AN EXPLANATORY INVESTIGATION ON THE ROLE OF COMMUNICATION ANTECEDENTS IN PROJECT MANAGEMENT

[1]SHASHEELA DEVI KARUPPIAH, [2]G. MARTHANDAN, [3]MOHANA SHANMUGAM

[1]Head (ICT Service Continuity), Tenaga Nasional Berhad, Department of Asset Management & Service

Continuity, Kuala Lumpur, Malaysia

[2]Professor, Multimedia University, Faculty of Management, Cyberjaya, Malaysia

[3]Senior Lecturer, Universiti Tenaga Nasional, Department of Computer Science and Information Systems,

Selangor, Malaysia

E-mail: [1]shasheela@gmail.com, [2]marthandan@mmu.edu.my, [3]mohana@uniten.edu.my

ABSTRACT

Project management has become a norm in many organizations for project benefit realization commonly aligned to organizational strategic goals. These projects in organizations create additional value to meet organization commitments. Research suggests that communication management is one of the key area in project management. This research therefore embarks empirically to determine the role of project communication impacting project management. The identified antecedents of communication are adapted from Media Synchronicity Theory (MST) to study the impact on communication performance influencing project management. The study uses data gathered by a survey involving respondents from the IT industry analyzed using the Partial Least Squares of the Structural Equation Modeling (PLS-SEM). The empirical evidence demonstrates a significant relationship between communication and project management. The study also contributes to the project management body of knowledge.

Keywords: *Project Management, Communication Antecedents, Communication Performance, MST, PLS-SEM.*

1. INTRODUCTION

Project management is attained by applying and integrating project management processes which have been categorized as five process groups; initiation, planning, execution, monitoring & controlling and closing [1]. According to the Project Management Body of Knowledge (PMBOK), project management is further classified into ten knowledge areas that are integration management, scope management, time management, cost management, quality management, communication management, human resource management, procurement management, risk management and stakeholder management. Each area consists of concepts, terms and activities that forms a specialized area [1] [2]. Project management is embraced across high project-intense industries and IT is one of it [3]. Project management has gone beyond aligning with strategic goals into reaping business benefits [4][5]. Studies have shown that 80% of organizations understand the value of project management, hence the reason why organizations are creating and practicing project management respectively [3]. However, project management remains as a huge challenge to organizations as project failure rates are still high and the same are observed in IT projects [6][7]. Past studies have also mentioned communication as a major factor that can steer the success or failure of a project [8]. In fact, communication management being the only knowledge area cutting across all the project processes and other knowledge areas explains the importance of project communication [1][9]. The outcome of this research suits for application across the other knowledge areas of project management as communication posits to have a role across all project management knowledge areas. Communication may influence into accepting anything new or change in an organization. By

communicating, the understanding for the need to change can be established and uncertainty can be cleared which changes the mindset of stakeholders of projects from rejection to acceptance mode [10]. For instance, in project procurement management, the justification communicated to decision-makers are important for the approval process. To add, in project human resource management, the project manager must be able to convey his/her messages to the team members with precision and clarity. A miscommunication between project manager and team can cause various damages to the project in terms of timeline, scope and budget among others.

For the purpose of this study, the Media Synchronicity Theory (MST) was adapted. The MST explains several communication media dimensions tested to produce communication performance [11][12]. In this study, the same concept is applied whereby the antecedents of communication were tested to achieve communication performance–alongside improve project management. One of the motivation of this study is the fact that prior studies indicating the importance of communication in project management are exploratory in nature [13][14][15]. In project communication the *what*, *when* and *how* is important, thus is adapted as the antecedents of communication [1][16][17]. This study therefore aims to establish the role of communication in project management empirically, within the IT industry from Malaysian context. The objectives of this explanatory study is to 1) explore the communication antecedents in project management, 2) establish the relationship between the antecedents of communication and project management and 3) determine if communication performance mediates between the communication antecedents and project management.

2. LITERATURE REVIEW

Prior literatures indicated the importance of communication in project management [13][14][15]. However, the importance of the communication antecedents granularly has not been established in prior studies empirically. This is a research gap found to be resolved by this study.

2.1 Media Synchronicity Theory (MST)

The MST originated from the Media Richness Theory (MRT), both focusing on the communication media to achieve task requirements or performance [12][18]. MRT suggests adequate communication medium to be chosen for each task by matching the degree of medium's richness to task's requirements [19]. MST, a new theory was formulated from MRT to address the capabilities of new media as well as to further improve the understanding of media and performance. Empirical evidence on MST and its implications are limited. The conceptual definitions and operational measures for media capabilities in the theory are still under development stage which provides opportunities for further empirical testing and validation [11][20][21].

