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Efficiency of Remote versus Office Work in IT Project Implementation and Engineering Mindset of Project Team Members

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Abstract.
The purpose of this quantitative study is to compare the efficiency and outcomes of IT projects when implemented in a remote environment versus an office setting. Data was collected vis a survey questionnaire and the respondents divided into two groups according to their roles in the projects. One group consisted of project team members, such as developers, business analysts, and quality assurance, and the other of project managers. Descriptive statistics were used to analyse the data. The findings show that there are significant differences between the remote work styles of project managers and team members as expressed in terms of productivity, effective teamwork, job satisfaction, stress and pressure management, and opinions. Whereas project managers, who must work closely with team members, face significant limitations working remotely, others can work independently away from their offices as fewer contacts with team members are needed. It was also found that the engineering mindset of project team members is a key factor in the success or failure of IT projects. Those with a strong engineering mindset are more likely to successfully implement projects.

Keywords: Project Implementation, Remote Work, Office Work, Engineering Mindset

1. Introduction

The COVID-19 pandemic has brought about significant changes in the way we work (Yang et al., 2022). This is especially the case with remote work. Indeed, according to the World Economic Forum (2020), distance work has increased by 159% during the period 2005-2020. And the International Labor Organization (ILO) reported that from 2014 to 2019, the number of remote jobs went up by 300% (ILO, 2020). As a result, distance work has become part of the 'new normal;' a change that has had consequences in some industries – in the information technology (IT) sector and IT projects in particular. Working remotely can pose challenges to project outcomes as project teams need special skills, techniques, tools, and mindset to keep running projects smoothly (Henke, 2022). IT projects are at the core of this study. Specifically, this research aims to compare the differences in terms of work efficiency and outcomes implementing IT projects when working in the office on the one hand and working in a virtual or remote environment on the other. It also seeks to identify the factors that may influence the so-called engineering mindset of project team members when implementing projects in social distancing situations. In a nutshell, an engineering mindset refers to a method of thinking that combines the problem-solving design process with the interpersonal skills necessary for teamwork (Project Academy, 2018). As can be easily seen, an engineering mindset is critical to implement projects smoothly, all the more in the case of remote work. The study aims to answer the following research questions:

- What are the differences in terms of work efficiency and outcomes between implementing IT projects working in the office and working from a remote environment?
- What factors related to the engineering mindset of an IT project team may affect the success or failure of an IT project?

The methodology employed in this study involves collecting data through a survey administered to respondents whose work is or has been related to IT projects.

2. Literature Review and Hypothesis Development

- IT Projects

Akampurira (2013) described an IT project as a type of project that involves the use of various resources to create beneficial outcomes for the target group. It has also been defined as a task that is completed over a certain period of time utilizing technology (Joseph, 2022). An IT project encompasses all the parts of an endeavour strategy; design, implementation, project management, and training. All these activities must be independent, able to be analyzed, planned, and managed, have clear objectives, a definite period of time, and be within budget while ensuring quality work that meets specified criteria (Akampurira, 2013). IT projects are essential for organizational success factors as they increase competitiveness and improve efficiency and productivity. They, however, pose challenges to the personnel within the organization. Tohidi (2011)

- Key Terms Defined

Working from home and distance working have become more prevalent in recent times, particularly with the advent of the Covid-19 pandemic, which has been an accelerator of trends. Since these alternative forms of work may have long-term effects on various aspects of people's working habits, including how they organize their work and where it is performed, it is especially important to clearly understand the following four key concepts at its root and how they relate to one another: remote work, telework, work-from-home, and home-based work.

