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Effective Communication Management in Remote Working Environment on Project Management Success

By

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Abstract

The spread of COVID-19 has compelled organisations worldwide to rethink their cost structures, business strategies, and work procedures, which resulted in a shift towards a remote working environment. This research aims to determine the impact of information accuracy, clarity, timeliness, and accessibility on project management success. This study takes the deductive approach of research by defining the problems related to effective communication management under a remote working environment by formulating a relevant hypothesis, organising and collecting data using a survey method, making deductions and conclusions, and validating the conclusions against the formulated hypothesis. The study examined relevant academic research papers concerned with all research variables and applied the Triple Constraint theory. The data collection was done through a self-administered questionnaire, which received 221 valid responses. A set of hypotheses arising from a conceptual model of effective communication management was tested using partial least squares structural equation modelling (PLS-SEM). Empirical results revealed that only three variables significantly influence project success. It further reinforces findings on the impact of effective communication management on project success. As a result, in an internationally diverse team, the project manager can use this research to show effective communication management that

are appropriate and feasible for the project. Overall, the study helps deepen the knowledge in effective communication management in this sudden adaptation of remote working environment and its significance in project management success.

Keywords: effective communication management, project management success, remote working, stakeholders.

1. Introduction

The spread of COVID-19 has compelled organisations worldwide to rethink their cost structures, business strategies, and work procedures, which resulted in a shift towards a remote working environment. Even though remote working was starting to gain popularity in the last few years, the current pandemic situation has fostered the transition to remote working, a necessity to ensure business growth and productivity are not compromised. Moreover, the transition serves as a mitigation plan to minimise the dispersion of the Novel Coronavirus in the workplace. In a study by the Office for National Statistics (ONS) in the UK, 48% of organisations adopted remote working during the lockdown. In Malaysia, following the announcement of the Movement Control Order (MCO) under the Prevention and Control of Infectious Diseases Act 1988 and the Police Act 1967 by the Prime Ministry Tan Sri Muhyiddin Bin Mohd Yassin to address the COVID-19 threat faced by the country, many organisations have opted for remote working. One of the organisations is the Malaysia Digital Economy Corporation (MDEC), a government agency under the Ministry of Communication and Multimedia. They have immediately activated their Business Continuity Management plan and implemented special working arrangements for their employees (MDEC, 2020).

However, some organisations were not prepared to support this new working norm. For example, organisations reluctantly transitioned to remote working in Spain due to their paternalistic culture. Likewise, in Africa, problems such as cybersecurity and unstable energy supply inflict significant challenges for organisations to adopt remote working (Azasu & Babatunde, 2020). In contrast, a survey conducted in Malaysia during the MCO revealed that the majority of the Malaysians, 69%, want remote working to continue even after the MCO period (Kaur, 2020). Similarly, in another survey conducted in the Gulf Cooperation Council (GCC), Bahrain had the largest share of respondents who had remote work plans than Saudi Arabia and the United Arab Emirates. Regardless of the organisation's readiness or employee desire, the current pandemic landscape has foisted the workforce around the world into a global experiment on remote working. This study finds inspiration because this pandemic situation affects all modes of working.

Especially in this era of information and technological advancement, organisations carry out their business tasks using the project-based approach in which communication management holds the highest importance (Muszynska, 2015). Communication is essential for everyone involved in and influenced by the project. Therefore, proper communication management is indispensable in project-based work. According to Kliem (2017), proper and effective communication management can influence a project's success; however, it is a challenging dynamic process for project managers and stakeholders. Rehman (2011) validates the same understanding where he concluded in his study that the prospects of projects success are proportional to the quality of management of the stakeholder communication. For example, Upwork is a company that has benefitted from the practice of effective communication management. Enterprises and professionals connect and communicate online to conduct business on this American freelancing platform. The sudden change in the working environment and communicating platform has profited the company by increasing 12% to 19% in only a quadrant of 2019 (Karthirgugan, 2020). Effective communication management is vital to project management success that it has been identified as the essence of a project by many researchers

(Zulch, 2014; Radujkovic & Sjekavica, 2017; Muszynska, 2018). A project will succeed in a remote working environment if it can understand the communication method and styles required by its communication system (Zulch, 2014). However, the core is the same; communication is effective only when attaining its goal and purpose.

Similarly, there are many dimensions to measure the effectiveness of the communication process. However, despite various dimensions, this study will focus exclusively on accuracy, clarity, timeliness, and accessibility of the information in a remote working environment. Thus, the initiation of this research is to determine the impact of information accuracy, clarity, timeliness, and accessibility under effective communication management in a remote working environment on project management success. This study presents a survey done in organisations based on project work in their daily jobs under a remote working environment.

2. Review of the literature

Communication in an organisation is the central bridge for sustainability and determines the effectiveness of the management (Arop, Obun, Owan, Joseph, & Akan, 2018). In comparison, communication in a project can be defined as a mutual exchange of project information and processes to build an understandable platform for stakeholders (Ismail & Yaser, 2019). In a study conducted by Imran, Shazia & Kashif (2011), they discovered that communication in a project mainly concerns discussing the iron triangle among stakeholders. Communication is the basis that coalesces cost, scope, and time management to attain a quality product or service (Zulch, 2014). Thus, the communication process is extremely important to everyone involved and influenced by the project.

Consequently, unsuccessful communication management may lead to cost overrun, time delay, conflict among stakeholders, and sometimes project failure. Project management success encompasses the iron triangle, an amalgamation of cost, time, and quality of a project's three most significant manipulative variables. Unfortunately, the emergence of the pandemic has forced many organisations to engage in work from a remote working environment. In such a situation, factual communication among stakeholders is more crucial than ever. Moreover, for a remotely working team, effective communication management is of utmost significance and with the basic proficiency to collaborate in sharing information, project objectives can be realised successfully (Muszynska, 2015).

2.1 Information Accuracy

Projects managed remotely require great teamwork within and between teams; therefore, the information shared among shareholders should be as accurate as possible. Zulch (2014) mentions that information shared amongst the stakeholders has to be concise, discreet, accurate and free of ambiguity as it contributes to enhancing communication during project management. In this context, information accuracy monitors whether the receiver is clear and precisely understands the message. Likewise, Rahman, Nouman & Ammar (2018) have defined information accuracy as the correctness in representing information. Inaccurate information in a project, especially from a remote working environment, will be caused many concerning problems that influence the project and may result in unsuccessful project management. Therefore, it is crucial for information transferred through any cloud communication tool to be accurate and precise.

