeted and tailored for most industries, for example manufacturing, retail, health care, transport, automotive, chemical… In order to give an idea how 'big' SAP actually is, it is important to state that all major hardware vendors and producers, with no exception, are fully engaged to partner with SAP (Acer, Dell, Fujitsu, Hewlett-Packard, IBM, Siemens and other companies have supported and certified SAP R/3 platforms). In fact, most of major companies in any sector use SAP. (Hernández 2000, 4.)

In 2015, SAP has launched a new product called SAP S/4 HANA, which is the new generation of SAP Business Suite. It is built on in-memory computing platform called SAP HANA. It offers cloud, on-premises and options for hybrid deployment in order to provide more choice to customers. The advantages of this system are for example a smaller data footprint, faster analytics and reports, multitenancy (this means that a single instance of an application runs on a server and serves multiple users) and faster access to data. Analysts have been saying that S/4 HANA can help companies reduce the complexity of their systems, because the HANA platform integrates people, devices, big data and business networks in real time. There are also claims that SAP HANA platform can potentially save up to 37% across hardware, software and labour costs. (Forrester Consulting 2014.)

As mentioned previously, a big part of business processes is very similar in most organizations. It would probably be very costly to completely develop a new information system for each company. Contemporary IS include several options of adapting to specific demands of a specific enterprise. The same applies for SAP.

Customizing

Customizing basically occurs when the system's settings recommended by SAP have to be adjusted. In customizing process the business structure, material types, document types and other parameters required for full functionality of the system are set. It is the most used tool in SAP implementation process. The main advantage is that during system upgrade, these parameters which have been customized are not rewritten. In the whole system, there are so-called 'blank spaces' (Customer Exit or User Exit). These are blank spaces in source codes, where the customer or user can input their own code. When system upgrade takes place, these blank spaces are not rewritten. In any case, it is necessary to verify the functionality of this code after the upgrade.

Own development possibility – a change of SAP standard

SAP system offers the option of own development. With the aid of development tools the existing database structured can be extended. It is of course possible to create your own database tables. With the use of ABAP (Advanced Business Application Programming – created by SAP company) programming language, individual transactions and even whole modules can be created. This tool can be even used to alter the standard functionality of the system, however this option is not recommended. Currently, even Java programming language can be used.

Recommended organisation of development environment

For the run of SAP system it is recommended to install several systems (clients). SAP company recommends to create three systems – the first one for development, the second one for testing and the final one for productive run. The development and customizing processes are done in the development system. The changes are transferred to the test system with the aid of transports. After thorough testing, the changes are transported to the productive run client. Some SAP implementation experts recommend

to use two clients for development, one of which contains only customizing and the other one contains only data.

3.2 Modules

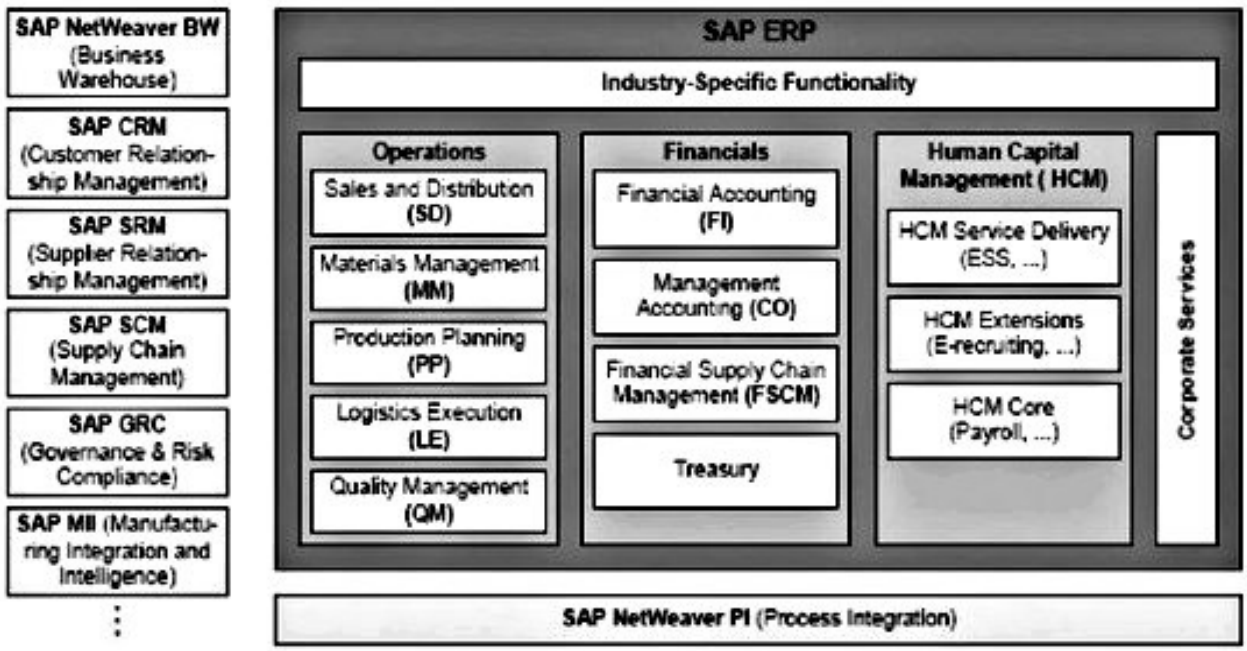


FIGURE 4. SAP ERP Overview (Adapted from Boeder & Groene 2014)

Sales and Distribution (SD)

Sales and Distribution module handles all activities related to sales. It involves all processes starting by the creation of sales orders through subsequent delivery and billing/invoicing. Additional logistic parameters like availability check are possible. Factors such as transport time, loading time and material preparation are taken into consideration when the system is processing the sales order. The whole process can also be accompanied by sales price lists, which automatically suggest sales price according to previously set criteria. It is also possible to track business partner's credit. Master records of suppliers are recorded in SD module.

Materials Management (MM)

Materials Management is an extensive module the purpose of which is to record materials, goods and semi-finished products in a warehouse. Also non-stock inventory can be recorded, such as office supplies and packaging. Records for services are also possible to maintain in MM module. The module evaluates the aforementioned items not only from the perspective of quantity, but also from the perspective of financial value. The basic organizational unit from the perspective of MM is plant. A plant can be a branch of a company or a production factory, possibly even other logistical structures. On the plant level, all activities of purchasing, production and sales are done. Every plant is assigned to one or more warehouses. A very important part of the MM module is master material data. Master material data describe the materials from several views.

- Basic data: general data such as number, measure unit, site, weight
- Accounting: keys or account numbers are entered for the purposes of accounting
- Production planning: this perspective serves for semi-finished and finished goods production
- Availability: emergency stocks, planned delivery time, goods
- Purchasing: purchasing measure unit, buyer
- Calculation: planned costs, bill of materials
- Classification: other material descriptions not already mentioned
- Plant/storage data
- Plant/storage supplies
- Forecasting of material needs
- Quality management: inspection data, inspection intervals
- Sales: data for sales and distribution

It is important to mention that every department in an organization needs to work with some views only. A rule applies here which states that individual views are independent. Individual departments are responsible only for their views (for example accounting is responsible for accounting data, logistics for quantities, measurements etc.).

Another part that the MM module handles is purchasing records. That usually starts with purchasing order and goes through picking to purchasing invoice settlement. Every process uses master supplier and material records as primary data. (Boeder & Groene 2014, 3; Maassen 2007.)

Production Planning (PP)

Production planning module's main task is to produce finished goods from materials or semi-finished goods. The product is accurately described in bill of material. Routing defines the workspaces where the actual production takes place. The production process is guided by production orders.

Financials (Financial module)

The main component of every ERP system is the register of accounting records. The FI (Financial Accounting) component records, summarizes and classifies the company's financial transactions. In this module, all financial aspects and business transactions are being recorded and registered, such as invoices, payments, clearings and financial documents. Based on transaction figures and balances in the processed documents, financial analysis such as cash flow, balance sheet and statements of profit and loss are being done periodically. This module is also important in terms of tax records. Next items found in this module are cashbooks, investment assets accounting and accounting of liabilities and receivables. (Boeder & Groene 2014, 3; Maassen 2007.)

The management accounting (CO) component is used mainly for in-house accounting. The main purpose of this component is to prepare data like product costing, cost of goods sold, overheads and inventory costing. This data is further used in business analysis in order to support management decisions. (Boeder & Groene 2014, 3; Maassen 2007.)

Other component of Financials is Financial Supply Chain Management (FSCM). This part is in charge of processing accounts payables and accounts receivables in order to procure smooth funding of business operations. It also contains additional functionalities, such as collection management, dispute management, online payment facilities for customers and vendors as well as credit management. (Boeder & Groene 2014, 3; Maassen 2007.)

The last part of Financials is a set of applications called Treasury. These applications main tasks are monitoring the company's liquidity and cash flow. These applications are also able to manage other financial assets of companies, such as funds, derivates, loans, stocks and securities. These applications are also able to manage market risks. (Boeder & Groene 2014, 3.)

Human Capital Management

The most important resources of most companies are their human resources, which is why SAP ERP gives an option to manage this part of business as well. This module gives a possibility of managing the company's human resources. This module can be actually deployed separately from other SAP Business Suite solutions in order to protect potentially sensitive data. This module actually uses an interesting data model called "infotypes." Infotypes are used to define data structure in the database for related data.

One difficulty this module encounters are the legal limitations and geographically differentiated HCM processes. This is also where infotypes come into play, as they enable various country-specific variations of user interface's logical arrangement.

As for the module itself, it is divided into three layers. The basis of SAP ERP HCM consists of core components which integrate the most important HR processes – organizational management, personnel administration, payroll, personal development and time management. These processes then provide data and functions that is later on used by SAP ERP HCM extension components. These are components that support secondary processes, such as e-recruiting and enterprise learning. The last, upper layer, is referred to as SAP ERP HCM service delivery. This layer actually enables user interaction with SAP ERP HCM components through various channels, for example self-services, employee interaction center and different online forms. (Boeder & Groene 2014.)

Project System (PS)

The importance of projects in business has already been mentioned, so it should not come as a surprise that SAP system allows project management as well. The PS module is optional and is a part of SAP's solution for Project and Portfolio Management. It helps project managers manage all aspects and resources of their projects along the entire project life cycle. It contains features such as setting up a project structure, drawing detailed plans and executing and completing the project. The PS module is of course fully integrated with other modules. (Dowling 2008, 4-8.)

3.3 Transactions

Launching applications and displaying the applications' related views is run by so called transactions. The term transactions denotes a chain of dialog steps that relate to each other from the viewpoint of business economy.

The execution of one transaction involves all dialog steps including the final update. Each dialog step is represented by a graphical representation (a view) and a related application logic, providing for example a check of information in the view or an update in the last dialog step. The combination of these two elements (views and related application logic) is referred to as dynpro (Dynamic Program). (Herzog 2006.)

3.4 Client/server architecture

The SAP R/3 system is based on client/server technology. In this case it means, above all, logical separation of an application from presentation and database. The result of this technology are basic services running in three layers - application layer, presentation layer and database layer. Presentation services refer to the services that are closest to the user. Using these services, input/output functions of SAP R/3 system are realised. These functions are made available to the user with the aid of GUI (Graphical User Interface). SAP's GUI is referred to as SAP GUI. The main task of presentation services is transferring commands/requests from the user further to the application layer, receipt of answers (or data) from the application layer and the subsequent display of the answers/data on the interface. The presentation layer contains all parts that the user interface is made of. Examples of such parts would be

online help, control elements (checkboxes, switches, and buttons), menu lists, toolboxes, shortcuts etc. The GUI, sometimes referred to as frontend, can, in the case of SAP, run on computers with basically any operation system. The separation of presentation and application layer in practical terms means that in order to visualise an application, a variety of means can be used. The result can be user interface displayed in web browser or the other way around – an interface that was developed by the business itself. (Boeder & Groene, 2014.)

