

# IMPACTS OF THE LOCK-DOWN DURING THE COVID-19 CRISIS ON PROJECT MANAGEMENT

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## Abstract

The article examines the topicality of the waterfall approach to project management, in response to the forced move to the online environment due to the Covid-19 pandemic. As part of the research, an indicative quantitative research was first carried out, used to design subsequent qualitative research carried out in the form of in-depth interviews with project managers. Three research questions were identified on the future of waterfall and agile approaches, online project management options and software support. Based on the information obtained, it was evaluated that the waterfall approach in its original and comprehensive form is no longer relevant; however, its principles still have their application. However, the future of the field of project management is called the hybrid approach, which combines elements of a waterfall and agile approach. It was also found that project management can be applied in an online environment, however, a combination of contact and remote work is appropriate. In this context, it was assessed that Microsoft Teams is the most widely used tool for online communication, and that project management software is failing Microsoft Project (although it still has a dominant position) and increasing use of JIRA.

**Key words:** Project Management, Waterfall Project Management, Agile Project Management, Remote Working

**JEL Code:** M0, M12

## Introduction

In 2020, an epidemic of the new virus (SARS-Cov-2) swept the world. The rate of spread and deaths associated with the disease have caused a global pandemic crisis that has forced countries to move from partial to complete lockdowns. There was a gradual ban on physical contact, meetings, or even going out. This situation has forced all companies to take specific measures and move their employees to a home office, thus transferring a large part of their normal processes to the online environment. This was no different in the field of project management, which has also experienced a revolution in recent years under the name "agile". The agile

approach of project management has been considered in recent years as a successor to the traditional waterfall approach. Gradually, a large number of companies are switching to it. Its characteristic speed and flexibility, together with the focus on software products, evokes the view that it is indeed more suitable for today's dynamic world full of uncertainties and the expected ever-higher level of process digitization. However, there are still proponents of the waterfall approach, who argue that an agile approach cannot be applied in certain fields, and especially in projects with a fixed framework, price and / or time. Related to this, there is still uncertainty and concern about moving a less flexible waterfall approach to the online environment, where today's world is clearly heading with increasing levels of digitization. The aim of the research was, among other things, to find out (in response to the current situation) the topicality of the waterfall approach, the degree of adaptability of complete project management to the online environment.

## **1 Waterfall versus Agile Project Management**

The waterfall model is a linear and sequential approach to project management, which consists of planning the project into clear, consecutive phases, where the next phase begins only after the end of the previous one. It is a traditional method of project management, where each member of the project team has a clearly defined role and works in a linear manner to achieve a predetermined project goal. This, as well as the individual phases planned to achieve it, is considered immutable. This method is especially suitable for long and well-thought-out projects. A single time plane and a minimal rate of change thus characterize them. From the principle of this methodology, changes during the project are not supported, mainly due to the high increase in the cost structure that they would cause. With the rise of project management, it has been found that not all projects can be developed with a workable and effective plan. This problem first arose for projects with a high degree of uncertainty and thus low reliability of estimates. The reason is the lack and high variability of information in the context of the project and about the project itself.

Kerzner (2013) finds the first indications of the unsuitability of the traditional approach to the management of some projects during the "Software Crisis" of the 1960s and 1980s. During this period, many software projects exceeded their budget and schedule, and had a very negative impact on their stakeholders. Much of the problem with these projects was a high emphasis on productivity, often at the expense of quality. The failure of software projects is confirmed by (Šochová & Kunc, 2014), who state that almost three quarters of software

companies' projects end late, exceed the agreed budget, and usually their output does not even solve the customer's real problem.

A key issue in the agile project management methodology is the document entitled "Agile manifesto" (Fowler, 2001). In this Manifesto, four main values of the agile methodology and 12 of its principles are presented, together defining this approach. This manifesto sets out four main values that, according to the agile approach, carry more weight than the values used in traditional project management methodologies: (1) individuals and interactions instead of processes and tools; (2) working software instead of thoroughly processed documents; (3) cooperation with customers instead of contractual negotiations; and (4) responding to change instead of following a plan.

Layton et al. (2020) in their definition of agile project management emphasize the focus on timely delivery of value, and flexibility and continuous improvement of the resulting output and project processes themselves so that the customer is delivered a tested product that meets his requirements. One of the most important essences of agile frameworks is iterative and incremental development. The whole project is thus divided into iterations, or recurring shorter periods of time, within which the work is performed and the output of the project is thus incrementally formed. There is a very wide range of agile methodologies / frameworks and new ones are still emerging. The best known include SCRUM, Kanban, Lean Development / Startup, DevOps, Extreme Programming (XP), or SAFe, or combinations of these frameworks, e.g. ScrumBan. For comparison traditional and agile project management see table 1 or (Thesing et al., 2021).

