Project Management Career Model as Project Competencies Change Within the Projects in the Philippines Construction Industry

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Abstract *– Nowadays, project-based organizations have become common because of the higher difficulty and mobility of industry practices. Project management competencies in such companies, which contribute to the acquisition of expertise, personal attributes, and managerial experience, are essential assets that need to be taken seriously. Standard project management job pathways have typically been implemented in the construction industry. However, more recent studies see project management skills as rigid structures and fail to accept their dynamic changes as the job advances. To resolve this discrepancy, this study carried out an overview of the project management competencies aligned with the construction industry's career model. Also, a quantitative analysis approach is used to analyze how those competencies change systematically as the degree of work increases in the career model.*

Keywords: *Project Management Competencies, Managerial Experience, Construction Industry, Project Management Skills, Quantitative Analysis Approach*

I. INTRODUCTION

The construction industry encounters some of the most challenging dilemmas within which to apply effective project management techniques. These challenges emerge from the uncertainties in the development process, budget, technology, and unforeseen circumstances. Consequently, a construction project is completed because of the succession of events and interactions with varying participants and processes in a constantly changing environment. Performance standards were established based on the ability of the organization to maintain the essential set of competencies that reinforce the successful execution of its construction projects. These events that can be quantified and used to differentiate the performance of an organization against an existing performance standard is known as competencies. Project management competencies refer to technical knowledge, skills affiliated to the job description, expertise with organization behavior, and experiences relevant to the industry. These competencies are essential to evaluate the construction organization and projects to obtain better organizational performance and project success.

The goal of this study is to develop a project management career models to create and promote project management competencies that are core assets of organizations considering that the project management world is marked by transition, tasks, and expertise and skills needed, evolve constantly. This will help the construction companies to provide employees to grow their overall skills so that they can move from experts to well-rounded project managers.

The researchers will remodel the traditional career model design in the construction industry that will generally benefit the project managers in maintaining a balance among organizational interests concerning the resources required and individual interests with regards to career advancement. Moreover, this career model will enhance consistency in the opportunities to grow and acknowledgment of the profession.

Lastly, this research will generate common communication and collaboration with the project managers. A successful project relies on effective communication. As the communication between project managers improve, it increases success and decreases the risks.

For this study, we will be approaching this through the quantitative method. For this study, the researchers prepared questionnaires with two parts, where part 1 is the basic information, including the number of years of experience in their current positions, age, gender. Then in part 2 is where we asked the respondents about ranking the important factors of competency in their respective jobs. The respondents are to answer a survey by Likert scale with 1 to 5 points, where the higher score means higher importance incompetency. To easily distribute the questionnaires, we will send an email to the respondents where they can conveniently answer the questionnaire through the link provided. To gather quantitative data, we will be creating a survey using Google Forms and will be sharing the link to the respondents. And after receiving back their answered questionnaires, we will be sorting out accurate and passed questionnaires and further proceed to our data analysis part.

II. METHODOLOGY

The researchers prepared questionnaires for the respondents to rate and where the data will be measured using a Likert scale. The interpretations of the five-point scale are 5 =Extremely Important, 4=Very Important, 3=Moderately Important, 2=Slightly Important, and 1=Not Important.

The researchers used Slovin's Formula to determine the needed number of respondents, we use:

$$n = \frac{N}{1 + Ne^2}$$

Let n be the needed number of respondents, N be the population size and e are the margin of error that denotes the acceptable probability of error.

For this study, the researchers will be asking the respondents to rate their importance of each competency on their job according to their positions. Friedman's Two-Way Analysis Test will be used to analyze the five-point Likert scale, where it will rank the appropriate project management competencies of each position in the project management.

Where:
$$Q = \frac{12}{nk(k+1)} \sum_{j=1}^{k} R_j^2 - 3n(k+1)$$

      k=number of competencies
      n= number of respondents
      R= sum of the ranks

The null hypothesis should be rejected, >0.005

Also, will make use Kendall's Coefficient of Concordance to analyze the data gathered for the concordance between the correlations and rankings.

