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Assessing the Impact of the COVID-19 Pandemic on Project Management Methodologies

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by

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I am submitting herewith a thesis written by Adrian Leung entitled "Assessing the Impact of the COVID-19 Pandemic on Project Management Methodologies." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science in Computer Science.

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Abstract

This research paper explores the impact of COVID-19 and the shift to remote work on project management practices across multiple industries. Through interviews with project managers, the study finds that companies with pre-existing remote work policies were better equipped to handle the transition to remote work. In contrast, companies without pre-existing policies faced increased challenges in communication, team morale, and workload management. The study also highlights the struggle to maintain work-life balance, the importance of communication, and the need to address technical difficulties. Project managers emphasized the importance of accountability and maintaining productivity during remote work. Overall, the study finds a positive shift in the collective outlook on remote work, with employees expressing a strong preference to continue working remotely even after the pandemic. The study emphasizes the evolving role of project managers in adopting a holistic approach to resolving interpersonal and managerial issues within teams during remote work.

1. Introduction

Project management is a discipline involving planning, organizing, and overseeing the completion of specific projects. The objective is to meet set goals and objectives while balancing constraints such as deadlines and budgets. This type of management is a critical process in many industries wherever people are organized to optimize workflow. Specifically, software engineering teams employ project management strategies to allow the team to focus on the work that matters, removing the distractions caused by tasks going off track or budgets spinning out of control.

Project management has been a necessary field for as long as it has been necessary to organize people, even as far back as building the pyramids of Egypt [6]. However, within the scope of software engineering, the earliest accomplishment in project management is the development of the Gantt chart in the 1900sThis was a tool mainly used for scheduling and tracking the progress of an ongoing project. While the priorities represented on a Gantt chart are very similar to a modern-day burn-down chart, Gantt charts were primarily used for initial project planning and scheduling, and in many cases did not provide real-time visibility into progress or work remaining [2].

It wasn't until the 1950s and 1960s that the field of project management began to take shape as a distinct discipline, with the publication of several influential books on the subject such as "The Effective Executive" by Peter Drucker. Drucker introduced important concepts to the discipline such as results-driven development and emphasized the importance of time management. In the following decades, the field of project management continued to evolve, with the introduction of new methodologies and tools, such as the Critical Path Method (CPM) and the Program Evaluation and Review Technique (PERT) [9]. Both developments were used to facilitate communication and improve the overall planning of a team. However, as projects become more intense and intricate, the field began to adopt a more holistic approach, with an emphasis on balancing the competing demands of scope, time, cost, quality, and risk [3].

In more recent times, the field of project management began to take advantage of the increased availability of technology and the Internet, the globalization of business, and the growing importance of sustainability and social responsibility. While technological improvements advanced the capabilities of project management, it was also necessary to restructure project management methodologies. The Waterfall Software Development Method, developed by Winston W. Royce, was the first modern approach to building a system, characterized by a concrete plan and rigid work schedule. It quickly gained support

from managers due to its ‘flowing’ methodology from its inception in 1970[7]. Agile was born from the downsides of Waterfall – mainly the lack of customer interaction and collaboration with stakeholders. Originally developed in 2001, Agile aimed to focus more on customer needs and providing business value than on documentation [8].

While Waterfall's characteristics are certainly not harmful to a given project, many software development teams today prefer the Agile approach, delineated by constant communication and collaboration within the team and its stakeholders. Even within the Agile approach there are a multitude of styles to adopt, such as Scrum, Kanban, Lean, XP, and Dynamic Systems Development (DSDM) - each of which offers organizational strategies that could be beneficial to a wide range of projects. Across all disciplines of Agile, common themes include a values-based approach, and iterative and incremental delivery. The values-based approach prioritizes stakeholder value by only implementing features that would directly contribute to the optimum level of return. Iterative and incremental delivery demands several cycles of development, each increasingly closer to a finished product. Progress on an Agile project can be viewed through a project burn-down chart, in which objectives, known as user stories, are visually counted down as they are completed. This approach is very attractive to software engineering teams

since Agile is associated with a faster time-to-market, increased flexibility and continuous improvement.

