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Assessing the Impact of the COVID-19 Pandemic on Healthcare Project Management: A Shift in Standards?

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Abstract

Background: *The COVID-19 pandemic was a shock event for many sectors, with the healthcare sector undoubtedly being the one most affected.*

Aim: *The study sought to examine the impact of the COVID-19 pandemic on project management within the healthcare industry, as this is the sector with the potential to implement innovations that mitigate such shocks in the foreseeable future.*

Methods: *The study was conducted between March and July 2023 by surveying professionally active individuals employed in hospitals who had experience in project implementation within the last five years. To discern the potential impact of the pandemic on project management practices in healthcare systems, we designed a specific survey questionnaire. Using a five-point Likert scale, participants assessed the importance of each criterion for their specific project. Of the total 389 respondents, there were 144 men and 245 women. The participants reported their involvement in 808 projects in total.*

Results: *Results show that after the pandemic, the importance of project efficiency and stakeholder satisfaction as factors for project success has increased. Moreover, the study revealed a stronger emphasis on the projects' impact on the future.*

Conclusion: *The pandemic has reshaped healthcare project management priorities, with project managers and sponsors collectively striving for recovery and improvement.*

Key words: *COVID-19 pandemic, project management, healthcare, hospitals, project success*

Introduction

The COVID-19 pandemic served as a stress test for healthcare industries around the world, highlighting both the strengths and weaknesses of various systems [1, 2]. Several meta-analyses and reviews addressed these issues. Healthcare workers, in particular, faced a myriad of challenges [3]. These ranged from the abrupt transition of education to remote formats [4], hindering direct patient interaction, to shortened hospital stays for specialties like surgery, deferred exams, and impediments to their educational endeavors [5]. An important concern were the infection rates among healthcare workers, leading to increased absences due to sickness, isolation, or quarantine, which further burdened the workforce [6]. Mental health strain among healthcare workers was profound [7]. A comprehensive meta-analysis by Tong et al. [8] reported insomnia prevalence at 42.9%, stress at 53%, and depression at 43%, after scrutinizing 19 studies with over 10,000 healthcare professionals.

Furthermore, the pandemic presented substantial challenges to the general healthcare system [9], especially to those suffering from diseases unrelated to the COVID-19 pandemic. During the pandemic, healthcare utilization decreased by approximately a third, with more pronounced reductions among those with less severe illnesses, leading to broad societal implications [10, 11]. An investigation into ten countries revealed disruptions in healthcare due to the pandemic. Notably affected areas included cancer and TB screenings, HIV tests, maternal health services, and vaccination of children. Such disruptions persisted, with preliminary 2021 data, suggesting continued interruptions [12]. Furthermore, over one in five patients postponed or forwent regular dental checkups and scheduled treatments [13].

Beyond quantitative data, qualitative studies from the USA and Japan indicate a shifting perception of system capabilities among patients and healthcare workers. Reports note growing insecurities among healthcare workers about their care delivery capabilities, while patients' faith in public health systems is wavering [14]. The OECD highlights the unpreparedness, understaffing, and underinvestment of health systems, emphasizing

the importance of system resilience in future crises. Proposed policy recommendations encompass the promotion of population health, workforce retention, data utilization, international cooperation, supply chain resilience, along with fostering governance and trust [15].

The pandemic era ushered in a heightened phase of executing numerous project initiatives within healthcare institutions. These initiatives encompass not only medical research, novel workplace solutions, telemedicine, and IT advancements but also the restructuring of the healthcare service system and the development of infrastructure solutions. The field of management literature includes several examinations of critical success factors for projects, yet regrettably, these investigations do not center on hospital organizations [16]. The distinctive nature of hospital organizations [17], and the limited empirical research on common management practices within the healthcare sector [18], leads to a situation where healthcare managers often lack a solid knowledge base in healthcare-specific management when they need to make crucial decisions for their projects [19, 20, 21]. An examination of the literature highlights the scarcity of empirical studies that explore the application of project management principles within healthcare contexts. Furthermore, previous research has failed to pinpoint the specific factors critical to project success within the distinctive hospital environment. As a consequence, hospital administrators entrusted with project management cannot reasonably assume that the critical success factors observed in other sectors will necessarily hold true in the healthcare sector [16].