- *Remote Work***:** Diab-Bahman and Al-Enzi (2020) define remote work as a situation where work is fully or partly carried out at an alternative worksite other than the default place of work.
- *Telework***:** Ruiller et al. (2019) determined that telework is a subcategory of remote work that involves workers who use information and communication technology or landline telephones to work remotely.
- *Work from Home***:** Work from home is work that takes place fully or partly within the worker's own residence, whereby the physical location in which all or some of the work is carried out is the worker's own home (Milenin, 2020).
- *Home-Based Workers*: As outlined in the resolution concerning statistics on work relationships, the International Labour Organization (ILO, 2020) defines home-based workers as workers whose main place of work is their own home.

- Advantages and Disadvantages of Distance Work

Lentjushenkova and Simenenko (2021) conducted a study on the advantages and disadvantages of remote work in Latvia and found that the advantages cited by respondents were : (i) Ability to organize personal work space (37.47%), (ii) Availability of choice in equipment (16.90%), (iii) Ability to choose work location (8.58%), (iv) Ability to choose work schedule (7.88%), (v) Savings on commute time (6.21%), (vi) Savings on commute expenses (5.53%), (vii) Ability to independently organize work process (3.96%), (viii) Opportunity for individual work (3.31%), (ix) Ability to work without constant supervision (3.17%), (x) Opportunity to reduce distractions from other employees (2.59%), (xi) Opportunity to spend more time with family and have hobbies (2.24%), and (xii) Ability to work on other tasks simultaneously (2.15%).

On the other hand, the disadvantages of remote working were found to include: (i) Difficulty in organizing work space (37.61%), (ii) Limited access to equipment (9.66%), (iii) Poor internet signal (6.57%), (iv) Irregular work schedule (6.32%), (v) Difficulty completing tasks over the internet (5.00%), (vi) Disorganized communication over the internet (4.62%), (vii) Limited access to work-related information (4.17%), (viii) Lack of face-to-face communication with management (3.43%), (ix) Lack of face-to-face communication with colleagues (3.16%), (x) Limited supervision by management (2.84%), (xi) Difficulty getting into a work mindset in the morning (2.21%), (xii) Difficulty disconnecting from work in the evening (2.15%), (xiii) Lack of change in environment (2.03%), (xiv) Feeling of isolation (1.96%), (xv) Distractions from family and household tasks (1.75%), (xvi) Difficulty motivating oneself (1.56%), (xvii) Lack of balance between work and personal life (1.50%), (xviii) Lack of inspirational working atmosphere (1.28%), (xix) Overload of information (1.14%), and (xx) Overload of communication (1.06%).

Lentjushenkova and Simenenko's (2021) study on the advantages and disadvantages of remote work in Latvia identified two main groups of disadvantages. One group includes disadvantages that have an impact or directly relate to the project, namely, difficulty in organizing a work space, lack of equipment, poor internet signal, irregular work schedule, difficulty completing tasks over the internet, disorganized communication over the internet, limited access to work-related information, lack of face-to-face communication with management, lack of face-to-face communication with colleagues, limited supervision by management, lack of inspirational working atmosphere, overload of information, and overload of communication. These various items represent 86.85% of the total topics discussed. The second group includes disadvantages that do not have an impact or directly relate to the project, namely, difficulty getting into a work mindset in the morning, difficulty disconnecting from work in the evening, lack of change in environment, feeling of isolation, distractions from family and household tasks, difficulty motivating oneself, lack of balance between work and personal life. They represent 13.15% of all the topics discussed.