The principle of communication in a project is that the information transferred amongst stakeholders should be correct and accurate as it is needed in decision-making and brings up the correct action (Arop, Obun, Owan, Joseph, & Akan, 2018). For example, information on the project scope has to be accurate as it helps stakeholders stay on track, while work

performance information helps track project deliverables status and ensures the suitable activity is carried out according to the plan. Many project managers agree that pre-planning the project will provide an accurate schedule, and changes can be made accordingly if required. Similarly, information accuracy holds its significance in delivering the cost-related message. Small information such as updating the daily work hours would carry high weightage as it concerns monetary value, directly affecting project management success. Figure 2.7 below show the steps involved in planning the project cost. To plan these steps, the information required should be accurate as any wrong information may lead to project cost overrun and eventually lead to project management failure.

H1: Information accuracy has a positive relationship with project management success

2.2 Information Clarity

Clarity of information is vital in conveying the project's purpose, and in completing each stage of the project is paramount in achieving project management success. Information clarity is measured by the quality of information that is easy to decipher and understand. Usually, in a remote working environment, many factors such as emotions, culture, location and communication tools and mediums can affect the transmission of the message. These causal factors may lead to inadequate information or, worse, information without clarity, causing misleading or ambiguous information. Eventually, this will affect the project management's success. Therefore, clear information is needed to communicate clearly and precisely, giving no chances for guesses and doubts (Muszynska, 2015). Sending out a message carrying clear, unambiguous and accurate information is one of the basic skills needed in every stakeholder, especially in remote working environments, and is considered desirable by employers worldwide (Valet, 2020).

Generally, poor quality information leads to poor decision-making. Mesly, Levy-Mangin, Bourgault & Nabelsi (2014) have identified misunderstanding, mainly related to language, including accents and fluency, as one of the common miscommunication problems that arise in dispersed or virtual teams due to lack of information clarity. They added that language barrier, perceptual problems and psychological state are some causes of unclear information, which creates a persuasion communication either cognitively or emotionally (Rahman, Nouman, & Ammar, 2018). Consequently, this will influence the stakeholder's expectations and perceptions, resulting in many bad decisions that impose direct or indirect risk to the project management's success and overall project completion. The figure below shows where persuasive communication can exist in the communication model in the form of noise.

H2: Information clarity has a positive relationship with project management success

2.3 Information Timeliness

Under the aegis of information and technology, it is possible to track information in real-time and obtain frequent feedback to have the information needed to make decisions. Information timeliness ineffective communication management ensures that the information is up-to-date and that the recipient receives it immediately (Muszynska, 2015). Project communication is essential as it binds all the parties involved, from project owner to end-user. The information timeliness in the project communication is obtained by assessing the availability and receptivity factors (Shakeria & Khalilzadeh, 2020). Availability is determined by the degree of information transmitted through a particular channel to reach its destination. Receptivity is represented by the accuracy of the message interpretation and the necessary actions made. The recipient must receive and acknowledge the message to achieve a complete

communication cycle. For example, if the messages are transmitted via email and the recipient does not check the email, this communication is deemed incomplete.

Project managers highly depend on timely and accurate information to perform their daily tasks. They rely on information to make decisions, outline strategies, mitigate risks and measure progress. Shakeria & Khalilzadeh (2020) mentions that the overall effectiveness of a project management team depends on the information received and sent. The flow of accurate and timely information in a systematic fashion makes the project team more competent as most of the process in the project is decided based on information available at the moment (Rajhans, 2018). Likewise, timely information is essential in project management because it is used in the project schedule, cost, and quality decision-making. The best cost-benefit relationship concerns time. Out-of-date information affects the project in terms of time and money. When information is not received promptly, the project productivity is affected regardless of the progress. If the information received is not based on the current situation, there are high chances for the project management's success to be negatively affected. Therefore, it is essential to have continuous information flow in a project.

Due to the pandemic, jobs ongoing at the site are currently restricted to limited numbers of people. The communication among remote workers may be delayed. Outside of traditional face-to-face meetings, team members may be busy with other tasks that result in the unlikelihood of timely information dissemination. There are many possible reasons for untimely information exchange, including difficulties in information generation, unscheduled work demands, poor planning or work habits. Guenter, Emmerik & Schreurs (2014) have identified that delays in information exchange have significant negative consequences. Similarly, Rajhans (2018) validates that delay in information is one of the common miscommunication problems in managing stakeholder relationships, which affects the project management's success.

In a remote working environment, one standard and unavoidable problem in communication is a delay in information exchange. Incomplete communication generates wrong perceptions, causing negative relationships amongst stakeholders (Rajhans, 2018). Muszynska (2019) suggests that the project management team should adapt communication management throughout the project. The timely communication between stakeholders will create a sense of conscience by sharing information and accepting the common goals in unison (Pirju, 2018). Rahjans (2019) added that the flow of correct and timely information in a well-structured manner makes the project team efficient, resulting in the well-timed project progress as scheduled, which positively affects project management success.

H3: Information timeliness has a positive relationship with project management success

2.4 Information Accessibility

Communication management plays a significant role in realising projects, especially in a remote working environment. Ensuring information timeliness requires collecting, transferring, processing, and presenting the data in real-time. Muszynska (2015) and Zulch (2014) define information accessibility under effective communication management as providing communication records to project stakeholders and making sure they are available whenever in need. For remotely functional teams, technology is the medium for communication. Mediation by technology may have both positive and negative effects. Since the pandemic, great communication tools are made available for projects such as Slack, Zoom, Microsoft Teams, Skype for Business, Workplace by Facebook, and many more. Thus,

selecting effective communication tools for each task is more important than following the predominant project management style.

However, the selection of tools and techniques to distribute information is influenced by the cost, tool availability, skillset, and type of project (Mnkandla, 2014). The problem arises when stakeholders have a problem accessing the system due to the sudden adoption of technology and the system's capability. Even agile organisations with standard systems and remote people still encounter technical problems such as internal email servers and VPNs overloaded by many people sharing the same platform (Taniguchi & Onosato, 2018). These situations affect the timeliness and accessibility of information that delays the projects, affecting project management success. Therefore, most project management teams in remote working environments use various communication channels to ensure information flow (Muszynska & Marx, 2019).