The implementation of the above recommendations necessitates a closer look at the underpinning structure of healthcare organizations, namely their project management. Although often overlooked due to its behind-the-scenes role, project management is vital for introducing innovations and investments. A prior study on the pandemic's impact on healthcare project management demonstrates the essential role of risk analysis. The managers who regularly utilize this tool are found to exhibit greater adaptability in rapidly changing scenarios. Moreover, the lasting change in project management seems to pivot toward digitalization, covering documents, workflows, and remote work setups [22]. The examination of particular COVID-19

responses resulted in the identification of four themes that deserve significantly more consideration in project planning. These themes are agility, selectionism in portfolio management, pace, project sponsorship and the importance of the commercial interface [1]. However, the situation in which project managers found themselves often required making swift decisions in an environment characterized by chaos and a lack of proper data to rely on [23, 24, 25], which could lead to subtle prioritization of some practices resulting in undesirable outcomes deviating from the initial project goals [26]. It was necessary as well to implement resilience behavior understood not only as a capability but as an outcome [27, 28, 29], which in turn lead to projects' and hospitals' resilience [30].

The study described below sought to quantitatively evaluate the impact of the COVID-19 pandemic on healthcare project management, along with discerning whether the pandemic's effects are enduring or merely situational.

Materials and Methods

Sample and Research Tools

We conducted the study between March and July 2023 by surveying professionally active individuals employed in hospitals who had experience in project implementation within the last five years. The respondents' occupational background – be it medical or non-medical – and the hospitals' legal status were not criteria for selection. Primarily, the survey targeted project managers who managed projects at the Military Institute of Medicine (MIM) in the last five years. If a project was carried out as a consortium, representatives from other units or hospitals were also invited to complete the survey. Furthermore, we utilized contacts with graduate schools and MBA programs in healthcare. The MIM graduate students partaking in the Management and Leadership of Medical Entities program in the Ministry of National Defense also filled out the survey. As a result, 389 participants took part in the study, expressing their opinion on 808 projects.

Characteristics of Respondents and Types of Projects Investigated

To discern the potential impact of the pandemic on project management practices in healthcare systems, we designed a specific survey questionnaire. Instead of gathering general opinions, the survey aimed to solicit experiences tied to specific projects. Thus, we asked the respondents to select particular projects at the beginning of the survey. The study considered categories of variables, which were derived from literature about project management in complex systems.

Project Types

Healthcare in Poland is predominantly a complex state-funded system focused on medical treatment, prevention, research, and training. Projects in this system vary in nature, so one should consider them in separation. The study examined the following project types:

- R+D: advancement of medical sciences such as the development of new drugs and treatment protocols or research on disease causes;
- health promotion: health promotion and disease prevention, including health education, vaccination programs, and screening tests;
- infrastructural: investments in physical infrastructure and system organization, such as hospital construction and modernization, IT systems development, or laboratory expansion;
- organizational: medical operations optimization and the improvement of service efficiency and quality such as process optimization, management system implementation, or quality management programs;
- educational: enhancing professional skills of healthcare sector employees.

Project Success Criteria

Based on the literature [31], we selected the following success criteria: project efficiency, project team satisfaction, stakeholder satisfaction, business success, and long-term influence. Using a five-point Likert scale, participants assessed the importance of each criterion for their specific project. For every

project mentioned, respondents answered two sets of questions about the importance of these criteria:

- from the project manager's perspective; and
- from the sponsor's perspective.

