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Impact of Project Management Process Groups on Project Success: A Case of Real Estate Companies

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Abstract: This study aims to assess the extent to which project management process groups contribute to real estate company's projects success in Ethiopia. Data for the assessment are obtained through five point Likert scale based questionnaire from 641 randomly selected respondents who are working in 60 real estate compaines. Data was analyzed by using correlation and regression analysis. Results revealed that Pearson product-moment correlation between process group initiating, process group planning was a moderate and process group executing, process group monitoring and controlling, process group closing was a strong with real estate company's project success. Regression results shows that there was 31.8 percent of the variation in project success was explained by five independent variables in the model. The overall project management process groups have strong impact on project success. To be more successful in real estate business, real estate companies must focus on project management process strategies.
Keywords: Project management process groups, Project success, Real estate companies

I. INTRODUCTION

Project management is an application of knowledge, skills, tools, and techniques to project activities to meet the project requirements (PMI, 2013). This application of knowledge requires the effective management of the project management processes. Whereas, a process can be defined as a set of interrelated actions and activities performed to create a pre-specified product, service, or result. Every process is categorized by its inputs, the tools and techniques that can be applied, and the resulting outputs. Project management processes is integration between the processes, their interactions, and the purposes they serve. These processes are grouped into five categories known as project management process groups or process groups (PMI, 2013).

The integrative nature of project management requires the monitoring and controlling process group to interact with the other process groups, as shown in Figure 1. These five project management process groups describe project in terms of phases. They involve several areas of project management applications. These areas refer to as project management knowledge areas. There is an interaction of the 47 project management process within the 5 project management process groups and the 10 project management knowledge areas.

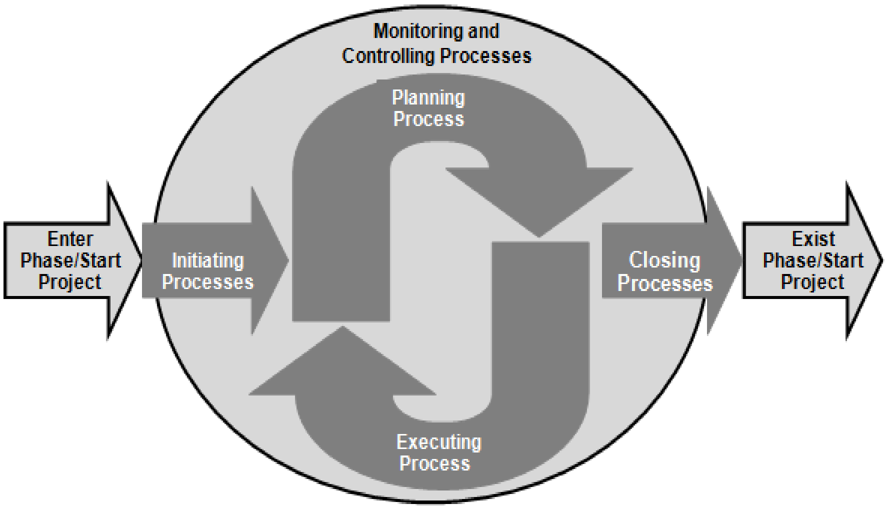

Figure 1: Project management process groups (PMI, 2013)

(1) Initiating Process Group

The processes in this grouped are used to define a new project or a new phase for existing project by obtaining approval for starting the project or phase. Hayes (2000) provided information for evaluating the completeness and effectiveness of a project charter template as a project management tool.

(2) Planning Process Group

The processes in this group are used to set scope and objectives for a project as well as to list down course of actions required to attain the objectives that the project was undertaken to achieve. Gulick (1936) defines planning as working out in broad outline the things that need to be done and the methods for doing them to accomplish the purpose. According to Goetz (1949) planning can be defined as a fundamentally choosing, whereas Koontz (1958) defines planning as the conscious determination of courses of action designed to accomplish purposes. Mintzberg (1994) describes planning as the effort to formalizing decision making activities through decomposition, articulation and rationalization. Hamilton and Gibson (1996) stated that an increase in pre-project planning for projects increases the likelihood of a construction project meeting financial goals. According to Gibson and Gebken (2003) pre-project planning in construction is a phase after business planning where a deal is initiated and prior to project execution.

