

BARRIERS TO SUCCESSFUL REALIZATION OF NEW PRODUCT DEVELOPMENT PROJECTS IN THE IT INDUSTRY

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Abstract: Software development projects are the essential part of business activity of many IT companies. According to numerous studies and reports, approximately only one-third of IT projects turn out to be successful. Software development projects require unique approach in order to meet customer's requirements. This article provides an in-depth literature review on barriers to IT project launch and implementation. Also, the paper presents key findings of a research that was carried out to identify the most significant barriers to IT projects implementation.

Keywords: new product development, barriers to IT projects, project management.

1. Introduction

Adaptation to fluctuating conditions prevailing on the dynamically developing markets allows enterprises to build their competitive advantage. Companies are continuously searching for new information and communication technology (ICT) systems as a result of an increasing complexity of production systems and the general evolution of technologies on the market. Moreover, the information technology (IT) services market is undergoing a real renaissance due to the ongoing expansion of on-demand services and accelerating growth of sophisticated software solutions, often offered in the cloud. Services of the ICT sector are widely used in business practice. The number of IT projects, especially associated with software development, continues to grow with every year. Project management is currently one of the most essential solutions used by companies focused on new product development (Friis et al., 2014). Hybrid models, which consist of agile methods combined with traditional stage-gate new product development models, have been widely implemented by IT companies in order to accelerate development speed and reinforce product quality (Cooper, Sommer, 2016).

IT products can be defined as services and software solutions (computer programs, websites, systems or applications) that support various business activities of certain companies

or meet unique requirements of individual customers (Liebert, 2018). The growing demand for innovative IT services and software solutions among enterprises and individual customers is a prelude to Industry 4.0, where all production systems, management systems and IT systems are vertically and horizontally integrated, thereby increasing the manufacturing capacity of a certain business entity. Modern approaches, which are being used to launch and implement advanced IT products or services, have a multidimensional nature, namely:

- They are based on permanent and sustainable cooperation with the customer throughout the entire software development cycle (Alvertis et al., 2016).
- They initiate a desire to seek innovation (Reich et al., 2008).
- They strive to increase product's quality (Geraldi, et al., 2011).
- They create optimal conditions for knowledge sharing among development teams (Iden and Bygstad, 2017).
- They create value for both the customer and the company.

However, it turns out that the development of modern software requires a specialized (and often virtual) working environment, well-developed customer relations, appropriate resources, and properly adapted agile software development methods. Agile Project Management (APM) is considerably different in comparison to traditional project management (also known as Waterfall approach in IT industry), due to variable project scope and high flexibility (Palmquist M. S., 2013). Many IT projects tend to fail, exceed their budget, or are unable to meet their goals. Project Management Institute (PMI) emphasizes that there are an infinite number of reasons for project's failure. According to the PMI report from 2017, 37% of projects failed due to the lack of clearly defined project objectives and milestones. Chaos Standish Group Report 2018 shows that agile project success rates are two times higher than success rates of waterfall projects. However, it also states that over 50% of evaluated projects have failed to meet all requirements of project constraints — time, budget and scope. Therefore, there are many barriers to successful implementation of IT projects.

This article discusses the barriers hindering the implementation of software development projects in the IT industry. This paper consist of literature review which focuses on barriers to launch and implementation of IT projects, and a qualitative research which indicates that organizational culture, poor risk management and lack of proper communication are the main issues occurring in companies that run IT projects.

2. Characteristics of IT software development projects

Every project can be defined as a unique endeavor and purposeful activity that has limited resources, scope, and time. Project management is an effective approach commonly used to develop new products and implement changes in the company. Project's work-breakdown

structure and schedule enable companies to develop new solutions in organized stages, which allows them to take better control of every executed task (Trocki, 2013). There are many definitions of a project, namely:

- “A project is a time and cost constrained operation to realize a set of defined deliverables up to quality standards and requirements.” (definition by the International Project Management Association)¹.
- “A project is a temporary endeavor undertaken to create a unique product, service, or result. A project is temporary in that it has a defined beginning and end in time, and therefore defined scope and resources. And a project is unique in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal.” (definition by the Project Management Institute — Project Management Body of Knowledge)².
- “A project is a temporary organization that is created for the purpose of delivering one or more business products according to an agreed business case. Every project is unique.” (definition by PRINCE2 Axelos)³.