Effective communication management in a remote working environment is challenging to achieve as it involves human interactions closely related to trust and beliefs and demands a high level of soft skills. Hence, every project manager should prepare a communication plan making information available to all at any time to ensure the smooth run of the project tasks without causing any delay in schedule or cost overrun. Various communication practices have been developed to cope with the challenges in a dispersed team. Muszynska (2015) stresses that theoretical knowledge on communication practices and stakeholder application is not reflected in practices.

H4: Information accessibility has a positive relationship with project management success

2.5 Project Success

A project is a temporary venture undertaken to create a unique product, service, or result that must be completed within a timeframe, budget, and specification (PMI, 2017). It is also often used to achieve an organisational strategic plan. To commence a project, many resources such as human resources, financial resources, technological resources, and natural resources are needed. Therefore, management must monitor and control these resources and manipulate them towards achieving the project goal. The fundamental characteristic of project management is that it has final deliverables that are restricted to a pre-defined schedule and budget. This differs from standard organisational management, which is an ongoing process. A project team is assigned to complete the project objectives in project management. The project team is a group of people with authority within the limit and defined delegation of work who slog in a team to execute the tasks and produce deliverables outlined in the project plan and schedule (PMI, 2017). They are responsible for achieving overall project objectives and deliverables by pitching in the planning and executing stage and performing tasks within expected performance quality to ensure project success. In order to have a mutual understanding of the vision and purpose of the project, frequent and effective communication is essential throughout the project timeline (Phillips, 2020).

Successful project management must achieve multifunctional objectives that are constantly measured against time, performance quality, and money outflow (Pirju, 2018). However, it is often misapprehended to project success. With relevance to their respective titles, project management success is the success of the management to carry through the project within a given scope, budget, and schedule with expected performance quality, while project success is the success of meeting the undertaken project's overall objectives and complete according to its specification and requirements (Radujkovic & Sjekavica, 2017; Frefer, Mahmoud, Haleema & Almamlook, 2018; Taniguchi & Onosato, 2018). Although

different, project management success and project success have mutual relationships. A project's success is measured against many criteria, including project management's success in scheduling, budgeting, and performance quality. Serrador (2015) proved this concept through a legit study of 1,386 projects. The results conveyed that project management success correlates moderately strongly to overall project success. He concluded that the iron triangle is neither the only aspect of project success not it is an aspect that can be ignored. Many researchers have included other dimensions to define project management success in proportion to their respected project field, yet the main dimensions of project management success are time, cost, and quality. Some even try to prove otherwise. For example, in a study to validate the project management success factors conducted by Radujkovic & Sjekavica (2017), they have divided the project management success into long-term goals and short-term goals and stated that a project could be successful under unsuccessful project management because it has achieved higher and long-term goals, and vice-versa.

Project management success encompasses the iron triangle, an amalgamation of cost, time, and quality of a project's three most significant manipulative variables. The fixed variable remains constant in the centre, as it is the main objective. The other three variables are mutually dependent, whereby none can change without affecting one or both of the remaining variables. Although these variables are interchangeable, the concept applied is the same. The iron triangle is also known as the triple constraint theory because of the constraints that the changes in any one variable will affect the others. For example, if there is an increase in scope during the project, the time and cost will increase. If the cost remains the same, the performance quality is likely to get affected due to the necessity to cut costs. Likewise, if the time is shortened while the scope remains constant, the cost will likely increase and affect the quality performance.

2.6 Theoretical Exposition

Successful project management must achieve multifunctional objectives that are constantly measured against time, performance quality, and money outflow (Pirju, 2018). Thus, Triple Triangle Constraint theory informs the dependent variable in this study. It amalgamates the three most significant manipulative variables in a project, cost, time, and quality. Any changes in one of the constraints will affect the others. Since time, cost and scope are interrelated, a delay in time management can cause cost overrun and impose quality issues on the project. This theory helps to indicate stakeholders on schedule, scope or budget creep and facilitates project managers to identify possible remedies to solve related issues. A project management success is a success of the management to carry through the project within a given scope, budget, and schedule with expected performance quality. This thus validates that the project management success is bounded by Triple Theory Constraint theory (Baccarini, 2004; Mishra, Dangayach & Mittal, 2011; Ofori, 2013; Barnard, Fletcher & Steyn, 2017).

Over the years, many others have applied and augmented the theory and have continued to evolve as a significant factor within management. The theory did not appear in the initial books of the PMBOK but now contains three separate knowledge areas directly related to the factors of the Triple Constraint. However, many researchers, practitioners and scholars believe that the Triple Constraint is outdated and inadequate for current project management's modus operandi (Baratta, 2006; Wyngaard, Pretorius & Pretorius, 2012). Therefore, they introduced many variations of the triple constraint method. One of the latest concepts is the Project Management Double Triangle. In addition to scope, budget, time, and quality. The idea is to provide clients and teams with satisfaction. Thus, the project manager is not only responsible for time, cost, scope and quality management, but also the human resource, risk and procurement management (Radujkovic & Sjekavica, 2017). The figure below provides the visualisation of the double triangle.

3. Methodology

The research design and approach selected or found appropriate for this study is deductive approach, explanatory and cross-sectional research design which uses quantitative research method by conducting a survey. The questionnaire is easy and quick, inexpensive, and provides valid prevalence estimates for risk factors and outcomes (Musa & Ezeobi, 2015). The target population has to have detailed knowledge of projects and occupy key positions of responsibility within a project environment where communication is vital for them in leading the project towards success. Therefore, the unit of analysis is narrowed down to the project manager, team leader, or team member. The RACI matrix was used as guidance in selecting the sampling frame. The RACI matrix is a responsibility assignment chart that maps out every task, milestone involved in completing a project and assigns which roles are responsible for each deliverable, which personnel is accountable, and who needs to be consulted or informed (Kantor, 2018). However, this is limited to stakeholders working in a remote working environment during the pandemic. Even though the remote working environment is still new in Malaysia, all business leaders and human resources are fully empowered to work from a remote working environment. Some have been in practice even before the pandemic. In such circumstances, this study took participants from any business field that played a role in the project by working from a remote working environment.