The application layer transfers descriptions of views to the presentation layer, independent of the platform. The transfer of these view descriptions to the GUI takes place in the computer which is running the presentation layer, depending on the interface that is running at the moment. Except for graphical interface, SAP GUI serves other purposes as well, for example facilitating connection of office suite applications (for example Microsoft Word or Microsoft Excel) with SAP R/3 system. It is important to mention that without connection to the application layer, SAP GUI is not functional. The SAP GUI is connected to the application layer at all times via user logon. The data transferred is in small volumes (2,6 to 5,3 kB per transaction/view change), which is why connection by the means of wide network (WAN) connecting geographically remote locations is possible. This means that the GUI and application layer version do not have to be identical. There is, however, a condition that the GUI version has to be the same or higher (newer) than the application layer version. SAP GUI is retrospectively compatible, which in practical terms means that SAP GUI version 4.5 can be used to access application server SAP R/3 version 3.1. For alternative client platforms (MacOS, Motif or OS/2), specific interface version were developed up until SAP GUI version 4.5B. Since 4.6D version, these specific versions were replaced by one, written in Java, meaning that it is relatively independent of the operation system in use. Aside from this, SAP GUI for HTML exists, which is a special version meant for displaying the SAP system user interface in a web browser. (SAPa)

The middle layer of client/server architecture, the application layer, is mostly concerned with creating an environment for running SAP R/3 system applications (core and basic services). For the application run, SAP R/3 system creates its own infrastructure (ABAP programming language, compiler, libraries, runtime environment etc.). Since the applications are run in their own environment, they are relatively independent of the hardware and operation system in use, they are not, however, able to be run outside this specific SAP R/3 system environment. The runtime environment has three main purposes.

- Running applications in virtual machines (software processors)
- Administration of users and processes
- Database access management (this is because the applications do not directly access the database)

In general, one application server is enough to run SAP R/3 system. In the case where more application servers are used, another server called message server becomes a part of the application layer. Its purpose is to manage mutual communication of the application servers. It is also possible to use this server to manage the application server load – the user logging in is redirected by the message server to the application server that has the least load at the moment. Even in this environment each application server runs SAP R/3 system core along with basic services. The application server can be said to perform a role of a broker between the user and the database. (Hernández 2000; Boeder & Groene 2014; Massen 2007.)

3.5 Client-system concept

The client is the highest hierarchical level in SAP R/3 system. All data used in multiple modules are saved on the client level. When preparing system solutions it is necessary to secure the integrity of the whole SAP system. This means separating activities related to system development and enabling simple data exchange between modules at the same time. Each client has its own data and parameters separated from other clients. At the same time, there are objects in the system that are independent on the client.

Every system standardly (as a part of installed database) includes these clients:

- 000 – SAP reference client that contains default settings for all tables and serves for comparison. It cannot be changed by users and is regularly updated when upgrading.
- 066 – Early watch. It serves for consulting service SAP Walldorf regarding system performance.

The SAP R/3 system includes tools for data transfer, for example settings, data and applications, both between clients of one SAP R/3 system as well as different SAP R/3 systems. This tool is called correcting and transport system. This method allows to perform settings and full testing of these settings in one client (or system) and subsequently transfer these to a different client (or a system) for live run by the means of transport requests. Corrections system made in this way can be used multiple times in order to perform settings of other clients if needed.

SAP R/3 also includes user authorization concept. The basis of this concept is clear and unambiguous identification of every user. In SAP R/3 system, this is dealt with by user account concept. These accounts are password protected. The clear user identification enables monitoring of system users' activities as well as determining who and when performed an action – for instance a system change, if necessary.

When assigning access rights, two general ways of approaching this issue exist – restrictive and permissive (benevolent). When using restrictive approach, users are assigned with minimal rights which are extended only if necessary. Permissive approach grants wider and more extensive rights to the users. The rights are limited in case when problems or difficulties arise. The permissive approach is suitable for test systems, where possible data loss is not very painful. For system in use, restrictive approach is the best one.

When assigning user rights, the persons responsible for individual modules hold the decisive power. The implementation team can make suggestions and recommendations, but the final decision is taken by the persons responsible. The implementation of defined user rights (creating user roles) and assigning of these to the users is done by the system administrator. (Hernández 2000; Boeder & Groene 2014; Massen 2007.)

4 SAP ERP IMPLEMENTATION PROCESS

This chapter aims at providing wide range of information and concepts regarding SAP ERP implementation process. Critical success factors for the success of SAP ERP implementation process will be identified, described and analysed, firstly by using theoretical knowledge. The outcomes of this process will then be compared to the results of qualitative and quantitative research.

4.1 Overview

When talking about SAP ERP implementation process, it is necessary to understand that the process in itself is a very wide and difficult process, the result of which is often organization-wide transformation of business processes and systems. It is not only a software installation, as it might seem. For this very reason, SAP ERP implementation process is closely related to change management – the successfulness of the implementation project is often determined by how well the organizational change management is addressed during the project.

Another important issue to address is that although there are very specific methodologies and life cycles of implementation processes, every implementation will be different, even if they are being done for the same company and in the same country, but different plants. Earlier the SAP customizing and the change of SAP standard has been explained. These processes are used to address the particularities and specific requirements of different SAP ERP implementations.

Therefore, the SAP ERP implementation process methodologies never specifically address the changes and particularities that are needed to be included in the final solution. There are no SAP solutions that are identical to each other. As was already explained in Specifics of IS/IT implementation projects, SAP ERP solutions are used to solve business problems that occur on all sides of the business, which is why SAP ERP implementation process is not only technology change and a mere software installation. The involvement of all personnel from both technology-oriented departments and business-oriented departments is necessary in order to maintain good quality of the project. Another important concept to understand that SAP ERP is meant to provide solution for extremely difficult enterprise problems. The SAP solution has the potential to affect every process in the company, based on its function as an

enterprise application and its ability to integrate historical data and functions. In order to provide an effective solution of the business issues at hand, further hardware and software technology requirements may arise, which could lead to more complications in SAP implementation. (Anderson 2003, 23-24.)

The implementation of SAP has a deep impact on mission-critical business functions. Before the deployment of applications that support financials, supply chain and inventory management processes and other important business processes, it is crucial to ensure that enough attention is paid to the creation of extra SAP environments that support development, testing and integration. (Anderson 2003, 23-24.)

One of the most important aspects of SAP implementation is related to transformation – SAP affects the way company will conduct business in the future. The current processes and procedures will undergo change. It is critical to ensure that the organizational community will embrace these changes in order to make sure the implementation process is successful. (Anderson 2003, 23-24.)

4.2 Reasons for implementing SAP

Now that there is a familiarity with general concepts of SAP ERP implementation, it is a good time to explain why companies actually decide to implement SAP. Anderson gives a list in his publication of the tactical reasons he has learned during his career from his customers:

- Supply-chain and logistics related issues – improvement of product quality or availability, reducing total product inventories and increase inventory turns in warehouses and distribution centres
- Customer service related issues – an increase in the knowledge of customer trends, increased turnaround on returns, analysis of customer purchasing trends, customer demographics, reduction in customer billing time
- General issues – addressing of government regulations by integration with standard tax systems, improvement of enterprise resource planning and allocation, responding to changing conditions of markets by trend analysis

These are more specific reasons for SAP implementation. From these reasons, it could be deduced that more strategic goals are of interest here:

- Application integration – this achieves numerous benefits. For example reducing data redundancy by using a single point of data entry. This results in saving time of employees previously required to input the data, which further reduces labour and overhead costs (Lau 2005, 127 [Jacobs & Whybark, 2000]). Further benefits include increase in efficiency of operations and productivity and in more coordination between different business units (departments, divisions, regions, or countries), which is especially beneficial for multinational corporations. This is enabled by the fact that SAP centralizes information and supports decision-making. (Lau 2005, 127.)
- Improved operational reporting – SAP enables online transaction processing (OLTP). This means that day-to-day processing activities and huge volumes of transactions are addressed by SAP. Further SAP functionalities enable aggregated reports. With the possibility to further use this data in other systems (for example Executive Information Systems – systems used by top management) and/or Business Warehouse, the SAP makes for an ideal platform that supports organizational decision making. (Anderson 2003, 29.)
- Improved strategic reporting – This is also supported by other components from mySAP Business Suite, for example SAP Business Information Warehouse. The focus in this type of reporting is on reports and analyses that are not usually available from simple transaction processing or aggregated reports. Therefore, the implementation of data warehouse is available. This allows the management to access and analyse information that supports decision making process. (Anderson 2003, 29.)
- Flexible business process support – this concept closely related to business process re-engineering (BPR). BPR says that every way of an organization doing business should constantly be questioned in order to ensure maximum efficiency. Anderson mentions that simply by performing BPR exercises during SAP planning process, some organizations were able to actually introduce business process changes to the systems currently in use before the implementation project went live.

4.3 Change Management

Change management is one of the most important parts of every SAP ERP implementation project. As previously mentioned, SAP ERP implementation is not merely a software installation, it is a process of business transformation and by default brings all sorts of changes along with it. Galoppin & Caems addressed this issue in their book and made an excellent comparison regarding this issue. They compared leading the organizational change to driving across a new territory. Sure, there are multiple maps available, but they will not make you reach your destination. If you want to get there, you have to get in the car and start the engine. Some environmental factors will slow you down, for example weather and accidents. It is your driving skills, experience and improvisation that will determine in what manner you will get there. Managing organizational change during SAP implementation means harmonizing the interaction between the hard systems and the soft systems approaches. (Galoppin & Caems 2007, 21.)

The actual execution of a change goes only as fast as the people's ability to absorb and make sense of the changes. It is actually not the transition from previous systems to SAP that makes people disrupted, it is the change of integration of processes that is required to make these systems work. The efficiency of an organisation is determined by the alignment of processes, systems and people with each other. This is why implementing SAP is not only a technological change and is not only an issue of IT department. It affects the organization as a whole on all levels. It brings together three disciplines that seemingly don't have anything in common – software engineering, business administration and organizational psychology. The issue is that if one of these elements is not handled correctly, the other elements are not able to make up for the difference. As suggested by FIGURE 5, the organizational change during SAP implementation happens where technology, processes and people meet. (Galoppin & Caems, 2007, 31-32.)

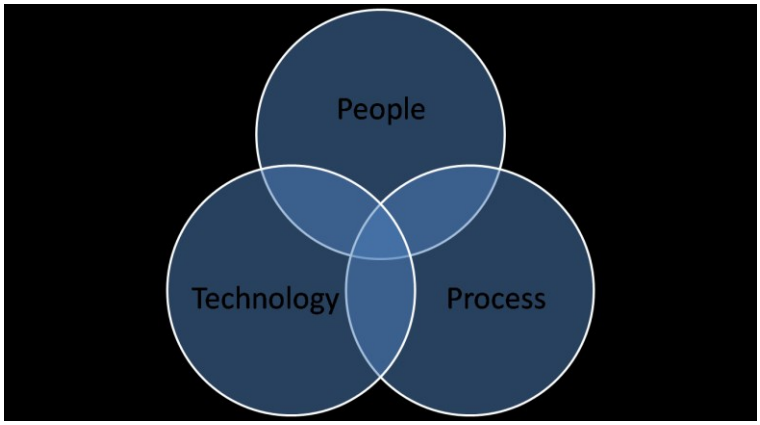


FIGURE 5. Cocktail of Three Disciplines (adapted from Galoppin & Caems 2007, 31).

SAP implementation does not require only an IS/IT systems change from the technological point of view (technology), but also a turnaround of the way business processes are handled (processes) and as a result a change of knowledge, skills and behaviours of employees (people). The most common mistake that occurs during SAP implementations and that leads to failed implementation projects is the inclination of people to mistakenly believe it is merely a software installation. Galoppin & Caems suggest that it is the companies that present the project as a fundamental business initiative that will transform the whole company that in the end profit from implementing SAP. Software installation is only a small part of the whole process. The successful implementation projects have one thing in common – they realize that the nature of the problem is organizational, not technical. (Galoppin & Caems 2007, 31-32.)