This dichotomy assisted us in highlighting potential discrepancies in evaluations between the two primary stakeholders in project management. Although the survey did not directly query sponsors, the transparency of healthcare project financing ensures that sponsors' criteria are well-documented. Thus, even if sponsors' perspectives were relayed through project managers, they remained reasonably objective.

Project Realization Time

We collected data on project completion dates and durations, which allowed us to categorize the projects into the following groups:

- projects completed before the pandemic;
- projects completed during the pandemic;
- projects completed after the pandemic;
- long-term projects initiated before and concluded after the pandemic.

We analyzed the collected data with SPSS and the ANOVA variance analysis method.

Sample Characteristics

Of the total 389 respondents, 144 were men and 245 were women. The largest percentage of respondents declared a hospital at Level 1 as their primary place of employment, meaning those providing services across at least 2 specialties selected from the list, including surgery, internal medicine, obstetrics and gynecology, neonatology, and pediatrics. The Polish hospital system distinguishes between different types of hospitals: Level 1, Level 2, and Level 3 (the gradation denotes the number of specializations served by the hospital – the higher the level, the more specializations), as well as specialized hospitals such as oncology and pulmonary, pediatric hospitals, and those with nationwide status. Table 1 presents the workplace structure. The distribution of respondents by their employment location corresponds to the statistical

number of specific types of hospitals in Poland. Specialized pediatric and oncological hospitals are the least common, as these specializations can be and are also offered by other hospitals. Respondents from the largest hospitals, often equipped with project offices and having the most extensive project portfolios, constituted a total of 32% (Level 3 hospitals and nationwide hospitals).

Table 1. Workplace structure

Place of Work	Number of Respondents	Percentage
1st level hospital	112	29%
2nd level hospital	107	27%
3rd level hospital	71	18%
Oncology at a pulmonary hospital	12	3%
Pediatrics hospital	16	4%
National hospital	52	14%
Other	19	5%

The age difference among respondents declaring experience in various types of projects is evident. Research and development, health promotion and organizational projects are primarily carried out by individuals aged 31–40 and 20–30. In the case of infrastructural projects, the reported age range shifts higher, namely 31–40 and 41–50. Conversely, for educational projects, the dominant age group is 20–30 years. Furthermore, just under 53% of study participants declared a medical education background, while 25% had an economic education background. Additionally, a significant 28% of participants reported completing MBA, doctoral, or postgraduate studies.

The largest percentage of the respondents, a substantial 44%, held independent specialist positions, while those in managerial roles represented 24% of the study participants. Importantly, regardless of their position within the hospital's structure, study participants were asked to indicate their role in the project they evaluated. The majority of projects were assessed from the perspective of "Team Members engaged in the implementation of at least one task" (53%), followed by "Project Supervisor or Project Coordinator"

(28%), "Management, Project Board, or Steering Committee" (16%), and "Project Manager or Principal Investigator" (14%). Simultaneously, nearly 10% of participants reported having more than one role in a project.

The participants reported their involvement in 808 projects in total. The table below provides a detailed breakdown of the types of projects categorized by different time periods in relation to the COVID-19 pandemic.

Table 2. Project types

	R+D	Educational	Infrastructural	Organizational	Health Promotion
Before the pandemic	59	35	39	38	43
During the pandemic	74	31	38	46	100
After the pandemic	27	41	39	51	167
Long-lasting projects	24	18	22	23	203

Results

There are no differences between project types in the evaluation of specific variables, so the projects tend to be assessed in the same way, regardless of the domain to which they apply.

Criteria Importance from the Project Managers' Perspective

The tables below illustrate the importance project managers apply to certain criteria regarding projects executed at various intervals of the pandemic. Differences that reached statistical significance are highlighted with an asterisk (*).

