



Research Article

How do Project Management Resources Contribute to Project Success? An Empirical Study of Sri Lankan Non-Governmental Organizations

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Abstract

Recent studies focus more on understanding and identifying Project Management (PM) resources in the project implementing organisations. The literature underlines the importance of PM resources for improving project performance and supporting projects operating in an uncertain and complex environment. However, the empirical studies on Non-Governmental Organisations (NGOs) are lacking to reveal. This study aims to develop a structural model to see the contribution of PM Resources to project success. In a quantitative survey method, the structured questionnaire is used to collect the data which obtained 447 responses. A Structural Equation Modelling (SEM) technique has been applied to develop the valid model. The setting for this study is Sri Lanka, a country recovering from civil war, natural disasters and economic turmoil and there have been several development projects have been underway by NGOs. Survey study findings confirmed that the three levels of PM resources, team, organisational and collaborative social have significant impacts on overall project success: PM success, project success and NGO success. These findings were used to develop an integrated conceptual model for PM resources and project success in NGOs. Overall, the model provides an academic contribution as a limited amount of research has been made on PM resources and project success from the NGO perspective. Further, it provides practical implications for NGO management to understand and build PM resources to improve successful project delivery by NGOs.

Keywords: NGOs, PM Resources, Project Success, Structural Equation Model.

Introduction

Non-governmental organisations (NGOs) are generally considered to be non-state, non-profit-oriented groups that function in the public interest (World Bank, 2001). NGOs are particularly active in developing countries where they play prominent roles in development activities and vulnerability reduction (Jayathilaka, 2021; United Nations Development Programme (UNDP), 2014). Currently, NGOs are deployed to mitigate challenges resulting from turbulence in the natural, economic and social environment (UNDP, 2014). To match these challenges, NGOs must develop and deliver increasingly complex projects. To facilitate the capability of NGOs' projects to succeed, PM has emerged as a key strand of NGOs' organisational resource development because NGOs' activities are project-based as they are meant to be temporary interventions to meet immediate community needs with additional temporary activities to build internal resource in the community to meet future demands (Ika, 2012).

PM effectively supports research, intervention design, planning, resource management, delivery and evaluation (Ashill et al., 2020; Ika et al., 2010). Improvements in how NGOs deliver projects will enable them to meet their stakeholders' needs and stated objectives effectively, such as quality specifications, budget and time schedules and improving specific conditions in the community. However, project implementation needs to be improved, as NGO projects have a high failure rate (Dedu et al., 2011; Ika et al., 2012; Nanthagopan et al., 2021; Shleifer, 2009). Especially in Sri Lanka, the high turbulence in the political and economic environment requires NGOs to plan at a high pace to rebuild the communities. Therefore, developing PM

resources capacity will enhance the project delivery of NGOs.

In NGOs, there is a need to understand how PM resources contribute to project success. Previous research identified the nature of PM resources, critical PM Resources and PM success levels in NGOs (Nanthagopan et al., 2016; 2019; Nanthagopan et al., 2021). However, paucity of studies revealed the contribution of PM resources to project success by NGOs (Ika, 2012; Nanthagopan et al., 2021). Therefore, this study aims to reveal PM resources' contribution to project success. It should be noted that the Sri Lankan context in which the study was carried out has several distinctive features, for example, an economic and political crisis and a history of civil conflict that may have significant application in other settings around the world. Development where similar instances of civil unrest have occurred, for example, in countries such as South Sudan, Rwanda, East Timor and Liberia (Mehta, 2022; Sorensen, 1998; UNDP, 2011).

The rest of this paper is structured as follows. The second section reviews the literature on PM resource types, PM resource levels, and project success. The third section explains the research methods of the study. The fourth section is the data analysis that applies structural equation modelling to show the association between PM resources and project success. Finally, the fifth section critically discusses the study findings in comparison with the literature, followed by a conclusion and implications in the last section.

Literature Review

PM Resources Types

PM is a set of processes applied to a project to deliver a unique output (Carnes et al., 2017; PMI, 2017). As processes, they do not have physical characteristics as other organisational resources such as machinery and buildings. Instead, these processes are based on intangible knowledge assets; explicit (codified) and tacit knowledge assets (DeFillippi et al., 1998; Fernie et al., 2003), also called 'know-what' (codified) and 'know-how' (tacit) (Nonaka, 1994). In practice, all knowledge is a mixture of tacit and explicit elements, and these designations should be perceived as a range spectrum rather than as definitive positions (Crossan et al., 1999; Nonaka et al., 1995). However, to understand knowledge and knowledge-based resources, it is essential to understand the nature of each type (Botha et al., 2008).

Figure 1 illustrates PM resource types. Explicit knowledge is codified (Hirai et al., 2007), and is relatively easy to identify (Brown and Duguid, 1998), store, and retrieve (Wellman, 2009). This is the type of knowledge managed by formal organisational systems as it exists in the form of documents and texts stored in physical and virtual databases (Botha et al., 2008). In project management, explicit knowledge resources form standards, methodologies and procedures (Jugdev et al., 2011; Nanthagopan et al., 2016).

Tacit knowledge is context-specific and hard to formalise or record as documents and generally in the heads of individuals and teams (Gutpa, 2011). Tacit knowledge is transferred only by direct human contact, typically through face-to-face discussions

(Hirai et al., 2007) and is based on interaction and involvement (Nonaka, 1994). Tacit knowledge is valuable (Wellman, 2009) as it supports innovation in organisations (Gamble and Blackwell, 2001) and can be divided into technical and cognitive dimensions.

The technical dimension covers informal personal skills and crafts, called 'know-how'. The cognitive dimension involves beliefs, ideals, values, and mental models (Botha et al., 2008). In project management, tacit knowledge resources take the form of team PM skills, knowledge-sharing activities and lesson-learning sessions (Jugdev et al., 2011). Drucker (1993) highlights that effective acquisition and applications of knowledge resources contribute highly to organisations' high performance and competitive advantage.

Most PM literature has focused on codified knowledge assets (Nanthagopan and Nigel, 2021; Ulri and Ulri, 2000). Research has also focused on how these assets are developed and shared through communities of practice (Lesser and Storck, 2001). In addition, an emerging research stream examines tacit PM resources (Mathur et al., 2007). The following section reviews existing work on PM resources in organisations.

Levels of PM Resources

The previous section examined the types of PM resources. This section examines existing work on PM resources. Nanthagopan et al. (2016) identified three levels of PM resources: Team Resources, Organisational Resources and collaborative social resources. Figure 2 illustrates levels of PM resources.

