Critical Success Factors in Managing Project Using IS/IT:

Case Study for Projects in Indonesia During COVID-19 Pandemic

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Abstract—**COVID-19 pandemic has forced the economy's downfall and pushed the enterprises around the globe to embrace Working From Home. For the projects managed using IS/IT during thereof, the literature study performed resulted in Factors to embrace; furthermore, the interview with a Global Service Manager of a state-owned Telco company in Indonesia suggested 24 CSFs drawn from such Factors aforementioned. A survey was then conducted to stakeholders of the projects in Indonesia using the Quota-sampling technique to rank or prioritize those CSFs into the top 12 ranked CSFs for the enterprises operating in Indonesia to quickly consider embracing the first time in every project setup. The Researcher thinks that this research performed during the COVID-19 pandemic will encourage the readers and enterprises to be more aware of the CSFs to run the project in such COVID-19 pandemic using IS/IT successfully.**

Keywords—*critical success factors, managing project, IS/IT, COVID-19 pandemic, working from home, remote working, virtual team*

I. INTRODUCTION

A. Background

By 8th December 2019, a new type of Coronavirus, later named as COVID-19 infected a person in Wuhan, China [1]. Afterward, by January 2020, the virus spread to other countries [2] through transmission from people to people or from people to other media to people as possible during the infected ones' flight activity or visiting time to other countries. Furthermore, the virus spread rapidly to many more countries, and the more severe impact it caused to the people's health, leading to people's massive deaths, such as in Italy [3]. Eventually, WHO declared it officially as a global pandemic by 11th March 2020 [4] and still as a global pandemic by the time the Researcher conducts this research. The world has been suffering from COVID-19 severely.

Most of the countries in the world have reacted promptly to this COVID-19 pandemic, affecting how the enterprises and or industries should perform their businesses. Some countries performed total lockdown, like UK [5], China, Italy, Spain, and India [6]. For Indonesia, by 31st March 2020, the President of Indonesia issued critical regulation, i.e., Government Regulation No 21/2020 titled "Big Scale Social Restriction for Accelerating COVID-19 Eradication" [7] as a guideline for the governor of each province to follow. But actually, there were many related regulations issued by some Ministries and President of Indonesia before that, since 4th February 2020. As for enterprises and or industries, to cope with such circumstances, working from home is un-prevented. Indonesian enterprises and industries, based on the regulations thereof, have also applied the working from home model. Particularly for Indonesian capital city, i.e., DKI Jakarta, companies included in the vital sectors part, i.e., Health, Food/Drink, Energy, Communication and IT, Finance, Logistics, Hotel, Construction, Strategic Industries, Basic service / Vital Object, and Daily needs could still operate [8]; but in real practice, involving limited employee and discipline social distance while performing the work activities.

B. Problem and Research Question

PMBOK 6th [9] defined the project objective as triple constraint, i.e., scope, cost, and time; while Marchewka [10] defined the project goal as the value that the project must bring to the organization in which the project resides. It is clear here that the expectation for every project is to meet its goals and objectives. Moreover, to successfully achieve its objectives, Schwaber & Sutherland [11] emphasized team collocation to reduce the communication barrier and to smoothen the communication flow.

In contrast with the expectation thereof, working from home has prevented the team collocation. Besides, the lack of team's visibility has threatened the ability to manage the team's support to each other to manage the scope. Egeland [12] mentioned that time to complete the project has been dragging for most of the projects run with Working From Home model. As the time is prolonged, the cost to maintain the resources to execute the project will surpass the cost baseline [9, 10]. Hence, even though the project's failure to meet its objective and or has big problematic issues has been previously high, according to Raczka [13], i.e., 70%; this pandemic has enlarged the failure potential.

As the world is still vague about when the pandemic will end and how to recover the economic condition, anticipations for a prolonged pandemic must be precisely considered. This anticipation also applies to facilitate the way to manage projects to achieve its goals and objectives still.