2.1 Communication Antecedents

Communication is defined as "the transmission of meaning from one person to another or any people, whether verbally or non-verbally" [16][22][23]. A basic communication model consists of the sender and receiver whereby communication medium is used to transmit and acknowledge the information transmitted [1]. During the 80's, communication was identified as a critical success factor for project implementation and expected to occur throughout the entire project implementation processes [24]. During project communication the *what*, *why*, *who*, *when*, *where* and *how* are taken into consideration [1]. These are the antecedents of communication commonly applied in any communication. Therefore, the antecedents investigated for this paper are communication timing, communication content, communication method and communication technology.

2.2.1 Communication timing

Communication timing refers to receiving information at the right time [17]. Successful communication in organizations need to be focused and timing is of crucial importance to avoid non-productive effort, to avoid duplication and help eliminate mistakes [10]. The importance of communication timing has been mentioned in other studies. In a construction study, the importance of communication timing is highlighted whereby during communication, responses to be provided timely for project issue clarifications and information needed [25]. In a tsunami early

warning to public study, timely and actionable information is crucial for disaster response agencies and affected communities during catastrophic disasters [26]. This indicates the importance of communication timing during any communication.

2.2.2 Communication content

An effective communication is all about the availability of correct information at the right time with a cost-effective manner [27]. Communication needs to consider the content, amount, quality, sequence, and what needs to be communicated for a work to be done optimally [25]. In a crisis management study, it was acknowledged that communication and the interaction with multiple parties is fundamental. Thus, the communication content analysis is crucial to avoid unnecessary data or communication inefficiency [28].

2.2.3 Communication method

Communication method refers to the medium used to transmit information [16]. Communication method can vary from written, oral, electronic, visual or non-verbal [16]. Both the MST and MRT theories argues on the task performance based on the information richness channeled via different mediums [18]. Under certain project complexity, the type of communication media used determines the level of performance either at minimal or maximal point [29].

2.2.4 Communication technology

Apart from using the best practices of project management, companies that best combines the use of best technologies will certainly develop better [30]. In another study, it has been stated that global virtual teams consisting of interdependent groups of individuals who reside on different time zones and countries rely primarily on communication technology and media to accomplish a common goal [31].

Referring to these literatures the communication antecedents mentioned earlier are adopted in this study to be tested for project management.

2.2   Communication Performance

Communication performance is about reaching a shared understanding of the information transmitted between the sender and receiver [12]. In organizations, communication is tied with business strategies and to be evaluated with measurable targets [32]. Accountability on communication strategy choices made should produce certain outcomes to be measured. Communication performance can be measured at the communication products (output), communication processes and stakeholder satisfaction (interaction), and on the results (impact) [33].

2.3   Project Management

The first formal Project Management Methodologies (PMM) were setup forty years ago to control budget, plans and quality. Literature shows whether the PMM is standardized or customized, or a combination of both; it still implies some context lead to a higher chance of project success [34]. Past studies have some evidence that value sought from a high performing project management system is associated with the success of projects [35][36]. Project management is not just a delivery system, but a partner with other managerial disciplines in building critical actions and interfaces internally and externally for projects to be successful [4].

2.4 Research Model and Hypotheses Development

The published statistics for project failures that are still high, and communication being a vital factor for project failure or success [8][27] drove this study to establish the role of communication in project management. Communication is vital for management functions [37] whereas communication management is necessary for successful communication in projects [38]. Communication management involves communication plan which spells out the *why*, *what*, *who*, *where* and *how* communication takes place [1][17]. These are not empirically proven in project management studies. Thus, the communication antecedents found in other studies are adopted for this empirical study of project management. The concept from the MST model were adapted to form the research model.