Table 3. Comparison of criteria assessed from the project managers' perspective

ANOVA						
	Sum of Squares	df	Mean Square	F	Sig.	
PM_effectiveness	Between Groups	13.596	3	4.532	4.900	.002*
	Within Groups	743.601	804	.925		
	Total	757.197	807			
PM_team_satisfaction	Between Groups	7.266	3	2.422	2.550	.055
	Within Groups	763.818	804	.950		
	Total	771.084	807			
PM_stakeholders_ satisfaction	Between Groups	8.713	3	2.904	3.475	.016*
	Within Groups	672.077	804	.836		
	Total	680.791	807			
PM_business_success	Between Groups	9.134	3	3.045	2.681	.046*
	Within Groups	913.242	804	1.136		
	Total	922.376	807			
PM_impact_on_the_ future	Between Groups	6.050	3	2.017	2.343	.072
	Within Groups	691.930	804	.861		
	Total	697.980	807			

When considering the importance of criteria from the project managers perspective, one may notice significant differences in the criteria for project effectiveness, stakeholders' satisfaction, and business success ($p<0.05$). Below, we provide post-hoc test results that show between which groups these differences occur:

- project effectiveness: more important after the pandemic compared to the periods both before and during the pandemic ($p<0.05$);
- stakeholders' satisfaction: heightened after the pandemic compared to its importance before the pandemic ($p<0.05$);
- business success: more important for long-term projects than for projects executed before the pandemic ($p<0.05$);
- impact on the future: more crucial after than before the pandemic.

Criteria Importance from the Sponsors' Perspective

The tables below illustrate the importance sponsors apply to certain criteria regarding projects executed at various intervals of the pandemic. Differences that reached statistical significance are highlighted with an asterisk (*).

Table 4. Comparison of criteria assessed from sponsors' perspective

S_effectiveness	**Between Groups**	10.209	3	3.403	3.727	.011*
	Within Groups	734.087	804	.913		
	Total	744.296	807			
S_team_satisfaction	**Between Groups**	12.057	3	4.019	3.335	.019*
	Within Groups	968.874	804	1.205		
	Total	980.931	807			
S_stakeholder_ satisfaction	**Between Groups**	11.548	3	3.849	4.716	.003*
	Within Groups	656.224	804	.816		
	Total	667.771	807			
S_business_success	**Between Groups**	4.171	3	1.390	1.314	.269
	Within Groups	851.012	804	1.058		
	Total	855.183	807			
S_impact_on_the_ future	**Between Groups**	16.845	3	5.615	6.469	<.001*
	Within Groups	697.906	804	.868		
	Total	714.751	807			

From the sponsors' perspective, there are notable differences in the importance attributed to such criteria as project effectiveness, team satisfaction, stakeholder satisfaction, and impact on the future ($p<0.05$).

Below, we provide post-hoc test results that show between which groups these differences occur:

- project effectiveness: more important after compared to before the pandemic, which mirrors project managers' sentiment ($p<0.05$);
- team satisfaction: more crucial in long-term projects than in projects undertaken during the pandemic ($p<0.05$);
- stakeholder satisfaction: more important after than before the pandemic, which agrees with project managers' view of the matter ($p<0.05$);
- impact on the future: elevated after compared to before the pandemic; also, markedly, in long-term projects deemed more important than in the projects that happened before the pandemic ($p<0.05$).

Development of Success Criteria Over Time by Project Type

Below, we will describe our findings based on the different categories of projects.

There were no discernible variations in the criteria for success in R+D projects, regardless whether they were executed in relation to the pandemic or not. Similarly, the criteria for success in health promotion projects remained consistent without any noticeable changes across different pandemic periods. Moreover, there were no discernible differences based on the pandemic timeline for organizational projects. However, variations did appear in the criteria for success in infrastructural and educational projects.

Infrastructural Projects

Brown-Forsythe test results revealed clear distinctions in project metrics across different stages of the pandemic ($p<0.05$). Below, we detail the comprehensive insights from the Games-Howell post-hoc tests.