The sample needs to be of an adequate size to avoid sampling errors. The formula applied in determining the sample size has no upshot on how well the sample is likely to delineate the population. Applying the Morgan and Wilson Van Voorhis formula in this study, the rule of thumb suggests that the formula: $N > 50 + 8m$, where N equals the number of respondents and *m* is the number of independent variables. Based on this equation, this study would need more than 82 respondents. However, most researchers or statisticians would agree that a minimum sample size of 100 is needed to generate meaningful results. A good sample size is typically 10% of the population if it does not exceed 1000 (Bullen, 2014). In this study, remotely working project members are in hundreds of thousands. Therefore, 10% of the population reaches the maximum sample of 1000. Considering the study's time, cost constraints, and previous studies on a similar topic (Taherdoost, 2016; Muszynska & Marx, 2019), targeting 200 respondents has been made with approximately 7.5% of the margin error by using the table below.

	Size of population					
Margin of error	>5000	5000	2500	1000	500	200
±10%	96	94	93	88	81	65
±7.5%	171	165	160	146	127	92
±5%	384	357	333	278	217	132
±3%	1067	880	748	516	341	169

Source: *(Bullen, 2014)*

The questionnaire is distributed using online communication applications such as WhatsApp, WeChat, Instagram, Facebook and IMO. The social media platform is a vast platform that provides easy access to participants, and it is private. These participants can access the questionnaire via a google link as long as there is an Internet connection. Once a response is submitted, it is automatically updated in the system. The analysis was conducted

through Smart-PLS. The measurement model was assessed using Cronbach's Alpha, Composite Reliability, Average Variance Extracted (AVE), Cross Loading and Fornell-Larcker Criterion. The structural model was evaluated by the t-value, coefficient of determination, f^2 value and p-value.

4. Results

Since Movement Control Order (MCO) was implemented in Malaysia, many organisations have switched to remote working environments. Hence, the questionnaire was distributed via social media because it would be more convenient to reach the participants. Responses were collected from project managers, team leaders and team members of projects from many business types. Regarding the number of respondents, there were 348 collected responses; however, only 221 responses were considered valid as they passed the controlled questions about their involvement in a project and if they worked on it from a remote working environment. Once the reliability and validity of the questionnaire were confirmed through the pre-test, the full test involving all the collected data from the 221 responses were performed using Smart Pls software. The demographic profile of the collected data for the study is presented in Table 1 below.

Table 1: *Demographic Profile of Respondents*

Demographic Characteristics	Frequency	Percentage (%)
Gender		
Male	112	50.7
Female	109	49.3
Age		
20 – 25 years old	4	1.8
26 – 44 years old	183	82.8
45 – 56 years old	31	14
57 years old and above	3	1.4
Position		
Project Manager	73	33
Team Leader	72	32.6
Team Member	76	34.4
Working Experience		
Less than 5 years	39	17.6
6 to 14 years	113	51.1
15 to 26 years	60	27.1
27 years and above	9	4.1
Business Type		
Manufacturing	44	19.9
Engineering	40	18.1
Oil and Gas	38	17.2
Oil and Gas	36	16.3
Event Organizers	20	9
Others	43	19.5

The frequency shows an almost equal number of male and female respondents where males contributed 50.7% and females 49.7% towards the study. The majority of the respondents are from the age group of 26 to 44 years old, with a frequency of 183, amounting to 82.8% of the total respondents. The response turned up to have well-distributed respondents

from the project manager, team leader and team member with small differences in the frequency. Moreover, 51.1% of respondents have 6 to 14 years of working experience, while nine respondents have working experience of more than 27 years. This satisfies the population of the research. The various work industry of the respondents strengthens the research as the aim of the research is to generally determine the impact of the accurate, precise, timely and accessible information under effective communication management in a remote working environment on project management success.

The Smart PLS measurement model results, which included Factor Loading, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted, are presented in Table 2. The reliability of individual items was represented by factor loadings, and the rule of thumb was that loadings should be 0.70 or higher. However, factor loadings revealed that just one item fell below the threshold: IA3. This item was re-evaluated and deleted from the scale to increase the composite reliability and AVE (see Figure 1 and Table 2). The value of CR ranged from 0.865 to 0.925, whereas the CB alpha ranged from 0.805 to 0.924. The values of both tests were well above the threshold value of 0.70, as recommended by Nunnally and Bernstein (1994). All of the constructs (measurement models) were found to be dependable. Confirmatory factor analysis CFA assessed two-dimensional validity (convergent and discriminant). The average variance extracted (AVE) values were utilised to examine the constructs' convergent validity.

Table 2: *Result of Measurement Model*

Construct Category	Research construct	Factor Loading	Cronbach's Alpha	Composite Reliability	AVE Value
Information Accuracy	IA1	0.702			
	IA2	0.719	0.805	0.865	0.562
	IA3	0.783			
	IA4	0.771			
	IA5	0.770			
Information Clarity	IC1	0.718			
	IC2	0.785			
	IC3	0.826	0.872	0.908	0.664
	IC4	0.880			
	IC5	0.854			
Information Timeliness	IT1	0.821			
	IT2	0.795	0.875	0.909	0.666
	IT3	0.835			
	IT4	0.818			
	IT5	0.813			
Information Accessibility	INA1	0.804			
	INA2	0.858	0.863	0.907	0.700
	INA4	0.850			
	INA5	0.854			
Project Management	PMS1	0.881			
	PMS1	0.909	0.924	0.925	0.814
	PMS3	0.902			
	PMS4	0.917			

The values of AVE ranged from 0.562 to 0. 814, as shown in Table 2. These numbers were far higher than the required criterion of 0.50, indicating that all constructions were legitimate. Discriminant validity was assessed using the Fornell–Larcker criteria (Fornell and Larcker, 1994). This necessitated using inter-construct correlation to compare the square rooted values of AVE. All of the square rooted values of AVE are higher than the equivalent inter-construct correlations, as seen in Table 3. It means that all constructs have enough discriminant validity to be useful (see Table 3).