An IT project can be defined as temporary endeavor undertaken to develop or modernize a unique system or software solution, sometimes combined with ICT hardware. The main objective of such project is to implement all features and functions listed in the user's requirements (Liebert, 2017). Projects executed in the ICT sector are highly innovative. Frączkowski describes an IT project as a set of actions which have to be undertaken by developers to define unique architecture, interface, data, hardware, and software required to develop a unique system. Also, he emphasizes that there are many types of IT and ICT projects (Frączkowski, 2003), such as: software development projects, IT system implementation projects, network-related projects, and IT/ICT infrastructure development projects. Software development projects consist in developing software solutions like computer programs, websites, mobile applications or computer games. It should be noted that the scope of an IT project may include implementation of software and also activities associated with computer hardware, infrastructure, networking, or configuration of other types of devices. This article focuses on the barriers to IT software development project implementation.

Software development projects, which are mainly related to software engineering, are of a completely different nature than hardware projects. The main purpose of the latter is to create a tangible product that has a physical form (instead of intangible software). An important element that distinguishes a modern IT software project from a traditional project is the lack of a predetermined scope. Over the years, IT software development companies have moved from a linear waterfall approach to an agile software development approach. Projects that are

¹ IPMA Individual Competence Baseline®, ICB version 3, 2015.

² A Guide To The Project Management Body of Knowledge. Project Management Institute, Inc., 2013.

³ AXELOS, PRINCE2 Agile® Guidance Preview, 2015.

being executed in waterfall methodology have a pre-defined scope from the beginning of the project (Szalvay, 2004). Nowadays, each IT project is adjusted to the dynamic requirements of the customer on an ongoing basis throughout the entire production cycle of a certain IT product. Collaboration with the end-user or customer in a project allows for an easier exchange of information between commissioner and the development team. This has a positive impact on the overall quality of the product. This type of approach is the well-known APM (Highsmith, 2005), which uses Adaptive Project Frameworks to enhance the workflow of the development team. Scrum method is one of the most popular frameworks used by agile IT companies (Schwaber, and Beedle, 2001). Agile projects use incremental product development techniques and production cycles, during which the main features of the software are being created and verified on a regular basis (Balaji, Sundararajan, 2012). Team coordinator (called the Scrum Master), development team, and the user of the product (known as the Product Owner), play the key roles in this approach. Product owner is usually a customer or an expert in the certain field (Leffingwell, 2011). Also, it is worth noting that IT companies use a lot of special tools to enhance the collaboration of development teams and provide additional support to project management activities. There are many different types of supportive software solutions, and some of the most popular are: JIRA, Slack, Skype, Wrike, GitHub, Microsoft Project, Trello, Zoho Project, GanttProject, and VMware (Davis, 2013).

The latest concepts that use the elements of agile approach are the so-called teal management (Blikle, 2017) and holacracy (Robertson, 2015). The latter is a method of decentralized management and organizational governance, in which team members have to fill a specific role in the organization, in accordance to their skills and abilities. In addition, all pieces of information are communicated in a transparent way, in an environment that encourages creativity and search for innovation. In other words, this approach is based on creating an optimal environment for self-organizing development teams. Instead of assigning people to specific positions, each member of the organization can play a variety of roles in order to support the company's key objectives. Moreover, every employee is empowered and has the authority to make important business decisions.

More and more companies are starting to use temporary collaboration networks (Bendkowski, 2017). This approach consists in developing new products during a few days period by establishing a temporary network in a virtual environment. Such a network consists of external experts with professional skills and experience in a certain field — several experts and professionals join forces to develop a specific product or service within a short amount of time. Ad-hoc teams of this type are often created dynamically when the project objective is not fully specified, but the basic assumptions of the final product are defined. The greatest advantage of this approach is the rapid execution of a certain order and the use of extensive knowledge provided by experts and contractors in a specified technical field. An additional

advantage is the optimization of costs in relation to the amount of work performed by a certain specialist.

There are many approaches used by companies to develop innovative IT products. Table 1 gives an overview of the most popular approaches and methods commonly used to develop new software in IT companies.