In contrast to this, the waterfall methodology has no selection of flavors. Instead, waterfall is characterized by a singular linear, sequential approach. There are well-defined phases, each with a distinct set of deliverables; once a phase is completed, it can be very costly to revisit. The concrete structure of operations and pre-defined requirements appeal to industries like military defense contractors [3].

Modern technology shaped how many interact with the management of projects today. The most notable example of this are the multitudes of technologies used to track project progress and central locations to display issues for team members to work on such as Scrum boards. Access to this information is as simple as making an account.

While adoption of modern technology was a huge leap for project management, the shift to remote work due to COVID-19 was certainly a step back [11]. Organizational strategies that took decades to develop and perfect were no longer effective, deprecated by the necessity of social distancing. However, due to the dynamic and ever-changing nature of project management, the industry quickly rebounded. There have been recent influxes in tools and methodologies used to plan, organize, and oversee the completion of projects remotely.

The demand for projects has been largely unperturbed by COVID and, combined with the large decrease of in-person work, has highlighted the continued necessity for project management. Technologies like Jira, Github, and Confluence allow for clear objectives for the team to split up and take on using an online interface. While these systems are incredibly helpful for members of the team to visualize user stories to work on, the shift away from in-person work took its toll on the interpersonal side of teams. Managers began finding it difficult to organize and motivate a team without being in the same room [11]. Tools like Zoom and Microsoft Teams attempt to answer this problem by facilitating contact between team members, but this still lacks the physical investment of a team being present in the same room.

The purpose of this research is to quantify the extent to which these issues affect the quality of work completed remotely, as well as the adapted measures used to counteract it. The research method by which this data will be acquired will be through conducted interviews of project managers who have had experience working in the field before the pandemic and have continued working throughout it. Through this research, it is expected that valuable insights will be gained on how remote work has affected project management practices and the adaptations made by project managers to mitigate the challenges. The findings of this research can contribute to the existing literature on project management, particularly in the

context of remote work, and provide practical recommendations for project managers and organizations to effectively manage projects in the changing work landscape.

2. Literature Review

This literature review examines the impact of the COVID-19 pandemic on project management, drawing from various sources to provide a comprehensive overview. The review identifies several key themes, including the positive impact of the pandemic on project management, changes in work patterns, communication challenges, and the need for agility and flexibility in the workplace.

The first article reviewed is from the Project Management Institute of Luxembourg, which reports that the pandemic had a positive impact on project management, with businesses investing in infrastructure for remote work and developing tools to make online sharing more effective. The article concludes that new health and sanitary protocols, management styles, and methods will need to be adapted post-COVID, but leaves the answer to what this may look like unresolved.

The State of Software Development - An Analysis by AllStacks focuses on the effects of COVID-19 on the business industry as a whole, and reports that the initial lockdown in March of 2020 had a large negative impact on the quality of work being completed across projects. However, as teams settled into working from home, there was a shift from working on user stories versus unplanned work that may have come up in daily stand-up meetings. The article also notes that project managers' roles shifted more to emphasis on encouragement of work during productive hours rather than an emphasis on getting work done on time.

The Effects of COVID-19 on Project Management Processes and Practices, published in the Central Asian Journal of Theoretical and Applied Science, describes research done to evaluate the changes that have occurred during and in the aftermath of the COVID-19 pandemic. The lack of face-to-face meetings resulted in a loss of emphasis on the creation process of the communication plan as a part of the project planning stage, leading to further miscommunications down the line. The article also notes that online communication demands extra effort and concentration, which could result in quicker burnout of the team.