**Tab. 1: Comparison of traditional and agile approach**

	<b>Traditional</b>	<b>Agile</b>
<b>Product</b>	<ol style="list-style-type: none"> <li>1. The product meets all the initial requirements to the maximum.</li> <li>2. The product is delivered to the customer fully completed.</li> <li>3. The product cannot be changed in the development process without delays and budget increases.</li> </ol>	<ol style="list-style-type: none"> <li>1. The product is delivered to the customer gradually at the end of each iteration.</li> <li>2. The product can be put into limited operation during the development phase.</li> <li>3. The product can be changed in the development process without delays and budget increases.</li> </ol>
<b>Customer</b>	The customer is not involved during product development.	The customer actively cooperates during development, has the opportunity to change requirements
<b>Development</b>	<ol style="list-style-type: none"> <li>1. There is a precise procedure and processes.</li> <li>2. One cycle with the result of the finished product.</li> </ol>	<ol style="list-style-type: none"> <li>1. Does not have a strict plan, may vary depending on customer feedback.</li> <li>2. It is iterated - each part of the product is functional and can be implemented.</li> </ol>
<b>Documentation</b>	The documentation is prepared before the start of the project, it contains all procedures and steps and data related to them.	Efforts to minimize documentation, in most cases only apply to certain activities.

<b>Team</b>	Strong hierarchy: subordinate vs. superior, clearly defined role of the leader and his full responsibility for the course of the project.	Maximum information sharing, mutual support, close cooperation and informal atmosphere.
<b>Costs</b>	The budget is not strictly defined in advance; it is based on individual changes in the requirement and the subsequent volume of the project.	The budget is predefined, when changing it; the customer's approval is required.

Source: authors

## 2 Home Office and Remote Working

Home Office, online work or remote work are the most common names, as the phenomenon of recent years is called. Before the Covid-19 pandemic, it became one of the common work benefits, although in many cases offered only to a limited extent and at the same time the center of many discussions, especially in terms of work efficiency. However, in 2020, due to the pandemic, the home office became a common way of working, across industries, and forced even fundamentally opposed companies to try switching to working in an online environment. Of course, moving to a home office requires meeting certain requirements. These are, above all, the provision of the necessary equipment and requisites so that it is possible to fully perform the work. The absolute minimum identified (Sutherland, 2020): telephone, computer, Internet access, reliable storage of documents and system backups, webcam (currently standard on laptops), access to telephone and email contacts, access to files and documents needed to do the job, a quiet place for calls, a suitable environment for video calls and, of course, software.

Based on many years of studies, it was found that a significant factor in labor productivity is the level of involvement and interaction of employees, where a high level of involvement results in better quality and higher productivity. In their study, Hickman and Robinson (2020) state that the level of involvement and interaction of employees working remotely is equal to the level of employees working locally. In normal, office work, hour-oriented work is common. However, working the necessary hours marking the completed work is not very compatible with the way you work from home. The results-oriented work approach is thus significantly more suitable for this case. This method allows for high flexibility, efficiency and a degree of motivation of the employee to perform the work. (Sutherland, 2020)

From the employer's point of view, this way of working brings several advantages. Employees working remotely mostly (Sutherland, 2020): work better and faster, work an average of more hours (usually due to lower sick leave), are happier with their work, are more open to collaboration and generally work better together, reduce costs to employees.

Employees themselves perceive work outside the office as a way to increase productivity through (Reynolds, 2017): less interruption, less stress from traffic to the workplace, less strict company policies, lower noise levels, clothing that is more comfortable, a more personal work environment, fewer meetings that are more efficient. More about well-being at work see (Charalampous et al., 2019).

From the manager's point of view (department, project), managing a remote team is a complex challenge. In addition to their normal job description, they must ensure that all team members have the necessary knowledge, skills, tools, information and equipment, as well as maintain the team's coherence necessary for its proper functioning and performance. (Sutherland, 2020).

Moreover, at the time of the Covid-19 pandemic, when work from home was infected, schools and kindergartens closed, and social life was completely reduced, employees and managers are exposed to unexpected and new situations. These are, for example, inadequate workspace, unstable internet connection, interference from children and other problems that practically transform the above-mentioned pros of working from home into negatives. These situations greatly complicate the performance of the work and result in a high level of stress, which, as well as a monotonous and non-social way of life, leads to health problems of physical and mental form. The level of dissatisfaction of women was greater precisely due to the care of children and households, as surveys show (Carli, 2020; Collins et al., 2020; Feng & Savani, 2020). The manager must pay even more attention to the health, well-being and motivation of employees or members of his team.