Gibson, Wang, Cho, and Pappas (2006) noted that research results show that effective pre-project planning leads to improved performance in terms of cost, schedule, and operational characteristics. Steinfort and Walker (2007) stated that a project plan and programme method of work being resolved and agreed by all parties involved in project as a success factor.

According to Shehu and Akintoye (2009) planning is one of the most important critical success factors and their research ranks effective planning at the top of a list of critical success factors. Serrador (2012) literature surveyed pointed out there is a strong link between planning and project success.

According to Wang and Gibson (2008), Dvir, Raz, and Shenhar (2003) planning and analysis are important and the more planning there is in a project, the more successful the project will be, time spent on these activities will reduce risk and increase project success. On the other hand, Thomas, Jacques, Adams, and Kihneman-Woote (2008), Morris (1998), stated that inadequate analysis and planning will lead to a failed project.

Choma and Bhat (2010) note that the optimum amount of effort spent planning and its relationship to success is an area of interest to researchers (speaks to the general nature and characteristics of projects) and practitioners (as guidance when defining project structure and timelines). Thomas, Jacques, Adams, and Kihneman-Wooten (2008) proposed the process for accomplishing the integration of project planning, project planning and control development, and project team building.

(3) Executing Process Group

The processes in this group are used to perform works of the project that are defined in the project management plan to achieve project requirements. Zhang and Xu (2008) analyzed six sigma and suggested that repeatability and reproducibility model need to be re-specified and the revised model posits that the new organizational system leads to information systems project success.

(4) Monitoring and Controlling Process Group

The processes in this group are used to follow, review, and facilitate the flow and performance of a project; identify any areas in which changes to the plan are required; and initiate the corresponding changes. Pinto and Slevin (1989) identified that monitoring and feedback-timely provision of comprehensive control information and troubleshooting-ability to handle unexpected crises and divisions from plan as critical success factors. Aubry, Hobbs, Muller, and Blomquist (2010) presented experiential results on the nature and reasons for project management office transition.

(5) Closing Process Group

The processes in this group are used to finalize all activities across all process groups to formally close the project or phase. Amponsah (2010) conducted study on improvement of project management practice in Ghana focusing on agriculture, banking and construction sectors of the Ghanaian economy. In his study the process areas used for the assessment included are requirement management, project planning, monitoring and evaluation.

II. PROJECT MANAGEMENT SUCCESS-TIME, COST, AND QUALITY FACTORS

According to Muller and Jugdev (2012) there is no clear definition exists and stresses the need for measurable constructs of project success. Cheong and Mustaffa (2017) research study outlined the development trend of project success measurement globally and locally. Cheung, Suen, and Cheung (2004) identified project performance grouping such as people, cost, time, quality, safety and health, environment, client satisfaction, and communication. Ismail, Rahman, and Memon (2013) studied the factors affecting time and cost overruns throughout life cycle of construction projects.

Table 1 shows contributions of many researchers strategies used in different stages of initiating, planning, executing, monitoring and controlling, and closing in project management implementation and project successful.