- Engineering Mindset

As mentioned in the introduction, the engineering mindset is a method of thinking that combines the problem-solving design process with the interpersonal skills required for teamwork (Project Academy, 2018). It focuses on identifying problems, providing effective solutions, designing, and developing adaptive and innovative products, and fostering a continuous learning attitude through curiosity and exploration (Caluori, 2014). As such, it encompasses the culture, metrics, feedback, planning abilities, tools, and values of engineering. The engineering mindset and motivation are often closely linked to goal-orientation and leadership. In their study on the correlation between engineering mindset skills and leadership and management skills, Jamieson and Donald (2020) determined that individuals with a strong engineering mindset, particularly those who place an emphasis on technical characteristics, communication, and teamwork, are more likely to improve organizational and societal leadership than those who adopt a traditional engineering approach. A comparative study on the engineering mindset of fifth graders aged 10 to 11 in the United States, using a sample of 2,086 individuals, found that students who received additional education in engineering skills had significantly higher scores in the Engineering Mindset questionnaire, an indication of improved academic, social, communication, and problem-solving skills. They also demonstrated greater ability to cope with and learn from failure compared to the average student group (Lottero and Lachapelle, 2020). A study about teaching engineering concepts in a STEM context found that engineering concepts allow students to apply engineering thinking to analyze and solve complex scientific problems and find more relevant and meaningful answers (Cunningham, 2017).

3. Research Design and Methodology

The hypothesis for this study is as follows. Since most of the disadvantages associated with remote working (86.85% of them) are related to project factors, and since human resources are a crucial aspect of project implementation, the engineering mindset of the project team members will have a direct impact on the efficiency and results of the project. However, various factors may influence work efficiency in remote work, such as personal, project, or external factors. Figure 1 captures the framework of this study and the concepts on which it is based.

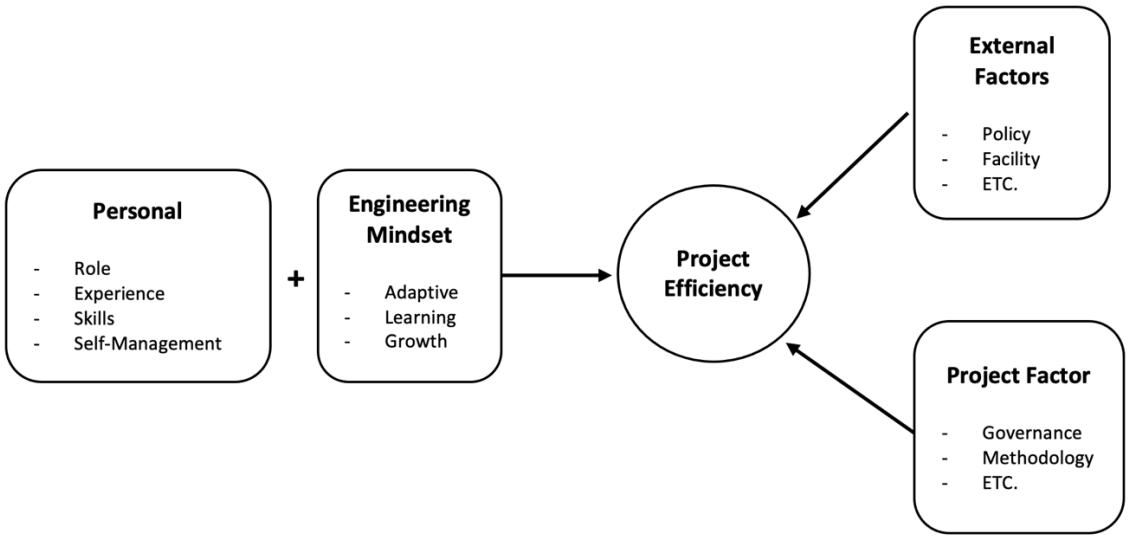

Figure 1: Conceptual Framework Diagram (created by authors for this study)

The survey instrument consisted of an online questionnaire using Google Forms, specifically developed for this study. The target population for the survey was IT professionals working remotely. The questionnaire was answered by a total of 112 respondents, who met the criteria of being IT professionals engaged in remote work (see list in Table 4). The questionnaire is divided into 3 parts: The first part is about the respondents' profiles. The second part concerns itself with the respondents' experience with distance working. The third part relates to project managers' perception of the engineering mindset (see Appendix 1 for the set of questions related to an engineering mindset). The questionnaire uses a 5-point Likert scale to indicate the degree of agreement, where 1 is "Absolutely disagree" and 5 "Absolutely agree".