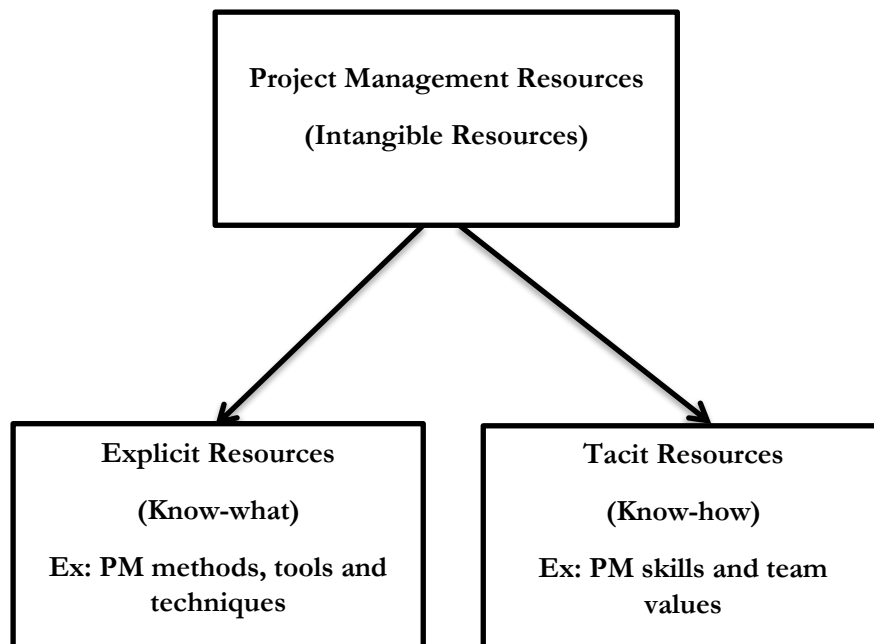


Figure 1: Types of Project Management Resources

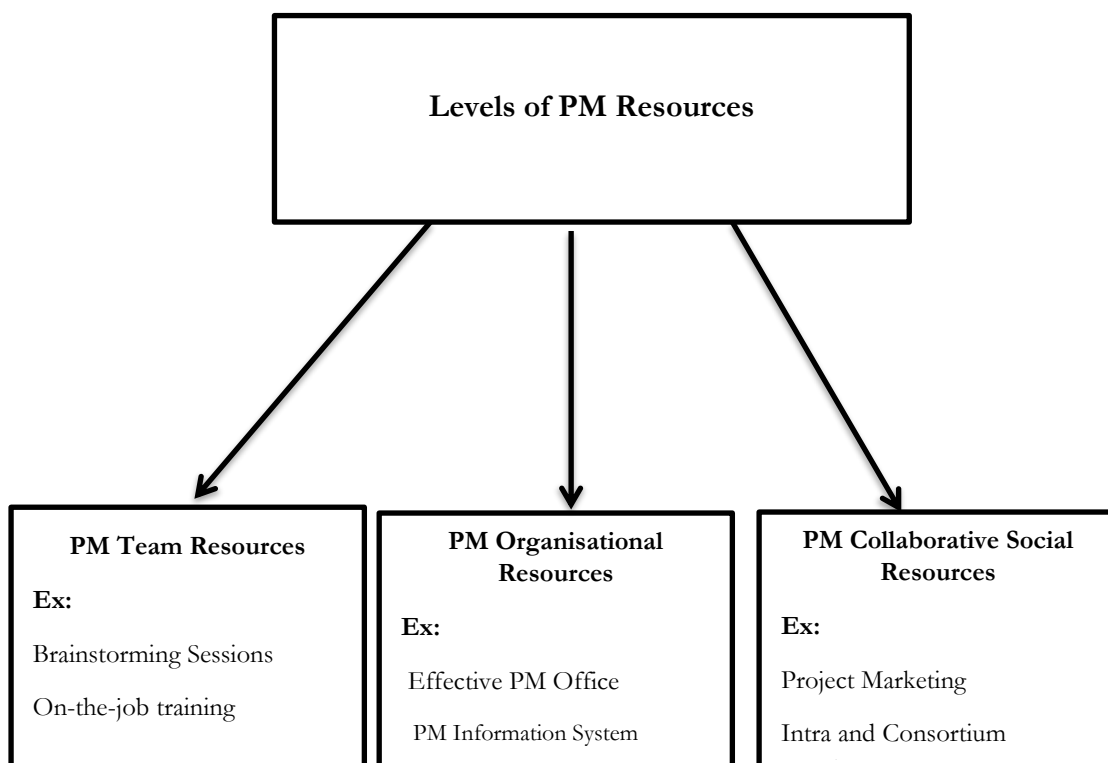


Figure 2: Levels of PM Resources

PM Team Resources

PM team resources are defined as explicit (codified) or tacit elements within teams (Jugdev and Mathur, 2006a). Explicit PM team resources consist of codified knowledge assets, for example, professional certifications and written documents of PM practices (Mathur et al., 2007). Tacit PM team resources consist of items based on informal sharing of knowledge, including casual conversations, mentoring, stories, brainstorming, and shadowing; those address how participants exchange tacit knowledge (Jugdev and Mathur, 2006a). In PM, team resources have been associated with the on-time completion of projects (Muriithi and Crawford, 2003). Nanthagopan et al. (2021) findings revealed that the four-team PM resources are critical to NGOs' performance: brainstorming sessions, success and failure stories, team cohesion and trust, and team values. These four resources are considered in this study to explain the team's PM resources.

PM Organisational Resources

Organisational PM resources have been defined as the extent to which the PM knowledge is distributed and the composition of this knowledge (Mahroeian and Foroza, 2012). PM organisational resources include explicit resources such as policies, rules and standards and tacit resources such as norms, values, and routines (Ekinge et al., 2000). In PM, tacit organisational resources can influence the success and failure of complex projects (Jaeger and Kanungo, 1990; Verma, 1995). For example, Belassi et al. (2007) found a significant relationship between the presence of supportive policies for project management and new product development

project success. Further, firms with project-oriented routines (Doolen et al., 2003) are associated with higher levels of technology transfer (Gopalakrishnan and Santoro, 2004). Nanthagopan et al. (2021) findings revealed that the four organisational PM resources are critical to NGOs' performance: effective PM office, PM methodology, standards and process, PM tools and techniques and effective project communication systems and technology. These four resources are considered in this study to explain the organisational PM resources.

PM Collaborative Social Resources

Collaborative social PM resources comprise formal/ know-what (explicit) and informal/ know-how (tacit) elements. This is the broader level of resource feeding the organisation with new knowledge from external sources. Yang et al. (2004) highlight that receiving information from the external setting promotes organisations getting new knowledge and achieving competitive advantage. Collaborative social PM resource has been revealed as a new resource to the existing literature, which are most important to successful operations for NGOs.

Since NGOs are non-profit mission-driven organisations, unlike private sector organisations, they face limits on how they can direct their resources and are formally accountable to their stakeholders. Moreover, these stakeholders are heterogeneous and have different needs and objectives (Reed et al., 2006). Therefore, NGOs need extensive social networking activities to successfully complete their projects. Nanthagopan et al. (2021) findings revealed that the four collaborative social PM resources are critical to NGOs' performance: project advisory from donors, NGOs intra and consortium

meetings, networking with stakeholders and project marketing. These four resources are considered in this study to explain the collaborative social PM resources.

Project Success

Project success can be assessed on three levels (Nanthagopan. et al., 2019). The first level is project management success, which focuses on completing the project within traditional time, budget and quality parameters. PM success refers to completing projects according to planned time, budget, quality and scope parameters (Baccarini, 1999; Shenhar et al., 2002). This level assesses project efficiency and outputs within the short term. The second level is project success; this broadly assesses stakeholders' satisfaction and the impact of projects on the community. Project success refers to the degree to which project outputs produce the desired outcomes. This evaluates the outcomes of the project in the medium term. The third level is NGO success. This evaluates how project outcomes impact NGO strategy and success. This means that PM resource supports increasing the reputation of NGOs and leads to increased fundraising capability, and how it contributes to the sustainability of NGOs. Project success contributes to achieving organisational objectives, and supports business strategies to achieve a competitive advantage for organisations (Shenhar et al., 1997; Cooke-Davies, 2002; Aladag et al., 2020).

Research Methods

The research is used the deductive approach, Explanatory design to reveal the associations between the PM resources and project success. The research setting, Sri Lanka, is an

appropriate environment to examine NGO activities because of a long history of voluntary service and the recent increase in NGOs due to war and disaster. The study adopts a survey study, it relies on a structured survey questionnaire. Advanced multivariate analysis techniques - Structural Equation Modelling (SEM) – was used to develop the structural model to see the association between the PM resources and project success (Byrne, 2013).

Method: Questionnaire

The survey method includes a self-administered structured questionnaire (Mazzocchi, 2008; Hair et al., 2003). The survey instrument for assessing PM resources and project success followed the instruments designed by Nanthagopan et al. (2019) and Nanthagopan and Williams (2021). The survey questionnaire was well-tested in the field survey in Sri Lanka and therefore improved the present study's validity and reliability. The survey instrument consists of 23 questions to assess PM resources and project success of NGOs. The survey instrument is divided into two parts: Part 1 consists of 12 questions to assess PM resources, and Part 2 consists of 11 questions to assess the project success of NGOs. In addition, six questions were used to collect respondents' demographic information.