SAP has the potential to increase efficiency of business processes, thus fundamentally change the way a company does business. The SAP implementation depends on sharing information and increasing cross-functional communication. It is typical for software projects/implementations to focus on elements such as analysis of requirements, configuration and development, hardware requirements, system performance, user training and so on. These factors are of course necessary, but it is by far not enough to make sure the SAP implementation project is successful. Galoppin & Caems identify change management from soft systems perspective as a key ingredient to SAP implementation success.

The following are keys to success of SAP implementation from change management point of view with particular regard to soft systems approach:

- Presenting the project as a strategic business issue
- The project teams have dedicated resources available from the whole organization
- The key decision makers regarding customization and SAP standard change are not managers but process owners.
- Methodical and persistent work, sticking to the project plan
- Concentration of effort, keeping momentum in the project
- The implementability of the design is ensured by extensive participation of the company
- Realistic scopes and scales
- Appropriate management
- Serious focus on milestones
- The commitment of company leadership and executives

(Galoppin & Caems 2007, 36 [Michael Hammer, 2005].)

There are many approaches to organizational change management and as long as there will be enough emphasis on change management during SAP implementation and as long as change management will be thoroughly addressed through all the steps of SAP implementation process, the organizational change should be smooth. An example of a particular change management approach would be an eight-level process. Firstly, a comprehensive change vision is created and the vision is made operational. As a second step, a change strategy is defined in order to evaluate the readiness towards the change within the organization and to select optimal change configuration and to establish change governance. Thirdly, leadership of the change program will be developed. Fourth step involves building commitment from all people involved by communicating, managing resistance and transferring of knowledge and skills. The fifth step involves managing the performance of employees and stakeholders by the means of needs establishment, performance management implementation and by people practices. As a sixth step, it is important to build a business case out of SAP implementation and deliver business benefits through it. The seventh step is developing the organizational culture that will favour the change instead of making resistance. Finally, the organization is designed by understanding the state the organization is currently in, designing the new organization and finally implementing the organizational change. (Lau 2005, 130 [Diese et al. 2000].)

4.4 Implementation team and steering committee

The project team should ideally be a blend of employees already working in the organization and external SAP consultants. The composition of implementation teams vary from project to project, however, some commonalities are observable.

Every project will certainly have a project manager. Also, every project will have module experts, who are experts in their respective fields and are able to model business processes based on the business process requirements. At this stage, a cooperation between these people and key users appear. Key users (or sometimes called process owners) are people from inside of the organization who are responsible for their respective modules. Let us say that for example a key user is an expert in Finance, probably works in the department, and has knowledge of the organization's business processes. These people will work with the module experts during the implementation and will participate in business process modelling, as they are the ones with internal knowledge of how the organization works in their field.

Every project will also have external SAP consultants. External SAP consultants are people with deep technical knowledge of SAP. The consultants usually handle customization and more technical issues.

The steering committee members are project sponsor, the project manager and some other members of management or executive group of the organization. The project sponsor and the steering committee's responsibilities are setting objectives, establishing scope and timing, defining key business requirements and monitoring the implementation and resolving any scope issues.

4.5 Implementation methodologies

As previously mentioned, there are currently many methodologies suggested by SAP as well as consulting companies. These methodologies have been developed over the years as a result of various implementation projects. Examples of those methodologies would be Step-by-step implementation, which focuses on implementing the software in small steps. The area of focus in this methodology is very narrow, which is on one hand beneficial, because the projects using this methodology generally

take longer, which means the people throughout the organization have more time to adapt to changes. On the other hand, the longer span of time that comes with using this methodology doesn't suit every organization. Some organizations intend to capitalize on the change as soon as possible, and in step-by-step implementation, the return on investment is generally delayed. The very narrow area of focus also sometimes causes the implementation team not to see the big, organization-wide picture. (Baloglu, 21.)

Another example that exists on quite the opposite side of the spectrum is Big Bang implementation. As the title suggests, this type of implementation is very fast. All or most of existing systems are replaced in a single operation with the new software. Although this methodology is the most cost-effective, it also bears the most amount of risk. (Baloglu, 21-22.)

4.6 Accelerated SAP

The methodology that will be further examined in this thesis is the Accelerated SAP (ASAP) methodology. The ASAP implementation methodology was developed by SAP and it focuses on rapid implementation and ongoing optimization, therefore ensuring the project stays cost effective. ASAP includes a roadmap which is linked to configuration tools in the SAP system. Initially, ASAP was developed for SMEs and smaller implementation projects, but this approach proved to be very successful in bigger implementation projects as well, which is why over the years the methodology was adopted and perfected for bigger projects too. The benefits of this approach include scalable and flexible methodology that is suitable for different project types. This includes the possibility to tailor the implementation to meet customer and project specific requirements. More importantly, this methodology takes into account all parts of the implementation life cycle, meaning not only the implementation project itself, but post-project support as well. One of the latest versions of ASAP methodology, version 8 (ASAP V8) will be used in this thesis. (Kale 2000, 270; SAPb.)

FIGURE 6. ASAP 8 implementation road map (Adapted from SAPc)

Project preparation

The initial phase of the project, the project preparation phase, defines all aspects and parameters of the project. This phase corresponds to stage one and two in project life-cycle (see chapter 1.4). The purpose of this phase is to set up the right environment and context for the upcoming SAP project. In accordance with project management, the goals, objectives, scope and plans are discussed in this phase. Teams, roles and responsibilities are assigned, the project infrastructure is established. The SAP TSO (Technical Support Organization) is established. The SAP TSO is the most valuable resource in SAP implementation project. It is a team of people charged with addressing, designing, implementing and supporting the SAP solution.

The planning phase of the project deals with preparation and finalization of the project charter, implementation strategy and planning of activities throughout the project. Budget, timetables and resources are determined as well. The project charter is a very important document and its aim is to build foundation for a successful project. It can also be used as a tool to manage the expectations of the project sponsor and other stakeholders. One way to think of the project charter is to think of it as a contract, because it basically represents a formal agreement between the project manager and the project sponsor. Another purpose of the project charter is to help the project manager with vital aspects of the project. It provides a clear statement of the project's mission and purpose and what the project team is committed to deliver, it helps with defining the roles and responsibilities of people involved in the project. One aspect that is often underestimated is that it makes the process and approach that will be used throughout the project visible, which helps with providing clear goals for the people involved in the project. Lastly,

it provides some basis for the scope of the project and it assists in managing expectations. (Baloglu, 47; Kale 2000, 289; Anderson, Nilson & Rhodes 2009, 140-141.)

At the end of this phase, the project can officially commence with a kick-off meeting, which is attended by the members of the executive and steering committees, project team members and of course SAP consultants.

Business blueprint

The purpose of this phase of the implementation project is to reach understanding of the company's intentions to run SAP to support their business. The result is the document called Business Blueprint, which is a detailed documentation of the intended implementation, which takes into consideration the particular requirements the company might have on the SAP system. In other words, it documents the business process-related requirements. Another way to look at the business blueprint is that it contains the details about the desired functionalities. Earlier customization and SAP standard change was discussed. This idea is quite close to it, as to meet the business process requirements, these actions will often need to take place. The assessment of the business process-related requirements is done by the implementation team based on business analysis and customer requirements. The Business Blueprint itself shout contain executive summary, enterprise process area scope document, organization structure, completed business processes questionnaires, justification for enhancements, conversions and interfaces and completed technical questionnaire. (Baloglu, 58-73; Kale 2000, 304-327; Anderson et al. 2009, 142-145.)

At this point, since the project team now has some idea of how the implementation will look like, user training and documentation plans can be established as well. This includes user analysis (what is the number of users and what are their positions in the company), what will be the type of user documentation and training materials. The user documentation and training materials will be prepared and resources required for the training will be determined, as well as training schedule. (Baloglu, 58-73; Kale 2000, 304-327; Anderson et al. 2009, 142-145.)

The final stage of this phase is the business blueprint sign off, which means the project is cleared to move on to the next phase. It is crucial to get the sign off, because the Business Blueprint is the basic building block of the implementation project. (Kale 2000, 327.)

Realization

The purpose of this phase is to implement the business process requirements from the Business Blueprint. Basically, the goal of this phase is to create a system prototype which reflects the business process and procedures requirements. The activities of this phase are centered around customization, configuration, testing and addressing change management. (Baloglu, 74-81; Kale 2000, 330-45; SAPc.)

As far as it is now known how exactly the solution will look like, there is further development in user training and documentation, more specifically the content is defined, developed and preparations for user training and documentation delivery are made. (Baloglu, 76-7.)

The methodology of system configuration is divided into two packages – Baseline Configuration (also referred to as Major scope) and Final Configuration (Remaining scope). The baseline includes the functions and processes that are priority requirements of the company. These commonly make up for approximately 80%. Final configuration are all business processes that were not included in the Baseline configuration. These processes usually require more amount of customization. After the Final configuration, the system is prepared for testing. (Baloglu, 74-81; Kale 2000, 330-45; SAPc.)

The tests are conducted in three ways referred to as functional, integration and regression testing. Testing is a vital part of the project, as the solutions that were previously developed and realized are now being thoroughly tested to ensure their functionality. The tests are focused mainly on business process testing, which means that the processes are executed as is required and the outputs created by the processes are as expected. The testing stage is very demanding in terms of resources, especially time. (Anderson 2003, 543 – 546.)

Functional testing, as the title suggests, focuses mainly on verifying that the business process actually works, meaning all options included in the interface like drop-down menu selection, checkboxes and so

on. The functional testing must also be performed after every change, therefore it is recommended to limit the number of additional changes beyond this point, if possible. (Anderson 2003, 543 – 546.)

Integration testing is more complicated than functional testing. The purpose of this testing is to validate the functionality between different business processes. This includes processes in the same functional areas as well as multiple functional areas. It is not uncommon to maintain a system dedicated solely to integration testing. (Anderson 2003, 543 – 546.)

The aim of regression testing is to make sure that a specific set of data and business processes produces consistent and repeatable results, including the case when subset of the data or process changes. Regression testing can be then seen as focused on testing integrity of business processes. The most important part is that regression testing makes sure that the business processes which are currently implemented will continue working after other business processes are changed. (Anderson 2003, 543 – 546.)

Final Preparation

This phase of the implementation process has two main targets – getting the system ready for the implementation as well as the company. All the previously done activities are now consolidated, such as testing, end user training and system management. This phase is crucial for the success for the go-live phase, as proper preparation enables the go-live phase to go as smoothly as possible. (Kale 2000, 358; SAPc.*)*

Systems tests are conducted as well. The purpose of these tests, unlike previously mentioned tests, is not to determine the functionality of the business processes, but to determine the system's ability to perform with the full load of business operations, transaction processing, postings and printing in the production system. Many types of tests are conducted, however the most important ones are System Administration Tests, Volume and Stress Tests, Backup and Restore Procedure Tests and Disaster Recovery Tests. (Kale 2000, 363.)

The purpose of System Administration Tests is to make sure that all of the system administration processes and procedures are correct and complete. (Kale 2000, 363.)

Volume and Stress Tests are designed to test the system's infrastructure. Volume Tests are conducted to determine whether the system is capable of performing satisfactorily with the full load of transactions and other data that are anticipated in the production system. Stress Tests are designed to test whether the current configured system is able to perform well with the full load of business operations, transaction processing, postings and printing in the production system. (Kale 2000, 363.)

Backup and Restore Procedure Tests are conducted to verify that the database backup and restore procedures are correct and complete. These procedures vary depending on the used database and operating and hardware systems. (Kale 2000, 363.)