Before COVID-19 pandemic (through physical collocation) – Project failure rate: up to 70%

Picture source: https://vitalitychicago.com/blog/how-important-it-co-locate-agile-teams/

During COVID-19 pandemic (using IS/IT) – Project failure rate: even higher than before
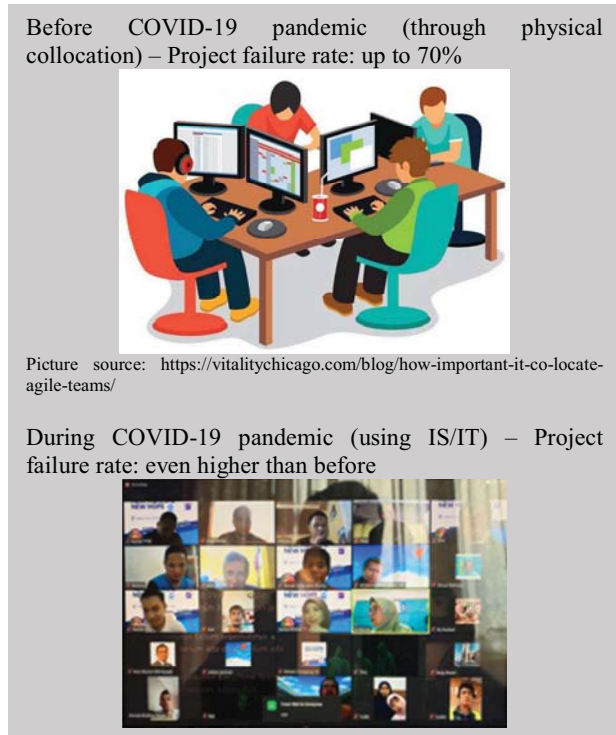

Fig. 1. Project Team Collocation

Thereof, as the physical team collocation has little chance to be performed during the COVID-19, the higher the potential of dragging timeline of the project will be, aligned with what Egeland [12] predicted that Working From Home will be the new norm to run projects; then, it means heavily relying on the use of IS/IT, as depicted in Fig. 1. However, as managing project by heavily relying on IS/IT to replace physical team collocation may become a new norm, there should be full consideration on the factors which should be embraced while managing such projects. Hence, this Research's goal is to answer the question, i.e., what are the most critical success factors in managing projects in Indonesia using IS/IT during the COVID-19 Pandemic?

C. State of The Art

The researcher had not found many kinds of literature addressing the CSFs in managing projects during the COVID-19 pandemic. While there were many kinds of literature about COVID-19 in Indonesia, the Researcher also had not found many kinds of literature on the Managing project with Working From Home using IS/IT. Hence, this research provides novelty for readers from both practitioner and academician, particularly for the prioritization of CSFs thereof.

II. LITERATURE STUDY

Ledwith & Luden [14] defined the communication technology used in managing projects with virtual team collaboration in their research. Their project management research got the majority of respondents from IT industry sector. Such communication technology mentioned are: Stand-alone video conferencing, Web conferencing, Instant messaging, Remote access and control tool, Email, Fixed telephone, Mobile phone, Letter/Fax, Social networks, Data-sharing repositories, and Team and organization web portals. Their research was published by Project Management Institute as White paper.

Besides, Marchewka [10] proposed four keys to the success of the IT project. Those keys are Value-driven approach, Socio-technical approach, Project-management approach, and Knowledge-management approach. Furthermore, Project-management approach also cover Resources, Expectations, Competition, and Efficiency and effectiveness [10]. However, it does not put in detail what inside those keys to take care of when running the project with a virtual team utilizing communication technology aforementioned.

Having considered both PMI White paper of Ledwith & Luden [14], and Marchewka [10] as credible sources; the Researcher combined both to pull the keys to the success of the project as below TABLE I. But to develop and or to enhance the keys Ledwith & Luden and Marchewka had, the Researcher add Family support as it is also determining key to moderate how one can work from home comfortably [15]. It creates a group of keys by which the project can be run successfully.

TABLE I. KEY GROUPS TO PROJECT SUCCESS

No.	Key Group	Originate From
I.	Value-driven	Value-driven approach [10]
II.	Socio-technical	Socio-technical approach [10]
III.	Project-management	Project-management approach [10], Dedicated team members [14]
IV.	Knowledge-management	Knowledge-management approach [10], Virtual team experience [14], Experience and knowledge [14]
V.	Leadership	Vision and goals [14], Team leader status [14]
VI.	Organizational	Common process [14]
VII.	Team attitude	Cultural awareness [14], Cultural adaptiveness [14]
VIII.	Family consideration	Dependency to family's decision [15]

However, as aforementioned, the eight keys have not put details on factors inside those keys, which are critical for the success of the project managed with a virtual team using IS/IT. The virtual team refers to the people who might be geographically and or organizationally separated but are enabled to communicate using IS/IT [16]. Hence, the Researcher uses the keywords, i.e., virtual team, working from home, and working remotely to search for other sources to operationalize the above seven keys to find the critical success factors thereof. The Researcher then studied many related

kinds of literature resulted from the search activity, as summarized in TABLE II. Furthermore, the Researcher performed coding of the Factors found in those related kinds of literature into the eight Key groups utilizing a tool, i.e., NVivo 12 Plus.