Table 1: Project management process groups research contributions

Initiating: Hayes (2000)
Planning: Collyer, Warren, Hemsley, & Stevens, (2010); Conforto & Amaral (2010); McLain (2009); Ortiz de Orue, Taylor, Chanmeka, & Weerasooriya (2009); Hawes & Duffey (2008); Jergeas (2008); Thomas, Jacques, Adams, & Kihneman-Wooten (2008); Khodakarami, Fenton, & Neil (2007); Eden, Ackermann, & Williams (2005); Pollack-Johnson & Liberatore (2005); Trietsch (2005); Vanhoucke, Vereecke, & Gemmel (2005); Cohen, Mandelbaum, & Shtub (2004); Haga & Marold (2004); Ingalls & Douglas (2004); Emhjellen, Emhjellen, & Osmundsen (2003); Leach (2003); Vanhoucke & Demeulemeester (2003); Globerson & Zwikael (2002); Herroelen, Leus, & Demeulemeester, (2002); Yates & Eskander (2002); Abbasi (2001); Liberatore (2002); Selinger (2001); Whitehouse & DePuy (2001); Al-Tabtabai (2000); Austin (2000); Hegazy (2000); Waterworth (2000); Zwikael, Globerson, & Raz, (2000); Carbno (1999); Gemmill (1999); Kumar (1999); Kuprenas, Kendall, & Madjidi (1999); Leach (1999); Siqueira (1999); Amor & Teplitz (1998); Baki (1998); Deng & Hung (1998); Raz & Globerson (1998); Gemmill & Tsai (1997); Gupta & Graham (1997)
Executing: Zhang & Xu (2008); Kuprenas, Kendall, & Madjidi (1999); Gupta & Graham (1997)
Monitoring and Controlling: Aubry, Hobbs, Muller, & Blomquist (2010); Conforto & Amaral (2010); Petit & Hobbs (2010); Miranda & Abran (2008); Thomas, Jacques, Adams, & Kihneman-Wooten (2008); Zhang & Xu (2008); Andersson & Muller (2007); Boersma, Kingma, & Veenswijk (2007); Bonnal, de Jonghe, & Ferguson (2006); Javed, Manzil-E-Maqsood, & Durrani (2006); Legris & Collerette (2006); Rozenes, Vitner, & Spraggett (2006); Smith & Flanegin (2006); Hallgren & Maaninen-Olsson (2005); Ash & Smith-Daniels (2004); Sanchez & Perez (2004); Anbari (2003); Badir, Founou, Stricker, & Bourquin (2003); Bauch (2001); Denker, Steward, & Browning (2001); Kuprenas, Kendall, & Madjidi (1999); Pruitt (1999); Brandon Jr. (1998); Christensen & Gordon (1998); Ibbs, Lee, & Li (1998); Gupta & Graham (1997); Levy & Globerson (1997); Murmis (1997); Robinson (1997)
Closing: Pruitt (1999)
Project Success: Collyer & Warren (2009); Thomas, Jacques, Adams & Kihneman-Woote (2008); Zwikael and Globerson (2006); Dvir, Raz & Shenhar (2003); Cooke-Davies (2002); Shenhar, Dvir, Levy and Maltz (2001); Shenhar, Levy and Dvir (1997); Pinto and Slevin (1988)

Source: Author's literature review work

III. RESEARCH METHODOLOGY

As per the objectives of the research study, quantitative and qualitative research methods were used in this research study. To examine the current state of real estate companies in Ethiopia, quantitative research method was used, as this method helped to select respondents for the qualitative analysis of the questionnaires. Major part of the research study was based on qualitative analysis method.

The research survey has been conducted mainly on the real estate companies situated in Addis Ababa, capital city of Ethiopia (North Ethiopia). There are 241 real estate companies in Ethiopia but most of the real estate companies are in Addis Ababa city.

The sample size (N) must be at least as much as $N > 50 + 8n$ for testing the multiple correlation and $N > 104 + n$ for testing individual predictors, where n is the number of independent variables (Gaur & Gaur, 2009; Pallant, 2010; Tabachnick & Fidell, 2007). Whereas for conducting factor analysis sample size of 200-300 is considered to be adequate and above 500 is considered to be excellent for a proper analysis (Gaur & Gaur, 2009).

Accordingly, $N > 50 + 8n$, $N > 50 + 8 (5)$, $N > 50 + 40$, $N > 90$, and $N > 104 + n$, $N > 104 + 5$, $N > 109$, $n = 5$ independent variables. These two conditions are satisfied in this research study and 641 respondents (sample size) are final processed for statistical analysis. The sample of this study consisted of 641 respondents by using five point Likert scale questionnaire, simple random sampling method from 70 real estate companies in Addis Ababa, Ethiopia.