Data Collection

The researcher selected the 'in-person' method of data collection. This method increases the data collection's credibility and makes it possible for respondents to get immediate clarification for vague answers (Wray and Barrett, 2022). Firstly, the researcher contacted the managers of selected organisations by telephone or mail

and informed them of the study's research objectives, and then received their consent for this study. Thereafter, he delivered the questionnaire in person and collected it from the respondents when it was completed. This improved the quality of data collection and increased response rates (Bowling, 2005).

Sample Selection

The target population is the whole population defined by the research study, from which the sample will be selected (Zikmund, 2000). In this researcher's study, the population is the 4,000 NGOs functioning in Sri Lanka (Ministry of Social Service and Welfare, 2012). However, only 1,426 NGOs are registered with the National Secretariat for NGOs, of which 1,042 are local NGOs, and 384 are international NGOs (National Secretariat for NGOs, 2014). Therefore, the researcher selected 1,426 registered NGOs as the study population because other NGOs' details are unavailable.

For this research, the sample size was 500 local and international NGOs (35% of the population). The sample size selection was based on the designated statistical analysis technique, structural equation modelling, which requires the largest sample size (Chin and Newsted, 1999). The study population consisted of local and international NGOs; therefore, a stratified random sampling technique was used to select a sample in equal proportion from each stratum and represent the sample to the population (Levy and Lemeshow, 2009). It helps the researcher to select a randomised probabilistic sample from the population and increase the generalisability of the survey findings to the population (Levy and Lemeshow, 2009). The researcher contacted 500 NGO managers, out of which 463 managers indicated their

interest in participating in the survey study of which, in turn, 447 questionnaires were used for further data analysis, while 16 questionnaires were eliminated due to incomplete data. Therefore, the finally selected 447 questionnaires were suitable for SEM analysis because the ratio of responses (447) to the number of variables (42) is greater than 10:1 (Chin and Newsted, 1999) and is much higher than the rule of thumb of 200, recommended by Garver and Mentzer (1999).

Survey Analysis

Statistical software packages were used to analyse the final survey data. The Statistical Package for Social Sciences (SPSS v22) was used to do the preliminary data analyses, and Analysis of Moment Structures (AMOS v26) was used to do the advanced analyses of the measurement model and test the hypothesised model (Byrne, 2013). SEM is used to evaluate the validity of substantive theories and further determine whether a specific model is valid with empirical data (Lei and Wu, 2007). This extends general linear modelling procedure (Lei and Wu, 2007). SEM is now used in many fields of study since it is widely recognised as a critical multivariate technique to study the relationships among latent constructs that consist of multiple indicators (Cooper and Schindler, 2003; Hair et al., 2006). The present study is undertaken in the new context of NGOs and aims to develop a structural model for identifying associations between PM resources and project success. Therefore, it requires the highly sophisticated SEM technique for testing proposed relations between latent constructs and assessing structural model validity for theory development (Hair et al., 2006; Stephenson et al., 2006).

Operational Model

Based on the findings of Nanthagopan et al. (2019) and Nanthagopan and Willimas (2021), the PM resources are classified into three levels; team, organisational and collaborative social resources and the overall project success classified into three levels; PM success, project success and NGO success.

The operational model is explained in Table 1. Team PM resources are measured using Questions Q1 to 4; Organisational PM resources Questions Q5 to Q8, Collaborative Social PM resources using Questions Q8 to 12, PM success is measured using questions Q13 to Q16, Project Success is measured using questions Q17 to Q19 and NGO success is measured using questions Q20 to 23.

Table 1: Operational Model of PM Resources and Project Success

Concepts	Variables	Indicators	Measures
PM Resources	Team PM Resource	Brainstorming sessions	Q1
		Success and failure stories	Q2
		Team cohesion and trust	Q3
		Team values	Q4
	Organisational PM Resource	Effective PM office	Q5
		PM methodology, standards and process	Q6
		PM tools and techniques	Q7
		Effective project communications systems and technology	Q8
	Inter-Organisational PM Resource	Project advisory from donors	Q9
		NGOs intra and consortium meetings	Q10
		Networking relations with stakeholders	Q11
		Project Marketing	Q12
Overall Project Success	PM Success	Meeting Scope	Q13
		Meeting Quality	Q14
		Meeting Time	Q15
		Meeting Budget	Q16
	Project Success	Stakeholders Satisfaction	Q17
		Project Impacts	Q18
		Project Sustainability	Q19
	NGO Success	Contribution to NGOs' Vision, Mission and Objectives	Q20
		Stakeholders Rapport	
		NGO Reputation	Q21
NGO Sustainability		Q22	
			Q23

Data Analysis

SEM is used to test the hypothesised causal relationships. SEM provides a more appropriate inference framework for mediation and other types of causal analyses and helps develop sound theoretical frameworks through rigorous testing (Hoe, 2008). The SEM process consists of two steps. First, validate the measurement model and fitting the structural model. The former is accomplished primarily through CFA, while the latter is accomplished primarily through path analysis with latent indicators. Three levels of PM resources and critical elements of PM resources were identified in the literature. Then the model creation by SEM is started based on theory. The researcher produced three alternative models

and finally identified a good fit model that explains the association between PM resources and project success well. The first order model explains item reliability to the latent construct; after clearing it, selected variables should be forwarded to the second order model, which illustrates the latent variables and is used for hypothesis testing.

SEM Model 1

This model was drawn based on previous findings in the literature indicating a positive relationship between PM resources and project success. The SEM shows the three levels of PM resources as Team (TPR), Organisational (OPR) and Collaborative Social (CPR) PM resources and the three levels of project success as PM Success (PMS), Project Success (PS) and NGO Success (NGO).