Where:

$$w = \frac{ss}{(n^3 - n)(\frac{k^2}{12})}$$

      ss= sum of the squares from the mean
      n= number of items being ranked
      k= number of respondents

The null hypothesis for this test is that the data are normally distributed. If the alpha level is 0.05 and the p-value is less than 0.05, then it is to reject the null hypothesis. If the p-value is greater than 0.05, then the null hypothesis is not rejected.

The researchers will also be using Spearman's rank correlation, ρ, which is a non-parametric measure of the rank correlation between two variables. This can assess how well the two variables can be described using a monotonic function.

Where:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$$

ρ = Spearman's rank correlation

d = difference between two rank

n = number of skills

The general null hypothesis for a Spearman correlation is that H_0 is that there is no correlation between the two variables.

III. RESULTS AND DISCUSSIONS

Two-part questionnaires were used to gather empirical data. Part one gathered the basic information, including the respondent's gender, the number of years of experience in the construction industry, level of position in work, and location of the workplace. Part two respondents were asked to estimate the significance of each competency in their work formed on the project management competencies summarized in Table. Each expertise was under different categories with a total of nine categories. A sample is "How important is being able to recognize a problem in work? (Conceptual Thinking)". Using a Likert Scale with 1 to 5 points for each index. A higher score which is 5 means extremely important while the lowest score of 1 means not important.

Respondents' Profile of Private Contractor Companies

Table 1. Level of project management / Career model	
Junior supervisor	29
Senior Supervisor	7
Project Manager	7
Project Director	2

By using Slovins Formula, the total number of respondents was computed arriving at 45 units as the sample. All respondents are in line with project management work. Table 4.1 shows the level of the project management position. With 29 responses, it shows that majority is at the junior level. The remaining area in the senior level having 7 respondents, 7 respondents also for those who are project managers, and 2 respondents for the project director.

Changes in Competencies within the Career Model of Construction Project Management

In this part of the research paper, the changes in the competencies as the career model changes in construction project management is investigated. For the researchers to be able to categorize and understand the changes in the competencies in construction project management, four levels in the career model are specified. These levels are categorized into junior supervision, senior supervision, project management, and project director.

The competencies are used to categorize and further understand the changes in project management competencies in the career model. In conducting the collection of the required data, a survey questionnaire was published. Then Friedman's Two-Way Analysis of Variance by Ranks and Kendall's Coefficient of Concordance was used to recognize the distinction in competencies at different levels of the construction project management career model. The Friedman Test is a non-parametric alternative to the Analysis of Variation with a repeated measure. This test is used to identify the differences among the group with an unknown distribution of data. On the other hand, Kendall's Coefficient of Concordance is a non-parametric statistical test that normalizes the statistics of the Friedman Test. These tests are used to process the data that was obtained from the survey questionnaire and are used to illustrate graphs for a better understanding of the result.
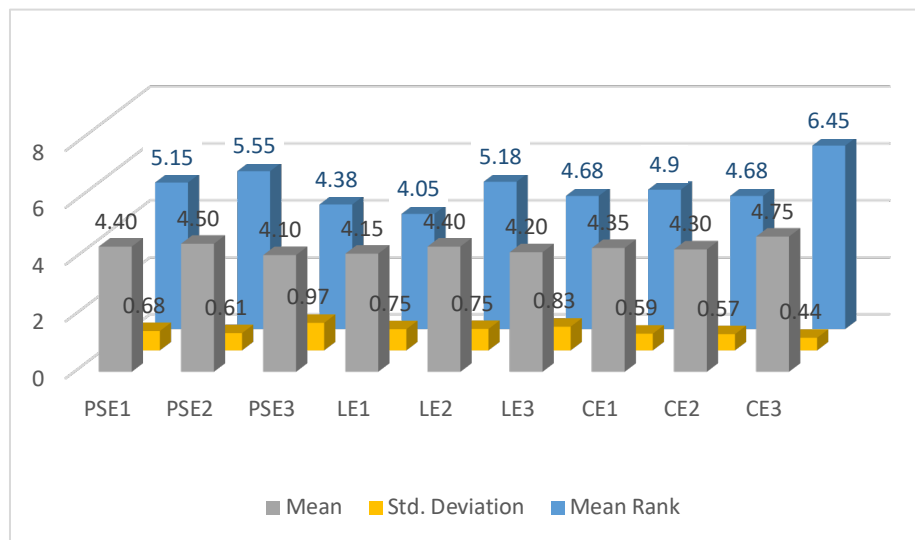