However, the management of remote teams is not new to many managers, as international teams, which are a relatively common way of collaborating between experts from around the world, usually work and communicate in an online environment. Remote teams are composed of geographically independent members working from different distances. Although these teams bring many benefits, all this collaboration is based on quality communication, which is conducted online. A survey (Grossman, 2011) conducted in 2011 on 400 corporate companies from the United States and the United Kingdom estimated the total annual loss of misunderstanding between employees at \$ 62.4 million. Adding to the employee's productivity losses caused by poor communication, the loss per employee is estimated at \$ 26,041 per year.

### **3 Software for Project Management and Remote Working**

Based on their functions and offered options, project management software can be divided into three levels: (1) Simple tools with easy operation, designed for planning a specific project. Their

ease of use is balanced by zero automation, minimal data analysis and the relatively high complexity of adjusting the project plan. (2) More complex tools designed for the management of a specific project. They are usually equipped with partially automated functions for planning, monitoring and reporting on the progress of the project. They also offer comprehensive data analysis for easier control of project progress. (3) The most powerful tools enabling multi-project management using a shared database and comprehensive software for inter-project monitoring and control.

According to the list of popularity of project management systems (Project Management Zone, 2021), there are more than 235 software for project planning. The unequivocal leader in this category is the Microsoft Project, followed by JIRA and Trello, which focus mainly on supporting agile methodologies. From waterfall or rather hybrid-oriented software, Asana, Wrike, and now also the rapidly growing Monday can be found in the top ten. EasyProject is also gaining in popularity, offering solutions for waterfall and agile projects. More about project management software, including cost (Mastný, 2021).

Communication plays a key role, significantly affecting efficiency and the overall cost of work, both in the company and in a specific project. More emphasis must be placed on communication in the online environment, where there is usually a greater amount of uncertainty, not only due to limited or due to completely missing non-verbal communication.

During the Covid-19 pandemic, attention shifted to group video calls, user screen sharing, and shared whiteboards. The software that started to dominate the market thanks to these possibilities are mainly MS Teams and Zoom. Earlier programs, such as Slack or Google's online toolkit, also have a strong position and popularity. More about communication software, including cost (Mastný, 2021).

#### **4 Methodology and Design of Research**

The research examined in detail the impacts, obstacles and benefits of project management in a waterfall way in the online environment. From the characteristics of the problem and the need for a deeper knowledge of the situation, a qualitative method of research was chosen in the form of in-depth interviews with project managers who have experience in managing waterfall projects in both ordinary and online environments.

Each interview was always conducted with just one respondent, in the form of a video call, with precisely defined questions in a fixed order. The aim of the research was to answer the following questions, which resulted from a previously conducted questionnaire survey among project managers: (1) Is the waterfall approach still a current approach to project management? (2)

Is it possible to manage projects fully in the online environment? (3) Does Microsoft Project still hold a dominant position as a software tool to support PM?

The interview was attended by project managers with different levels of experience, working with teams of different sizes, from different fields and from companies differing in size and internationalization. The wide experience spectrum ranges from beginning project managers, with a few years of experience, to project and program managers with more than 20 years of experience, or even managers certified according to PMI, PRINCE2 or IPMA. Some of them work for corporations, some for startups and some work externally. Both local, Czech and international companies are represented. The companies and projects that are included in this research fall into the following fields: healthcare, education, retail, construction, financial sector, public services or manufacturing, most often IT. Participating managers, depending on their position, field and specific project, lead project teams small, up to 10 members, medium, around 20 members, and large, 40 members and above. Full research results see (Mastný, 2021).

## **5 Results of Research and Discussion**

### **5.1 Q1: Is the waterfall approach still a current approach to project management?**

In most cases, respondents believe that the waterfall approach in project management still has and will have its application, especially for projects with a fixed price or with a fixed project output. At the same time, the usual attitude to the relationship between the waterfall approach and the agile approach is largely that the agile methodology is another option for leading a project, rather than a successor approach in project management. Some even argue that the waterfall and agile approach are actually the same processes, consisting of the same phases, differing only in the mindset of the actors and in the speed of passage and frequency of repetition of the phases. However, managers admit that due to the influence of agile methodology, especially in terms of flexibility and customer focus, the waterfall approach today is not identical to its original, historical form.