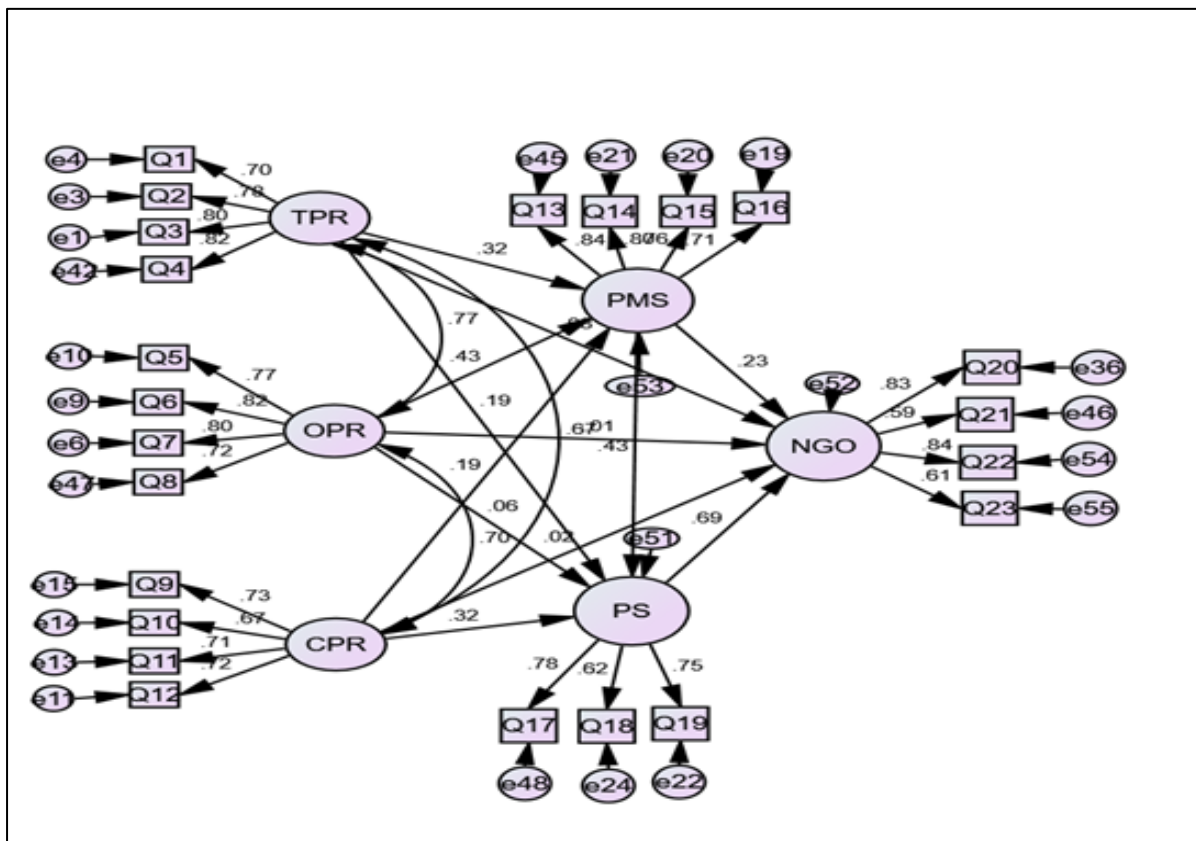


Figure 3: SEM Model 1

SEM Model 1 results are as follows: absolute fit indices; $\chi^2 = 474.7$, $df = 215$, normed chi-square value (χ^2 / df) = 2.208, GFI = 0.917, RMSEA = 0.052, P Close is greater than 0.05, and SRMR = 0.034; incremental fit indices; NFI = 0.923, TLI = 0.948, and CFI = 0.956; parsimonious fit indices: AGFI = 0.894 and PNFI = 0.784.

This indicates a good fit model as this normed chi-square value is less than 3.0 (Wheaton, 1987; Carmines and McIver, 1981), RMSEA is less than 0.08, and P Close is greater than 0.05 (MacCallum et al.,1996). In addition, CFI is greater than the cut-off value of 0.90, and SRMR is less than the cut-off value of 0.08 (Hu and Bentler, 1999).

Table 2: Estimates for SEM Model 1

Relationships		Hypothesis	Standardised Regression Estimates		Sig (at 0.05)	
			R ²	P value		
Team PM Resource	—————→	PM Success	H1	0.32	<0.001	Sig
Team PM Resource	—————→	Project Success	H2	0.19	0.015	Sig
Team PM Resource	—————→	NGO Success	H3	0.08	0.273	Not Sig
Organisational PM Resource	—————→	PM Success	H4	0.43	<0.001	Sig
Organisational PM Resource	—————→	Project Success	H5	0.06	0.519	Not Sig
Organisational PM Resource	—————→	NGO Success	H6	0.01	0.823	Not Sig
Collaborative Social PM Resource	—————→	PM Success	H7	0.19	0.002	Sig
Collaborative Social PM Resource	—————→	Project Success	H8	0.32	<0.001	Sig
Collaborative Social PM Resource	—————→	NGO Success	H9	0.02	0.934	Not Sig
PM Success	—————→	Project Success	H10	0.43	<0.001	Sig
PM Success	—————→	NGO Success	H11	0.23	0.020	Sig
Project Success	—————→	NGO Success	H12	0.69	<0.001	Sig
Absolute Fit Index			$\chi^2 = 474.7$, $df = 215$, $\chi^2 / df = 2.208$, GFI = 0.917, RMSEA= 0.052, P Close > 0.05, SRMR = 0.034			
Incremental Fit Index			NFI = 0.923, TLI = 0.948, CFI = 0.956			
Parsimony Fit Index			AGFI = 0.894, PNFI = 0.784			

However, many hypothetical paths (Table 2), namely H3, H5, H6 and H9, suggest insignificant relationships between the factors. Therefore, the researcher considered an alternative model by first eliminating the H3, H6 and H9 insignificant paths.

SEM Model 2

Model 1 was identified as the proposed model, and Model 2 as the reduced model. It restricts the influence of PM resources on NGO success. A chi-square difference test was performed to compare these models of selecting the best model.

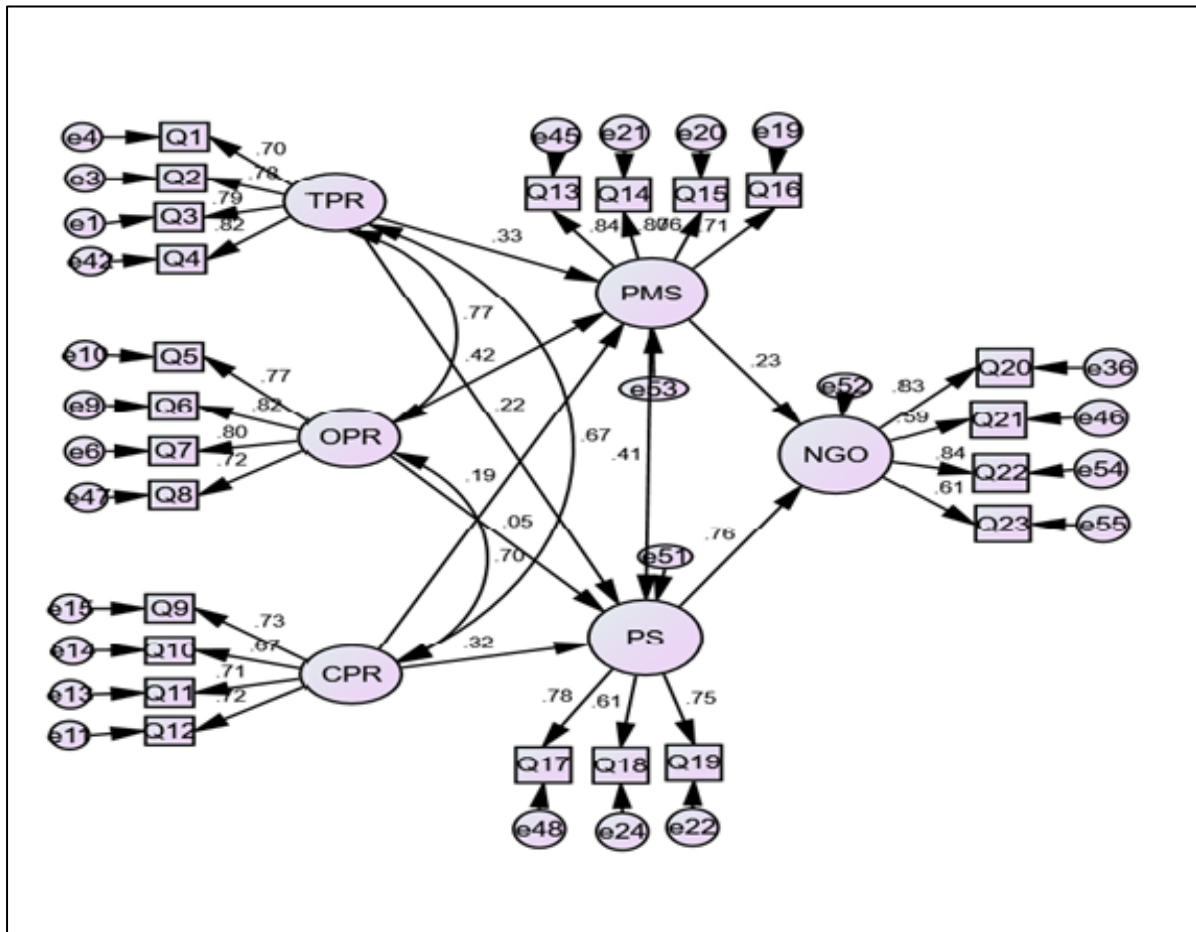


Figure 4: SEM Model 2

Table 3 summarises the results of the chi-square test. This model has been modified by eliminating the paths H3, H6 and H9, which produced insignificant causal relationships. Results of the modified model are as follows: absolute fit indices: $\chi^2 = 475.8$, $df = 218$, $\chi^2 / df = 2.183$, $GFI = 0.917$, $RMSEA = 0.051$, P Close is greater than 0.05, and $SRMR = 0.034$; incremental fit indices: $NFI = 0.923$, $TLI = 0.949$ and $CFI = 0.956$; parsimonious fit indices: $AGFI = 0.895$ and $PNFI = 0.795$. The model shows a good fit.