Figure 1. Average rating of the junior level to the importance of the conceptual and organizational competencies

This figure illustrates that the factors of human competencies of PSE2, LE2, and CE3 are significant contributors to the importance of project management competencies among the Junior Supervisor level based on the data shown in the table. The table proves that the computed value for PSE2, LE2, and CE3 was less than the accepted P-value (0.05). Therefore, the researchers rejected the null hypothesis for Conceptual Competencies. Knowing how to manage risks, making effective decisions, and knowing how to organize projects are significant factors among the Junior Supervisor level in project management.
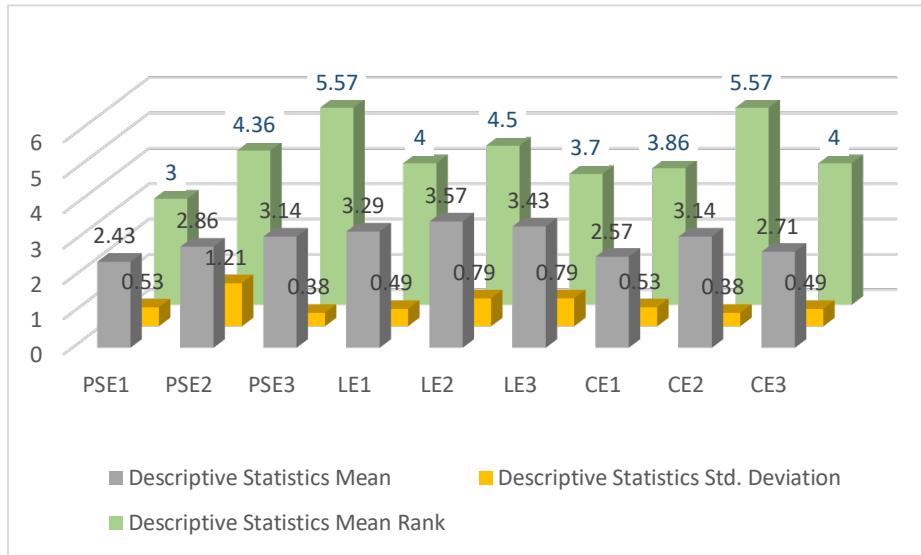
Figure 2. Average rating of the senior level to the importance of the conceptual and organizational competencies