In this context, it was also argued that the waterfall approach as originally established and defined is outdated. Given this information, I would define the current situation in such a way that project managers profess the principles of the waterfall approach, but no longer apply this approach to their projects as a whole. In other words, the waterfall approach of today is still called the waterfall approach, although in reality it is shifting in some respects to the agile one. As a result, modern waterfall can be described as a hybrid approach, in which, however, traditional techniques prevail over the agile ones.

In comparing these approaches, it is also worth mentioning the idea, which has been said several times in research, that agile is actually a waterfall approach, because it goes through the same phases, only faster and repeatedly. In addition, the related idea that agile is just a mindset, focused on speed and flexibility, which is applied to the waterfall approach. Due to the different

approach of agile approaches and waterfall, the authors of the article do not agree with this idea. However, it would be appropriate to include some artifacts from Scrum, such as retrospective, in the modern waterfall approach. Significant is the benefit of retrospectives performed during the project, when the team pauses and discusses what works and what does not during, which can lead to reduced misunderstandings and waste of resources during implementation, not in the final phase and possible projection to in other projects.

The approach in understanding management and responsibility for the project is also different. Both approaches understand the roles of project manager and scrum master differently; today the role of agile coach is appearing more and more often. Given that, the agile coach has different powers and responsibilities than the classic project manager; the question is whether in the future, within hybrid approaches, the project team will not include both the project manager responsible for the project and the agile coach providing agility within the project. Alternatively, whether powers and responsibilities will not be transferred from the project manager to the whole team, as is the case with agile methodologies.

## **5.2 Q2: Is it possible to manage projects fully in the online environment?**

Many project managers have long been accustomed to managing virtual teams and partially operating in an online environment. However, many companies and managers were concerned about the complete management of projects in the online environment, especially for projects of a rather waterfall type. However, the current pandemic situation has taken over this decision and forced even such projects to be moved online. The pandemic situation has shown that a large number of projects, regardless of the management approach, can be run completely online, using appropriate software tools. Of course, there are clearly moments when it is more appropriate or even necessary for the physical participation of either at least the project manager, or a specialized team member, or possibly a complete team. At the same time, it is worth noting that the sector in which the project occurs still plays a significant role in this respect. The research confirmed the general assumption that project management in traditional fields, such as construction, fully online is a significant problem. In the future, however, we can expect a higher degree of digitization and the transfer of some project management activities to the online environment in these fields as well. On the other hand, in the field of information technology, an even greater level of work has been verified remotely and / or from home, although a significant part of these projects already had remote teams as well as remote clients.

As for the work from home itself, the flexibility it allows is highly compatible with project management. Especially those where communication within other time zones is required. On the other hand, it is very good that they are aware of the importance of personal, social ties, both in the team and with the client. For most managers, the proposed combination of work from the office and



from home, 2 to 3, or vice versa, is such a realistic proposal that should satisfy both the company and the employees. On the one hand, this greater flexibility will help companies retain employees, while also saving them the cost of renting large offices. It will provide employees, in this case project managers and members of project teams, with the required flexibility, as well as space and facilities for physical meetings, or the possibility of the necessary social and informal contact. It can thus be expected that, after a predominantly positive experience with working from home within entire companies, companies will move in this direction, ie by enabling a partial home office.

### **5.3 Q3: Does MS Project still hold a dominant position as a SW tool to support PM?**

From the point of view of tools for project management support, Microsoft Project is becoming more and more widespread. However, research has shown that its actual use is not so common or very welcome. The reason is a kind of complexity and cumbersomeness. As research has shown, a clear shift towards agile and hybrid techniques can be observed, and although MS Project has been supplemented with special features for SCRUM, its high complexity and inflexibility does not fully meet the current demands of users. This is confirmed by the significantly growing popularity of Atlassian tools, led by JIRA, even among waterfall-driven projects. Although JIRA was originally intended purely for software development, from which it has moved to agile methodologies in general, it is now moving into the entire field of project management. Pleasant user environment, ease of use, clarity, but also a higher possibility of cooperation within the project team from JIRA are just creating the software corresponding to the present. The need for collaboration within the team is also confirmed by the higher frequency of use of Confluence or Miro.

It is with these collaboration tools that a significant expansion can be expected. With the expected higher use of home office and remote teams, it will be necessary to conduct analytical and brainstorming meetings in an online environment. Applications that offer a whiteboard function, or free space for visualizing ideas and thoughts, and the possibility of collaboration, are likely to become common software for project teams.