In a construction project management study, it states communication should be timely and when contractors request for information or clarification on issues, responses should be timely [25]. This study confirmed that communication between project members affects

project outcomes in construction projects in China [25]. Communication needs to consider amount, content, sequence, quality and what needs to be communicated to allow task to be carried out optimally [25]. Explicit communication is important because it improves efficiency and productivity [39]. These form hypotheses H1 and H2:

H1: Timely communication improves communication performance
H2: Right communication content improves communication performance

In another construction project study, it was stated ineffective communication can lead to misunderstanding and cause construction failures. In this study, it was emphasized that the communication method of managing information is important [16]. Thus, this forms hypothesis H3:
H3: Appropriate communication method improves communication performance

A study focusing on collaborative technologies has mentioned that technologies are implemented as a preparation for the ever-changing business environment especially in improving business performance in a distributed setup. These technologies are applied in supply chain management, project management, distance learning, human resource management and multiple disciplinary [40]. Technology allows communication to be concise, clear and consistent [40]. In another sales force job satisfaction study, it was confirmed that communication infrastructure positively impacts job satisfaction, administrative performance and outcome performance [41]. Thus, hypothesis H4 is formed:
H4: Communication technology readiness improves communication performance

A study comprising of all communication antecedents impact towards project management empirically was a gap found from the literature review phase and adopted as one of this study's objective. The communication technology found in other fields [40][41] is a new characteristic to be tested for project communication in project management.

The media capabilities in MST are switched with the communication antecedents to test the empirical results of this study to form the

communication performance for better project management. The correlation between communication management and project performance was recommended for future studies [9]. Based on this gap, communication performance is adopted as a mediator between communication antecedents and project management, forming the following hypotheses:

H5: Communication performance mediates between the communication timing and project management
H6: Communication performance mediates between the communication content and project management
H7: Communication performance mediates between the communication method and project management
H8: Communication performance mediates between the communication technology and project management.
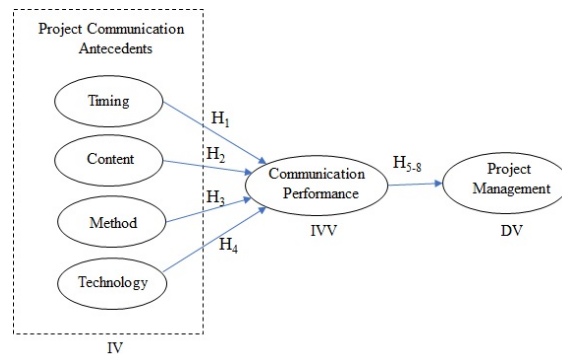

Figure 1: Research Model

Figure 1 is the research model developed for this study. Project communication antecedents identified from other studies as mentioned in section 2.5 were adapted into the MST to test the impact on communication performance and further to improve project management. The study gap to study the correlation between communication management and project performance in the original MST [9][12] was adopted here whereby, communication performance is adopted as the mediator between project communication antecedents and project management.

3. RESEARCH METHODOLOGY

An electronic survey was conducted using questionnaire as the main data collection instrument. Electronic questionnaire surveys are easily designed and administered [42]. The

questionnaire design was based on prior literature [16][33][40][43][44][45] and altered accordingly to suit this study. A pilot test was run with 20 respondents. The questionnaire survey used ordinal scale for demographic data collection and interval scale (7-point Likert) for remaining data collection. The 7-point scale is the optimum rating scale and high in reliability. A scale higher than 7-point demands discrimination and a scale lower than 7-point suffers loss of reliability due to coarseness of grouping [46]. The Likert scale which is a commonly used measurement method in educational context was used for this questionnaire design [47]. A recent study, has supported that 7-point Likert scale provides accuracy of measure and appropriate for electronically distributed or unsupervised usability questionnaires [48]. The operationalization of the variables used in the questionnaire is as shown in Table 1:

Table 1: Operational Definitions

Construct	Definition	Reference
Communication Content (CC)	Measure the type, accuracy and relevancy of the project information communicated.	Ling & Ma (2014) Christensen (2014)
Communication Method (CM)	Measure the channels/mediums used as information carrier within the project.	Zulch (2014)
Communication Performance (CPER)	Measure the communication performance achieved.	Vos (2015)
Communication Timing (CT)	Project information communicated in timely manner.	Ling & Ma (2014) Christensen (2014)
Communication Technology (CTE)	Measures the infrastructure readiness for project communication to take place.	Bayrak (2015)
Project Management (PM)	Measure the adoption of project management.	De Carvalho (2015)

This study was conducted among the IT professionals in IT projects within Malaysia. Out of the 200 questionnaires distributed online and manually, 130 successful responses were received which recorded 65% of response rate. The 130 samples are sufficient as per the G-Power tool because this research model with 4 predictors requires only 129 samples.