IV. DATA COLLECTION AND ANALYSIS

This research study applied general linear model to determine the predictive power of the effects of project process groups on real estate project success. This included Pearson product-moment correlations coefficients (r), regression analysis, the model, analysis of variance (ANOVA) and coefficient of determination. Pearson product-moment correlation coefficient (r) is generally used method for measuring the degree of relationship between two variables. It is assumed that there is linear relationship between the two variables and the two variables are casually related which means that one of the variables is independent and the other one is dependent. Moreover, a large number of independent causes are operating in both variables to produce a normal distribution (Kothari & Garg, 2014).

The present research study applied Pearson product-moment correlations coefficients (r) to determine the relationship between project process groups and real estate project success. Data analysis was carried out with the help of SPSS-20 version. The Pearson product-moment correlations coefficients (r) matrix obtained for the five interval-scaled variables is shown in Table 2.

Table 2: Guidelines to interpret Pearson product-moment correlations coefficients (r)

Strength of Association	Pearson Correlation Coefficient (r)
Weak	0-0.29
Moderate	0.30-0.49
Strong	0.50-1.00

Source: Pallant, 2010; Cohen, 1988

According to Kothari and Garg (2014) the value of the Pearson product-moment correlations coefficients (r) should lie between +1 and –1. A positive values of Pearson product-moment correlations coefficients (r) indicates a positive correlation between the two variables (i.e., changes in both variables take place in the statement direction), whereas negative values of Pearson product-moment correlations coefficients (r) indicate negative correlation (i.e., changes in the two variables taking place in the opposite directions). Whereas, a zero value of Pearson product-moment correlations coefficients (r) indicates that there is no association between the two variables. The value of Pearson product-moment correlations coefficients (r) nearer to +1 or -1 indicates high degree of correlation between the two variables.

(1) Correlation between Project Management Process Groups and Project Success

The strength of relationship between project management process groups factor i.e., process group initiating (PGI), process group planning (PGP), process group executing (PGE), process group monitoring and controlling (PGMC), process group closing (PGC), and dependent variable project success (PS) are shown in Table 3. The Pearson product-moment correlations coefficients (r) between independent and dependent variables were interpreted based on Table 2. Table 3 result reflects that all the independent variables (process groups) viz., process group initiating (PGI), process group planning (PGP), process group executing (PGE), process group monitoring and controlling (PGMC), process group closing (PGC), have a positive correlation with the dependent variable (i.e., project success).

(i) Project Initiating Process Group and Project Success

The relationship between process group initiating (PGI) and project success (PS) was investigated using Pearson product-moment correlation coefficient (r). There was a moderate, positive correlation between the two variables (Table 3), $r = 0.375$, $n = 641$, $p < .01$ (statistically significant), reflecting that hypothesis one is accepted (i.e., H1: A project initiating process group has impact on project success). Since the sign of the Pearson product-moment correlations coefficients (r) value is positive, the relationship is direct. It means as the practice of process group initiating (PGI) increases, there is a high likelihood that project success (PS) will also increase.

(ii) Project Planning Process Group and Project Success

The relationship between process group planning (PGP) and project success (PS) was investigated using Pearson product-moment correlation coefficient (r). There was a moderate, positive correlation between the two variables (Table 3), $r = 0.475$, $n = 641$, $p < .01$ (statistically significant), reflecting that hypothesis two (H2) is accepted (i.e., H2: A project planning process group has impact on project success). Since the sign of the Pearson product-moment correlations coefficients (r) value is positive, the relationship is direct. It means as the practice of process group initiating (PGI) increases, there is a high likelihood that project success (PS) will also increase.

(iii) Project Executing Process Group and Project Success

The relationship between process group executing (PGE) and project success (PS) was investigated using Pearson product-moment correlation coefficient (r). There was a strong, positive correlation between the two variables (Table 3), r = 0.508, n = 641, p < .01 (statistically significant), reflecting that hypothesis three is accepted (i.e., H3: A project executing process group has impact on project success). Since the sign of the Pearson product-moment correlations coefficients (r) value is positive, the relationship is direct. It means as the practice of process group executing (PGE) increases, there is a high likelihood that project success (PS) will also increase.