4. Knowledge management refers to the knowledge itself and the management to acquire knowledge.
5. Leadership refers to the character expected to be owned by the leaders, which will base how those leaders act.

TABLE II. Unranked CSFs

No.	Key Group	Success Factors	Critical Success Factors	
I.	Value-driven	Explicit goal, Achievable goal, Measurable goal [17], Goal function as a key driver for project milestone, Changeable goal upon needed [18]	1. 2. 3.	Achievable goal Measurable goal Changeable goal
II.	Socio-technical	Technological cues, Socioemotional needs [19], Flexibility of work place and schedule [20], Opportunities to share ideas about the work environment and way of working [21], Freedom to choose work tasks [22], Technology, networking and multidisciplinary relationship building skills [23], Familiarity with technology [24], Efficient information technology communication (ICT) tools [25]	4. 5. 6.	Freedom to choose work tasks Technology networking and multidisciplinary relationship skills Efficient information technology communication (ICT) tool
III.	Project-management	Team composition [19], Project management [26], Efficiency, Ease of communicating [20], Sound information and communication about the concept, adequate managing of expectation [21], Visual accessibility, Operation accessibility [27], Frequency of FTF meeting [24], Creative conflict resolution, Clear roles for team members [28], Project control, Good project management methodology [17], Appropriate process, Adjustable team charter, Decision approach is based on RACI model [18], Shared project data and records [29], Competent project team [25]	7. 8. 9.	Team composition Clear roles for team members Competent project team
IV.	Knowledge-management	Diversity of skill sets [20], Intellectual knowledge of the technical [22], Experience knowledge with virtual teams [30]	10. 11. 12.	Diversity of skill sets Intellectual knowledge of the technical Experience knowledge with virtual teams
V.	Leadership	Leadership action to create trust [19], Degree of attractive leader [31], Inclusive leadership [18], Embodiment of ideal leadership [32]	13. 14. 15.	Leadership action to create trust Degree of attractive leader Inclusive leadership
VI.	Organizational	Human resource policies and procedures, Proper team leader selection [19], Management leadership, Readiness for organizational change, Top management commitment, Organizational culture [26], Encouraging face-to-face team virtual communication [28], Adequate budget for required IT resources, Adequate number of IT staff and IT skills, Clear IT principles and policies [17]	16. 17. 18.	Management leadership Top management commitment Organizational culture
VII.	Team attitude	Integrity, Goal commitment, Empathy, Good interaction management, Good communication style [33], Cooperation [20], Quick responses to complaints or misunderstandings [21], Comfort [27], Openness, Agreeableness [34], Trust amongst project teams [25], Adaptiveness to national culture and regional differences [26]	19. 20. 21.	Integrity Comfort Adaptiveness to national culture and regional differences
VIII.	Family consideration	Family head full support [15], Family commitment to share interior facility [21], Family's perception of work-life balance	22. 23. 24.	Family head full support Family commitment to share interior facility Family's perception of work-life balance

Below is the short briefing of each of the key groups depicted in TABLE I (some might have specific meaning referring to the references they originate from, while others have generally understood meaning):

1. Value is the goal that is going to be achieved by such organization sponsoring the project [10].
2. Socio-technical is the sum of the activity to influence the positive involvement of stakeholders (socio), and the technology aspect of the project [10].
3. Project management is the management of the project to achieve its goals and objectives.

6. Organizational, in this case, refers to all the support and property of the organization, which will contribute to the success of the project.
7. Team attitude refers to the team's ability to collaborate, tolerate, etc.
8. Family consideration here refers to how the family will bring the positive support on the project activities performed from home, which is also crucial on how the employee working from home, even for as simple as interior facility sharing.

III. Research Methodology

The method used in conducting this research is depicted in Fig. 2. First, the Researcher performed literature study to find factors affecting the success of the project and or the success of working from home, collaborating with a virtual team, and performing remote work. As also depicted in TABLE I; from the literature study, the Researcher found the eight key groups to consider for the success of managing projects remotely or with a virtual team. Furthermore, as depicted in TABLE II; in the third column, the Researcher found the success factors of each of the key groups through further literature study. The Researcher then performed an interview with a Global Service Manager of the biggest state-owned Telco company in Indonesia to qualify which success factors should be considered as critical success factors. From the interview, 3 CSFs are then drawn from each key group, as shown in the fourth column in TABLE II, resulting in a total of 24 CSFs.