4. RESEARCH FINDINGS

4.1 Data Analysis

Structural Equation Modelling (SEM) analysis is the most effective way to test mediated effects. SEM can concurrently test all the relationships in the model, let it be the loading of observed indicators to the latent constructs, the paths from independent variable to the mediator and the dependent variable, and the path from the mediator to the dependent variable. SEM also has an advantage of dealing with measurement errors. SEM is able to provide higher level of validity and reliability[49][50]. This research uses Partial Least Square (PLS) - SEM for data analysis. PLS-SEM is a second generation multivariate statistical technique used to test and estimate causal relationship among multiple independent and dependent constructs [51].

4.2 Construct Reliability and Validity

SmartPLS 3.0 was used to measure the model in this study. The Composite reliability and the Cronbach's Alpha values were measured to determine the model's reliability. As per Table 2, the composite reliability for all the variables are greater than 0.70 which means reliability for all variables are achieved. The Cronbach's Alpha for all the variables are greater than 0.70, thus internal quality is achieved. The AVE for all the variables are greater than 0.50, means a good internal quality model is also achieved [52].

Discriminant validity ensures a reflective construct has the strongest relationship with its own indicators compared to other constructs in the PLS path model [52]. The discriminant validity is measured by the Fornell-Larcker and the heterotrait-monotrait ratio of correlations (HTMT) approach. Discriminant validity is achieved when average variance extracted (AVE) is greater than the correlation squared of the other constructs [53]. As per

Table 3, all AVE values in diagonal are greater than the off-diagonal numbers showing acceptable discriminant validity. In recent research, the HTMT has a superior performance compared to Fornell-Larcker in assessing discriminant validity. Discriminant validity is achieved if the HTMT values are lesser than 0.9 [54]. This research model has achieved discriminant validity as all the HTMT results are lesser than 0.90 as per Table 4. The loadings of measured variables should be higher than the cross loadings by at least 0.1 to indicate sufficient discriminant validity [52]. Table 5 shows the loadings of all constructs meet this criterion. So, it is concluded that discriminant validity is achieved.

Table 2: Cronbach's Alpha, Composite Reliability (CR) and AVE Results.

Constructs	Cronbach's Alpha	CR	AVE
Communication Content (CC)	0.750	0.854	0.662
Communication Method (CM)	0.847	0.895	0.683
Communication Performance (CPER)	0.799	0.869	0.624
Communication Timing (CT)	0.780	0.901	0.820
Communication Technology (CTE)	0.813	0.863	0.514

Table 3: Discriminant Validity Results – Fornell Larcker.

Constructs	CC	CM	CPER	CT	CTE	PM
CC	**0.814**					
CM	0.295	**0.826**				
CPER	0.582	0.433	**0.790**			
CT	0.438	0.254	0.674	**0.905**		
CTE	0.513	0.520	0.636	0.526	**0.717**	
PM	0.572	0.458	0.700	0.599	0.675	**0.744**

Table 4: Discriminant Validity Results – HTMT.

Constructs	CC	CM	CPER	CT	CTE	PM
CC						
CM	0.353					
CPER	0.733	0.501				
CT	0.536	0.284	0.845			
CTE	0.598	0.639	0.752	0.625		
PM	0.679	0.526	0.827	0.718	0.780	

Table 5: Cross Loadings.

	CC	CM	CPER	CT	CTE	PM
CC3	**0.789**	0.184	0.398	0.168	0.352	0.453
CC4	**0.868**	0.294	0.582	0.512	0.592	0.602
CC5	**0.781**	0.224	0.404	0.327	0.242	0.294
CM3	0.181	**0.778**	0.291	0.164	0.427	0.375
CM4	0.285	**0.866**	0.401	0.259	0.465	0.39
CM5	0.276	**0.906**	0.45	0.272	0.507	0.439
CM6	0.213	**0.745**	0.22	0.077	0.259	0.279
CPER1	0.524	0.347	**0.848**	0.651	0.606	0.612
CPER2	0.388	0.42	**0.788**	0.469	0.466	0.57
CPER3	0.52	0.319	**0.735**	0.485	0.482	0.414
CPER4	0.408	0.285	**0.785**	0.506	0.444	0.598
CT1	0.425	0.269	0.636	**0.914**	0.515	0.565
CT3	0.365	0.188	0.581	**0.896**	0.434	0.518
CTE1	0.295	0.551	0.316	0.254	**0.673**	0.455
CTE2	0.283	0.422	0.35	0.244	**0.665**	0.323
CTE3	0.315	0.422	0.399	0.358	**0.714**	0.438
CTE4	0.469	0.411	0.491	0.449	**0.825**	0.562
CTE5	0.307	0.468	0.491	0.348	**0.759**	0.544
CTE6	0.463	0.1	0.578	0.504	**0.65**	0.515
PM1	0.468	0.313	0.508	0.459	0.454	**0.784**
PM2	0.492	0.275	0.503	0.405	0.418	**0.811**
PM3	0.385	0.371	0.495	0.289	0.411	**0.694**
PM4	0.407	0.383	0.502	0.547	0.601	**0.729**
PM5	0.267	0.354	0.409	0.345	0.448	**0.649**
PM6	0.431	0.366	0.636	0.584	0.583	**0.785**
PM7	0.498	0.329	0.547	0.443	0.574	**0.743**