However, one hypothetical path (Table 3), namely H5, shows an insignificant path. Therefore, the researcher considered an alternative model to derive a good model with all significant paths.

Comparison of SEM Models 1 and 2

The Chi-square Difference Test (CSDT) technique was applied to examine the significant difference in the nested structural models (Kline, 2005). The CSDT technique calculates the difference between the chi-square values and degrees of freedom of two models and compares a set of critical values based on changes in degrees of freedom (Kline, 2005). The result of the chi-square difference test is shown in Tables 4 and 6. Comparing full Model 1 and reduced Model 2, the results of CSDT showed $\Delta \chi^2 = 1.170$, $\Delta df = 3$, and p is greater than 0.05. Since the difference in the chi-square test was insignificant, both models are equivalent.

Table 3: Estimates for SEM Model 2

Relationships		Hypothesis	Standardised Regression Estimates		Sig (at 0.05)	
			R ²	P value		
Team PM Resource	→	PM Success	H1	0.33	<0.001	Sig
Team PM Resource	→	Project Success	H2	0.22	<0.001	Sig
Team PM Resource	→	NGO Success	H3	Constrained		
Organisational PM Resource	→	PM Success	H4	0.42	<0.001	Sig
Organisational PM Resource	→	Project Success	H5	0.05	0.501	Not Sig
Organisational PM Resource	→	NGO Success	H6	Constrained		
Collaborative Social PM Resource	→	PM Success	H7	0.19	0.002	Sig
Collaborative Social PM Resource	→	Project Success	H8	0.32	<0.001	Sig
Collaborative Social PM Resource	→	NGO Success	H9	Constrained		
PM Success	→	Project Success	H10	0.41	<0.001	Sig
PM Success	→	NGO Success	H11	0.23	0.012	Sig
Project Success	→	NGO Success	H12	0.76	<0.001	Sig
Absolute Fit Index			$\chi^2 = 475.8$, $df = 218$, $\chi^2 / df = 2.183$, GFI = 0.917, RMSEA= 0.051, P Close > 0.05, SRMR = 0.034			
Incremental Fit Index			NFI = 0.923, TLI = 0.949, CFI = 0.956			
Parsimony Fit Index			AGFI = 0.895, PNFI = 0.795			

However, when we compare the significance of standard regression estimates, Model 1 has many insignificant paths. Moreover, parsimonious measures slightly improved

from Model 1 (AGFI = 0.894, PNFI = 0.784) to Model 2 (AGFI = 0.895, PNFI = 0.795). Therefore, Model 2 is comparably better than Model 1 (Kline, 2005; Mulaik et al., 1989).

Table 4: Chi-square Difference Test

	χ^2	df	$\Delta \chi^2$	Δdf	Significance
Model 1	474.662	215			
Model 2	475.832	218	1.170	3	$p > 0.05$

SEM Model 3

SEM Model 3 was modified from Model 2 by eliminating the path which showed an insignificant relationship between organisational PM resources and project success. The results of the model are as follows: absolute fit indices: $\chi^2 = 476.3$, $df =$

219, $\chi^2 / df = 2.175$, GFI = 0.917, RMSEA = 0.051, P Close is greater than 0.05, and SRMR = 0.034; incremental fit indices: NFI = 0.923, TLI = 0.950 and CFI = 0.956; parsimonious fit indices; AGFI = 0.896 and PNFI = 0.799. The model shows a good fit.

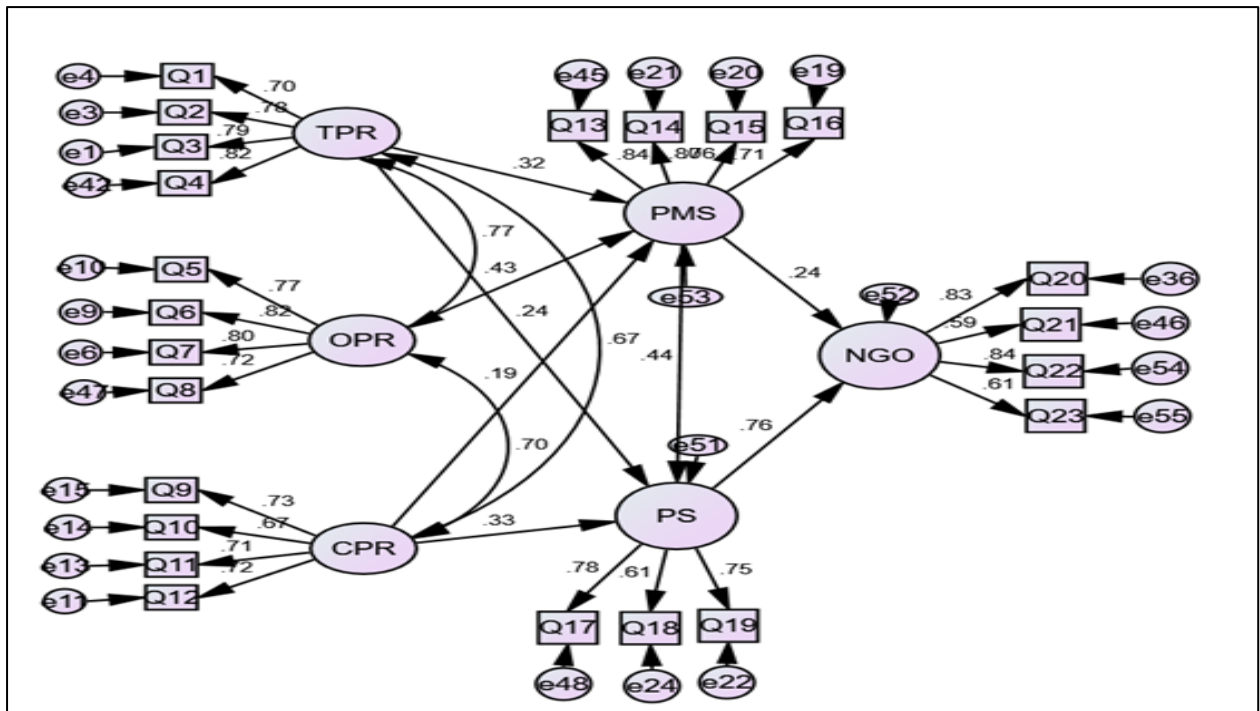


Figure 5: SEM Model 3

Table 5: Estimates for SEM Model 3

Relationships	Hypothesis	Standardised Regression Estimates		Sig (at 0.05)
		R ²	P value	
Team PM Resource → PM Success	H1	0.32	<0.001	Sig
Team PM Resource → Project Success	H2	0.24	<0.001	Sig
Team PM Resource → NGO Success	H3		Constrained	
Organisational PM Resource → PM Success	H4	0.43	<0.001	Sig
Organisational PM Resource → Project Success	H5		Constrained	
Organisational PM Resource → NGO Success	H6		Constrained	
Collaborative Social PM Resource → PM Success	H7	0.19	0.003	Sig
Collaborative Social PM Resource → Project Success	H8	0.33	<0.001	Sig
Collaborative Social PM Resource → NGO Success	H9		Constrained	
PM Success → Project Success	H10	0.44	<0.001	Sig
PM Success → NGO Success	H11	0.24	0.012	Sig
Project Success → NGO Success	H12	0.76	<0.001	Sig
Absolute Fit Index	$\chi^2 = 476.3, df = 219, \chi^2 / df = 2.175, GFI = 0.917, RMSEA = 0.051, P \text{ Close} > 0.05, SRMR = 0.034$			
Incremental Fit Index	NFI = 0.923, LI = 0.950, CFI = 0.956			
Parsimony Fit Index	AGFI = 0.896, PNFI = 0.799			

Comparison of Models 2 and 3

Table 6 illustrates the chi-square difference test. Comparing the improved Models 2 and 3, the results of CSDT indicate $\Delta \chi^2 = 0.438$, $\Delta df = 1$, and p is greater than 0.05. The p -value is insignificant. This indicates there are no significant differences between Models 2 and 3. However, Model 2 has one insignificant path (H5).