The questions used in the engineering mindset section were heavily influenced by Ricco, Girtz, and Silliman's (2017) study, which includes questions both positively and negatively formulated to test the reliability of the responses from project team members. As can be seen from the list of questions shown in Appendix 1, the engineering mindset can be sub-divided into 3 types of mindsets: Adaptive, Growth, and Learning (Umaji & Paireekreng, 2021).

Table 2 defines each type and indicates the questions shown in Appendix 1 to which they relate.

Table 2: Categorization and Cronbach's Alpha Calculation Results

Type of Mindset	Definition	Question Number (see Appendix 1)	Cronbach's alpha
Adaptive	A mental attitude consisting in assessing the facts and circumstances of a situation and/or environment and making the appropriate adjustments to thrive in any scenario.	1,2,3,11,13,16	0.807
Growth	An approach to life in which an individual believes that his/her talent, intelligence, and abilities can be developed further.	4,5,7,8,9,12	0.796
Learning	An attitude that predisposes openness to new experiences. There is a belief that abilities can be developed by learning and intentionally growing from experience.	6,10,14,15	0.812

Cronbach's alpha was used to assess the reliability and internal consistency of the set of questions. The formula for Cronbach's alpha is as follows:

$$\alpha = \frac{N\bar{c}}{\bar{v} + (N-1)\bar{c}} \quad (1)$$

Where: N = the number of items
$\bar{c}$ = average covariance between item-pairs
$\bar{v}$ = average variance.

A Cronbach's alpha of 0.807 for adaptive mindset, 0.796 for growth mindset, and 0.812 for learning mindset indicate that the items measuring each type of mindset are highly correlated with each other, suggesting that they measure the same underlying constructs or concepts. This means that the items are reliable and consistent in measuring the intended construct.

The Cronbach's alpha results shown in Table 3 indicate the internal consistency of the items measuring each type of engineering mindset (Adaptive, Growth, and Learning). The values of Cronbach's alpha for each type of mindset are all above 0.7, which is generally considered an acceptable level of internal consistency.

Table 3: Cronbach's Alpha Interpretation

Result	Interpretation
> 0.9	Excellent
> 0.8	Good
> 0.7	Acceptable
> 0.6	Questionable
> 0.5	Poor
< 0.5	Unacceptable

This study uses descriptive statistics and the mean average method to find the difference between the success and unsuccess of the project team in terms of the engineering mindset of its members. In addition, Standard Deviation is employed to prove the deviation of the result. Using a Mean and Standard Deviation as statistical measures is appropriate in this context as they provide simple and easy-to-understand descriptions of the central tendency and variability of the scores for each type of mindset. Cronbach's alpha values indicate that the items are

measuring the same underlying constructs with good internal consistency, so the Mean and Standard Deviation should provide a reliable summary of the data for each type of mindset (see Table 6 in the next section for the results).

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4. Results and Discussion

As mentioned above, all the survey participants are working on IT projects in various capacities. Based on their respective roles in the projects in which they are involved, they can be lumped together into the following groups:

Table 4: Roles and Percentages

Role	Number	Percentage
Developers (Dev)	35	31.13%
Product Owners (PO), Business Analysts (BA), System Analysts (SA)	26	23.03%
Quality Assurance (QA), Testers	24	21.17%
Project Managers (PM)	22	20.36%
Others (IT Support, Recruiters, Top Management etc.)	5	4.31%
	112	

The various roles under which the respondents take part in IT projects can be grouped into two main areas: Project Managers and Project Executors. The latter includes developers, product, business, and system analysts, as well as quality assurance and testers,. The findings indicate that the two groups produce clearly different results in terms of work productivity, work enjoyment, and stress and pressure management.