Ng offers insight into how different industries reacted to the shutdown. "Considerations for IT Management in a COVID-19 World" impels IT Project Managers to adopt agility and flexibility in the workplace to account for the rapidly changing times. During a time in which workers are heavily encouraged to work remotely, tasks which may only be completed in person like un-patched firewalls may go unnoticed until it's too late. Ensuring teams remain effective by reducing stress among members can go a long way in completing tasks on time.

Finally, Managing the Crisis: How COVID-19 Demands Interact with Agile Project Management in Predicting Employee Exhaustion, published in the British Journal of Management, explores the impact of the COVID-19 pandemic on employees in project teams, and how agile project management practices may have helped buffer this impact. The study suggests that organizations should be mindful

of the impact of COVID-19 demands on employees in project teams and implement interventions that reduce these demands. Agile project management practices themselves may not always be effective in reducing strain, and organizations may need to use selected practices or combine them with other strategies to support employee well-being.

Overall, these articles demonstrate that the COVID-19 pandemic has had a significant impact on project management practices, and highlight the need for flexibility, adaptability, and effective communication in the workplace. As organizations continue to navigate the pandemic and its aftermath, it will be important to learn from these experiences and develop new strategies for managing projects in a rapidly changing world.

2.1 Analysis

The impact of the COVID-19 crisis on project management has been evident through several common themes highlighted in the articles reviewed. One major theme is the need for further adaptation in remote work. As businesses were forced to quickly adjust to remote work arrangements, this led to investments in remote work infrastructure, development of online collaboration tools, and increased reliance on virtual interactions [5]. However, remote work also presented challenges such as communication difficulties, increased burnout due to the extra effort required for online communication, and blurred work-life boundaries [10].

Another common theme is the changes in work patterns brought about by the pandemic, including shifts in productive hours and increased reliance on data to keep teams on schedule. Project managers have had to adjust their roles to focus on encouraging work during productive hours rather than just ensuring timely completion of tasks [1].

Uncertainties and challenges have also been a prominent theme in the impact of COVID-19 on project management. Sudden changes and uncertainties caused by the crisis, difficulties in finalizing agreements, increased stress among team members, and potential impacts on employee well-being have all posed challenges for project managers [13].

Additionally, the need for both agility and flexibility in project management has also been emphasized, as the rapidly changing nature of the crisis has required organizations and project managers to be adaptive, responsive, and resilient in the face of uncertainties and changing circumstances. Effective leadership has been underscored as a crucial factor during times of uncertainty and organizational turmoil, especially within Agile projects. Strong leadership can help navigate the challenges posed by the pandemic and support the well-being of employees. This in turn requires project managers to step-up and take on roles they might not have expected to [10].

This also emphasizes the importance of equipping upcoming project managers with the tools they will need in a post-COVID world. As the Project Management Institute (PMI) reported, more project management certifications were awarded during the beginning of the pandemic than any previous period**.** This can likely be attributed to the fact that remote work requires a larger amount of organizational focus to achieve and thus requires specific training to do effectively. Project management certifications have also changed in the face of the coronavirus - the PMI launched a new certification, the PMI Agile Certified Practitioner + Crisis Management, which includes a focus on managing crises and leading virtual teams. The Scrum Alliance, another non-profit project management community

also modified their certification courses targeting the new environment of project managers.

Despite some positive impacts, such as increased investments in remote work infrastructure and professional development opportunities, the referenced articles also underscore the challenges and uncertainties that project managers and organizations have faced during this time. Overall, it's evident that the pandemic has necessitated changes to project management practices including the prioritization of employee well-being, and increased agility and flexibility in managing projects in the face of changing circumstances.

3. Methods

Data collection for this study involved an interview process of project managers across a variety of industries. The sample was collected through people personally known to be Project Managers who had been working before the pandemic. Coding experience was not necessary, only familiarity with Project Management processes. This convenience sample allowed a more personal touch to the discussions. However, difficulties arose in the number of Project Managers that were available for interviews – this will be further discussed in the limitations section. During interviews, questions asked included:

- How long have you been a Project Manager?
- Do you have any leadership experience beyond this position?
- What organizational practices do you use at work?