Moreover, parsimonious measures slightly improved from Model 2 (AGFI = 0.895, PNFI = 0.795) to Model 3 (AGFI = 0.896, PNFI = 0.799). Therefore, the researcher accepts Model 3, in which fit indices give good values, including improved parsimony (Mulaik et al., 1989), and all hypothetical paths are significant (Kline, 2005). Hence, modified SEM Model 3 was concluded as the final model.

Table 6: Chi-square Difference Test

	χ^2	df	$\Delta\chi^2$	Δdf	Significance
Model 2	475.832	218			
Model 3	476.270	219	0.438	1	$p > 0.05$

Comparison of Standardised Regression Estimates across different Estimation Methods

The final modified SEM model for this study was identified using the maximum likelihood (ML) estimation method. The ML method relies predominantly on three assumptions: large sample of population, univariate normality, and multivariate normality (Lee and Song, 2004; Kline, 2005). The empirical data of the present study closely met the first two important assumptions. The first assumption, the sample size of 447 (>400) in this study, was remarkably adequate to perform the ML estimation method (Boomsma and Hoogland, 2001; Chin and Newsted, 1999; Engel et al., 2003). Next, as presented in the previous chapter (Data Presentation), all variables were close to normal fit because all variables' values of skewness and kurtosis lie between -1.0 and +1.0 (Garson, 2012).

However, the multivariate normality assumption was not met by the empirical data. The development of asymptotic robustness of normal theory methods is convincing for the appropriateness of using ML methods under violation of normality assumption in certain conditions. Namely, latent variables are mutually independent, and the sample size is large (Amemiya and Anderson, 1990; Hu and Bentler, 1998). Further, Hu and Bentler's (1998, p.450) study reveals a violation of multivariate normality alone seems to exert less impact on the performance of fit indices, and, he added, ML performs much better than other estimation methods (e.g., Generalised Least Square and Asymptotically Distribution Free) for model selection and evaluation. It has been validated by other researchers that ML performs well with or without the correction of non-normality (Boomsma and Hoogland, 2001; Olsson et al., 2000). Therefore, the selection of the ML method was more appropriate for this study as the empirical

data met, to a great extent, the ML assumptions (Hu and Bentler, 1998).

However, an appropriately specified model gives moderate variations of non-normality on parameter estimates across different estimation methods (Bollen, 1989; Finch et al., 1997; Olsson et al., 2000). Hence, the researcher compares the findings of the ML method with other existing conventional and non-conventional estimation methods to warrant the accuracy of the SEM findings (Olsson et al., 2000). The identified final model was compared using Generalised Least Square (GLS), Asymptotically Distribution Free (ADF) and Bayesian estimation methods. ML and GLS work well for multivariate normality and asymptotic theory assumptions (Hu and Bentler, 1998). However, ADF and Bayesian estimation methods make flexible, asymptotically-free nature of estimation (Browne, 1984; Chumney, 2012).

Standardised regression parameter estimates were used to compare the results across estimation methods (Chumney, 2012; Olsson et al., 2000;). The results of standardised regression estimates are shown in Table 7. The standardised regression estimates of all hypothetical paths in ML, GLS and Bayesian methods are significant at the 95% confidence level. In ADF method, except for one path (H2), all paths show significance (H2) at the 95% confidence level. In addition, the variations of standardised regression estimates across estimation methods are unexceptional. Therefore, it can be justified that the final ML SEM model results are well accepted across different estimation methods (Olsson et al., 2000). Therefore, the ML results are compelling to explain the associations between PM resources and project success.

Table 7: Comparisons of Standardised Regression Estimates across Different Estimation Methods

Hypothesis	ML		GLS		ADF		Bayesian (R ²) (Sig at 0.05)
	R ²	P value	R ²	P value	R ²	P value	
H1	0.32	<0.001	0.26	0.003	0.27	<0.001	0.33
H2	0.24	<0.001	0.21	0.007	0.06	0.30	0.24
H4	0.43	<0.001	0.51	<0.001	0.56	<0.001	0.42
H7	0.19	0.003	0.14	0.041	0.11	0.05	0.18
H8	0.33	<0.001	0.35	<0.001	0.39	<0.001	0.32
H10	0.44	<0.001	0.45	<0.001	0.36	<0.001	0.44
H11	0.24	0.012	0.21	0.031	0.32	<0.001	0.23
H12	0.76	<0.001	0.77	<0.001	0.68	<0.001	0.75

Confidence level = 95%, N = 2000 (Bootstrapping), N = 20000(Bayesian)

Direct, Indirect and Total Effects on SEM Model 3

Modified SEM Model 3 is accepted as the final model for the study as it meets the overall goodness of fit and all the hypothetical paths are significant. Finally, the direct, indirect and total effects are evaluated between the exogenous and endogenous latent factors. Direct effects mean that any intervening factors do not mediate part of the causal effect between independent and dependent factors, and indirect effects mean that part of the causal effect is mediated by one or more intervening factors (Baron and Kenny, 1986). Hence, total effects add both direct and indirect effects between independent and dependent factors. The previous SEM sections show the 12 hypothetical paths with direct effects only.

Hence, Table 9 contains 19 hypothetical paths with direct and indirect effects. The model includes three latent exogenous factors: team PM resources, organisational PM resources and collaborative social PM resources and three endogenous latent factors, namely, PM success, project success and NGO success, where the first two are mediators.

The Table 8 shows the standardised direct, indirect and total effects of the final SEM Model 3. All paths of direct, indirect, and totals effects are significant at the 95% confidence level. In addition, the established hypothetical paths indicate positive relationships between PM resources and project success. Section 4.8 tests the predetermined hypothetical correlations based on direct and indirect effects results.

Table 8: Standardised Direct, Indirect and Total Effects (Modified SEM Model 3)

		Team PM Resource (TPC)	Organisational PM Resource (OPC)	Collaborative Social PM Resource (CPC)	PM Success (PMS)	Project Success (PS)
PM Success (PMS)	Direct Effects	0.322*	0.431*	0.186*		
	Indirect effects	-	-	-		
	Total Effects	0.322*	0.431*	0.186*		
Project Success (PS)	Direct Effects	0.236*	-	0.328*	0.440*	
	Indirect effects	0.142*	0.190*	0.082*	-	
	Total Effects	0.378*	0.190*	0.410*	0.440*	
NGO Success (NGO)	Direct Effects	-	-	-	0.235*	0.756*
	Indirect Effects	0.361*	0.245*	0.354*	0.333*	-
	Total Effects	0.361*	0.245*	0.354*	0.568*	0.756*

Note: P<0.05, *Significance

Hypothesis Testing

This section explains the hypothetical relationships between the PM resource and project success based on the previous findings of the author, who conducted an exploratory case study and a quantitative survey study to identify the PM resource,

critical PM resources, and hypothetical relationships between the independent and dependent variables (Nanthagopan et al., 2016; Nanthagopan and Nigel, 2021). Initially, hypotheses were proposed based on an extensive review of the literature followed by findings of the exploratory case study of the author.