The purpose of Disaster Recovery Tests is to ensure that the disaster recovery processes and procedures are correct and complete. All components of the system's technical infrastructure are covered in this test, including the storage disks, networks, databases, user authorizations etc. Tolerance for downtime, adequacy of service and maintenance level vendor agreements and the effectiveness of escalation procedures and communication paths are verified as well. (Kale 2000, 363.)

The final phase before going live (the Final Preparation phase) is often called the cutover phase. Cutover is the process of transitioning from an old system to a new one. Some examples of cutover activities would be assigning ownership of functional processes in SAP to individuals (this refers to process owners), reviewing and updating all systems-related operations such as system monitoring and backup policies. The system is then subdued to a GoingLive check, which checks the system configuration and performance. After that, the system is locked down, which means that no more changes are made in the system. (Anderson 2003, 621 – 624.)

User training is conducted as well. The training is conducted in a training client. It is crucial to ensure that all the end users are able to conduct the routine tasks they will be handling in the future confidently.

Last but not least, one of the final parts of this phase is data transfer. Data transfer is often referred to as the most critical part of the project. The data transfer should always be given a high priority, it is very time-consuming process and the project manager must not forget to assign enough time to complete this

process as well as check the completion afterwards. As almost everything, the transferred data must be fully tested in every detail. It is good to keep in mind that the transfer should be done at the latest possible moment, which helps keeping the manual transfers to the minimum. Data transfer is a highly technical issue. (Baloglu, 88.)

After conducting all the activities, the readiness of the system to go live is assessed. The completion of requirements is checked. The requirements are that end user documentation as well as end user training is complete, the R/3 system administration is in place, the technical setup is complete, the conversion of customization settings, master data and transaction data is complete and that the production cutover and support plan is in place.

After verifying that all the requirements are met and getting approval from management, verifying that the users are ready and making sure that the security system is fully operational, the system goes live.

Go Live

Go Live signifies the start of a new system usage. The purpose of this phase is to move from a project-oriented environment to live production run. In other words, the system goes live. Involvement of all project team members is necessary at this point, as sustained support to business users is provided. Help with transition into the new environment should be secured as well. (SAPd.)

However, at this phase, the implementation process is far from over. Some errors might still occur in day-to-day operations or issues reported by end users. Main activities in this phase include addressing and correcting these issues. The corrections could include altering the business process, modifying the ABAP code, configurations or training on additional modules or functionalities. SAP system and daily transactions are also monitored for possible optimizations. (Kale 2000, 370 – 372.)

It is also critical to setup a help desk and Customer Competency Center. The purpose of both is to provide sufficient support for end users. Project implementation and support, business support, technical support and information services are some examples of activities undertaken by both entities. Setting up a help desk is especially important right after go-live period. Some users are still confused even after their training and help desk helps them overcome this issue. (Kale 2000, 381.)

At this phase, communication between all people involved in the implementation project is crucial. It is critical to ensure that everyone is on the same page and knows what is happening with the solution and knows what errors and issues have occurred. The project moves to so-called hyper care phase. This phase usually lasts around one month. The system is delivered to the hands of the users and system support transitions into routine support. (Anderson 2003, 644-647.)

Operate

This phase was first added to version 7 of ASAP methodology and is therefore rather new. This step was basically previously covered by the fifth phase - hypercare (Go Live). The purpose of this step is to optimize the application life style standards, processes and procedures and align them with operation needs. The system is operated with the help of the central operation platform (SAP Solution Manager) with the documented solution, which is based on the transferred project documentation. (SAPc.*)*

4.7 Critical Success Factors

In most contemporary publications and articles, 11 factors are recognized as critical success factors critical to ERP implementation success. Those are:

1. ERP teamwork and composition
2. Change management program and culture
3. Top management support
4. Business plan and vision
5. Business process re-engineering and minimum customization
6. Effective communication
7. Project management
8. Software development, testing, and troubleshooting
9. Monitoring and evaluation of performance
10. Project champion
11. Appropriate business and information technology legacy systems

(Gargeya & Brady 2005, 503-504.)

ERP teamwork and composition

This factor means the cooperation and effort of all people involved not only in the implementation. As previously mentioned, the implementation team should be balanced or include people from various departments and functions, and that is because in SAP implementation, both technical and business knowledge is important. The team members should be a mix of external SAP consultants and internal staff. The best staff should be assigned to the project. The level of interaction between project team members and consultants has a direct impact on the SAP implementation's success. That is because it allows the internal staff to develop technical skills for design and implementation. (Ful-Hoon Nah, Zuckweller and Lee-Shang Lau 2003, 12; Ful-Hoon Nah & Lee Shang-Lau 2001, 289; Gargeya & Brady 2005, 510-511.)

Change management program and culture

It was already mentioned that a change so extensive such as implementing SAP EPR system requires proper change management. The users of the system must be trained properly and any resistance or concerns must be addressed through regular communication, the work of change agents and identification of job support tools for different users. It is especially important to pay enough attention to the user trainings, as this will enable the transition from the old system to the new system to go more smoothly. It is crucial to ensure that staff understands how the system will change different business processes. Establishing help desk or some sort of support organization is critical. (Ful-Hoon Nah et al. 2003, 11; Ful-Hoon Nah & Lee Shang-Lau 2001, 293; Al-Mashari & Zairi 2000, 162; Aladwani 2001, 269-270.)

Top management support

This particular factor is one of the most important ones on the list and is closely related to change management. The staff will not have enough faith and willingness for the change if the implementation is not fully supported by company's top management. In order to express their support, top management should publicly and explicitly announce that the project is a top priority. New goals and objectives should be made legit by managers. The role of the new system should be communicated to employees clearly. It is important to ensure that new organizational structures, roles and responsibilities are established.

Possibly the most important aspect of top management support is the fact that enough quality resources are allocated to the project (this includes staff, time as well as budget). One way to ensure top management support is by tying management bonuses to project success. (Ful-Hoon Nah et al. 2003, 14-15; Ful-Hoon Nah & Lee Shang-Lau 2001, 291.)

Business plan and vision

This particular factor relates to change management, because for successful change management it is important to put emphasis on business plan and vision throughout the change process. The business plan and vision serve to guide the ongoing organizational effort related to the change. The business plan is supposed to include proposed strategic and tangible benefits, resources, costs, risks and timeline. The business plan containing such information will then assist in steering the direction of the implementation project. Specific and measurable goals should be included as well, since reaching the goals will sustain organizational commitment to ERP implementation. (Ful-Hoon Nah et al. 2003, 10; Ful-Hoon Nah & Lee Shang-Lau 2001, 291.)

Business process re-engineering and minimum customization

These factors have been previously mentioned. Basically, BPR should occur in order to fully benefit from the best practices offered by the system. The business processes should be adapted to the highest extent possible to fit the processes used in the system. In other words, the organization should try to make their business processes fit the software. This will decrease the amount of customizations needed, which in turn decreases the possibility of mistakes and problems. (Ful-Hoon Nah et al. 2003, 10-11; Ful-Hoon Nah & Lee Shang-Lau 2001, 293-294; Al-Mashari & Zairi 2000, 162-164.)

Effective communication

Communication is a subject that has already been touched multiple times. The importance of effective communication and feedback, especially when it comes to change management, cannot be underestimated. Effective communication should occur throughout all implementation phases and especially during activities such as training and user input. Company vision needs to be communicated, as well as project benefits and the commitment and support of top management to the project. Clear and effective communication helps companies to achieve continuous improvement in SAP ERP implementation. (Ful-Hoon Nah et al. 2003, 11-12; Ful-Hoon Nah & Lee Shang-Lau 2001, 291.)

Project management

The whole Chapter 1 was dedicated to project management. For the project's success, it is crucial to ensure that responsibilities and roles given are clear and specific, the scope of the project needs to be thoroughly considered and controlled. Project milestones should be defined, schedules and budget needs to be realistic and project deliverables should be clearly defined as well. (Ful-Hoon Nah et al. 2003, 13-14; Ful-Hoon Nah & Lee Shang-Lau 2001, 292.)

Software development, testing and troubleshooting

This factor refers to the technical parts of SAP ERP implementation. The development and testing should be thoroughly considered and managed. The general architecture of the system should be established before the deployment phase while considering the implementation's requirements. All testing done needs to be very thorough and needs to address the given tested process/infrastructure from every possible angle. As for troubleshooting, the most important aspects are quick response, patience, perseverance and problem solving capabilities. (Ful-Hoon Nah et al. 2003, 14; Ful-Hoon Nah & Lee Shang-Lau 2001, 294.)

Monitoring and evaluation of performance

This includes setting proper, measurable and attainable milestones during the project preparation phase. This helps to keep tabs on progress in the implementation. These milestones can be then used as a measure against the goals of the project. The monitoring of performance involves the exchange of information between the project team members and taking into account feedback received from end

users, which in the end relates to effective communication again. A tool that helps to monitor and evaluate the performance could be the usage of regular reports and project updates. (Ful-Hoon Nah et al. 2003, 13; Ful-Hoon Nah & Lee Shang-Lau 2001, 294-295.)

Project champion

This idea is important in ERP implementations in particular, because of the tendency of such projects to include company-wide changes. The idea here is to select a respectable member (usually high-level executive) of the organization to "champion" the project throughout the organization, which includes advocating for the system and promoting its benefits. The champion acts as a "resistance manager", which aids the project a great deal, especially from change management perspective. (Ful-Hoon Nah et al. 2003, 13; Ful-Hoon Nah & Lee Shang-Lau 2001, 292.)

Appropriate business and information technology legacy systems

Legacy systems refer to the system that was in use before SAP ERP implementation. These systems actually determine the level of IT and organizational change that is needed for the success of SAP ERP implementation. The more complex the legacy systems are, the more technological and organizational changes are required. This critical success factor refers to the fact that the amount of stability and success in the particular business setting determines the success of SAP ERP implementation project. All parts of the organization play a role in this, including existing business processes, organizational structure and company culture. Success in these areas is directly related to success of ERP system implementation. (Ful-Hoon Nah et al. 2003, 9-10; Ful-Hoon Nah & Lee Shang-Lau 2001, 292-293.)

5 RESEARCH

This part provides an assessment and analysis of theoretical findings on the issue on SAP ERP implementation projects with particular attention paid to the assessment of critical success factors. Qualitative and quantitative research outcomes are considered and compared to theoretical findings.

5.1 Qualitative research

As qualitative research, two in-depth interviews were conducted. The aim of these interviews was to get a comprehensive insight into the issue of SAP ERP implementation process which can be shared with readers. Interview questions can be found in Appendix 1.

First interviewee is an IT manager, ERP manager and SAP Competence Centre manager for Schneider Electric. His involvement in SAP ERP implementation projects was mainly project management and PS module expert.

The interviewee found the easiest part of the implementation process to be final preparation, as the tests in this phase are being finalized and preparation for cutover is not as demanding as the other parts, although the data preparation for cutover might prove to be quite difficult too. Also he suggested that after years of practice, project assessment in the project initiation and planning phase has become quite easy. This, as will be revealed in the following section, is supported by the survey results.

The interviewee proceeded to identify the hardest parts of the implementation process. According to him, key user training might prove to be very difficult, as it is very hard to make the key users truly learn the system and communicate everything that needs to be in the system so that the implementation team can implement the process in the right way. He also mentioned the importance of key users' participation in testing and proceeded with an example. There was an incident where all the testing was done by the implementation team, so after the team left, the key users didn't know what to do. Also, change management was identified as one of the crucial elements of SAP implementation process. Other difficult yet crucial part of the implementation process that has been identified is correct documentation,

especially blueprints. The key users should actually make their own documentation for end users, because after the implementation team leaves, it is the key users who train the end users.