These questions were asked to gain an understanding of the current role the interviewee acts in their current company. Experience as a project manager can be quantified by asking how long they have been in that role. The next set of questions were asked to assess the impact that COVID had on processes that had been in place for years:

- Do you feel these systems have differed in effectiveness through the strain that COVID has put on everyone?

- Have you personally done anything differently due to COVID-related complications? Do you find it easier or more difficult?
- Have you had any problems relating to people being more untrustworthy during remote work?
- Do you feel you have to plan for more risk-prone situations? (budget/work cuts, supply chain issues, team member being too sick to deliver)

During some interviews, questions and follow-ups strayed away from the initial listed questions, with the purpose of a holistic discussion of their experiences. During disclosed situations in which conflicts directly arose due to circumstances related to the coronavirus, follow up questions included:

- How did your team react to the ongoing situation?
- Did that particular situation affect your outlook on planning in the future?

4. Results

The results of these interviews conducted with project managers across multiple industries shed light on the impact of COVID-19 and the shift to remote work on project management practices. Companies that had established remote work policies prior to the pandemic were better equipped to handle the transition to a remote work environment. These companies had already implemented remote work practices for some of their employees, such as providing necessary tools and technologies, setting clear expectations, and establishing communication protocols. As a result, when it came to everyone needing to work remotely, the transition was relatively smooth, and employees were able to adapt to the remote work setting more easily. In contrast, companies that did not have pre-existing remote work policies had to develop them on the fly, which posed challenges in terms of ensuring consistent communication, maintaining team morale, and managing workloads.

Contracting companies, in particular, faced unique challenges during the pandemic. Interviews revealed that these companies experienced difficulties in landing and securing new projects, which had a negative impact on team morale. The uncertain business environment, budget cuts, and delays in decision-making by clients were identified as some of the key challenges faced by contracting companies. However, these challenges were quickly resolved as the pandemic

progressed, but it made the early days of the pandemic particularly difficult for some industries.

Another common theme that emerged from the interviews was the struggle to manage work and life balance during the transition to remote work. With the boundaries between work and personal life blurred, employees reported challenges in maintaining a healthy work-life balance. Some project managers shared that employees had to make adjustments to their physical workspaces at home, such as converting a gaming PC rig into a remote workstation or setting up a dedicated home office in a separate room. Additionally, project managers highlighted the importance of fostering a culture of flexibility and understanding, allowing employees to establish a work routine that suited their individual needs and responsibilities.

Communication emerged as a critical aspect of project management during the remote work period. Many companies adopted a policy of communicating information through multiple mediums to ensure that vital information was effectively conveyed to all team members. Emails, chat platforms, SMS conversations, and project management tools were used to disseminate information, as project managers recognized that attention could drift during virtual meetings, and important information could be missed.

Moreover, project managers highlighted the necessity of planning for team members to be absent due to familial or health-related reasons, especially in larger teams. This required careful coordination and delegation of tasks to ensure that the absence of team members did not disrupt project timelines.

Technical difficulties were initially reported as a challenge during the first few weeks of remote work. Issues such as unstable internet connections, inadequate home office setups, and lack of access to necessary tools, hardware and technologies posed obstacles to productivity. However, project managers noted that as employees became more accustomed to remote work, these technical challenges were addressed through improved home office setups, provision of necessary equipment, and training on using remote work tools effectively. This highlights the adaptability and resilience of project teams in navigating the challenges posed by remote work.

Interestingly, it was observed that employees who tended to slack off during remote work were also the ones who struggled with productivity during in-person work. Project managers emphasized the importance of maintaining accountability and setting clear expectations for performance, regardless of the work setting. This involved establishing regular check-ins, monitoring progress, and providing support and feedback to ensure that employees remained focused and productive during remote work.