As can be seen in Table 5, there are notable differences in several dimensions between the perception of project managers and that of project executors (the others involved in IT projects). For one, the majority of project managers reported less productivity and more stress and pressure compared to executors. Additionally, project managers reported less enjoyment working on IT projects than executors did. One possible interpretation for these discrepancies is that project managers may be more heavily involved in coordinating and managing the work of various team members, which could lead to more stress and pressure and result in less productivity.

In contrast, assuming different roles, such as product owners, business analysts, system analysts, developers, and quality assurance, may have more autonomy to work independently, which can lead to higher productivity and enjoyment. Furthermore, the survey results suggest that working remotely may be more challenging for project managers than for others involved in IT projects because the former rely heavily on communication and collaboration with team members and may therefore find it more difficult to coordinate and manage their work remotely.

Table 5: Percentage Results

Topic	Measurement	PM	PO/BA/SA	Dev	QA
Productivity	Less Productivity	**61.04%**	11.64%	13.45%	27.78%
	Not sure	12.09%	21.35%	21.83%	26.77%
	More Productivity	26.87%	**67.01%**	**64.72%**	**45.45%**
	Less Enjoy	**51.13%**	10.18%	16.56%	17.24%

Topic	Measurement	PM	PO/BA/SA	Dev	QA
Work Enjoyment	Not sure	26.38%	27.84%	19.05%	25.32%
	More Enjoy	22.49%	**61.98%**	**64.39%**	**57.44%**
Stress and Pressure Management	Less Stress and Pressure	17.45%	**52.62%**	**54.34%**	**48.97%**
	Not sure	27.68%	19.20%	16.82%	23.61%
	More Stress and Pressure	**54.87%**	28.18%	28.84%	27.42%

The data shown in Table 5 can be explained as follows:

- *Project Manager*s (PM)*:* The survey results suggest that project managers experience higher levels of stress and pressure and lower levels of productivity and enjoyment compared to others involved in a project in different roles. This could be due to the fact that project managers are responsible for overseeing and coordinating the work of multiple team members, which can be a challenging and demanding task. In addition, project managers may have to deal with issues such as resource allocation, timeline management, and stakeholder communication, which can be stressful and time-consuming. The results also suggest that working remotely may be more challenging for project managers, as they may need to rely more heavily on virtual communication and may find it harder to monitor and coordinate the work of their team members.

- *Product Owners / Business Analysts / System Analysts (PO/BA/SA):* According to the survey results, those in these roles report higher levels of productivity, enjoyment, and lower levels of stress and pressure compared to project managers. This may be because these roles provide more autonomy and opportunities to work independently and may not involve as much responsibility in terms of overseeing and coordinating the work of others. Additionally, these roles may be more focused on tasks such as requirement gathering, design, and problem-solving, which can be more engaging and rewarding.

- *Developers (Dev):* The findings indicate that developers report high levels of productivity and enjoyment, but also experience moderate levels of stress and pressure. This can be accounted for by the fact that developers are responsible for building and coding software, which can be a challenging and technically complex task. However, the results suggest that developers may be able to work relatively independently and may have a high degree of control over their work, which could contribute to higher levels of productivity and enjoyment.

- *Quality Assurance (QA):* The results indicate that quality assurance professionals report moderate levels of productivity and enjoyment, but also experience moderate levels of stress and pressure. This may be because quality assurance involves a lot of testing, which can be repetitive and time-consuming. Additionally, quality assurance professionals may need to work closely with developers to identify and resolve bugs and issues, which can be stressful and requires strong communication and collaboration skills.

- *Engineering Mindset of Team Members*

Another research question to address is the engineering mindset of an IT project team and how it may affect the outcome of an IT project. The survey results indicate that work efficiency is directly correlated to the engineering mindset of team members. The group of respondents with the highest scores as shown in Table 5 will have a positive effect on remote work. In other words, they are suitable for remote work and can work efficiently in such a remote environment. Conversely, those with low scores will have a negative effect on remote work and are therefore more predisposed to work in an office or in a face-to-face environment.