The critical part of the implementation process that has been identified is integration tests. In business blueprints, it is described how the process will look like, the consultants then customize it and module tests are done. After that, integration testing is done, so the whole solution is taken and simulated in order to see how the process will work and look like in the target system. In this step, you can often see if the people working with modules did a good job, if everything aligns, because this is the step where you see for the first time the integration of all modules. Other critical parts identified were testing, integration, interfaces and data preparation. As will be revealed in the survey section, the survey's results support these findings, as well as theoretical results.

The last part of the interview was dedicated to identifying where exactly most of the projects go wrong. The interviewee's answer was interfaces, data transfer, data integrity and change management. The usual problem in this case is inadequate description of interfaces. Interfaces aren't paid enough attention to because most of the focus goes to the main processes. For example invoicing process, they know how it works, but sometimes it slips your attention that you need to send the invoice through EDI (Electronic Data Interface). Interfaces are difficult to customize, you need testing environment for it and sometimes that could be a problem, because you don't get to test it before going live. As for data, the main issue is data integrity, because for example it is not possible to create a material for storage location that hasn't been created. Sometimes the current system doesn't support things like that, so it needs to be created in order to work for SAP. Also measurement units are tricky – it is possible to purchase in metres, store in kilograms and dispatch in centimetres. So if the units aren't set and aligned correctly, it can cause damage in the warehouse. Change management is often not paid enough attention to and it is supposed that the employees just have to adapt, because it is their job. Anyhow it is a very important part of the implementation process that is often underestimated or incorrectly managed. The results of this question are also supported by the theoretical findings as well as survey findings.

The second interviewee has two decades of experience dealing with ERP systems, including SAP, and was working for big international companies, such as Tetra Pack and Nokia. According to the interviewee, the parts of the implementation project that might be considered as easier than the rest is

planning and setting up the rollout teams. One of the reasons is that in the beginning of a project, the employees and team members are usually motivated and excited about the project, but when the project encounters difficulties, the motivation and overall mood in the organization goes down and is hard to maintain. Also, when there is no necessity for customization and there is a possibility of using the standardized SAP package could be considered to be easy, relative to the other parts of the project.

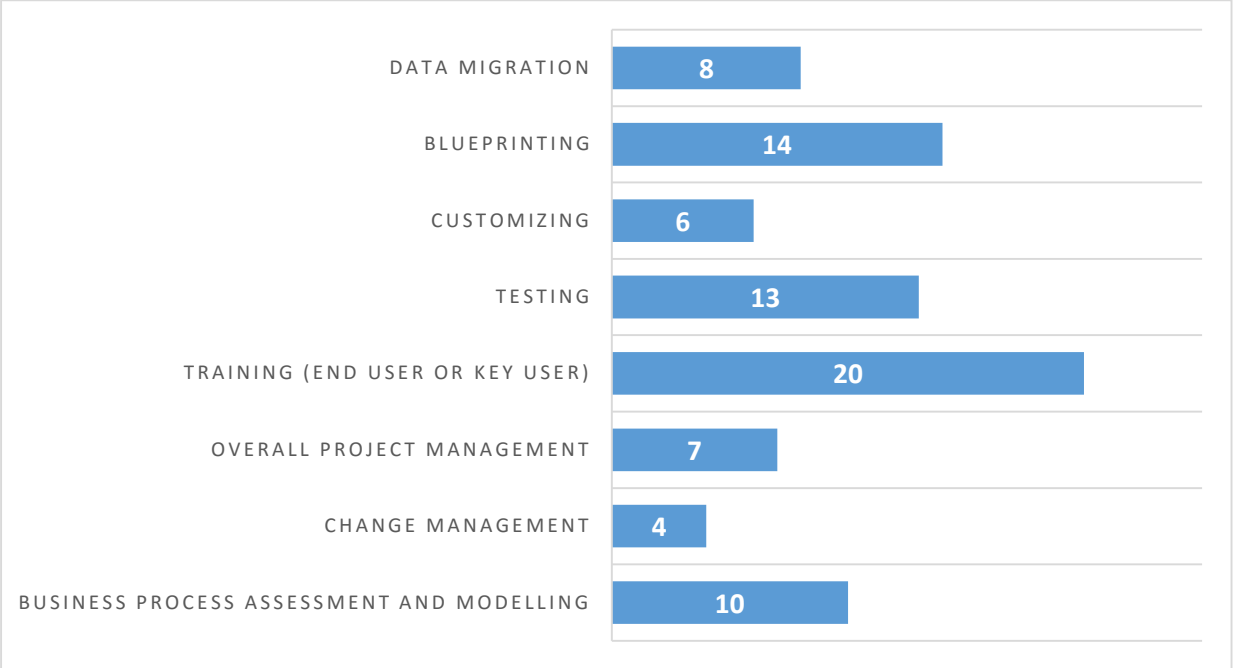
The interviewee proceeded to identify the hardest part of the implementation process. According to him, one of the hardest parts is when you have to deal with scope changes due to the inability to deliver the requested deliverables. But the hardest part is change management – people, especially in big companies, have become used to working in a certain way, so from that fact arises the necessity to internally sell the project to people throughout the organization and explain why it is necessary to implement the change. Change management was also identified as the most critical part of the implementation process, due to the reasoning that nowadays, the technical issues are more easily solved than dealing with resistance against change inside of the organization. When dealing with change management, the interviewee mentioned several ways of doing so, including proper planning and communication, top management support and clear and effective vertical communication. All of these have been previously identified in the theoretical part and are now verified. Another method the interviewee suggests is fingerprints – that means involving the people in the project in seemingly small ways, such as accepting one more column in a table, which helps with getting their acceptance. Another fact to take into consideration is that when the change as big as SAP implementation occurs, senior employees of the company might feel threatened by junior employees, because the junior employees are generally more open to the change, which threatens the positions of senior employees.

5.2 Quantitative research

The quantitative research was done by the means of an online survey. It contained 50% of open-ended questions, for one simple reason. The respondents of this survey are people that were/have been involved in multiple implementation projects and therefore what they have to say to the issue of SAP ERP implementation process is valuable and can potentially bring valuable findings to the research. The total number of respondents is 30. More detailed results and graphs of the survey can be found in Appendix 2.

The first set of questions aimed at providing a deeper understanding of the respondents. Most of the respondents work in IT department, IPO (Information Process and organization) which is basically IT department as well but not concerned only with IT, and SAP Competence Centre. SAP Competence Centre is basically a department focused on SAP application support, like help desk functions, trouble shooting, system stabilizing etc. Most of the respondents are business analysts, business process managers, project managers or key users. Business Analysts are people who analyse organizations and documents the organization's business processes and systems in order to assess the organization's business model and its integration witch technology. They may also contribute in business process modelling. Business Analysts often work with SAP, as SAP is essentially a bridge between the business side and the technology side of a business. Business Process Managers are people who are in charge of everything related to business processes, like evaluating, designing, measuring, monitoring and controlling. As SAP implementation is about understanding and correctly designing and implementing the specific business processes of an organization, these people are crucial when it comes to SAP implementation projects. The outcomes of these questions revealed that the respondents are experts and people involved in crucial operations and activities regarding SAP ERP implementation process.

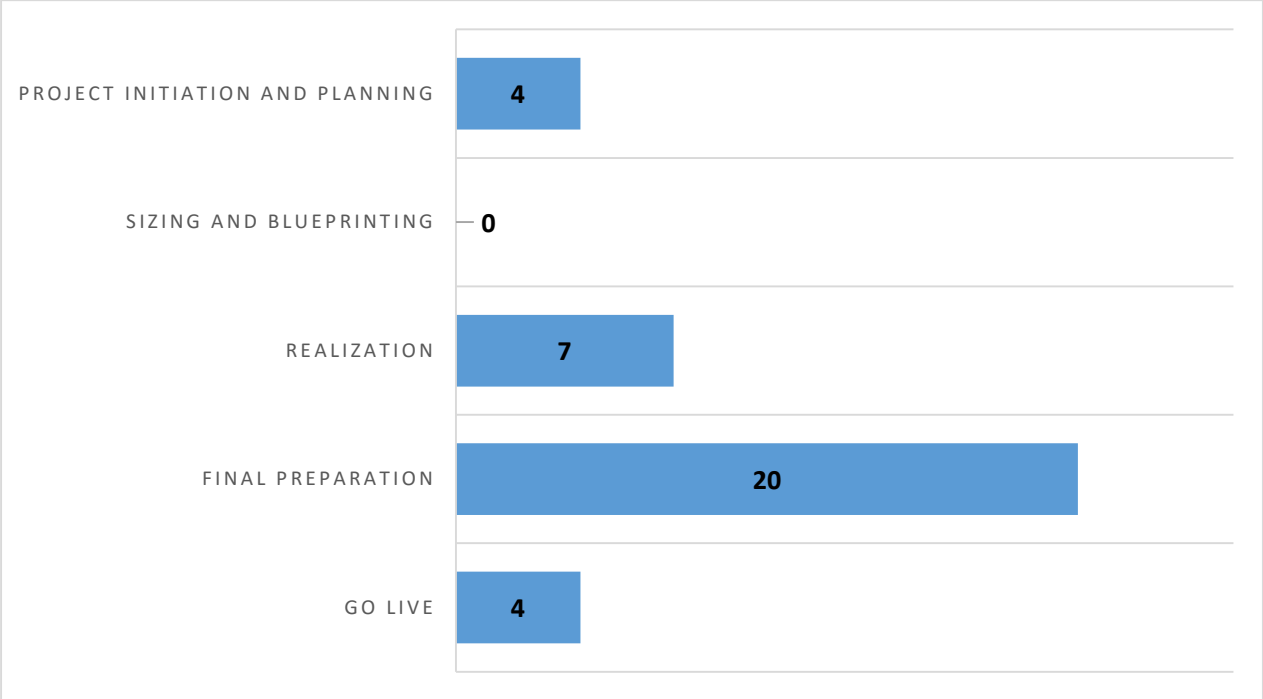
Another revelation about the respondents was provided by answers to a question that asked what activities the respondents are/were actually responsible for. This is illustrated by GRAPH 1 below. The results are quite standard. As training is very important and usually a lot of users are trained, both key users and end users, a lot of respondents were responsible for that. Blueprinting requires a lot of manpower as well, as most processes in the organization is being assessed and evaluated in order to figure out how to exactly implement it. Blueprinting basically goes hand in hand with business process assessment and modelling, however as previously explained, that is not the only thing blueprint is about, hence the smaller amount of people responsible for business process assessment and modelling. Testing, as also found in the interviews, is a crucial element of SAP implementation projects, which is why a lot of respondents were responsible for that activity as well. One interesting finding is that only 4 respondents were directly handling and addressing change management, or at least admitted to it. Every project manager should keep that in mind and with 7 project managers during the respondents, the number should be higher, as we will find out in the next question, change management is considered to be one of the most important activities in SAP implementation projects.



GRAPH 1. What activities specifically were you responsible for?

The next set of survey questions was aimed at assessing the difficulty of different phases of the implementation process. GRAPH 2 below shows that final preparation phase was identified as by far the easiest one. This quite makes sense, as in timeline it is one of the shorter phases and involves less activities than other phases. Most testing is done in the realization phase and the final preparation phase only consists of infrastructure and system load testing. No one found sizing and blueprinting easiest, which suggests it is one of the most critical phases in ERP implementation.