Overall, there was a significant positive shift in the collective outlook on remote work, with many employees expressing a strong preference to continue working remotely even after the pandemic. Some project managers reported that on days when they were forced to come into the office, productivity decreased due to distractions from being around many coworkers. As a result, in-person workdays often turned into planning days rather than productive workdays.

While the results did not reveal any major changes to project management methodologies stemming from the shift to remote work, it highlighted the evolving role of project managers in adopting a holistic approach to resolving interpersonal and managerial issues within teams. Project managers played a crucial role in ensuring that their teams could continue development with minimal hindrances during the remote work period.

5. Limitations and future work

One of the main limitations of this study is the small sample size of project managers interviewed, which may limit the generalizability of the findings. Although the sample consisted of project managers from the aerospace, software contracting, ISPs and insurance industries, this may not fully represent project managers in other industries. It's also noteworthy to mention a self-report bias may have influenced the results as project managers may have responded with desirable responses or may not have accurately recalled their experiences.

Furthermore, due to the rapidly changing nature of the COVID-19 pandemic, the findings of this study may be limited to the specific time period and context in which the interviews were conducted and may not be entirely applicable in a world full of increasingly lax COVID restrictions.

For future research, replicating this study with a larger and more diverse sample size would be sure to enhance the validity of the findings. This could involve including project managers from a broader range of industries and geographic locations to obtain a more comprehensive understanding of the effects of COVID-19 on project management practices.

Additionally, further investigation could be conducted to assess the success of recommendations provided to project managers for remote work during the pandemic, as well as their long-term impact on project performance and outcomes.

Longitudinal studies could also be conducted to examine changes and trends in project management practices and challenges over time as the pandemic continues to evolve.

The relationship between unfinished tasks and emotional exhaustion could also be explored in future works, as this could provide insights into the dynamic between work demands and psychological well-being in the context of project management during crisis situations. These avenues of future research could contribute to a more comprehensive understanding of the long-term effects of COVID-19 on project management and inform evidence-based strategies for managing projects during and beyond the pandemic.

In conclusion, this study highlights the evolving role of project managers in adopting a holistic approach to resolving interpersonal and managerial issues within teams during the remote work period. While the small sample size of project managers interviewed and possible self-report bias limit the generalizability of the findings, replicating the study with a larger and more diverse sample could enhance the validity of the findings. Such studies could contribute to a more comprehensive understanding of the long-term effects of COVID-19 on project management and inform evidence-based strategies for managing projects during and beyond the pandemic. Overall, project managers played a crucial role in ensuring that their teams could continue development with minimal hindrances

during the remote work period, and the findings of this study underscore the importance of project managers in the face of unprecedented challenges.

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7. Appendix

List of questions asked during interviews

- How long have you been a Project Manager?
- Do you have any leadership experience beyond this position?
- Do you enjoy it? What could make the position more enjoyable for you? What things are most difficult for you in your position?
- Do you prefer Remote or In-Person work for both organizational and work-related matters?
- How effective do you feel you are as a Project Manager? Do you attribute this to the systems in place (however they are organizing their team) or moreso your ability to work with people?
- What organizational practices do you use at work?
- Do you feel these systems have differed in effectiveness through the strain that COVID has put on everyone? *
- Have you personally done anything differently due to COVID-related complications? Do you find it easier or more difficult?
- Have you had any problems relating to people being more untrustworthy during remote work?
- Do you feel you have to plan for more risk-prone situations? (budget/work cuts, supply chain issues, team member being too sick to deliver)

- What were some initial difficulties you experienced in the transition from in-person to remote work?
- How did you handle both managerial and inter-personal issues that arose due to this transition?
- Did you have to deal with issues related to people or family members getting sick and/or dying during COVID?
- How did it impact availability or morale of people when sickness and death came?