This figure illustrates that the factors of human competencies of PSE3, LE2, and C23 are significant contributors to the importance of project management competencies among the Senior Supervisor level base on the data shown in the table. The table proves that the computed value for PSE2, LE2, and CE3 was less than the accepted P-value (0.05). Therefore, the researchers rejected the null hypothesis for Conceptual Competencies. Being able to frame a problem, making effective decisions, and knowing how to organize projects are significant factors among the Senior Supervisor level in project management.
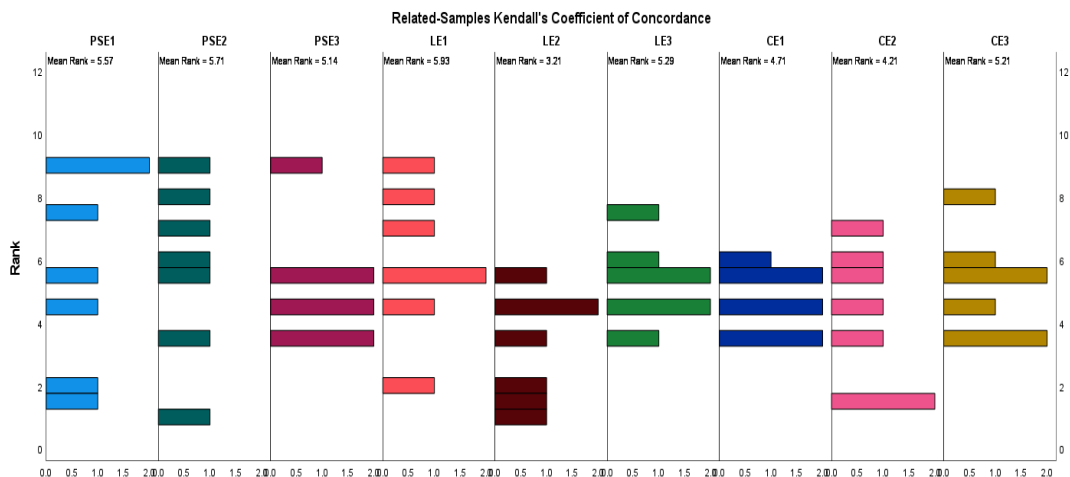

Figure 3. Average rating of the project director level to the importance of the conceptual and organizational competencies

This table illustrates that the factors of human competencies of both PSE1 and PSE3, all of LE sample competencies, and both of CE1 and CE2 are significant contributors to the importance of project management competencies among the Project Director level. The table proves that the computed value for these competencies was less than the accepted P-value (0.05). Therefore, the researchers rejected the null hypothesis for Conceptual Competencies. Being able to recognize a problem, knowing

how to frame a problem, sharing credits for success, making effective decisions, the delegation of tasks effectively, knowing the goals of the projects, and knowing how to organize projects are the significant factors among the Project Director level in project management.

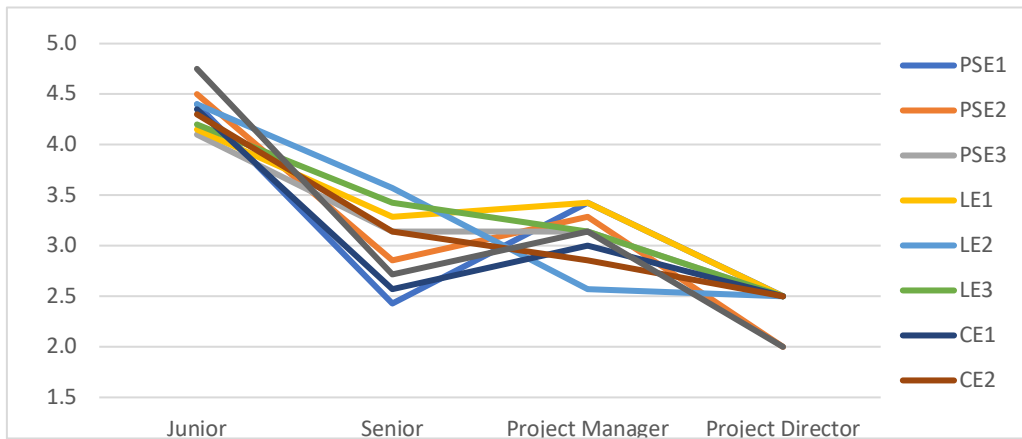*Summary of the changes in conceptual and organizational competencies*