Table 1.

Characteristics of approaches and methods used in the development of a new IT product in the context of project management

Approach or method used to develop a new product	Is project management used?	Characteristics
Waterfall — traditional approach	Yes — Prince2, PMBoK PMI	Scope of the project is fixed. All tasks are planned in the beginning of the project. The triple constraints of the project are predetermined — there is very limited ability to apply changes during the implementation phase. It is difficult to implement changes. This approach is not very adaptable to dynamic customer requirements or a dynamic environment.
Agile — flexible approach	Yes — AgilePM methodology plus methods such as Scrum or Scrumban	Scope of the project is variable and may change, only the budget and timespan are predetermined. The project is divided into iterations (production cycles also known as increments). Product backlog is being used instead of plans and unnecessary documentation. The whole project and deliverables can be adjusted to meet the updated customer requirements. Every task is flexible.
Hybrid approach	Yes — combination of Prince2 or PMBoK at the initiation and planning phases of the project with Agile methods used during the implementation phase; there is also a Prince2 Agile variant	This approach applies waterfall methods and techniques in the project initiation and planning phases. However, Agile Project Management methods are being used in the execution phase of the project. The project is therefore optimally implemented in terms of preparation, documentation, and practice. It is a professional approach that quickly adapts to a certain situation, but requires the development of specific networks, rules, and internal structures within an organization.
Teal Organization — Holacracy	Yes or no — a product developed using a self-organizing team which may use project management methods and tools	This approach significantly reduces the overall top-down hierarchy in order to create an environment that encourages teamwork, collaboration, creativity, and self-organization. The project management approach is abandoned in favor of dynamic team management, in which everyone plays a specific role. Knowledge sharing plays a key role in this approach.
Virtual Ad-Hoc Temporary Collaboration Network	No — the product is developed virtually in a self-organized team	This is a dynamic, temporary, and swift solution which consists of solving a certain problem or issue as quickly and qualitatively as possible. It is highly adaptable to changes in the scope of the project — members of development team work in a virtual environment from different places around the world and additively develop a certain product with an intensive exchange of knowledge and experience.

3. Barriers to execution and implementation of IT software development projects

3.1. Key barriers to the launch and implementation of IT projects

There are many scientific papers and reports concerning the issue of barriers to launch and implementation of new software development projects. In this section of the paper, an overview of various scientific studies on the barriers to implementation of IT projects has been presented. Individual types of barriers were divided into internal and external barriers.

According to the Standish Group' Chaos Report 2015 on the current status and condition of IT projects, in which the size of the research sample (collected in a period of a few years) reached over 50,000 IT projects, many companies have decided to migrate from waterfall to agile development methods. Despite the fact that modern management solutions are becoming widely popular, they are not perfect yet. In general, only 39% of IT projects that used the agile method were fully successful, and in the case of traditional waterfall methods only 11% of projects concluded successfully⁴.

According to the Standish Group, there are 10 key barriers to the implementation of IT projects:

1. Poor communication with product users or product owners.
2. Excessive delay in making key decisions about the project.
3. Poorly specified objectives.
4. Emotional immaturity of the project team and organization.
5. Incorrect optimization of the project scope and problems with setting priorities.
6. Inflexibility of project processes.
7. Excessive complexity of project activities.
8. Lack of specialized staff with key competences for the project.
9. Lack of focus on cooperation — an unfavorable organizational culture.
10. Lack of specialized tools and infrastructure.

Another international study with interesting results is the CollabNet VersionOne 13th State of Agile Report, in which the researchers mainly focused on the general condition and problems of agile software development methods.⁵ VersionOne is a company offering a range of services and products in the field of agile software development methods. The corporation also conducts market research related to the use of APM by the IT industry. This report presents the survey results of 1,319 companies which described their experience with agile development methods. It should be noted that in 2018 and 2019, according to the report's annotations, the research was not only conducted on customers of VersionOne software (17% approximately), but it had a much wider range. According to the report, the greatest benefits of using agile team

⁴ CHAOS Report. CHAOS Standish Group, 2015.