4.3 Common Method Variance (CMV)

CMV was a concern for this study as both the independent and dependent variables were collected simultaneously from the same respondents [55]. CMV is defined as a systematic error variance shared among variables which are measured using the same method or source [56]. In this study, the post-hoc statistical remedies were adopted. The Harman's Single Factor Test and the Measured Latent Marker Variable Approach using Item Level Correction (ILC) Approach were conducted to ensure no Common Method Bias (CMB) [56][57].

The Harman's Single Factor Test states all items in a research model should be subjected to an exploratory factor analysis. The presence of a substantial Common Method Bias will result in one factor emerging [57]. The results as per Table 6 shows the presence of nine (9) distinct factors with eigen values greater than 1.0, rather than a single factor. The PCA results also shows 35 factors exist accounting for 69.13% of the total variance. The first unrotated factor captured only 32.382% of the variance in data.

The Measured Latent Marker Variable Approach using Item Level Correction (ILC) Approach is used after the analysis of measurement and structural models to observe the impacts of CMV on R^2. A marker indicator is constructed with the items in the exogenous variable to predict the endogenous variables in the research model [55]. The R^2 value increased from 0.485 to 0.561 which is an increase of 0.076 only. Thus, these non-significant changes prove common method bias did not influence this study.

Table 6: Harman's Single Factor Test – Principal Component Analysis.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	11.334	32.382	32.382	11.334	32.382	**32.382**
2	2.886	8.245	40.627	2.886	8.245	40.627
3	2.112	6.034	46.661	2.112	6.034	46.661
4	1.679	4.798	51.458	1.679	4.798	51.458
5	1.410	4.029	55.488	1.410	4.029	55.488
6	1.340	3.829	59.317	1.340	3.829	59.317
7	1.245	3.557	62.873	1.245	3.557	62.873
8	1.145	3.273	66.146	1.145	3.273	66.146
9	1.044	2.984	69.130	1.044	2.984	**69.130**
10	.979	2.796	71.926			
11	.911	2.602	74.528			
12	.866	2.474	77.002			
13	.764	2.182	79.184			
14	.718	2.052	81.236			
15	.676	1.932	83.168			
16	.597	1.707	84.875			
17	.536	1.533	86.407			
18	.517	1.478	87.886			
19	.488	1.393	89.279			
20	.443	1.265	90.544			
21	.382	1.090	91.634			
22	.366	1.044	92.679			
23	.313	.893	93.572			
24	.279	.798	94.369			
25	.265	.758	95.127			
26	.237	.676	95.803			
27	.224	.641	96.445			
28	.211	.602	97.047			
29	.201	.574	97.621			
30	.190	.543	98.164			
31	.171	.489	98.653			
32	.139	.396	99.049			
33	.134	.382	99.432			
34	.113	.322	99.753			
35	.086	.247	100.000			

4.4 Structural Model Testing Results

The research model was tested with structural equation modelling (SEM). As shown in Figure 2, the result estimations for the structural model are at $*p<0.05$ and $***p<0.001$. All the paths in the PLS analysis are positively significant at level 0.05 and all the T-values are greater than 1.96. Thus, all hypotheses are supported. Coefficient of determination (R^2) value is a measure of the model's predictive accuracy and is calculated as the squared correlation between a specific endogenous construct's actual and predicted values. The coefficient represents the exogenous latent variables combined effects on the endogenous latent variables [52]. R^2 values of 0.67, 0.33, 0.19 are substantial, moderate, and weak respectively [52]. The model fit (R^2) for this study, shows 61.1% for communication performance and 48.5% for project management respectively which falls within the moderate classification.