Table 3: *Fornell-Larcker Criterion for discriminant validity*

	INA	IC	IA	IT	PMS
Information Accessibility	**0.842**				
Information Clarity	0.624	**0.815**			
Information Accuracy	0.560	0.693	**0.750**		
Information Timeliness	0.722	0.752	0.627	**0.816**	
Project Success	0.638	0.655	0.631	0.640	**0.902**

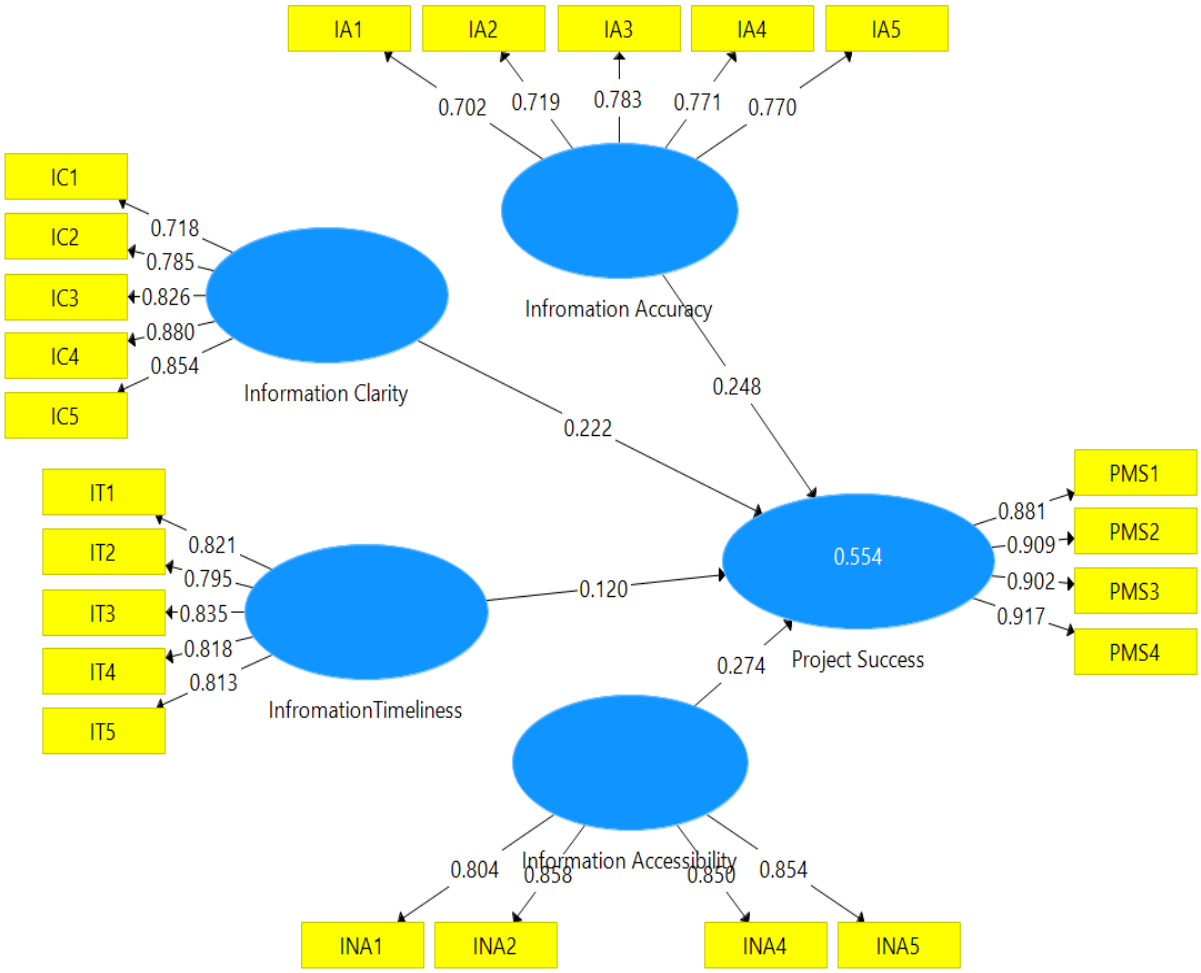

Figure 1- *Graphic of the Measurement Model*

The results of path analysis are exhibited in Table 4. The first IV, information accessibility (INA), directly impacts project success (β = 0.274, t = 2.846). The second IV, information clarity (IC) has a significant and direct impact on project success (β = 0.222, t = 2.195). The third IV, information accuracy (IA), has a significant and direct impact on project success (β = 0.248, t = 3.561). At the same time, the fourth IV, information timeliness (IT) has no significant and direct impact on project success (β = 0.120, t = 1.481).

Table 4: *Hypotheses Testing*

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Information Accessibility -> Project Success	0.274	0.265	0.096	2.846	**0.005**
Information Clarity -> Project Success	0.222	0.216	0.101	2.195	**0.029**
Infromation Accuracy -> Project Success	0.248	0.259	0.070	3.561	**0.000**
Information Timeliness -> Project Success	0.120	0.127	0.081	1.481	**0.139**

The value of R-square for the whole model is 0.554 for the sample. The value of R-square for the model shows a "substantial" effect. Furthermore, a q-square value greater than zero, which is 0.438, shows the model's high predictive relevance.

5. Discussion

By integrating theoretical foundations from Triple Triangle Constraint theory, a framework was conceptualised connecting INA, IC, IT and IA and PMS. The developed model was empirically tested across a sample of 221 project management firms. The study findings reveal that valuable communication management can significantly improve a firm's project success rate. The findings support three hypothesised relationships and shed light on an important and relatively new context for the remote working environment on project management success. The findings support empirical results showing a significant impact of INA, IC and IA on firms' project success. However, IT did not support the findings. Jobs at the location are currently confined to a few persons because of the pandemic. Communication among remote workers may be delayed as a result of this condition. Outside of typical face-to-face meetings, team members may be preoccupied with other responsibilities, making timely information distribution unlikely. Untimely information transmission can be caused by various factors, including difficulty in information generation, unexpected job needs, inadequate planning, or bad work habits. According to Guenter, Emmerik, and Schreurs (2014), delays in information sharing have significant detrimental repercussions.