Next, the Researcher conducted a survey to get the ranking or prioritization of such the 24 CSFs; with the questionnaire applying a 10-point choice to quantify the impact of each CSF in which 1 indicates very low impact and 10 indicates very high impact. The population of the survey is the Project stakeholders in Indonesia. Using Quota-sampling technique, the survey link is distributed to Instant messaging groups with the persuasive message to each group member to also forward the link outside each of the group, i.e., to those have work experience in a project.
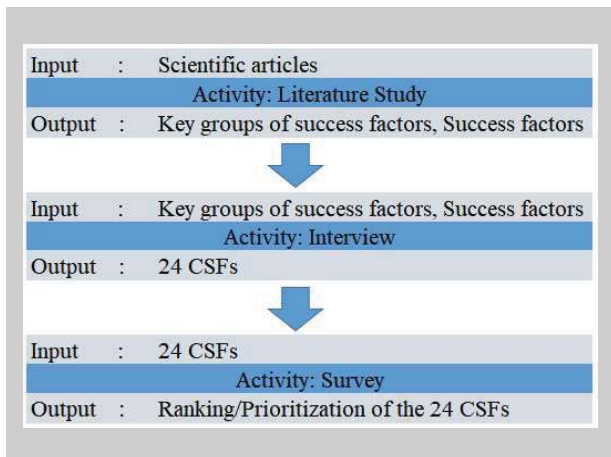

Fig. 2. Research Sequence

IV. Related Works

Some kinds of research have inspired the Researcher to perform this research. Kinds of research partially discussed CSFs in managing projects are embraced as a Literature study in previous Section II. Those kinds of research have contributed to the foundation of this research, as the Researcher has pulled out the success factors from thereof. Nevertheless, the Researcher expect more related kinds of research in the future.

Furthermore, Walsh [16] has revealed how the virtual team could gain success through technological advancement in his research. His research is for sure, correlated with this research in which IS/IT is used to collaborate remotely. However, this research performed by the Researcher provides more specific CSFs in managing projects during Pandemic in which Working From Home becomes a global norm for the time being.

Besides; Gisin, Schulze, and Degenhardt [32] have exposed a CSF for Flexible-Mobile Work. The Researcher has embraced the point in that research as well, i.e., the importance of leadership. However, that research has not provided comprehensive points in a specific view, i.e., managing project during Pandemic.

V. Results and Discussions

The Researcher got total responses of 168 people, but it dropped 82 due to incomplete survey answer, and 3 as the respondents have no experience with any project; hence, the valid response remains 83 people. For more validity, the researcher confirmed that none of the chosen respondents have chosen the all same number to answer the questions with the 10-point choice. The respondents come from many industry sectors, as shown in TABLE III; however, Telco and IT are the majority. Besides, TABLE III shows how some companies are operating in more than one sector. The title of the respondents also varies, as served in TABLE IV. Furthermore, those respondents reveal the IS/IT used in their projects during Working From Home as depicted in TABLE V; Email, Zoom, and Mobile phone are on top position as each gets 70% of respondents or above; it is to note that this part is using checklist option by which each respondent can choose more than one IS/IT tool in the survey.

TABLE III. Respondents by Industry

Industry Sector	Respondents
Telco	35
IT, Telco	7
Government	7
Oil & Gas	5
Energy	4
IT	4
Education	2
IT, Financial Services, Government, Consultant	1
IT, Insurance	1
IT, Insurance, Financial Services, Utilities, Professional Services, Consultant	1
IT, Telco, Oil & Gas, Energy, Financial Services, Consultant	1
IT, Telco, Food & Beverage, Education	1
IT, Telco, Professional Services	1
Telco, Manufacturing	1
Telco, Manufacturing, Others	1
Financial Services	1
Insurance	1
Professional Services	1
Utilities	1
Others	7
Total	**83**

Title of Respondent	Number of Respondents
CEO	2
COO	1
Director	4
Operational Director	1
Division Head	1
Project Director	2
Senior Manager	1
Head of Network Rollout	1
Head of Service Operation	1
Project Establishment Manager	1
Senior Manager Presales	1
Senior Project Manager	1
Manager Global Order & Enhance Service	1
Manager Strategic Investment	1
Manager	5
Project Manager	7
Operation Staff	3
PMO Staff	2
Implementation Manager	1
Project Controller	3
Project Coordinator	6
Application Specialist	1
Competency Center Global Consultant	1
Pre Implementation Lead	2
Technical Project Lead	1
Project Support	1
Site Manager	2
Lead	1
Senior Engineer	1
Software Developer	4
Engineer	9
Senior Automation Engineer	1
Supervisor	5
Finance	1
Functional	1
IT Staff	1
Junior Instructor	1
Mentor	1
Officer	1
Technical Support	2
Total	**83**