Table 9: Hypotheses, Associated Paths and Results

Hypothesis	Exploratory Case Study	Standardised Regressions	P Value	Supported
H1	Team PM Resource has a direct and positive effect on PM Success	0.322	0.001	Supported
H2	Team PM Resource has a direct and positive effect on Project Success	0.236	0.001	Supported
H2a	Team PM Resource has an indirect and positive effect on Project Success through the mediating effect of PM Success	0.142	0.001	Supported
H3	Team PM Resource has a direct and positive effect on NGO Success	0.080	0.273	Not Supported
H3a	Team PM Resource has an indirect and positive effect on NGO Success through the mediating effects of PM Success and Project Success	0.361	0.001	Supported
H4	Organisational PM Resource has a direct and positive effect on PM Success	0.431	0.001	Supported
H5	Organisational PM Resource has a direct and positive effect on Project Success	0.060	0.519	Not Supported
H5a	Organisational PM Resource has an indirect and positive effect on Project Success through the mediating effect of PM Success	0.190	0.001	Supported
H6	Organisational PM Resource has a direct and positive effect on NGO Success	0.010	0.823	Not Supported
H6a	Organisational PM Resource has an indirect and positive effect on NGO Success through the mediating effects of PM Success and Project Success	0.245	0.001	Supported
H7	Collaborative Social PM Resource has a direct and positive effect on PM Success	0.186	0.004	Supported
H8	Collaborative Social PM Resource has a direct and positive effect on Project Success	0.328	0.001	Supported
H8a	Collaborative Social PM Resource has an indirect and positive effect on Project Success through the mediating effect of PM Success	0.082	0.003	Supported
H9	Collaborative Social PM Resource has a direct and positive effect on NGO Success	0.020	0.924	Not Supported
H9a	Collaborative Social PM Resource has an indirect and positive effect on NGO Success through the mediating effects of PM Success and Project Success	0.354	0.001	Supported
H10	PM Success has a direct and positive effect on Project Success	0.440	0.002	Supported
H11	PM Success has a direct and positive effect on NGO Success	0.235	0.043	Supported
H11a	PM Success has an indirect and positive effect on NGO Success through the mediating effect of Project Success	0.333	0.001	Supported
H12	Project Success has a direct and positive effect on NGO Success	0.756	0.001	Supported

Then, these hypotheses were tested with the help of standardised coefficients between all the constructs through SEM analysis. As a result, a total of 91 hypotheses were proposed, and SEM findings supported 15 hypotheses. Finally, the proposed conceptual model was modified. A summary of hypotheses, associated paths and results is presented in Table 9.

Findings and Discussion

The study compares and contrasts the hypothetical relationships of the study's latent constructs, which were constructed from the literature review. Jugdev and Mathur (2007) established a model to explain the associations of tangible and intangible PM assets with achieving VRIO characteristics of PM processes in private sector organisations. Subsequently, Mathur et al. (2013) identified a model that explained the associations between the VRIO characteristics of the PM assets and PM performance outcomes on the project level and firm-level performance. Further, the previous research examined the PM resources and VRIO characteristics using EFA and CFA techniques. However, there is no valid model from previous researchers for explaining the associations between PM resources and project success. The present study identifies and organises PM resources into three levels and assesses these associations with three levels of project success. Therefore, this is a new approach to linking 'PM resource and project successes' in PM literature.

The study briefly discusses the valid model which best explains the associations between PM resources and project success. Then, SEM evaluated the model and identified a model which explains the associations

between PM resources and project success. Further, construct validity tests warrant that the concepts' measurements are valid. Additionally, the standardised regression estimates of the final validated model compared with other different GLS and ADF methods and concluded ML results convincingly explain the associations between PM resources and project success. Finally, hypotheses were tested using direct and indirect results of standardised regression estimates.

The present study proposes a model to show the associations between PM resources and project success. The three levels of PM resources are: team, organisational and collaborative social PM resources and the acknowledged three levels of project success are: PM success (mediator), project success (mediator) and NGO success. The study explains the associations (direct, indirect and total) between each level of PM resource and the project success of NGOs using the standardised regression results of the SEM final valid model.

Associations between Team PM Resource and Project Success

Team resources are vital for the best PM performance of organisations (Jugdev and Mathur, 2009; Latif and Williams, 2017; Mathur et al., 2013). The study reveals that brainstorming sessions, success and failure stories, team cohesion and trust and team values significantly influence the three levels of project success. The results confirmed that team PM resource has a direct association with PM success, direct and indirect associations with project success and indirect associations with NGO success. However, the survey study did not indicate a direct

positive association between team PM resources and NGO success.

The standardised regression (r^2) of direct effects on PM success and project success is 0.322 and 0.236, respectively, and indirect effects on project success and NGO success is 0.142 and 0.361, respectively. It shows that team PM resource significantly affects the three levels of project success in NGOs. However, it is pointed out that team PM resource does not directly contribute to NGO success; instead, it indirectly contributes to NGO success either through PM success or/and project success.

Team PM resource dramatically improves the team’s project operations, either improving team PM knowledge and skills or improving team members’ mutual understandings and values. Therefore, the results emphasised that PM resource is essential for NGOs to succeed at the three levels of project success. However, the third level of NGO success may not be achieved directly by team PM resources since NGO success could be comprehended while PM and project success are accomplished. Table 10 presents the association between team PM resources and the three levels of project success.

Table 10: Associations between Team PM Resource and Project Success

Team PM Capacity	Standardised Regression Estimates (r^2)		
	PM Success	Project Success	NGO Success
Direct Effects	0.322	0.236	-
Indirect Effects	-	0.142	0.361
Total Effects	0.322	0.378	0.361

Note: *Significance at 0.001 level

Associations between Organisational PM Resource and Project Success

The survey study results pointed out that organisational PM resource; Effective PM office, PM methodology, standards and process, PM tools and techniques, Project communication system and technology has only significant direct association with PM success, and it does not make a direct contribution to project success and NGO success; However, the results did indicate organisational PM resource has indirect associations with project success and NGO success. The literature emphasises the importance of organisational PM resources for project performance; however, associations with three levels of project

success are not disclosed (Kaleshovska, 2014; Martin et al., 2007; Mathur et al., 2013; Milunovic and Filipovic, 2013).

The standardised regression (r^2) of direct effects on PM success is 0.431, and the indirect effect on project and NGO success is 0.190 and 0.245, respectively. It shows that organisational PM resource makes a solid contribution to PM success and a medium indirect contribution to project success and NGO success. Organisational PM resource consists of formal forms of items which greatly support planning, organising and executing projects. Therefore, PM success is achieved n projects are completed by meeting scope, quality, budget and time requirements. This success contributes to project success

and NGO success. However, organisational PM resource does not contribute directly to achieving either project success or NGO success. Previous research findings highlighted significant positive associations between PM resources and the first two levels of PM and project success (Jugdev et al., 2013; Fortune et al., 2011).

The study claims that these formal forms of organisational resources are limited to immediate project outcomes and do not directly contribute to long-term project results. Table 11 presents the association between the organisational PM resource and the three levels of project success.

Table 11: Associations between Organisational PM Resource and Project Success

Organisational PM Resource	Standardised Regression Estimates (r ²)		
	PM Success	Project Success	NGO Success
Direct Effects	0.431	-	-
Indirect Effects	-	0.190	0.245
Total Effects	0.431	0.190	0.245

Note: *Significance at 0.001 level

Associations between Collaborative Social PM Resource and Project Success

The study results show that collaborative social PM resource, Project advisory from donors, NGOs intra and consortium meetings, networking with stakeholders and Project marketing has a significant positive effect on the three levels of project success. It indicated that collaborative social PM resource has a significant direct association with PM success and project success and does not directly contribute to NGO success. However, as with the other two PM resources, it contributed indirectly to NGO success. The literature has not extensively discussed these collaborative social resources and their associations with the project's success (Latif and Williams, 2017; Martin et al., 2007; Mathur et al., 2013).