Project management effectiveness during the pandemic was notably lower from its post-pandemic evaluation ($p<0.05$), while the project managers

emphasized team satisfaction more after than during the pandemic ($p<0.05$). From the stakeholder perspective analysis, the results indicate that:

- team satisfaction was more important in long-term projects compared to both the period before and during the pandemic ($p<0.05$);
- business success gained in importance after the pandemic as opposed to during the pandemic and was moreover deemed more important in long-term projects compared to during the pandemic ($p<0.05$);
- impact on the future was deemed more important after than both before and during the pandemic ($p<0.05$).

Educational Projects

From the project managers' perspective, there was a significant difference in business success during the pandemic compared to before the pandemic ($p<0.05$). Meanwhile, from the sponsors' perspective, the effectiveness was significantly lower during the pandemic compared to before the pandemic ($p<0.05$), stakeholder satisfaction showed a significant decrease during the pandemic ($p<0.05$), and there appeared a significant increase in business success after compared to during the pandemic ($p<0.05$).

Discussion

After the onset of the COVID-19 pandemic, healthcare project management faced a rapidly evolving landscape of challenges and priorities. Regardless of type or theme, projects were judged uniformly, suggesting that the benchmarks for success remained consistent across domains.

After the pandemic, both project managers and sponsors accentuated the importance of key project criteria. The foundational "golden triangle" of project management – scope, time, and budget – was even more emphasized. This shift probably reflected the constraints highlighted during the pandemic, when healthcare utilization dwindled and budgetary pressures mounted [10, 11]. Furthermore, the many paused projects during peak pandemic [8] might have engendered an urgency to refocus on these foundational elements.

Team well-being and satisfaction did not gain in importance; however, a subtle decrease appeared for this criterion in the sponsors' perspective during the pandemic. This is all the more worrying when we recall the mental and emotional well-being challenges faced by professionals [8].

Furthermore, stakeholder satisfaction emerged as pivotal in the post-pandemic stage, hinting at the importance of projects aimed at the healthcare sector's rejuvenation.

For infrastructural projects, the aftershocks of the pandemic brought about distinct shifts in priorities. The post-pandemic emphasis on team satisfaction is particularly noteworthy. One might infer that after weathering the immediate storm of the pandemic, organizations acknowledged the indispensable role of a content and cohesive team for reconstructing the infrastructure landscape. Unfortunately, this transition appeared only in the managerial perspective. This finding aligns with the prevailing managers' sentiment of prioritizing well-being and mental health in the professional sphere, echoing the findings by Tong et al. [8]. Furthermore, such criteria as business success and impact on the future began to command greater attention among project managers and sponsors after the pandemic, reflecting an overarching drive to fortify the infrastructure sector against future uncertainties.

Educational projects, on the other hand, had their own set of challenges and changes. During the pandemic, the healthcare sector faced tumultuous waters with the abrupt transition to remote learning, as detailed by Dedeilia [5]. As a result, there appeared a discernible dip in project effectiveness and stakeholder satisfaction. However, the post-pandemic stage offered a glimmer of recovery. Project managers seemed to recognize the colossal benefits stemming from well-executed educational projects, thus placing a renewed emphasis on business success. It is possible that the hardships encountered during the pandemic underscored the transformative power of education, nudging sponsors and managers alike to reorient their focus.

In conclusion, while the pandemic undeniably reshaped the priorities in healthcare project management, the synchronized perspectives of project managers and sponsors suggest a collective drive toward recovery and improvement.

Study Limitations

This study has a few key limitations. First, relying on retrospective data in the questionnaire introduces potential memory bias, as participants might not accurately recall project criteria prior to the pandemic. Second, while our research aimed to discern the pandemic's impact, the parallel Russo--Ukrainian War – particularly influential on the society in Poland – might have further swayed post-pandemic criteria in healthcare projects. Finally, sponsors have a strong say in shaping the narrative as they decide the funding and define success. This dominance might sideline the project managers' perspective, as there is little room for their views in the prevailing system.

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