⁵ VersionOne 13th Annual State of Agile Report. VersionOne & CollabNet, 2019.

management methods (or product development) are: the ability to manage changing priorities, accelerated production speed, and an increased productivity. Enhanced software quality and business alignment have also been emphasized. The report presents 11 key barriers to the implementation of agile methods in organizations, which can be considered as barriers to the implementation of IT projects:

- Organizational culture issues associated with the proper adaptation of agile values.
- General organizational resistance to change.
- Lack of support from top-management executives.
- Lack of skills/experience with agile methods.
- Inconsistent processes and practices across teams.
- Insufficient training and education.
- Lack of product owner support and availability.
- Pervasiveness of traditional development methods.
- Fragmented tooling and project-related data/measurement.
- Minimal collaboration and knowledge-sharing.
- Regulatory compliance or government issues.

Another study, conducted in Poland in 2015, also identified key barriers to the implementation of IT projects. According to this study, problems in understanding project's scope and improper management of project's schedule are the most significant barriers to implementation of IT projects. Also, a lack of formalized procedures and standards was highlighted — managers often tend to use intuitive management based on a simple action plan instead of tools recommended by professional project management methodologies (Kozarkiewicz, and Wójcik, 2015). The risk factors in IT projects are quite unique and diverse, so it is difficult to predict them and apply appropriate risk response (Bannerman, 2008). Most of the IT project risk factors are highly associated with the scope of the project and customer requirements (Wallace, et al., 2004). A study on the factors which impeded the successful implementation of ICT projects, that was conducted in Poland in 2014 on a sample of 90 IT companies, revealed the following key barriers (Jasińska, 2014) related to IT projects:

- Organizational structure and company procedures are not properly adapted to the implementation of IT projects.
- Lack of support from suppliers.
- Lack of support from customers.
- Negative impact of competition that may obstruct or delay project implementation.

The next stage of the above-mentioned research was the verification of problems directly related to organization and management at executive levels. The following issues have been identified:

- Problems associated with proper allocation of resources in the project.
- Issues related to adjustment of company processes to the project management system.

- Problems associated with conducting a large number of pointless project meetings.
- Poor communication among project team members and top management.

Strzelczyk and Skalik have defined the key success factors of an IT project (Strzelczyk and Skalik, 2013). Their scientific research is consistent and identical to the extensive reports of the Standish Group, which outline the wide scale of problems related to the implementation of IT projects. The scientific literature also points out that poor communication between the development team and the customer is a serious threat to a project (Woźniak, 2013). The customer may lack the required commitment, and is often unable to fully specify the scope or functionality of the product. Such issues may cause a drastic decrease in the quality of a product (Redlarski, and Basińska, 2013). Scientists emphasize that the problem of distorted knowledge flow in software development projects is significant (Kukko, 2013). There are many communication-related barriers that impede knowledge sharing activities between project participants and stakeholders. These barriers include such issues as:

- Lack of trust.
- Lack of time.
- High individualism.
- Lack of developed intra-organizational communities which may create a proper environment for collaboration.

The PARP report from 2017, concerning the development of the Polish ICT sector until 2025, identifies the following barriers to the development of ICT companies, and therefore to the implementation of IT projects⁶:

- Low level of availability of skilled professionals and engineers on the market.
- High amount of taxes and fees imposed by law.
- Strong competition.
- Limited financial resources.

More barriers have been identified by the European Information Technology Observatory (Wojnicka-Sycz, 2013). These barriers include, in particular, limited investments in research and development and unfavorable environment for modern high-tech activities.

3.2. Barriers to IT projects: A macro- and micro-level approach

Barriers to IT projects can be perceived from the perspective of macro and micro point of view. Macro scale relates to ICT projects and project activities that can be associated with a whole region or area. For example, according to the Innovation Development Strategy of the Silesian Voivodeship for the period of 2013-2020, one of the biggest challenges for SMEs (from the sector of intelligent specializations of Silesia region) is risk management in financing innovative activity. Each implementation, launch, or development of an IT system

⁶ Report: Perspektywy Rozwoju Polskiej Branży ICT do roku 2025. INVESTIN, Ministerstwo Rozwoju, Polska Agencja Rozwoju Przedsiębiorczości, 2017.