Information timeliness is crucial in stakeholder communication concerning obtaining feedback from customers or users. A timely communication process allows the project team to make the best decisions on the project without causing any further delay. Despite its importance, information timeliness negatively affects project management success. Theoretically, project management success concerns the cost, quality and time to complete the project as required. Zulch (2014) mentions that communication is the area that integrates the scope, time and cost to achieve a quality project. It is an effective constituent that brings the areas together. In this study, timeliness is regarded as the timely feedback upon receiving the message. Feedback was not given importance under the sudden shift towards the remote working environment due to most communication is being made via video teleconference. This scenario is similar to the traditional office meetings, only that it is conducted using cloud communication tools where the discussion will be carried out verbally, and decisions will be made upon accurate and precise information. Hence, correct and timely information flow will produce an effective project team (Imran, Shazia, Kashif, 2011), indirectly enhancing project management success. This validates that information timeliness is a practical element required in creating an uninterrupted flow of information to retain good communication, thus negatively affecting project management success.

Similarly, Rajhans (2018) confirms that one of the most common miscommunication challenges in managing stakeholder relationships is information delay, impacting project management success. The significance of this study is to determine the impact of effective communication management in a remote working environment experienced during the pandemic on project management success. Hence, four dimensions of effective communication management: information accuracy, information clarity, information timeliness, and information accessibility, are used to investigate the impact of effective communication management in remote working environments on project management success.

The findings of this study have established that project management success for remotely managed projects depends on effective communication management, which is INA, IC and IA. This means that establishing proper communication access and adequate information flow in a project handled from a remote working environment can help ensure project management success. This finding is consistent with the results of (Imran, Shazia, & Kashif, 2011), who revealed that stakeholder communication is one of the significant determinants of project management success. Effective communication is an ongoing and interrelated process; thus, managing it to function successfully is integral to good project management (Suleiman & Main Naser, 2013).

The findings from PLS-SEM also revealed that effective communication between stakeholders within a remote working environment helps accomplish the project within the scope, time, and budget. The flow of accurate, clear and timely information in a structured manner makes the project team efficient, positively affecting the project's outcome. Zulch (2014) found that electronic communication is the most effective communication method used in projects management, which during the pandemic was the only mode of communication in remote working environments. Thus, communication effectiveness using cloud communication tools is vital for project management, especially in areas where time, quality, and cost are concerned. Without proper communication management, the decision making regarding the time will impact the cost, which will affect the project quality. The correct information sends to the right person at the right time via a suitable medium will aid the stakeholders in making the right decisions.

Likewise, effectively managed communication between stakeholders will increase understanding and help boost work performance, which leads to project success. As cited by Asazu & Babatunde (2020) in their study, lack of effective communication management impedes productive team performance. Similarly, (Muszynska, 2015) has also emphasised the importance of effective communication management in virtual teams, whereby project management outcomes maybe be at risk if project teams are not in mutual understanding. With these findings, it can be concluded that every project team need to manage their communication effectively where information is conveyed accurately and clearly in a timely basis with full access to transfer and retrieve information. This is to prevent disruption in the information flow to accomplish project management success.

6. Implications

6.1 Theoretical Implications and Contributions

This research has studied the impact of effective communication management in a remote working environment on project management success. One of the theoretical contributions of this research is the tested relationships of the dimensions of effective communication management, which in this study are information accuracy, information clarity,

information timeliness and information accessibility, with the main dimensions of project management success that is time, cost and quality. The data collected from diverse project backgrounds shows that project management success involves cost, time and quality, where effective communication management in the remote working environment plays a significant role in decision making. The right message to the right person at the right time does help in decision making, which positively affects the iron triangle. This study agrees with Serrador & Turner (2015) and his 1,386 project research results. Indeed, the iron triangle is one of the significant aspects contributing to project management success.

The pandemic has caused many organisations to adopt remote working environments on a different connotation. Since it is considered a new approach to working, very little research on the relationship between communication in a remote working environment and project management success. Therefore, this research will benefit many academicians and researchers interested in similar or further research related to this study. This study's reliability and validity test results prove that the research instrument used in this study is worthy for further analysis. Besides that, the obtained results indicated that the independent variables are significant contributors to project management success. Consequently, this improves the impact on project management success when communicating from a remote working environment. Overall, the study helps deepen the knowledge in effective communication management in this sudden adaptation of remote working environment and its significance in project management success.

6.2 Practical Implications and Contributions

This research has studied the impact of effective communication management in a remote working environment on project management success. The results have encouraged and validated that the dimensions of effective communication management used in this research significantly impact project management success. The study may currently prove beneficial for many organisations and might continue to opt for a remote working environment or the latest term given 'work from home. Effective communication management will play a significant role in such an environment. For instance, the study can instigate organisations to assess their cloud communication tools used, assist in implementing dimensions of effective communication management and help to mitigate current and future communication management problems that are hindering project management success. With accurate, precise, timely and accessible communication practices installed, organisations can increase their overall communication management effectiveness and project management success.

Moreover, the study may immensely benefit the project managers as they head the project and lead the stakeholders towards accomplishing the task according to the triple constraint. From the results of this study, project managers might find the dimensions of effective communication management used in this study as significant factors in achieving project management success. By accessing the team's communication pattern, misunderstanding among stakeholders can be avoided, the gap of information communication can be minimised, and correct decisions based on accurate, clear and timely information. Moreover, in an internationally diverse team, the project manager can use this research to establish a proper communication channel using cloud communication tools that are appropriate and feasible for the project, which covers all the dimensions of effective communication management used in this study.

Additionally, software developers can also hugely benefit from this study. Many cloud communication tools were launched during the pandemic. This sudden bloom of communication software created an awful customer experience and contributed to the many miscommunication and delays, which might have led to project risks. Thus, it is best for

software developers to study the crucial dimensions for project management success as provided in the study and develop their software or provide upgrades accordingly. Overall, the study will be helpful to those directly and indirectly related to project management.

6.3 Social Implications and Contributions

This study is inspired by the fact that communication is vital to keep stakeholders informed on the project progress and identify issues, risks, miscommunication, and other related challenges that affect project time, budget, and quality performance. The presented research results offer some guidance for society, regrading effective communication management in a remote working environment. Firstly, communication is a basic skill that is applied in daily life. This study may help build interpersonal communication skills by conveying accurate, clear and timely information. As a result, society can avoid miscommunication from a household or politics on a bigger scale. In politics, when the public can have access to information, the trust towards the politician will be indirectly cultivated.

Secondly, this research's effective communication management may help reduce stress and workload tension. Since the pandemic has been enforced, and many people are put under stress fearing the unknown state of their health and future. In addition, the work continues in the new setting of the remote working environment. With multiple changes happening, one can quickly go under stress. According to a survey by Ipsos, Malaysians reported the highest anxiety levels among other 28 countries.