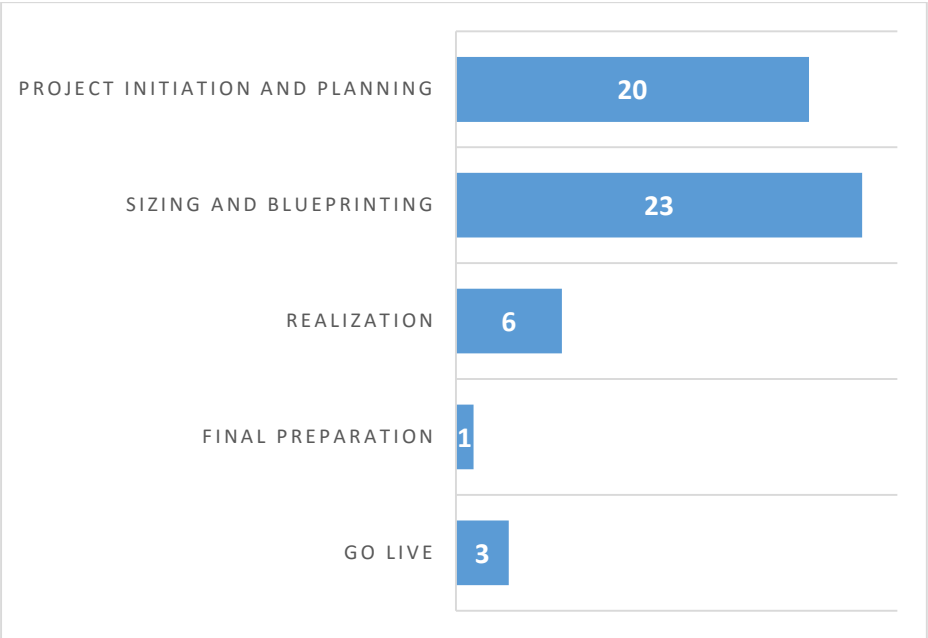
The results are consistent with the interview results, where the critical activities were found to be integration testing and one of the most difficult parts was correct documentation (including blueprints).



GRAPH 2. What do you consider to be the easiest phase of the implementation process?

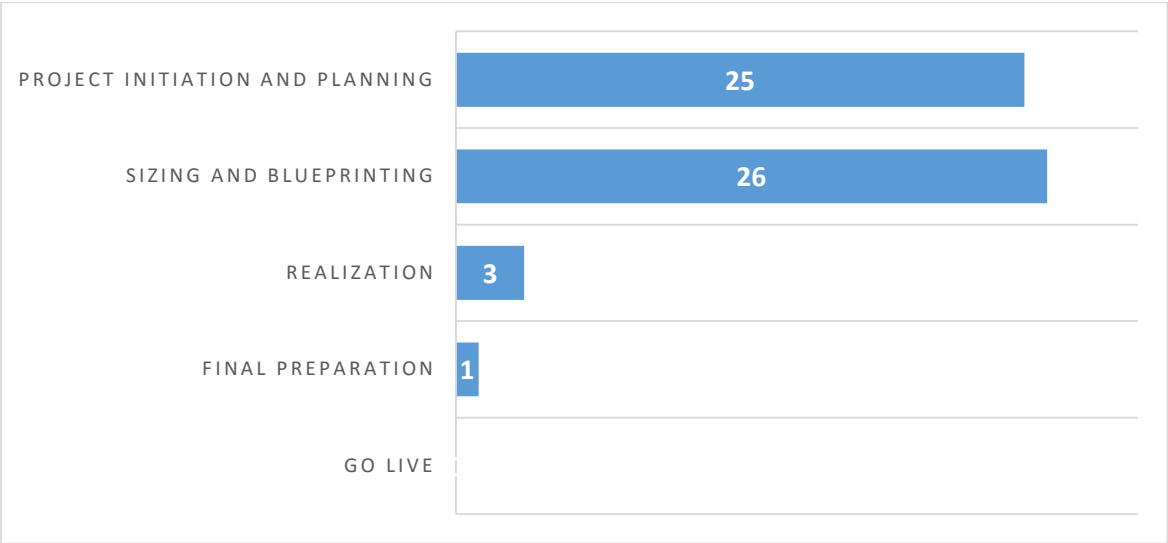
GRAPH 3 below shows that the respondents found the most difficult phases of the implementation process to be project initiation and planning and blueprinting. As theory suggests, these are indeed the critical parts of any SAP implementation projects, as it is crucial to get the scope requirements and documentation right at the beginning of the project, because those are the activities and documents that the entire project is based on.

The results are consistent with interviews conducted, as it was found that correct documentation and blueprinting is one of the most difficult parts of the implementation process.



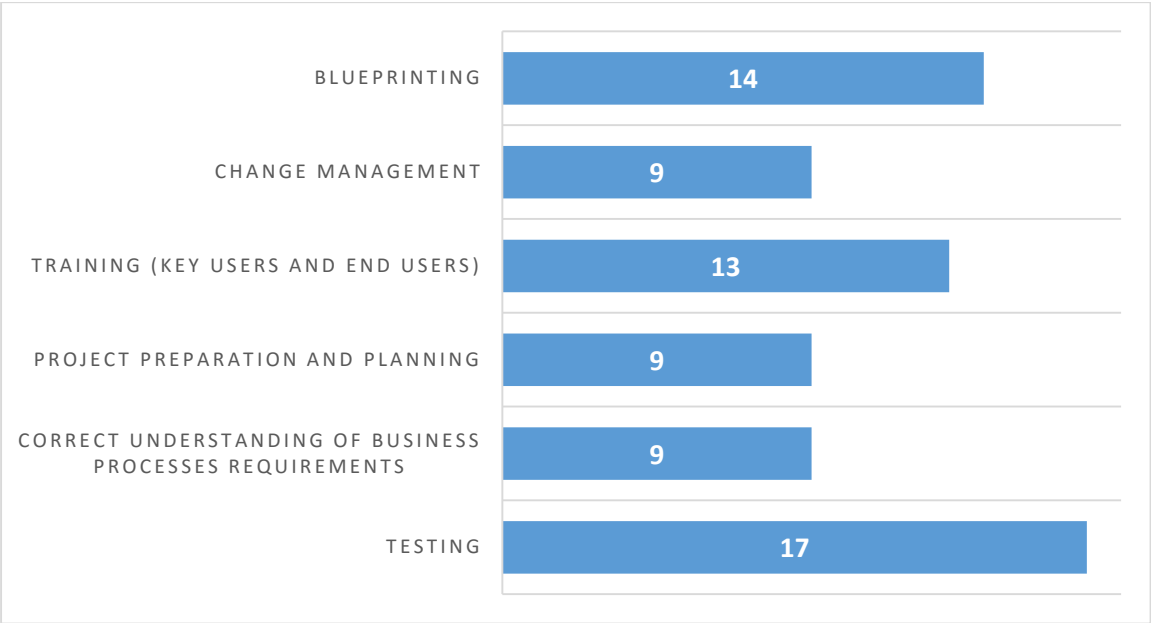
GRAPH 3. What do you consider to be the most difficult part of the implementation process?

GRAPH 4 below shows what part of the implementation process the respondents found to be the most important one. The results of this question also correspond with other theoretical framework and concepts, as the project is mostly based on documentation and decisions made in the initial phase of the project as well as during the blueprinting phase. Most of the business process requirements analysis and assessment is done in the blueprinting phase, which is why it came on top. It is quite surprising that no respondents answered with Go Live and very few respondents answered with Realization and Final preparation. A possible explanation could be that successful management of the first two phases is indeed crucial and determines the success of SAP implementation, whereas the other phases are mostly based on the first two phases.



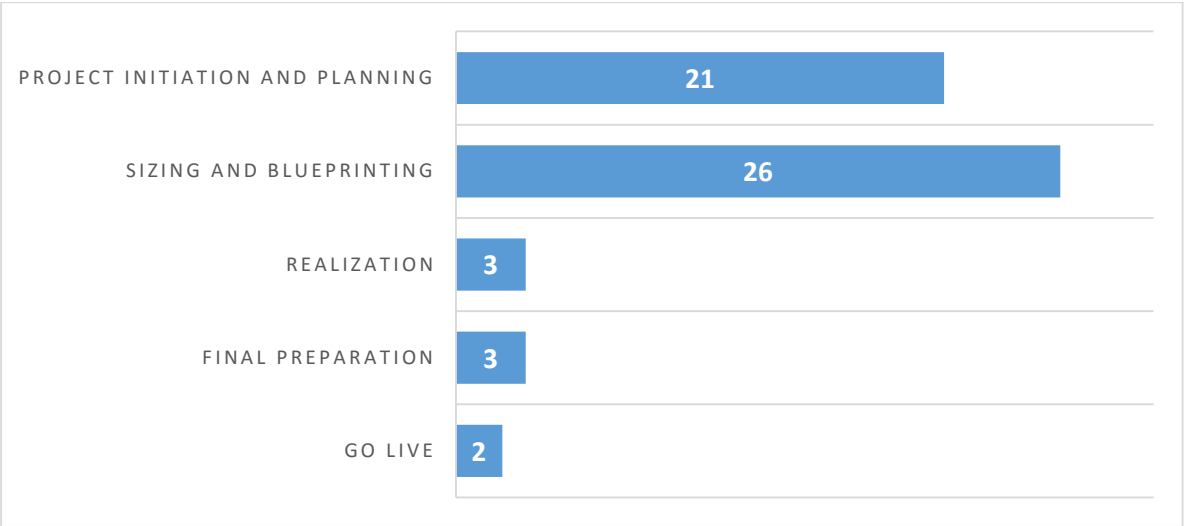
GRAPH 4. In your opinion, what part of the implementation project is the most important?

GRAPH 5 below illustrates the results of one of the key questions – What activities specifically do you consider to be the most important ones in the implementation project? The findings of this question correspond with theoretical part of critical success factors, as well as the interviews. It has been found that testing is considered the most important activity in SAP implementation projects, followed by blueprinting and training. Change management, project preparation and planning and correct understanding of business process requirements share the same amount (13%). This question revealed a nice correlation between theory and practice, as it supports the ideas presented in the theoretical part.



GRAPH 5. What activities specifically do you consider to be the most important ones in the implementation project?

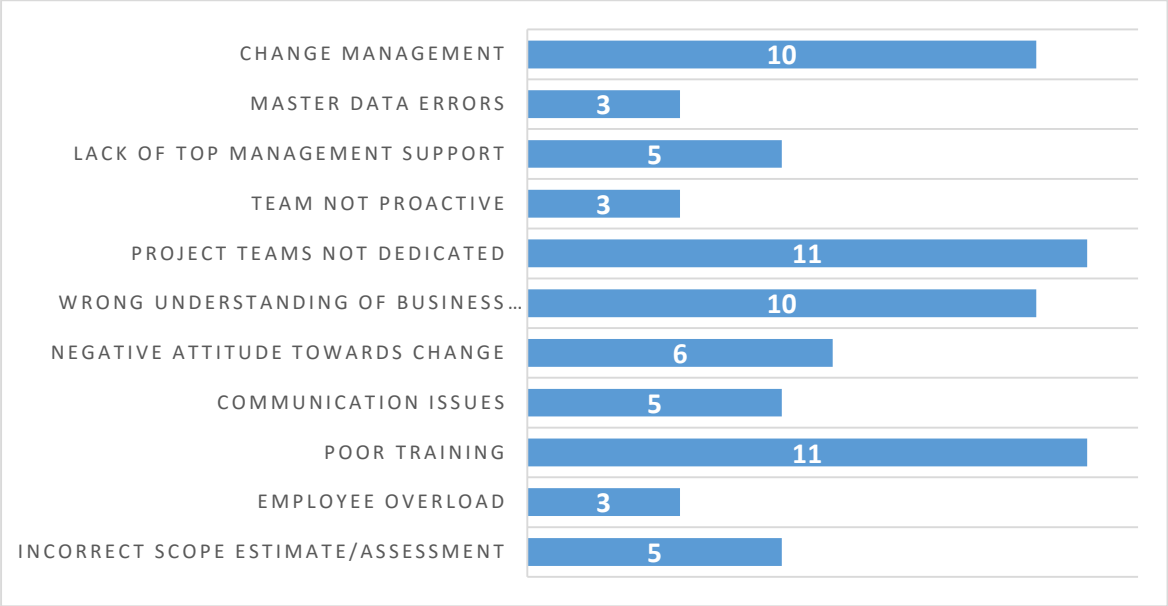
GRAPH 6 below shows the respondents' answers as to what part of the implementation project is most likely to go wrong. The first two phases of SAP implementation are also the most likely to go wrong. As it will be revealed in the next question, correct understanding of the business requirements and correct scope estimate/assessment is critical to the success of SAP implementation, therefore if anything goes wrong, the project will encounter scope changes, which as was found out from the interview is not viewed positively. Scope changes require a lot of explanations and may cause delays and confusion in the projects.