Table 3: Product-moment correlations coefficients (r) between independent (process groups) and dependent variables (project success), N=641

		PGI	**PGP**	**PGE**	**PGMC**	**PGC**	**OPG**	**PS**
PGI	r	1						
	Sig.							
PGP	r	.638**	1					
	Sig.	.000						
PGE	r	.609**	.896**	1				
	Sig.	.000	.000					
PGMC	r	.665**	.901**	.897**	1			
	Sig.	.000	.000	.000				
PGC	r	.586**	.817**	.819**	.842**	1		
	Sig.	.000	.000	.000	.000			
OPG	r	.796**	.936**	.929**	.949**	.897**	1	
	Sig.	.000	.000	.000	.000	.000		
PS	r	.375**	.475**	.508**	.552**	.506**	.534**	1
	Sig.	.000	.000	.000	.000	.000	.000	

Note: **.Correlation is significant at the 0.01 level (2-tailed), r-Pearson Correlation coefficient, Sig.-Significance, PGI-Process group initiating, PGP-Process group planning, PGE-Process group executing, PGMC-Process group monitoring and controlling, PGC-Process group closing, PS-Project success, OPG-Overall process groups

Source: Computation based on data gathered from author's field work

(iv) Project Monitoring and Controlling Process Group and Project Success

Bakar, Razak, Abdullah, Awang, and Perumal (2010) identified critical success factors to develop an empirical framework for depicting the success factors for sustainable building and found that effective monitoring and control, realistic schedule, ability to solve problem, understanding project objective and well allocation of resources are crucial factors in ensuring the success of sustainable building construction in Malaysia.

The relationship between process group monitoring and controlling (PGMC) and project success (PS) was investigated using Pearson product-moment correlation coefficient (r). There was a strong, positive correlation between the two variables (Table 3), r = 0.552, n = 641, p < .01 (statistically significant), reflecting that hypothesis four is accepted (i.e., H4: A project monitoring and controlling process group has impact on project success). Since the sign of the Pearson product-moment correlations coefficients (r) value is positive, the relationship is direct. It means as the practice of process group monitoring and controlling (PGMC) increases, there is a high likelihood that project success (PS) will also increase.

(v) Project Closing Process Group and Project Success

The relationship between process group closing (PGC) and project success (PS) was investigated using Pearson product-moment correlation coefficient (r). There was a strong, positive correlation between the two variables (Table 3), r = 0.506, n = 641, p < .01 (statistically significant), reflecting that hypothesis five is accepted (i.e., H5: A project closing process group has impact on project success). Since the sign of the Pearson product-moment correlations coefficients (r) value is positive, the relationship is direct. It means as the practice of process group closing (PGC) increases, there is a high likelihood that project success (PS) will also increase.

(vi) Overall Process Groups and Project Success

The relationship between overall process group (OPG) and project success (PS) was investigated using Pearson product-moment correlation coefficient (r). There was a strong, positive correlation between the two variables (Table 3), r = 0.534, n = 641, p < .01 (statistically significant), reflecting that hypothesis six is accepted (i.e., H6: The overall project management process groups has impact on project success). Since the sign of the Pearson product-moment correlations coefficients (r) value is positive, the relationship is direct. It means as the practice of all process group (OPG) increases, there is a high likelihood that project success (PS) will also increase.

(2) Standard Multiple Regression Analysis for Project process Groups and Project Success

Regression is used to explain the variations in one variable usually called the dependent variable, by a set of independent variables. It identifies the nature of the relationship. The number of independent variables in regression analysis could be one or more. In case of one independent variable it is referred as simple regression, whereas in case of more than one independent variable, it is called a multiple regression analysis (Chawla & Sondhi, 2016). In standard multiple regression, all the independent variables are entered into the equation simultaneously. Multiple regression is based on correlation, but allows a more complicated investigation of the interrelationship among a set of variables and used to address a variety of research questions (Pallant, 2010).

In this research study multiple regression analysis method has been used to know the relationship between independent variables (PGI-Process group initiating, PGP-Process group planning, PGE-Process group executing, PGMC-Process group monitoring and controlling, PGC-Process group closing) and dependent variable (PS-Project success).

Multiple regression analysis output produced by SPSS-20 has several tables like variables entered/removed, model summary, analysis of variance (ANOVA), coefficients, and collinearity diagnostics. The Table 4 tells about the independent variables and the regression method used. In this research study there are 5 independent variables entered for project management knowledge areas process group and regression method used is enter method. And there no variables removed.