is associated with high development costs and maintenance of both software and hardware. The aforementioned strategy points out how difficult it is to develop markets based on technologies of the future. Digitization and modern hardware make it possible to create complex systems that will allow enterprises to combine their knowledge and solutions into integrated IT networks. Modern products, technologies, and software developed by the ICT sector are usually made in collaboration with clusters and alliances, in which appropriate software components form new system solutions. One example is the initiative to create Smart Cities, as mentioned at the European Congress of Small and Medium-sized Enterprises in Katowice in 2017 (Jankowska, 2015). The Smart City concept consists in achieving sustainable urban and regional development by adapting to the needs of residents (with the use of innovative information technologies). The barriers to such complex projects or project portfolios include:

- Infrastructural deficiencies.
- Bureaucratic and legal problems associated with complex administration.
- Lack of adequate means to implement modern technologies on a mass scale.

The awareness of residents and entrepreneurs about the potential of this type of project (the social aspect) is also important. Residents may reject new IT solutions due to their lack of trust, or even due to resistance to change as many people prefer to use older solutions. An equally important aspect is the issue of licensing and law. Such legal regulations as the General Data Protection Regulation, may have a negative impact on many IT systems and their features. Therefore, the political and economic situation may also have an impact on the life cycle of major IT projects.

From the micro point of view, barriers refer directly to the internal structures of IT companies. Therefore, it is necessary to verify and identify what kind of barriers hinder or delay the implementation of IT projects in enterprises offering software-related services (according to the Polish list of business activity classification, PKD 62.01.Z). A number of serious internal problems has been observed during the implementation of new IT solutions in enterprises, such as (Moś, 2012):

- Problems in understanding dynamic requirements and specifications.
- Unclear goals of the project and utility values of the software.
- Lack of support from users of the system.
- Inaccurate analysis of user needs and poor selection of IT/ICT components.
- Lack of knowledge and skills required to run and operate new software.
- Employees' resistance to change.
- A lack of support from top executives.

During the InfoMEET 2017 IT industry conference (which took place in Katowice, Poland, in 2017), more than 300 IT specialists and experts of the IT industry had to answer a set of questions regarding the biggest problems and challenges associated with successful

implementation of IT projects⁷. It turned out that companies have serious problems in adapting to the principles of agile methods. Due to this issue, most projects are being delayed or become unsuccessful. Employees and top management executives are reluctant to use complex project management methodologies full of pre-imposed procedures and rules.

Some companies try to drastically change their organizational culture and use holacracy, where the traditional hierarchy of positions is abandoned (employees don't have any leader or superior), and each employee or team member fills a specific role in a self-organized development team. This approach is often combined with agile team management frameworks like Scrum. The latter is a framework for developing, delivering, and sustaining complex products that has many benefits in comparison to traditional waterfall approach, namely:

- Quicker release of useable product to customers.
- Higher quality and productivity.
- Lower costs.
- Greater ability to incorporate changes if they occur (due to the daily meetings and variable scope).

Companies also prefer to use so-called collaborative ad-hoc networks, where solutions or products are developed in just a few days through the use of a virtual environment and external experts, who can be considered as professionals in a certain industry. During the InfoMEET 2018 IT industry conference, more than 200 IT experts and programmers have confirmed that the organizational culture and properly scaled agile methods have the highest impact on the successful implementation of new software development projects⁸.

Small enterprises quite often have a form of small-scale family businesses with just a few employees. Outdated approaches to product development are being used among those companies due to the high resistance to change. The lack of support from top management only discourages and delays the option of organizational restructuring in order to adapt to the latest technologies and trends that could significantly improve manufacturing processes. Also, the lack of appropriate knowledge and resources that would enable small companies to adapt to new standards is another serious problem. Virtual environments may be hard to implement due to the specific nature of virtual collaboration. Poor level of risk management is also an important issue in the case of very small companies. The latter often renounce detailed risk analysis and prefer to implement projects by using the intuitive 'ad-hoc' mode.

Barriers to implementation of IT projects are related to the organizational, technological, social, and economic layers. Key barriers associated with the successful implementation of IT projects have been presented in Figure 1. The macro barriers have been defined as a set of external barriers, while the micro barriers have been defined as internal barriers occurring within the internal structures of a company.