GRAPH 6. In your opinion, what part of the implementation project is most likely to go wrong?

GRAPH 7 below illustrates the results of the last question. The last question turned out to be probably the most interesting one. The four most common causes of problems or difficulties in SAP implementation projects, according to the respondents, were poor training, project teams not 100 % dedicated to the project, insufficient change management or lack of focus on change management and wrong understanding of business requirements. As explained previously in the theoretical part, these 4 elements are also one of the critical success factors, which is why improper handling might cause issues during the project. The findings also correspond with interview findings, where all of these factors were identified. Other common cause is negative attitude towards change, which indirectly corresponds to poorly addressed change management. If change management is insufficiently addressed, the negative attitude will prevail. This cause also corresponds to employee overload and not 100 % dedicated project teams. Sometimes, employees are just assigned to the project, but keep their daily responsibilities as well. This is usually done by assigning 70 % of employee's time to his daily responsibilities and 30 % of the project. This causes him to make difficult decision regarding the project and possibly being overloaded as well. This is particularly disruptive for key users, whose daily responsibilities interfere with them really learning and understanding their trainings. This then causes disruptions for end users, who are not getting trained well enough from key users, because they were overloaded. This then causes negative attitude throughout the organization, therefore harming the acceptance of change. As we can observe, it is not a particular issue that causes disruptions during the SAP implementation projects, but

rather a sequence of events. It is therefore necessary to address all aspects equally and treat them as they are equally important. This should maintain balance within all stages of the project.



GRAPH 7. In your opinion, what is the most usual cause of problems/difficulties in implementation projects?

CONCLUSION

Project management of SAP ERP implementation process is a complex activity lead by a project manager and done by the project team. It brings a whole set of issues and problems that need to be dealt with and at the same time, meet the expectations of project sponsor. Oftentimes the projects are done on an international basis, which brings a whole set of other issues.

The aim of my thesis has been to provide a general overview of theoretical knowledge related to SAP ERP implementation process, which has been done in the theoretical part. Critical success factors have been identified and discussed in the theoretical part followed by analysis and discussion of both qualitative and quantitative research findings.

In terms of identifying what particular critical success factors are the most important, the simple answer is that it depends. Every organization is unique and operates on different principles in different environments. The business processes of every organization are unique as well, which presents a certain amount of difficulty when identifying what critical success factors are the most important ones. It is advisable to not underestimate any of the critical success factors in order to achieve smooth course of the implementation project. However, the thesis points to some critical success factors and activities which deserve special attention due to their importance.

In the thesis, it has been found that the theoretical part related to theoretical framework of SAP ERP implementation phases is true and correct. Blueprinting and Project initiation and planning was found to be the most crucial phases during the implementation project, because basically every activity done further in the project is based on activities conducted in these two phases.

Testing, training and change management were found to be the most crucial parts of implementation projects by both qualitative and quantitative research. Testing allows to confirm that customizing and business processes are adapted to fit the particular needs of the organization in question and the implementation of the processes works well within the system and is aligned with the other processes. It also allows to make sure that the organization’s infrastructure is prepared to handle the load of the system which is to be implemented. Training aids in making sure that people in the organization will be

able to handle and manage the system after the project team departure. Change management is a chapter on its own and several books have been written on that particular subject, which proves and demonstrates the importance of this concept. The theoretical part supported and confirmed these findings.

The aforementioned finding also relate to the parts where most projects go wrong – poor training, change management, wrong understanding of business requirements and project teams not dedicated enough. Further recommendations and deductions can be made regarding these issues, such as putting enough focus on training and making sure it is done thoroughly and correctly. Change management should not be underestimated. The most common mistake is that employees are just supposed to adapt to the change, instead of providing framework for employees to deal with the change. Wrong understanding of business requirements has its roots in poor communication, wrong project scope estimate and bad blueprinting. In order to fix that, forming official communication and feedback channels can be done. This will achieve that all relevant communication will reach important persons. Wrong project scope estimate and bad blueprinting also stems mostly from poor communication. It is therefore necessary to confirm the reliability and correctness of all modelled business processes as well as making sure the project scope requirements are well understood both on the project manager side as well as on the project sponsor side.

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APPENDICES

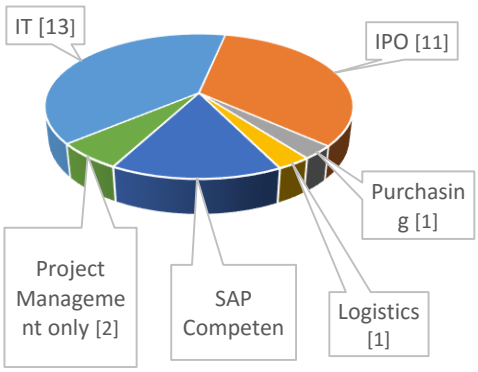
APPENDIX 1: Interview questions

1. Can you please introduce yourself?
2. What experience do you have with SAP ERP?
3. How exactly were you involved in the SAP ERP implementation processes?
4. What would you say is the 'easiest' part of the implementation process?
5. What would you say is the 'hardest' part of the implementation process?
6. How would you evaluate change management?
7. What are other most difficult parts of the implementation process?
8. What part of the implementation process is the most time-demanding?
9. What part of the implementation process you think is the most critical one? (In general)
10. What are/were your main responsibilities as Project manager/Member of the steering commitee?
11. In what ways would you say it differs from other members of the implementation team?
12. What parts of the implementation process do you pay the most attention to from the perspective of Project manager/Steering commitee member?
13. What part of the implementation process you think is the most critical one from the point of view of Project manager/Steering commitee member?
14. What part of the implementation process is most likely to go wrong?
15. Can you give an example of 2-3 projects you were working on? Can you describe them?
16. How 'big' were the projects?
17. How many people were involved?
18. What was the budget?
19. What problems did you have to deal with in those projects?
20. How important would you say is team work in those projects?

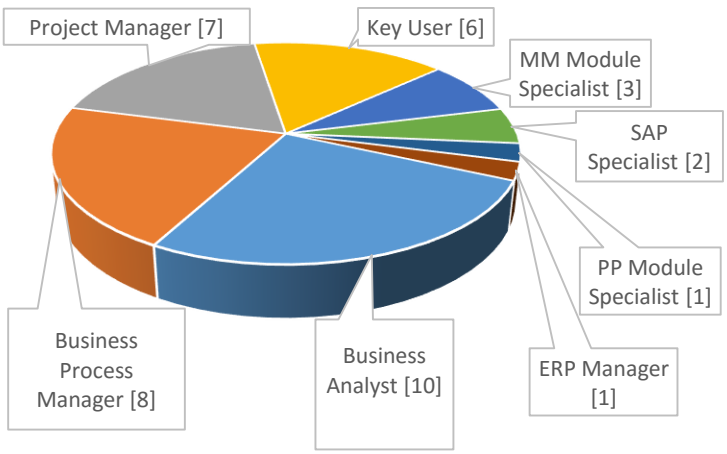
APPENDIX 2: Survey results

- **In what department do you work/were you working in when participating in SAP EPR implementation projects (in case the department has changed since the projects)?**

▪ IT	40 %
▪ IPO	33 %
▪ SAP Competence Centre	15 %
▪ Project Management only	6 %
▪ Purchasing	3 %
▪ Logistics	3%

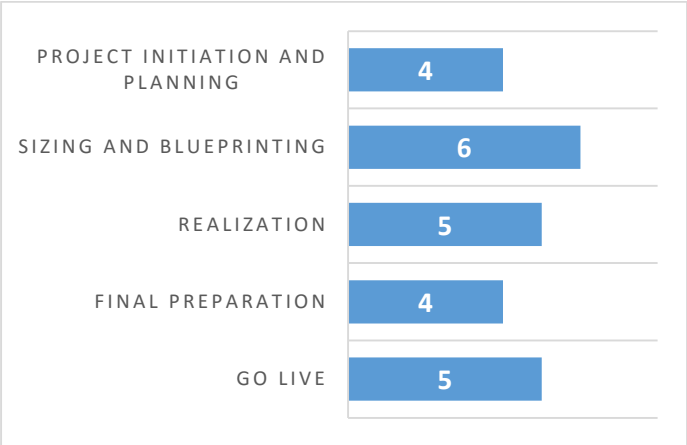


- **What was your role/position in SAP ERP implementation projects?**



- Business Analyst 26 %
- Business Process Manager 21 %
- Project Manager 18 %
- Key User 16 %
- MM Specialist 8 %
- SAP Specialist 5 %
- PP Module Specialist 3 %
- ERP Manager 3 %

➢ **Were your activities during the implementation project focused on some parts only? If yes, which ones?**

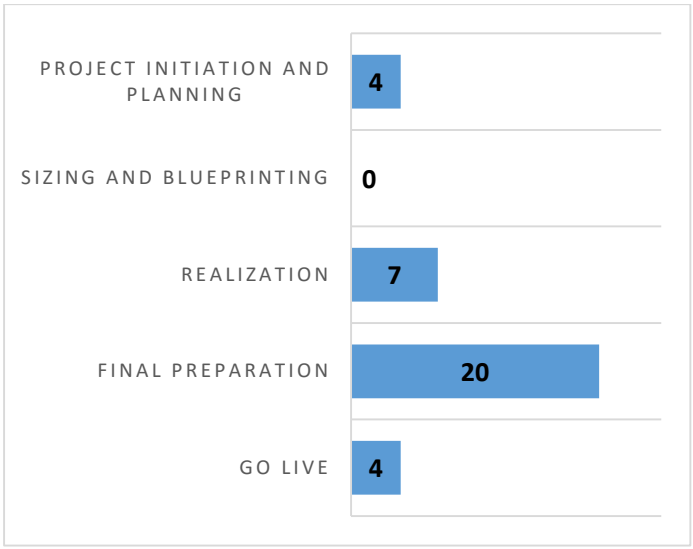


- Project initiation and planning 17 %
- Sizing and blueprinting 24 %
- Realization 21 %
- Final Preparation 17 %
- Go Live 21 %

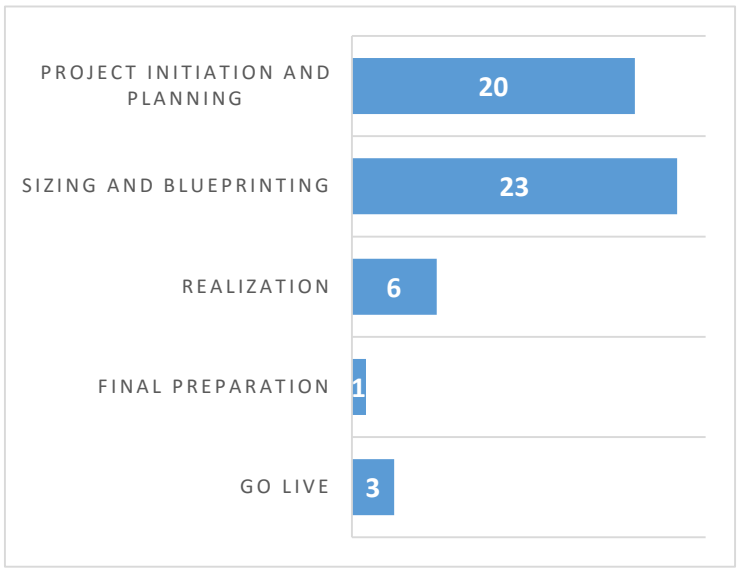
Actual number of respondents: **7**

➢ **What part (or parts) of SAP ERP implementation process do you consider to be the "easiest" one?**