It is interesting to note that a significant proportion of respondents who answered 'Not sure' on the three topics fell within the moderate range of engineering mindset percentage. This observation suggests a potential association between uncertainty in responses and specific aspects of the engineering mindset. It may indicate a need for these individuals to collaborate closely with their supervisors to seek advice or enhance their decision-making confidence. Furthermore, this subgroup represents a valuable target for further research on developing the engineering mindset. By understanding their challenges and areas for improvement, interventions can be designed to enhance their adaptive skills and learning capabilities, ultimately fostering their growth in the field of engineering.

Table 6 presents the mean scores and standard deviations (SD) of the three different groups for the three different topics related to the engineering mindset. The topics include productivity, work enjoyment, and stress/pressure management. The groups are categorized based on the survey results.

The Engineering Mindset and Productivity

The "More Productive Group" reported a mean score of 4.12 with a standard deviation of 0.81. This indicates that participants in this group, who were identified as more productive based on the survey results, showed a higher level of association between the engineering mindset and productivity. The "Less Productive Group" had a mean score of 3.76 with a standard deviation of 0.72. This suggests that participants in this group, who were identified as less productive, exhibited a somewhat lower level of association between the engineering mindset and productivity. The "Not Sure" group had a mean score of 3.23 with a standard deviation of 0.83, indicating a lower level of association between the engineering mindset and productivity, and a higher variability in responses compared to the other two groups.

The Engineering Mindset and Work Enjoyment

The "More Enjoy Working Group" reported a mean score of 4.01 with a standard deviation of 0.78, indicating that participants who were categorized as enjoying their work more, based on survey results, had a higher level of association between the engineering mindset and work enjoyment. The "Less Enjoy Working Group" had a mean score of 3.76 with a standard deviation of 0.73, suggesting a slightly lower level of association between the engineering mindset and work enjoyment for those categorized as enjoying their work less. The "Not Sure" group reported a mean score of 3.33 with a standard deviation of 0.76, indicating a lower level of association and slightly higher variability in responses.

The Engineering Mindset and Stress/Pressure Management

The "Good Management" group reported a mean score of 4.03 with a standard deviation of 0.86, indicating a positive association between the engineering mindset and the ability to manage stress and pressure for those who were identified as having good stress management skills based on the survey. The "Not Good Management" group had a slightly lower mean score of 3.91 with a standard deviation of 0.79, suggesting a lesser degree of association between the engineering mindset and stress/pressure management for those identified as not having good stress management skills. The "Not Sure" group reported a mean score of 3.72 with a standard deviation of 0.71, showing the lowest level of association among the groups.

In summary, the data show that there is a positive association between the engineering mindset and productivity, work enjoyment, and stress/pressure management. The degree of this association varies among different groups categorized based on their productivity, work enjoyment, and stress management skills, as derived from the survey results. Those in the more productive, more enjoy working, and good management groups generally have a higher association with the engineering mindset compared to the other groups.

Table 6: Mean Average and Standard Deviation

Topic	Group	Mean	SD
The Engineering Mindset and Productivity	More Productive Group	4.12	0.81
	Less Productive Group	3.76	0.72
	Not Sure	3.23	0.83
The Engineering Mindset and Work Enjoyment	More Enjoy working Group	4.01	0.78
	Less Enjoy working Group	3.76	0.73
	Not Sure	3.33	0.76
The Engineering Mindset and Stress/Pressure Management	Good management	4.03	0.86
	Not Good management	3.91	0.79
	Not Sure	3.72	0.71

5. Conclusion

Distance working is likely to become the new standard in today's work environment. Therefore, it is important for everyone to adapt and learn, especially with regard to IT projects and their implementation. The results in this research indicate that as far as IT projects are concerned, remote work has limitations and is not suitable for every team member involved in an IT project and the roles they play respectively. The roles of project managers and those of operators (developer, QA, BA etc.) are different due to the differences in their tasks and work styles. Project managers need to be in close contact with team members to ensure most efficient performances. In that respect, working remotely is clearly a limitation and an obstacle. It is therefore imperative for project managers to adapt and develop new work methods that meet the changing environment while maintaining the quality and the supervision of the work of all those involves as project operators.