(a) Model Summary-Determining How Well the Model Fits

The regression coefficient R = 0.564 shows the strength of the causal relationship between the dependent (PS-project success) and independent variables (PGI-Process group initiating, PGP-Process group planning, PGE-Process group executing, PGMC-Process group monitoring and controlling, PGC-Process group closing). Model 1 was able to explain 56.4% of the observations.

The R square is the proportion of variation in the dependent variable (project success) that is explained by the 5 independent variables. It is expressed as a percentage. Therefore, 31.8 percent (i.e., R square = .318) of the variation in project success can be explained by 5 independent variables (Process group initiating, Process group planning, Process group executing, Process group monitoring and controlling, Process group closing) in the model (Table 5). This means that 68.2% of the variation in project success cannot be explained by project management process group alone. Therefore, there must be other variables that have an influence also for the Ethiopian real estate company's project success.

Table 4: Variables entered/removed[a] for project management process group

Model	Variables Entered	Variables Removed	Method
1	PGC, PGI, PGE, PGP, PGMC[b]	.	Enter

a. Dependent variable: PS
b. All requested variables entered.
Note: Independent variables-PGI-Process group initiating, PGP-Process group planning, PGE-Process group executing, PGMC-Process group monitoring and controlling, PGC-Process group closing, and dependent variable-PS-Project success
Source: Computation based on data gathered from author's field work

The adjusted R square was .313 the model estimated shows that there was 31.3% positive variation in project success as a result of changes in the project management process groups explained by model. 68.7% of the variation in project success was explained by other factors other than project management process groups adopted by the Ethiopian real estate companies. In this model standard error of the estimate is .54280 (Table 5).

Overall statistical significance of the regression model was examining by testing the null hypothesis that R = 0 and the regression coefficient is not significant. From the model significance (Sig. = 0.000). Therefore, we failed to reject the null hypotheses and concluded that there was a statistically significant positive causal relationship between project management process group adopted by the Ethiopian real estate companies and the project success. In this research study for project management process group only one model is output due to standard multiple regression method used.

Table 5: Model summary for project management process groups

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.564[a]	.318	.313	.54280

Change Statistics				
R Square Change	**F Change**	**df1**	**df2**	**Sig. F Change**
.318	59.276	5	635	.000

a. Predictors: (Constant), PGC, PGI, PGE, PGP, PGMC

Note: Independent variables-PGI-Process group initiating, PGP-Process group planning, PGE-Process group executing, PGMC-Process group monitoring and controlling, PGC-Process group closing and dependent variable-PS-Project success

Source: Computation based on data gathered from author's field work

(b) Analysis of Variance-Statistical Significance

The F-ratio in the ANOVA table (Table 6) tests whether the overall regression model is a good fit for the data. The first row between-groups variability the second row the residual shows within groups gives variability due to random error and the third row gives the total variability. Using enter method, Table 6 shows that the 5 independent variables (Process group initiating, Process group planning, Process group executing, Process group monitoring and controlling, Process group closing) statistically significantly predict the dependent variable (Project success), $F(5, 635) = 59.276$, $p < .05$ (i.e., the regression model is a good fit of the data).

In the df (degree of freedom) in the same table, the first number represents the number of independent variables 1 to 5, the second number (635) are the total number of complete responses for all the variables in the equation (N), minus the number of independent variables (K) minus 1. Therefore, (N-K-1) [(641-5-1) = 635 for Model 1.