Figure 4. The change in conceptual and organizational competencies

Overall, in this figure, the change in the importance of the sample competencies are shown at each level of project management. The chart is used to exhibit the change in the importance of certain project management competencies from the junior supervisor, senior supervisor, project manager, and project director. It is shown in the figure that the employees that are starting in the construction industry value these competencies more than the other level. Then, it is shown that a massive decrease when they step into the senior supervisor level. The fluctuation in the importance of project management competencies occurs when employees get on the project manager level. Lastly, the importance of these project management competencies suddenly drops when they step into the project director level. Although the rise and fall of the importance of the project level occur, this does not mean that one thing is important and the other is not. This only means that in each level of project management, different competencies are prioritized.
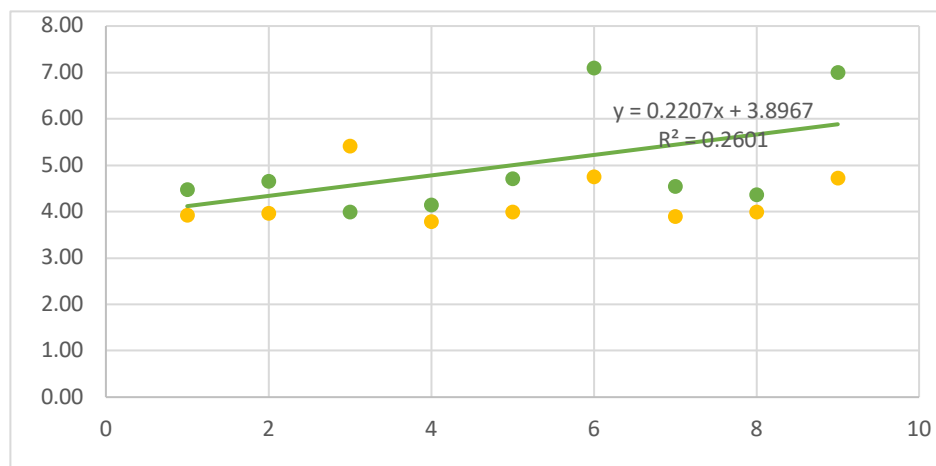

Figure 5. Correlation Result of the importance of the Human Competencies (Junior Level)

As the figure illustrates that there is a monotonic relationship, it means the assumption is not being violated. The correlation result proves the relationship of the

importance of the competencies to the junior level in project management. As the x (0.2207) variable increases, they (3.8967) variable increases as well which results in a strong positive correlation.
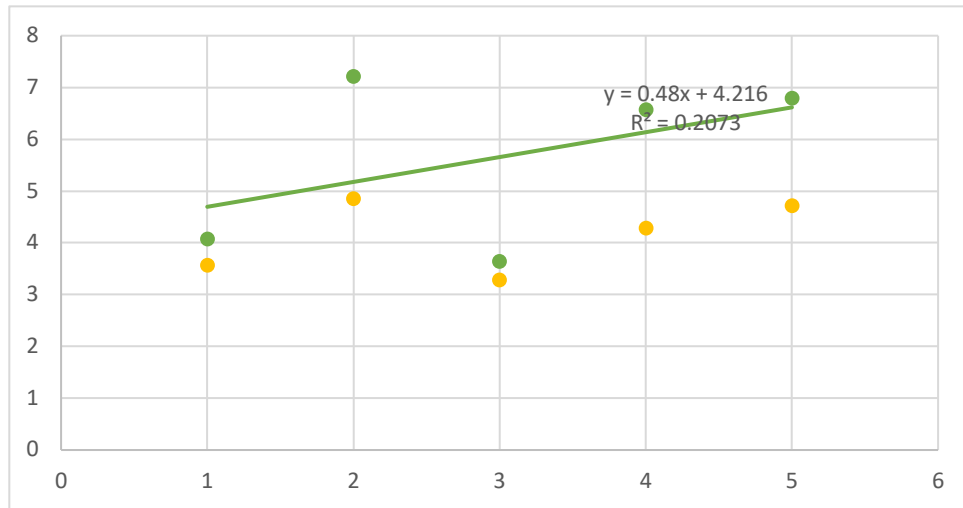

Figure 6. Correlation Result of the importance of the Human Competencies (Senior Level)

As the figure illustrates that there is a monotonic relationship, it means the assumption is not being violated. The correlation result proves the relationship of the importance of the competencies to the senior level in project management. As the 'x' (0.48) variable increases, the 'y' (4.216) variable increases as well which results in a strong positive correlation.