On the other hand, for all those whose roles in IT projects involve specific areas of responsibility and/or little contact with others, obviously remote operations pose fewer problems and obstacles in remote operations, if any at all. As a matter of fact, when combined with other external factors such as commuting time, time management, or work-life balance, distance working may end up generating more time to focus on one's job and providing real opportunities for higher efficiency. For all those roles, continuing working under a remote working model may thus be desirable and more conducive to higher productivity. As to the engineering mindset in the context of remote work, it was found that those with higher engineering mindset scores were more likely to be able to work on remote projects and at the same time be more efficient than those with low score averages. In other words, project implementation has a greater chance of success when project members truly have an engineering mindset, i.e., when their focus is on the three key skills that in this study represent an engineering mindset.

As we saw earlier, these skills include an (i) Adaptive mindset, the ability to cope with change or problems that may arise, (ii) a Growth mindset, the ability to ensure that there are no restrictions on operations or solutions, and (iii) a Learning mindset, the ability to find new approaches or formats that are suitable for operations, including learning lessons from failures in order to further improve. As the COVID-19 pandemic and the necessity to work from home because of social distancing made it abundantly clear, IT projects conducted in remote environments require individuals capable of adapting to changing situations and quickly learning key skills in order to increase efficiency. The engineering mindset precisely contains these key skills critical to enhancing the capabilities of project team members. Therefore, the implementation of IT projects in a remote environment requires all team members to develop greater engineering mindset skill sets in order for them to be ready to deal with ever-changing situations.

The survey results, when analyzed both in terms of respondents' efficiency and engineering mindset, reveal that individuals with higher engineering mindset scores were far more likely to work more efficiently on remote projects than those with lower scores. This aligns with the findings of Umaji and Paireekreng (2021), who established that project managers who achieved higher scores in engineering mindset measures were markedly more adept at working efficiently relative to those who scored lower. These findings are also consistent with the study results of Jamieson and Donald (2020) on the relationship between engineering mindset and leadership and Lottero and Lachapelle's (2020) determination that people with a good engineering mindset will also have a good growth mindset (Growth) and adaptability (Adaptive) to cope with and solve problems. They can learn from their mistakes and use them as guides for future self-improvement, including the ability to analyze, find answers, and solve problems effectively. This is also in keeping with Cunningham (2017), whose study on the application of engineering concepts to science teaching (STEM) concluded that engineering concepts help students apply engineering thinking to solve scientific and complex problems. Clearly, the engineering mindset of team members and the skills associated with it may be one of the deciding factors in the management's choice of project implementation approach.

- *Suggestions for Further Studies*

How to develop an engineering mindset in the context of IT projects, or elsewhere, could precisely be the topic of future studies. Indeed, while this study has emphatically highlighted the need for developing a strong engineering mindset, it did not focus on how to measure the engineering mindset of team members or on how to build or improve their engineering mindset and the role of human resources in improving project success rates. Other factors that could be considered for further studies and investigated more closely include the educational level, certification, or previous work experience of team members and their importance in a remote work environment. There may also be additional factors in the context of an IT project that may affect the performance and implementation outcome of an IT project implementation, such as team-specific skills, high-level management support, technology, or the organization policy. They all may be part of the considerations for further research. .Also related to the latter topic and another direction for further studies is organisational support and allocation of resources for remote working.

References

Akampurira, A. (2013). Project management for information technology projects. *Journal of Project Management, 31*(5), 647-655.

Caluori, R. (2014). Mindset and motivation. *Journal of Business and Technical Communication, 28*(2), 97-116.