Similarly, a study found high percentages of reported depression at 59.2%, anxiety at 55.1%, and stress at 30.6% (Wong, et al., 2021). Hence, the onus is on the project management team to help their stakeholders to get acquainted with the remote working environment. By practising effective communication management, the workload and stress in work can be reduced. Many researchers have proved that miscommunication leads to mistrust and stress. The four independent variables studied in this research proved to contribute to project management success significantly. Therefore, by emphasising the delivery of accurate, clear, timely and accessible information, there are high chances to avoid misunderstanding and help employees to work efficiently.

7.0 Limitation, recommendation for future works and conclusion

Even though the study is found to be substantial, some limitations need to be addressed. Limitations occur in almost all research, and these limitations need to be acknowledged. There are two limitations identified in this study. The first is in the responses proclaimed by the respondents. Respondents might answer the questionnaire from a personal perspective as a sender or recipient, which can produce partial data. An analysis of communication records such as emails, logs, messages, documents, communication networks or in-depth interviews would provide unbiased data. However, these methods are very challenging and consume much time. Thus, its usage should depend on the type of hindrance faced in effective communication management in a project that affects the project management's success.

The second limitation is in the use of convenience sampling. This study used this method because it covers a wide range of the population. Based on the study, 82.8% of the total respondents are 26 to 44 years old. People belonging to this age group are more technology-savvy than other age groups. Consequently, cloud communication tools for this age group might not influence the accuracy, clarity, timeliness and accessibility of the information sent and received under the remote working environment. As the sample was not the finest, the final

results could have been affected. Nevertheless, adopting the probability sampling method might help overcome this weakness.

Based on the findings of this study, some recommendations for future research can be made. A few suggestions can be made about the data collection conducted in this study. Firstly, only a small number of responses could be collected in this study due to the restriction of time and the implementation of new rules concerning the pandemic. If future researchers could conduct the study on a larger scale, they would be able to generalise the results and provide more significant contributions theoretically and practically. Secondly, to enhance the credibility of the sample, more or equal amounts of responses should be collected from all groups of ages. Although this study was not constructed to test the effects of the particular dimension, they might exert a certain amount of impact on the study outcomes as aforementioned. Thirdly, similar to the survey done by Muszynska (2018), future researchers can apply qualitative and quantitative methods for their research as long as time permits them. Kumar (2019) have stated that the mixed method can enhance accuracy and provide meaningful conclusions.

Furthermore, some suggestions can be made based on the study results. The results yielded from the Multiple Linear Regression analysis indicates that the independent variables explored in this study only explains 53.7% of the variability in the project management success. The remaining 46.3% of the variation is caused by other factors, which may be significant in describing the outcome of project management success. Future research can study the possible variables. Moreover, in a project environment, project managers must facilitate the collaboration of work between stakeholders from a geographically dispersed team. ICT adoption is crucial in project management, especially in remote working environments. Since the e-work has become the promising future of work-life, it is best to study the suitability of ICT adoption depending on the nature of the project. Overall, future researchers interested in project management can explore the possible factors that may influence project management success.

Additionally, since the dimensions of effective communication management explored in this study impose positive significance on project management success, future researchers can enrich this study by studying the moderator and mediator variables. A moderator is used to test the relationship between the independent and dependent variables. An example of a moderator used in this study is the ICT adoption. Ahuja (2007) has found that ICT adoption for communicating information positively affects project management processes. A mediator is used to explain the process between an independent variable and a dependent variable, which affects the strength and direction of the relationship. From this study, a possible mediator is a work-life balance. In a typical project-based work, stakeholders are often busy communicating and solving problems to ensure the project is a success. However, some studies have positive outcomes from the work-life balance, as found by Faust & Foglio (2020) and Felstead & Henseke (2017). Hence, it is highly recommended to explore further the possible moderators and mediators relevant to this research and study their relationships.

Effective communication management in a remote working environment is one of the key project management areas which is the most difficult to control and execute. It involves many aspects, various communication tools and methods and is highly reliant on the human factor. The remote working environment identified in the literature exists in many inter-organisational and international projects mainly related to IT. Unfortunately, it took a calamity like the current Covid-19 pandemic for its global acknowledgement and adoption in all project-based organisations. English (2017) has mentioned the upside of remote working in a project,

that with the aid of technology, organisations can recruit experts in the field from across the borders of the world, as nowadays, physical presence in the workplace is not required. Though it may sound encouraging, the process has many challenges incorporated, especially in effective communication management.

This study intended to determine the impact of effective communication management in a remote working environment on project management success. The dimensions explored in this study is proven to be valid and legitimate factors in determining project management success. The findings significantly contribute to current knowledge, understanding, and practices in project management. Project management success is the fundamental goal for almost all organisations, project managers, clients and users. Therefore, it is imperative to adopt the right technology and practices that ensures continuous flow of accurate, precise, timely and accessible information. In conclusion, effective communication management in a remote working environment is significant in achieving project management success.

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References

Ahuja, V. (2007). IT Enhanced Communication Protocols for Building Project Management by Small and Medium Enterprises in The Indian Construction Industry. Queensland: Queensland University of Technology.

Arop, Obun, F., Owan, Joseph, V., & Akan, M. E. (2018). Effective Communication Management and The Performanceof Tertiary Instituitions in Cross River State, Nigeria. International Journal of Current Research, Vol 10, Issue 07, pp72019-72023.

Azasu, S., & Babatunde, Y. (2020). Office space and remote working in the age of COVID-19. Journal of Property Management, 34 & 35.

Baccarini, D., & Collins, A. (2004, September). Project Success - A survey. Retrieved from Research Gate: https://www.researchgate.net/publication/292013545

Baratta, A. (2006). The triple constraint: a triple illusion. Global Congress 2006. Seattle: Project Management Institute.

Blackstone, J. (26 April, 2010). Theory of Constraints. Retrieved from Scholarpedia: www.scholarpedia.org

Bullen, P. B. (2014). How to choose a sample size (for the statistically challenged). Retrieved from tool4dev: http://www.tool4dev.com

English, P. (2017). An Investigation into Remote Leadership and Effectiveness of Technology in Leading Employees in Virtual Teams. Ireland: National College of Ireland.