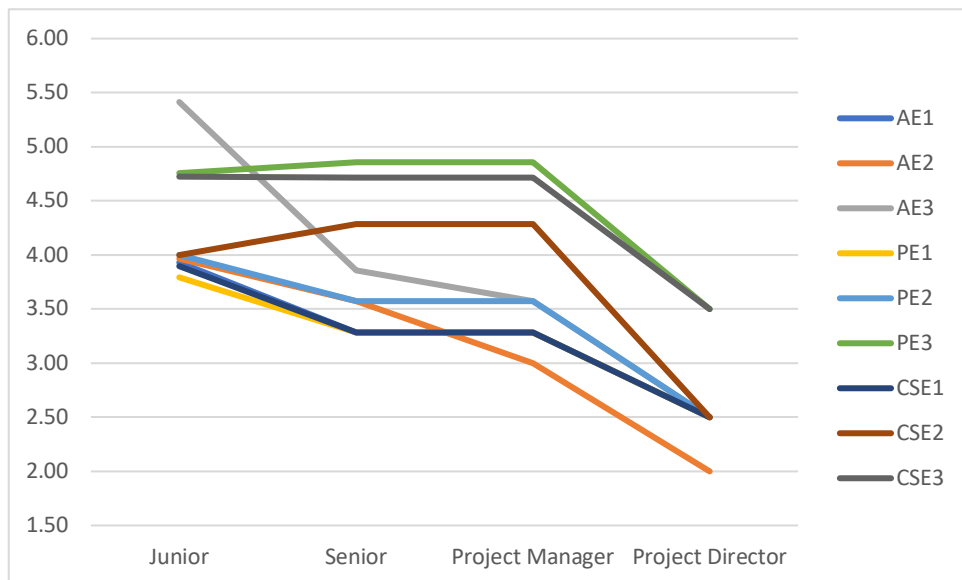*Summary of the changes in human competencies*

Figure 7. The change in human competencies

After analyzing the importance of each factor of human competencies in the Junior Level, Senior Level, Project Manager Level, and Project Director Level. In the figure above, it shows the importance of competencies at each level. The researchers conclude that having human competencies is that the lower the position, the more competencies happen, while the higher the position, the lower the importance of the competencies happens.

JUNIOR LEVEL			
Knowledge and Intellectual Competencies	Importance		
	Mean	S.D	Mean Rank
PC1. Integrity	3.21	0.82	3.67
PC2. Honesty	3.72	0.75	5.19
PC3. To be rational under pressure	3.72	0.92	5.07
PAE1. To be able to create a project plan	3.79	0.73	5.43
PAE2. To be able to set milestones/deadlines	3.72	0.84	5.34
PAE3. To manage budget	3.52	0.78	4.14
TE1. To have computer skills	3.83	0.89	5.45
TE2. To know how to use project management tools	3.72	0.80	4.93

Table 2. Related Samples Friedman's Two-Way Analysis of Variance by Ranks (Knowledge and Intellectual Competencies/Junior Level)

In this table, the PC abbreviation stands for Personal Characteristics which is a factor of Knowledge and Intellectual Competencies, while the PAE is Project Administration Expertise and TE is for Tools Expertise. The respondents from the Junior Level rates the importance of each factor of Knowledge and Intellectual competencies. In this table, it shows that knowledge on how to use financial management tools is the most important factor on Junior Level having a mean rank of 5.78, then 5.45 in having computer skills and 5.43 on knowing to create a project plan.