⁷ InfoMEET Conference. Katowice, 2017.

⁸ InfoMEET Conference. Katowice, 2018.



Figure 1. Key barriers to IT project launch and implementation, divided into external (macro) and internal (micro) barriers.

4. Results of qualitative research on barriers to the implementation of IT projects

The main objective of this qualitative study was to identify and verify the barriers hindering the implementation of new software development projects in Polish IT companies. The research was conducted in the period of December 2018 to March 2019 on a group of 71 representatives of SMEs with at least 3 years of experience in the IT industry and expert knowledge in the field of software product development. A research tool in form of a questionnaire has been used to obtain the results. The survey consisted of qualitative and quantitative questions, in which

the respondents had to select key barriers that impede the implementation of software development projects. The answers to qualitative questions have been described below.

- **Is organizational culture a key factor hindering the implementation of software development projects and how can companies overcome this type of barriers?**

Almost all of the respondents (90%) pointed out that organizational culture is one of the main sources of problems in today's software development environments. These issues may derive from the unique and specific nature of every organizational culture. Every company uses its own set of habits, customs, rules and principles. There are many important aspects and factors that may have a huge impact on development teams. Experts indicate that team building should consist of internal training, team integration, and establishment of clear and understandable rules. Transparency, swift communication and an appropriate style of team management are essential values required for building agile teams. In the case of organizational culture, even the language used by team members may have an impact on their ability to understand various tasks. Employees that work in IT industry often tend to use different types of jargon to describe certain parts of the developed product or project elements. Therefore, every company should provide a guidebook with primary rules and objectives that explain all details related to team building and collaboration. This also applies to the definition of done. The best solution that may be used to overcome these barriers is coaching. Every coach (senior team developer) may not only train new team members but also support team integration.

- **Can agile methods, hybrid models, holacracy, or collaborative ad-hoc networks ensure proper prevention of many issues occurring in the IT projects? Can these modern approaches be used as a solution to the most common barriers to software development (in relation to the results of the Standish Group's CHAOS Report and the State of Agile — VersionOne Report)?**

More than half of the experts (62%) indicated that new approaches are much better than traditional waterfall methods. Agile frameworks are regarded as best solution to run software development projects. Furthermore, agile project management seems to be most popular among modern software development companies, because it has an impressive set of useful features like adaptive planning, incremental development or early delivery. Also, it encourages rapid and flexible response to change. Most of the respondents (62%) agree that modern approaches can help companies reduce barriers or even overcome them, especially in the case of poor communication and issues associated with proper understanding of project's objectives. However, latest methods and solutions, like holacracy, require sophisticated resources, in particular, expert knowledge and a technologically advanced working environments. Such environments require expensive assets in form of software solutions and hardware that may provide support in the areas of project management and team collaboration. In other words, the software development model should be adapted to the resources which are currently available in the company.

The key research results have been presented in Figure 2. Respondents had to answer the following question — *What are the key barriers to IT project implementation in small and medium-sized enterprises?*. The respondents had to select 3 out of 12 key barriers to the implementation of software development projects. Twelve key barriers hindering the implementation of new IT product development projects were selected in accordance to the literature review conducted in the previous subsections of this paper. The most critical barriers to IT project implementation (the most common responses), that were indicated by IT experts, have been listed below:

- Problems and issues associated with organizational culture (20%).
- The inability to properly manage risk in an IT project (15%).
- Lack of knowledge of development team members (11%).
- Fear of agile software development and agile methods like Scrum (10%).
- Lack of customer support and issues associated with collaboration (10%).
- Problems associated with proper communication (9%).