Cunningham, J. (2017). The application of engineering concepts to science teaching (STEM). *Journal of Engineering Education and Development, 25*(2), 1-7.

Diab-Bahman, D., & Al-Enzi, R. (2020). Remote work: A study of the factors influencing its acceptance. *Journal of Business and Technical Communication, 34*(2), 191-220.

Henke, J. B., Jones, S. K., & O'Neill, T. A. (2022). Skills and abilities to thrive in remote work: What have we learned. *Frontiers in Psychology,* 13.

International Labour Organization (ILO) (2020). *Resolution Concerning Statistics on Work Relationships.* Retrieved August 12, 2022, from https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C198

Jamieson, M., & Donald, J. (2020). The relationship between engineering mindset skills and leadership and management skills. *Journal of Engineering Education, 109*(4), 555-572.

Joseph (2022, May 23). *What Is Information Technology Project?* Retrieved August 12, 2022, from https://theconnectedset.tv/what-is-information-technology-project

Lentjushenkova, L., & Simenenko, A. (2021). Advantages and disadvantages of working remotely in Latvia. *Journal of Business and Technical Communication, 36*(1), 1-20.

Lottero-Perdue, P. S., & Lachapelle, C. P. (2020). Engineering mindsets and learning outcomes in elementary school. *Journal of Engineering Education, 109*(4), 640-664.

Milenin, M. V. (2020). Distance work changes strategy of HR management. *Vestnik of the Plekhanov Russian University of Economics, 17*(4), 92-102

Project Academy (2018). *What is Engineering Mind-Set Thinking?* Retrieved August 12, 2022, from http://www.projectacademy.org/Documents/Engineering-Mind-set-summary-11.pdf

Ricco, G. D., Girtz, S., & Silliman, S. E. (2017, June). *Exploring Engineering Mindset*. 2017 ASEE Annual Conference & Exposition.

Ruiller, C., Van Der Heijden, B., Chedotel, F., & Dumas, M. (2019). "You have got a friend" The value of perceived proximity for teleworking success in dispersed teams: Team Performance Management: *An International Journal, 25*(1/2), 2-29.

Tohidi, H. (2011). Human resources management main role in information technology project management. *Procedia Computer Science, 3,* 925-929.

Umaji, K., & Paireekreng, W. (2021, August). A Study of Project Manager Skills for Enterprise Data Platform Project. In 2021 2nd International Conference on Big Data Analytics and Practices (IBDAP) (pp. 84-89). IEEE

Yang, L., Holtz, D., Jaffe, S., Suri, S., Sinha, S., Weston, J., ... & Teevan, J. (2022). The effects of remote work on collaboration among information workers. *Nature Human Behaviour, 6*(1), 43-54.

World Economic Forum (2020). *The Future of Job: Report 2020*. Retrieved August 12, 2022, from http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf

Appendix 1

Survey Questions Related to Project Team Member's Engineering Mindset

No.	Positive (P) or Negative (N)	Question
1	N	You have a certain amount of intelligence, and you really can't do much to change it
2	N	Your intelligence is something about you that you can't change very much.
3	P	No matter who you are, you can significantly change your intelligence level
4	N	To be honest, you can't really change how intelligent you are
5	P	You can always substantially change how intelligent you are
6	N	You can learn new things, but you can't really change your basic intelligence
7	P	No matter how much intelligence you have, you can always change it quite a bit
8	P	You can change even your basic intelligence level considerably
9	N	You have a certain amount of talent, and you can't really do much to change it
10	N	Your talent in an area is something about you that you can't change very much
11	P	No matter who you are, you can significantly change your level of talent
12	N	To be honest, you can't really change how much talent you have
13	P	You can always substantially change how much talent you have
14	N	You can learn new things, but you can't really change your basic level of talent
15	P	No matter how much talent you have, you can always change it quite a bit
16	P	You can change even your basic level of talent considerably