The standardised regression (r²) of direct effects on PM success and project success is 0.186 and 0.328, respectively, and the indirect effect on project success and NGO success is 0.082 and 0.354, respectively. It shows that

collaborative social PM resource makes a solid contribution to project success compared with the contribution to PM success. This may be acquiring knowledge and skills from external stakeholders who support NGOs to understand more about stakeholders' requirements and how to work with other NGOs to fulfil community requirements. Therefore, collaborative social PM resource greatly supports NGOs for meeting stakeholders' requirements, project impacts and sustainability more than completing the project within scope, quality, budget and time constraints. This means resource is highly focused on project outcomes rather than immediate outputs. Further, it is pointed out that collaborative social PM resource did not directly contribute to NGO success; instead, it indirectly contributes to NGO success either through PM success or/and project success. Table 12 presents the association between collaborative social PM resources and the three levels of project success.

Table 12: Standardised Effects of Collaborative Social PM Resource on Project Success

Collaborative Social PM Resource	Standardised Regression Estimates (r^2)		
	PM Success	Project Success	NGO Success
Direct Effects	0.186	0.328	-
Indirect Effects	-	0.082	0.354
Total Effects	0.186	0.410	0.354

Note: *Significance at 0.001 level

Comparison of Total Effects of three levels of PM Resources on Project Success

This section compares the total effects of individual-level PM resources over the three levels of project success of NGOs. Standardised regression (r^2) of total effects for team PM resource on PM success, project success, and NGO success is 0.322, 0.378 and 0.361, respectively. Organisational PM resource’s effect on PM success, project success and NGO success is 0.431, 0.190 and 0.245, while collaborative social PM resource’s effect is 0.186, 0.410 and 0.354, respectively.

Organisational PM resources highly account for PM success. This means standardised regression (r^2) effects of organisational PM resource on PM success is 0.431, team PM resource on PM success is 0.322 and collaborative social PM resource on PM success is 0.186. Therefore, in order to increase PM success, organisations need to focus on the three levels of PM resources. However, their priority should be developing the organisational PM resource by, for example, an effective PM office, PM methodology, standards and process, PM tools and techniques and effective project communication systems and technology.

Collaborative social PM resources highly account for project success. The standardised regression (r^2) effect of collaborative social PM resource on project success is 0.41, team PM resource on project success is 0.378 and organisational PM resource on project success is 0.19. Hence, organisations must focus on all three levels of PM resources to gain project success. However, their main concern should be collaborative social PM resource as it highly impacts project success ($r^2 = 0.41$) compared with the other two PM resources. These items include project advisory from donors, NGOs intra- and consortium meetings, networking with stakeholders and project marketing events.

NGO success is highly accounted for by team PM resources which explain that the standardised regression (r^2) effects of team PM resources on NGO success are 0.361. For the other constructs, the results are: collaborative social PM resource and organisational PM resource on NGO success are 0.354 and 0.245, respectively. All three levels of PM resources' impact on NGO success are medium. However, team PM resource has the highest construct impact on NGO success ($r^2 = 0.361$). Hence, organisations should give priority to improving team PM resources in order to achieve NGO success. These items include brainstorming sessions, success and failure stories, team cohesion, trust, and team values.

Overall, all three levels of PM resources have excellent impact on the three levels of project success of NGOs. Organisational PM resource has the highest impact on PM success of the constructs, collaborative social PM resource has the highest impact on project success and team PM resource has the highest impact on NGO success. Therefore, in conclusion, all three levels of PM resources are vital for NGOs to achieve overall project success.

Table 13 shows the total effects (standardised regression estimates) of the three levels of

PM resources on the three levels of project success in NGOs.

Further, the study reveals that three levels of PM resources have not indicated a direct effect on NGO success. Further, it identified NGOs’ success would be accomplished indirectly through the achievement of PM and project success. This is warranted by past studies ensuring that PM and project success lead to the business success of organisations (Cooke-Davies, 2002; Shenhar et al., 1997).

Table 13: Total Effects of the Three Levels of PM Resources on Project Success

Constructs	Standardised Regression Estimates (r ²)		
	PM Success (mediator)	Project Success (mediator)	NGO Success
Team PM Resource	0.322	0.378	0.361
Organisational PM Resource	0.431	0.190	0.245
Collaborative Social PM Resource	0.186	0.410	0.354

Note: *Significance at 0.05 levels

Conclusion

The study sought to answer the main research question, how does Project Management Resource support the successful delivery of projects in NGOs. In order to address this research question, the study examined the relationships between PM resources and project success with the support of the survey study. As a result, the study produced a valid model which shows the associations between PM resources and project success and has shown that significant associations exist between PM resources and project success in NGOs.

Findings emphasised that the three levels of PM resources significantly contribute to the

three levels of project success. The SEM results concluded that there are significant direct relationships between the three levels of PM resources and the first level of PM success and between the team and collaborative social PM resources and the second level of project success. Further, it is highlighted that the three levels of PM resources have significant indirect effects on the second level of project success and the third level of NGO success. Therefore, the SEM technique is supported to uncover the actual associations between the PM resources and project success. Further, the study highlighted that team PM resource makes the highest contribution to NGO success compared with the other two resources,

while organisational PM resource makes the highest contribution to PM success. In contrast, collaborative social PM resource makes the highest contribution to project success.

The derived hypotheses were tested in the survey study. Altogether 19 hypotheses were derived in the case study, and 15 hypotheses were accepted based on the survey study results. The survey rejected direct associations between the three levels of PM resources and NGO success and between organisational PM resources and project success. Finally, a valid model was identified that best explains associations between PM resources and project success. Previous researchers highly discussed explicit organisational-level resources and less discussed the team and collaborative social level resources. However, this validated model of PM resources and project success based on NGOs, post-conflict scenario highlights the organisational level resources have direct positive contributions only with PM success, while fails to explain significant direct contributions with project success. However, the team and collaborative social PM resources have positively contributed to PM success and project success. Therefore, in the NGOs context, organisational resources are not adequate to achieve project success; alternatively, they need to develop team and collaborative social level resources to attain project success.

The study sought a new approach to look at PM resources and their associations with project success with supporting RBV insights in NGOs. The RBV is a well-established theory applied in private sector organisations in assessing organisational resources. At present, the RBV is widely accepted in examining PM resources in private sector

organisations and highlighted PM resources contribute to the competitive advantage of private sector organisations (Mathur et al., 2013; Mathur et al., 2007; Jugdev and Mathur, 2006b). However, the previous studies did not extensively discuss the PM resources and only undertook to explain VRIO characteristics of PM resources and their contribution to competitive advantage quantitatively. Therefore, the present study sought substantial contributions to establish a validated framework for evaluating PM resources and showing the associations with project success in NGOs; it was conducted in the under-explored Sri Lankan country context.

The practical contribution is achieved by studying improving project delivery among the NGOs. This study confirms that there are significant associations between PM resources and project success. Therefore, the study will improve PM practices in NGOs. This will lead to successful project delivery and improve organisational performance and sustainability in NGOs. The study has provided comprehensive knowledge of PM resources and project success from a developing country's context, i.e., Sri Lanka. However, it could be transferable to other settings and other types of organisations. NGOs face many challenges and difficulties in providing services and programmes to their communities, members, and beneficiaries in this competitive and turbulent environment.

Understanding and building their PM resources to respond effectively requires an investment of money, time, and effort. It also calls for the participation of many organisational development players to correctly find out the key elements of PM resources to improve project delivery by

NGOs. Therefore, the study support NGO managers and policymakers in focusing on designing the PM resource capacity enhancement plans and systematically developing the PM capacities in NGOs.

The study attempted to minimise the paucity of studies in the domain of PM resources and project success from NGOs and a developing countries' setting. The previous studies were conducted in private sector organisations and also in the developed-countries context. However, this study is conducted in a new setting in the developing world and NGO sector.

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