TABLE V. IS/IT USAGE

IS/IT Tool/Application/System	Respondets
Email	78%
Zoom	72%
Mobile phone	70%
Instant messaging	30%
Microsoft team and organization web portals	24%
Google meet	23%
Social networks	23%
Data sharing repositories	22%
Microsoft team	20%
Remote access and control tool	19%
Fixed telephone	7%
Skype	7%
CloudX	1%
Letter/Fax	1%
Webex	1%

Finally, TABLE VI shows the ranking of those CSFs. Efficient information technology communication (ICT) tool is ranked as the first, showing the importance of having an efficient ICT tool in running the project with Working From Home scheme during COVID-19 pandemic. While Changeable goal is ranked as the last, showing the less desire to change the goal during the execution of the project. However, even the last rank still has quite a good average, i.e., 6.80, which is approaching 7.00, showing how all 24 CSFs are positively valid in the respondents' judgment. Furthermore, as the balance is applied, top prioritization may be given for the 50% of the total CSFs herein, which means the top 12 ranked should be provided earliest to bring quick impact for the success of the project managed using IS/IT during COVID-19 pandemic.

TABLE VI. CSF MEAN RANKING, BY IMPORTANT DEGREE JUDGMENT FROM PROJECT STAKEHOLDERS IN INDONESIA

P.	Rank	CSF	Mean	Std. Dev
First Priority	1	Efficient information technology communication (ICT) tool	8.10	1.92
	2	Top management commitment	8.02	1.77
	3	Family head full support	8.02	1.99
	4	Family's perception of work-life balance	7.89	2.13
	5	Integrity	7.87	1.71
	6	Competent project team	7.75	1.57
	7	Management leadership	7.75	1.90
	8	Family commitment to share interior facility	7.69	1.87
	9	Clear roles for team members	7.66	1.92
	10	Organizational culture	7.66	2.03
	11	Comfort	7.66	1.73
	12	Leadership action to create trust	7.65	1.81
Second Priority	13	Intellectual knowledge of the technical	7.64	2.04
	14	Technology networking and multidisciplinary relationship skills	7.59	2.07
	15	Experience knowledge with virtual teams	7.59	1.90
	16	Team composition	7.49	1.92
	17	Adaptiveness to national culture and regional differences	7.49	1.78
	18	Inclusive leadership	7.47	1.84
	19	Achievable goal	7.36	1.81
	20	Degree of attractive leader	7.27	1.91
	21	Measurable goal	7.16	1.86
	22	Diversity of skill sets	7.11	1.82
	23	Freedom to choose work tasks	6.88	1.99
	24	Changeable goal	6.80	1.96

VI. SUMMARY

A. Conclusion

There are top 12 ranked CSFs resulted in this research to be prioritized by every single enterprise running projects. These top 12 ranked CSFs are strongly backed up by real circumstance as the samples are mostly from Telco and IT companies that are included in the list of Industry sector which can still operate in Indonesia during COVID-19 pandemic, which means some of their employees must still go to fields

while the majority of their employees must stay working from home, increasing the need to manage their projects more precisely using IS/IT. Moreover, the bigger scale applied, i.e., a 10-point choice in the questionnaire for each factor examined, gives the respondents a chance to be more accurate in comparing one to others.

B. Research Limitation

With limited time to perform the survey, the Researcher admits that this research sample should be more than what this research has. Moreover, due to time constraint, this research could not limit the participant of each company as doing so will result in even smaller samples. So, it is advised that future research collects more samples and limits the samples from every single company; hence, proper planning to include more companies to gain more samples should be the key consideration.

C. Recommendation

For enterprises to successfully run projects during Pandemic COVID-19 using IS/IT, the enterprises may consider applying what practitioners and academicians proposed as Success factors summarized in TABLE II in the third column. However; the enterprises might not be able to embrace all in one shoot, so the enterprises may practically choose those considered critical first, which are served at TABLE II in the fourth column, namely as CSFs. But, for quick impact to enterprises, the priority among all factors thereof to fully considered to be in place for the first time the project run is the top 12 ranked CSFs in TABLE VI.

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