- Project initiation 11.5 %
- Blueprinting 0 %
- Realization 20 %
- Final Preparation 57 %
- Go Live 11.5 %

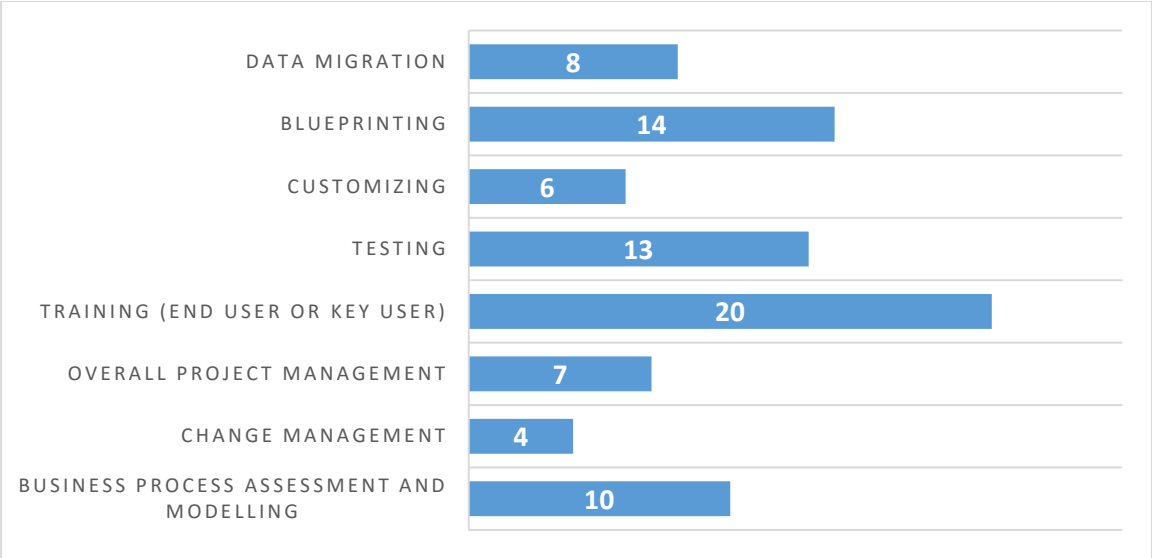


- **What part (or parts) of SAP ERP implementation process do you consider to be the most difficult one?**



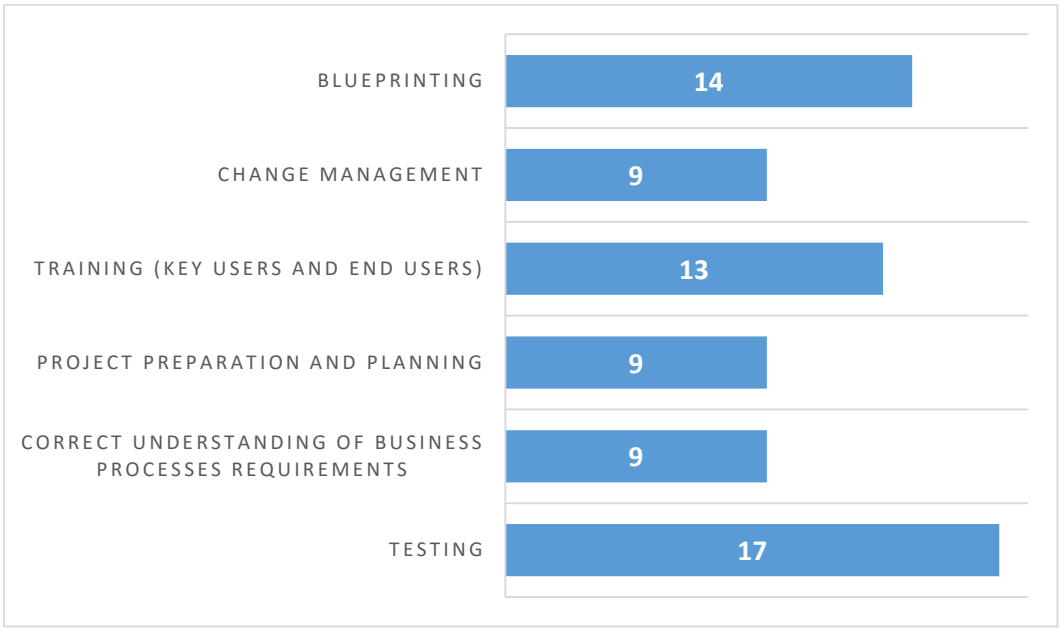
- Project initiation and planning 38 %
- Sizing and blueprinting 43 %
- Realization 11 %
- Final Preparation 2 %
- Go Live 6 %

- **What activites in particular did you participate in/were responsible for? Please try to be as specific as possible (testing, end-user training, change management etc.).**



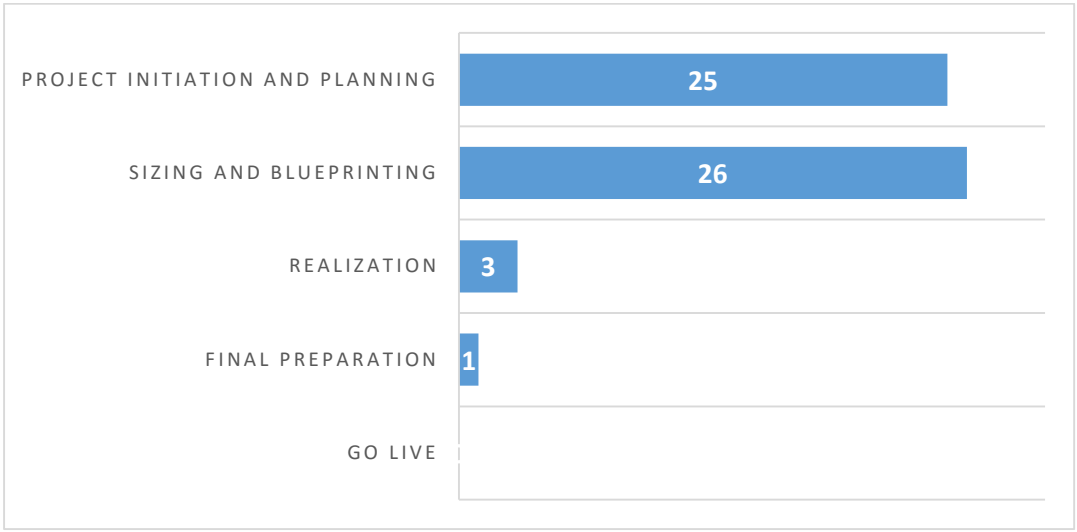
- Data migration 10 %
- Blueprinting 17 %
- Customizing 7 %
- Testing 16 %
- Training (end users and key users) 24 %
- Overall project management 9 %
- Change management 5 %
- Business process assessment and modelling 12 %

- **What activities specifically do you consider to be the most important ones in the implementation project?**



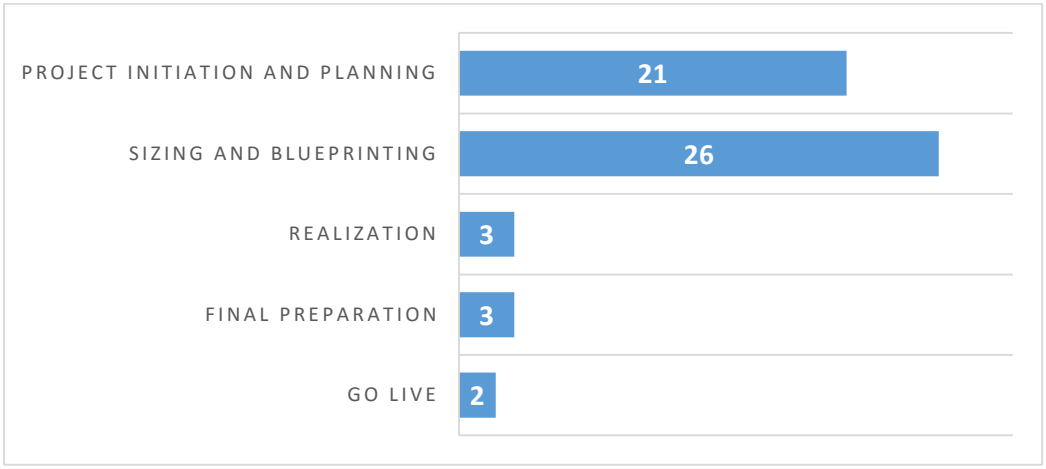
- Blueprinting 20 %
- Change management 13 %
- Training (end users and key users) 17 %
- Project preparation and planning 13 %
- Correct understanding of business processes requirements 13 %
- Testing 24 %

➢ **In your opinion, what part of the implementation project is the most important?**



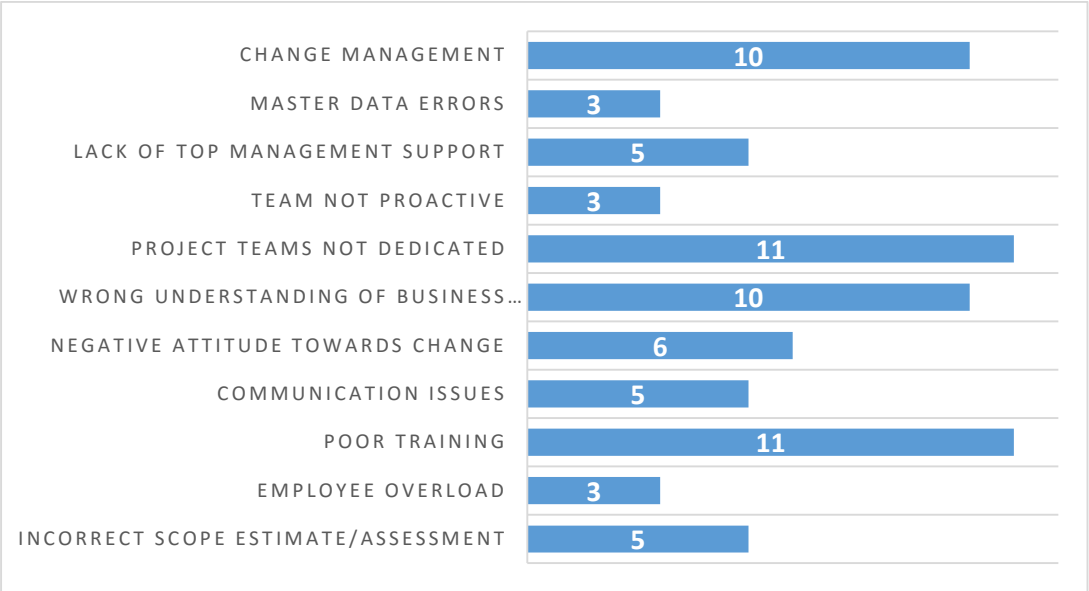
- Project initiation and planning 45 %
- Sizing and blueprinting 47 %
- Realization 6 %
- Final Preparation 2 %
- Go Live 0 %

➢ **In your opinion, what part of the implementation project is most likely to go wrong?**



- Project initiation and planning 38 %
- Sizing and blueprinting 47 %
- Realization 6 %
- Final Preparation 6 %
- Go Live 3 %

- **In your opinion, what is the most usual cause of problems/difficulties in implementation projects (potential answers are for example human error, technical difficulties, not paying enough attention to an activity,...)? Please try to be as specific as possible.**



- Change management (poorly addressed) 14 %
- Master data errors 5 %
- Lack of top management support 7 %
- Team not proactive 5 %
- Project teams not dedicated 15 %
- Wrong understanding of business requirements 14 %
- Negative attitude towards change 8 %
- Communication issues 7 %
- Poor training 15 %
- Employee overload 5 %
- Incorrect scope estimate/assessment 7 %