5. MANAGERIAL IMPLICATION

This research findings offer some insights to the theoretical and practical implication in the field of project management. The empirical evidence of this research supports five key findings. As hypothesized as per Table 7, the findings show that (1) timely communication timing improves communication performance, (2) right communication content improves communication performance, (3) appropriate communication method improves communication performance (4) communication technology readiness improves communication performance and (5) communication performance mediates between communication antecedents and project management. This study has bridged the gap found in prior literatures whereby the communication antecedents does play a role in project management and shall be considered meticulously in project management practise. In addition, these communication antecedents adapted from different field of studies has proven to be suitable to be applied in IT project management.

Most studies or industry practices usually emphasize the importance of communication management in project management in order to achieve certain goals let it be project milestones or completion which is aligned strategically to organization goals.

Despite the emphasize given, many projects still do face communication issues. In future, based on this research findings, project stakeholders should consider to look granularly into the communication antecedents and it's impact to the required communication performance customized to respective project. By looking deeper into the communication antecedents, project stakeholders can pin down the exact issues faced within the project to improve project management. In a way, the communication antecedents are forming the communication structure which is deemed important for proper communication management and project management [58]. This study also emphasizes that communication antecedents are significant to achieve fruitful project management.

6. CONCLUSION AND FUTURE WORKS

This research's main objective was to investigate the role of communication antecedents in influencing project management. The objective of this research was achieved, whereby communication does play a role in project management. Even though the data collection process for this study was time-consuming due to distributed locations of the respondents within Malaysia, the required number of samples took almost 6 months to be achieved. An online survey was deployed for the data collection which enabled access to respondents who were geographically distributed. This research has newly established and confirmed that communication antecedents are important precursors to achieve required communication performance in project management. This study has established the empirical evidence that communication antecedents enhances communication performance and subsequently improves project management. This study also introduces a new contribution in which communication technology is a proven and important communication antecedent for communication performance in project management. These granular findings on communication antecedents empirically are expected to contribute to the project management body of knowledge.

However, several limitations do exist. Other deemed relevant communication antecedents should be tested in this model as future works. The scope of this study was within Malaysian context and should be expanded to other regions with different culture and environment settings. The result of this research also sheds valuable light on a broader understanding to the project management body of knowledge.
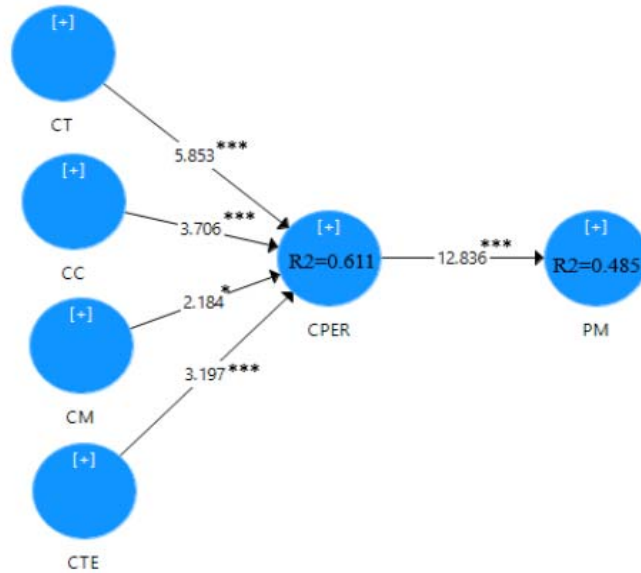
Figure 2: Structural Model Results

Table 7: Hypothesis Testing Results.

Hypothesis	Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T- Values	P Values	Decision
H1	CT -> CPER	0.415	0.412	0.071	5.853	0.000***	Supported
H2	CC -> CPER	0.247	0.241	0.067	3.706	0.000***	Supported
H3	CM -> CPER	0.142	0.146	0.065	2.184	0.029*	Supported
H4	CTE -> CPER	0.217	0.228	0.068	3.197	0.001***	Supported
H5	CT -> CPER -> PM	0.290	0.293	0.059	4.896	0.000***	Supported
H6	CC -> CPER -> PM	0.173	0.172	0.052	3.292	0.001***	Supported
H7	CM -> CPER -> PM	0.099	0.104	0.048	2.067	0.039*	Supported
H8	CTE -> CPER -> PM	0.152	0.161	0.047	3.238	0.001***	Supported

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