## **Conclusion**

Although the last five to ten years in the field of project management there is a strong trend of agile approaches, which are described as an evolutionary step in this field and which are, sometimes somewhat forced, applied in companies around the world, research results show that project managers are more reticent about them than is generally prevalent. In connection with this, the opinion on the waterfall approach to project management is surprising, which is, precisely due to the popularity of the agile, often described as obsolete. However, research has shown that project managers still see the benefit and applicability of the principles of the waterfall approach, especially some types of projects. These projects have a fixed scope, a fixed price and the need for a clearly defined output. These are clearly construction projects, which are usually identified as projects

unsuitable for agile, projects with high regulatory and legislative requirements, but also certain projects in the field of information technology, although an agile approach is more common for IT.

Research has shown that the pressure for flexibility can no longer withstand the waterfall approach in its original form. It can therefore be stated that the waterfall approach in its historical form and as a comprehensive approach to project management is no longer relevant for current and future projects. However, its principles are still current and we can expect their application in a hybrid or reformed waterfall approach in future projects.

Projects can be fully managed even in the online environment. However, the degree of suitability of online project management depends greatly on the field and type of project. However, combined management would be recommended, where physical meetings and team cooperation are set up for key activities, milestones in the project or transition between phases, and operation in the online environment is set up for the remaining parts of the project.

Research suggests that Microsoft Project still holds a dominant position in software tools to support project management, but in the future, it can be expected to gradually decline in favor of more modern tools such as JIRA, along with complementary whiteboard tools and for creating mind map. Online communication tools have been used more intensively, which is certainly not surprising. The main tools used during the pandemic in this regard were Zoom and Microsoft Teams, which further helped them to dominate the market.

## References

- Carli, L. L. (2020). Women, Gender equality and COVID-19. *Gender in Management*, 35(7/8), 647–655.
- Collins, C., Landivar, L. C., Ruppanner, L. & Scarborough, W. J. (2020). COVID-19 and the gender gap in work hours. *Gender, Work, and Organization*. 28(1), 101–112.
- Feng, Z. & Savani, K. (2020). Covid-19 created a gender gap in perceived work productivity and job satisfaction: implications for dual-639 career parents working from home. *Gender in Management*, 35(7/8), 719–736.
- Fowler, M, et al. (2001). The agile manifesto. *Software Development*, 9.8: 28-35.
- Charalampous, M., Grant, C. A., Tramontano, C., & Michailidis, E. (2019). Systematically reviewing remote e-workers' well-being at work: A multidimensional approach. *European Journal of Work and Organizational Psychology*, 28(1), 51-73.
- Grossman, D. (2011). *The cost of poor communications*. In: The Holmes Report. Available online: <https://www.provokemedia.com/latest/article/the-cost-of-poor-communications> [cit. 2021-03-20]

- Hickman, A. & Robinson, J., 2020. Is Working Remotely Effective? Gallup Research Says Yes. In: *Gallup*. Available online: <https://www.gallup.com/workplace/283985/working-remotely-effective-gallup-research-says-yes.aspx> [cit. 2021-03-20]
- Kerzner, H. (2013) *Project Management. A System Approach to Planning, Scheduling, and Controlling*. New Jersey: John Wiley & Sons.
- Layton, M. C.; Ostermiller, S. J. & Kynaston, D. J. (2020). *Agile project management for dummies*. John Wiley & Sons.
- Mastný L. (2021). *Waterfall approach to project management in an online environment*. Diploma Thesis. University of Chemistry and Technology Prague.
- Project Management Zone (2021). *Project Management Systems – Popularity Ranking*. Available online: <https://project-management.zone/ranking/planning> [cit. 2021-03-21].
- Reynolds, B. W. (2017). *2017 Annual Survey Finds Workers Are More Productive at Home, And More*. In: FlexJobs. Available online: <https://www.flexjobs.com/blog/post/productive-working-remotely-top-companies-hiring/> [cit. 2021-03-20]
- Sutherland, L., & Janene-Nelson, K. (2020). *Work Together Anywhere: A Handbook on Working Remotely-Successfully-for Individuals, Teams, and Managers*. John Wiley & Sons.
- Šochová, Z. & Kunc E. (2014). *Agilní metody řízení projektů*. Brno: Computer Press.
- Thesing, T., Feldmann, C., & Burchardt, M. (2021). Agile versus Waterfall Project Management: Decision Model for Selecting the Appropriate Approach to a Project. *Procedia Computer Science*, 181, 746-756.

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