Felstead, A., & Henseke, G. (2017, March). Assessing the growth of remote working and its consequences for effort, well-being and work-life balance. New Technology, Work and Employment, 195-212.

Fornell, C. and Larcker, D.F. (1994), "Evaluating structural equation models with unobservable variables and measurement error", Journal of Marketing Research, Vol. 18, pp. 29-50.

Frefer A. A., Mahmoud, M., Haleema, H. & Almamlook, R. (2018). Overview Success Criteria and Critical Success Factors in Project. Industrial Engineering & Management, 1-6.

Guenter, H., van Emmerik, I. H., & Schreurs, B. (2014). he negative effects of delays in information exchange: Looking at workplace relationships from an affective events perspective. Human Resource Management Review, 283–298.

Imran, N., Shazia, A., & Kashif, R. (2011). The impact of stakeholder communication on project. African Journal of Business Management, Vol. 5, No. 14, pp5824-5832.

Ismail, A. R., & Yaser, G. (2019). Assessment of Cause and Effect Factors of Poor Communication in Construction Industry. OIP Conf. Series: Materials Science and Engineering (pp. 1-8). Johor: IOP Publishing.

Kantor, B. (2018, January 31). CIO. Retrieved from The RACI matrix: Your blueprint for project success: http://www.cio.com

Karthirgugan, K. (2020, August 13). Rise Of Remote Work And Digital Nomads In Age Of Covid-19.

Kaur, K. (10 June, 2020). Survey:69% Of Malaysians Workers, 56% Employers Wants Work From Home To Continue.

Kumar, R. (2019). Research Methodology: A Step-by-Step Guide for Beginners, 5th edition. SAGE Publications Ltd.

MDEC, M. D. (2020). Special Working Arrangement for MDEC Employees Following Announcement by YAB Prime Minister of Mlaaysia to Address Covid-19 Threat. Cyberjaya: Malaysian Digital Economy Corporation (MDEC).

Mishra, P., Dangayach, G. S., & Mittal, M. L. (2011). An Empirical Study on Identification of Critical Success Factors in Project Based Organisations. Global Business and Management Research, 356 - 868.

Mnkandla, E. (2014). A review of Communication Tools and Techniques for. The African Journal of Information Systems, Vol 6, Issue 1 pg 1-8.

Musa, A. Z., & Ezeobi, P. M. (2015). Statistical Issues in Research 1: Overview of Epidemiologocal Study Design. Nigerian Journal of Clinical and Biomedical Research, Vol 7, No. 5, pp 27-33.

Muszynska, K. (2015). Communication Management In Project Teams-Practices And Patterns., (pp. 1359-1366). Poland.

Muszynska, K. (2018). A concept for measuring effectiveness of communication. Journal of Economics and Management, Vol 33 pg 63-79.

Muszynska, K., & Marx, S. (2019). Communication management practices in international projects in. Procedia Computer Science (pp. 329-336). Poland: Elsevier BV.

Nunnally, J.C. and Bernstein, I.H. (1994), "The assessment of reliability", Psychometric Theory, Vol. 3, pp. 248-292.

Nunnally, J. C. and Bernstein, I.H. (1994). The Assessment of Reliability. . Psychometric Theory, 248-292.

Ofori, D. F. (2013). Project Management Practices and Critical Success Factors–A. International Journal of Business and Management, Vol 8, No 21, pg 14-30.

Phillips, S. (2020). Working Through The Pandemic: Accelerating The Transition To remote working. Business Information Review, 1-6.

Pirju, I. S. (2018). The Importance on Communication. Acta Universitatis Danubius, Vol. 12, No. 2, pp 152-161.

PMI. (2017). A Guide to The Project Management Body of Knowledge, 6th Edition. Pennsylvania: Project Management Institute Inc.

Radujkovic, M., & Sjekavica, M. (2017). Project Management Success Factors. (pp. 607 - 615). Primosten, Crotia: Elsevier Ltd.

Rahman, H., Nouman, S., & Ammar, R. (2018). Project Success in the Eyes of Project Management Information System and Project Team. Abasyn Journal of Social Sciences, pp1-8.

Rajhans, K. (2018). Effective Communication Management: A key to Stakeholder Relationship Management in Project-Based Organization. The IUP Journal of Soft Skills, Vol XII, No.4, 47 - 66.

Rehman, Imran, H. N., & Shazia, A. (2011). The Impact Of Stakeholder Communication On Project Outcome. African Journal Of Business Management Vol.5 (14), 5824-5832.

Serrador, P. & Turner, R. (2015). The Relationship Between Project Success and Project Efficiency. Project Management Journal.

Shakeria, H. & Khalilzadeh, M. (2020). Analysis of factors affecting project communications with a hybrid DEMATEL-ISM approach (A case study in Iran). Heliyon, 1-18.

Suleiman, A., & Main Naser, A. (2013). he role of Time, Communication and Cost Management on Project Management Success: Study on Sample of Customers Construction Projects in Mecca City of Saudi Arabia. International Journal of Information and Coding Theory, 75-111.

Taherdoost, H. (2016). How to Design and Create an Effective. International Journal of Academic Research in Management (IJARM), Vo.l 5, No.4, pp 37-41.

Taniguchi, A., & Onosato, M. (2018). Effect of Continuous Improvement on the Reporting Quality of Project Management Information System for Project Management Success. International Journal of Information Technology and Computer Science, Vol 1, pp1-15.

Valet, V. (12 March, 2020). Forbes. Retrieved from www.forbes.com: https://www.forbes.com/sites/vickyvalet/2020/03/12/working-from-home-during-the-coronavirus-pandemic-what-you-need-to-know/?sh=4c8e07bf1421

Wyngaard, J. V., Pretorius, J. C., & Pretorius, L. (2012). Theory of the triple constraint — A conceptual review. 2012 IEEE International Conference on Industrial Engineering and Engineering Management (pp. 1991-1997). South Africa: Research Gate.

Wong, L., Alias, H., Md Fuzi, A., Omar, I., Mohamad Nor, A., Tan, M., & al, e. (25 March, 2021). Escalating progression of mental health disorders during the COVID-19 pandemic: Evidence from a nationwide survey. Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur, Malaysia.

Zulch, B. G. (2014). Communication:The Foundation of Project Management. (pp. 1000-1009). South Africa: Elsevier Ltd.