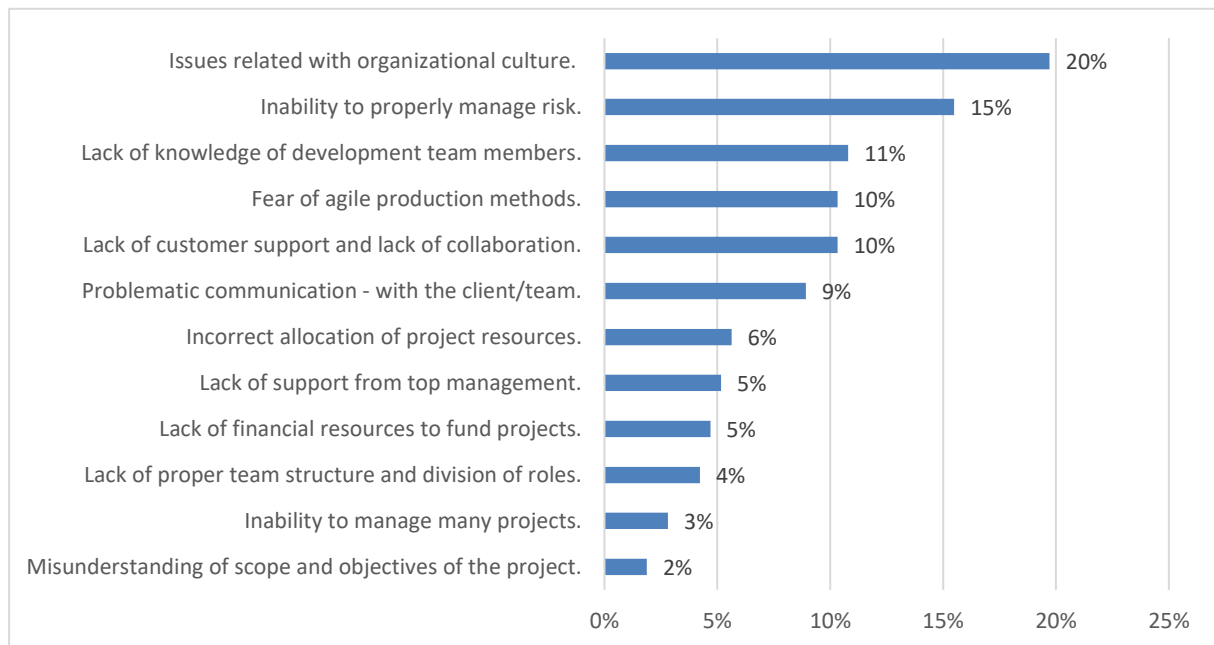


Figure 2. Key barriers to IT project implementation according to the IT experts of SMEs, ranked in order of the most frequent responses.

5. Conclusion

Information technology projects associated with software development deliver real value to customers, thereby allowing business entities to strengthen their position on the market. There are dozens of technical, organizational, social, political, and economic barriers that may have a negative impact on the progress of an IT project. Companies may reduce these barriers

by taking appropriate precautions and implementing organizational changes. Enterprises should use a variety of supportive tools, like project management software solutions, in order to make IT projects more successful. Also, a proper software development method has to be selected — agile software development is slowly becoming a common standard in most IT companies. Enterprises should search for optimal methods of team management, which must be adjusted to the organizational conditions of a certain company. Organizational culture has to be properly managed and configured — it should be understandable to all employees and stakeholders. To overcome the barriers to IT project implementation, the company should verify whether it meets a number of important criteria, which are the key success factors of IT projects. According to the Chaos REPORT 2015 by the Standish Group, the key success factors of an IT project include the following items⁹:

- Top management support.
- Emotional maturity (in the context of organizational culture).
- User involvement.
- Optimization and specialized resources.

The research results presented in this article indicate that a properly adjusted organizational culture is a key factor that may reduce barriers to IT project implementation. A well-developed organizational culture can provide favorable conditions for the creation of self-organized development teams. Another important aspect is the optimal use of agile team management methods. Companies should develop appropriate procedures, habits, and standards required by agile frameworks in order to enhance the workflow and knowledge sharing among project team members. Proper risk analysis and comprehensive risk management plan will help IT company identify and manage potential problems that could undermine a project. Also, every company has to skillfully manage its resources and provide sophisticated assets in form of software and hardware that can be used to establish a virtual working environment.

There are many barriers to the implementation of NPD projects in the IT industry. This is mainly caused by the uniqueness and complexity of IT projects. The literature review presented in this paper and key findings of the empirical research can only provide a minor overview of this dynamic issue. Therefore, more research should be conducted to explore this issue further.

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⁹ CHAOS Report. CHAOS Standish Group 2015.

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