Table 6: Analysis of variance (ANOVA[a]) for project management process group

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	87.321	5	17.464	59.276	.000[b]
	Residual	187.088	635	.295		
	Total	274.409	640			

a. Dependent variable: PS

b. Predictors: (Constant), PGC, PGI, PGE, PGP, PGMC

Note: df=degree of freedom, Sig.-Significance, Independent variables-PGI-Process group initiating, PGP-Process group planning, PGE-Process group executing, PGMC-Process group monitoring and controlling, PGC-Process group closing, and dependent variable-PS-Project success

Source: Computation based on data gathered from author's field work

(c) Regression Coefficient

Table 7 gives the regression coefficients and their significance. Again, regression coefficients are used to construct an ordinary least squares equation. Using the regression coefficients for independent variables and the constant term given under the column labelled B, ordinary least squares equation has been constructed for predicting project success as:

Project success (PS) = .802 - (.300) (Process group planning) + (.684) (Process group monitoring and controlling) + (.198) (Process group closing)

In Table 7, model indicated that holding project success at a constant of B = .802 (sig: 0.000), a unit increase in implementation of process group planning would decrease project success measure by 0.300 units (sig. 0.009), process group monitoring and controlling leads to increase by 0.684 units (sig. 0.000), and process group closing leads to increase by .198 units (sig. 0.011).

From this the project management process group practices can be ranked as process group monitoring and controlling the first and process group closing the second. From the project success equation, process group initiating and process group executing factors are excluded because of insignificant contribution ($p > .05$) to express project success.

In case of using standardized coefficients, the ordinary least squares equation in this case will be:

Z Project success = - (.226) (Z Process group planning) + (.506) (Z Process group monitoring and controlling) + (.162) (Z Process group closing)

Table 7: Coefficients[a] for project management process group

Model		Unstandardized Coefficients		Standardized Coefficients	Statistical Significance		Collinearity Statistics	
		B	**Std. Error**	**Beta**	**t**	**Sig.**	**Tol.**	**VIF**
1	(Constant)	.802	.179		4.490	.000		
	PGI	.021	.046	.020	.461	.645	.549	1.821
	PGP	-.300	.115	-.226	-2.617	.009	.144	6.953
	PGE	.140	.106	.111	1.315	.189	.150	6.676
	PGMC	.684	.125	.506	5.464	.000	.125	7.987
	PGC	.198	.078	.162	2.542	.011	.264	3.785

a. Dependent variable: PS

Note: Sig.-Significance, Tol.-Tolerance, VIF-Variance inflation factor, Independent variables-PGI-Process group initiating, PGP-Process group planning, PGE-Process group executing, PGMC-Process group monitoring and controlling, PGC-Process group closing, and dependent variable-PS-Project success

Source: Computation based on data gathered from author's field work

(d) Collinearity Diagnostics

Based on the references discussed previously, this research study model is found with value of variance inflation factor less than 10 and tolerance greater than 0.10 therefore no collinearity problem that influence the least square estimates (Table 7). In Table 8, condition index obtained is another measure of multicollinearity. Rule of thumb is that there is multicollinearity if any two independent variables have variance proportions in excess of 0.9 (column values) corresponding to any row in which condition index is in excess of 30. This condition is also met in this research study and there is no multicollinearity and data if further analysed.

Table 8: Collinearity diagnostics[a] for project management process group

Model	Dimension	Eigen value	Condition Index	Variance Proportions					
				(Constant)	**PGI**	**PGP**	**PGE**	**PGMC**	**PGC**
1	1	5.969	1.000	.00	.00	.00	.00	.00	.00
	2	.013	21.849	.80	.30	.00	.00	.00	.00
	3	.011	22.899	.17	.65	.01	.02	.01	.05
	4	.004	39.587	.01	.01	.07	.11	.02	.90
	5	.002	59.058	.02	.02	.49	.83	.08	.00
	6	.001	63.633	.00	.02	.43	.03	.90	.04

a. Dependent variable: PS

Note: Independent variables-PGI-Process group initiating, PGP-Process group planning, PGE-Process group executing, PGMC-Process group monitoring and controlling, PGC-Process group closing, and dependent variable-PS-Project success

Source: Computation based on data gathered from author's field work

V. CONCULSION

The present research study focused on impact of project management process groups on real estate project success. Project management process groups (i.e., initiating process group, planning process group, executing process group, monitoring and controlling process group, and closing process group) plays significant contribution to real estate project success. Among all these project management process groups, project initiating and project planning process group has moderate impact on project success, where as executing process group, monitoring and controlling process group, and closing process group has strong impact on project success. The overall project management process groups have strong impact on project success.

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