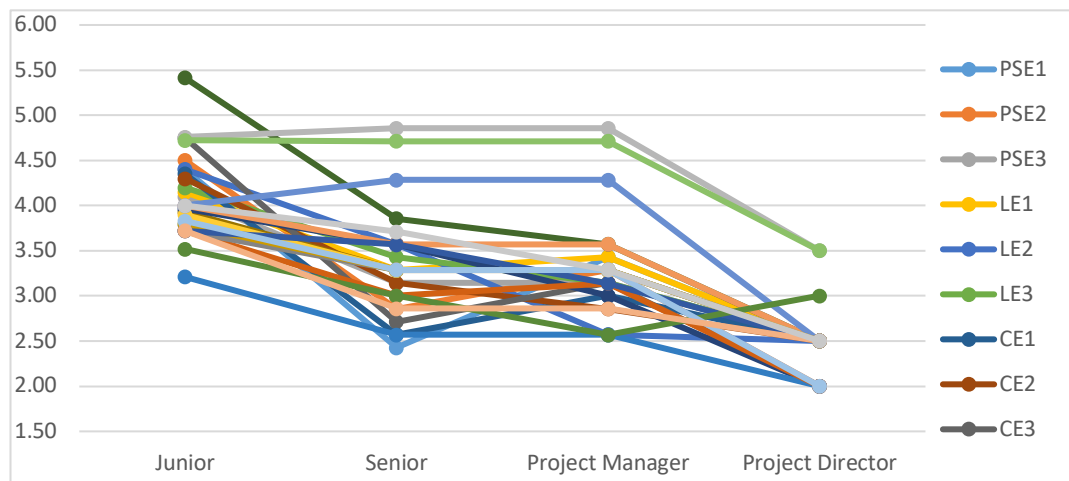*Summary of the Project Management Careers by their Level*

Figure 8. Project Management Competencies by Career Level

After analyzing the importance of each factor of knowledge and intellectual competencies in the Junior Level, Senior Level, Project Manager Level, and Project Director Level. In the figure above, it shows the importance of competencies at each level. The researchers concluded that in the knowledge and intellectual competencies is that the lower the position, the more competencies happen, while the higher the position, the lower the importance of the competencies happens.

IV. CONCLUSIONS AND RECOMMENDATIONS

Through the conduction of this research paper, the researchers were able to determine the difference in competencies as project management levels change. The researchers were able to understand that although there are a rise and fall in the importance of project management competencies at each level, this does not mean that it is not important at a project management level. This only shows that as one ascends in the corporate ladder of the construction and engineering industry, the matter of priority of these competencies changes but does not mean it is insignificant.

Figure 22 indicates that the competency weight ratios are constant at different phases of project management, showing the clear true importance of conceptual and organizational competencies, human competencies, and knowledge and technological competencies in the career model. The rationale for this observation is that the expected value of these competencies reduces at equal levels as the job level increases. As it is shown the knowledge and intellectual competencies don't change.

Moreover, this research paper provides progress involving competencies in construction project management through involving these competencies in a career path. This research paper also analyzes the difference of these construction project management competencies with regards to its absolute and relative importance at a career level. Absolute Importance refers to the importance of these competencies to perform the work. While on the other hand Relative Importance refers to the impact of competency to do the job well and the changes it exhibits at different levels in the career path. This trend can be clarified by the extent and scope of this expertise. Especially in comparison to the other levels, the junior level needs more conceptual and organizational abilities relevant to the nature of their work, but less on other forms of expertise. A project director, for example, requires a high degree of conceptual and operational expertise, but less technical skills. However, the increased work scope as the level increases shows that the individual point of view to the importance of each competency decreases and it does not require them.

Also, our research further encourages the study of project management knowledge by evaluating project management skills rooted in the career course. It is mostly used as a dynamic system intended to investigate its origins, attributes, and repercussions. For reference, a vast number of studies have examined the abilities of project managers, including teamwork, interpersonal skills, academic skills, and technical skills. However, there is no comprehensive study of project management expertise in the career path process. Our observations overcome these limitations and show major gaps in the competencies needed at various project management levels.

In this research, the rise and fall of the importance of each competency in each project management level are very evident as it fluctuates instantaneously. The researchers were able to observe this and can conclude that employees in the construction industry give high regards to project management competencies at the beginning of their careers at the junior supervision level. As the employees ascend a level in the career path, the fluctuation in the importance of these project management occurs. Although the sudden changes occur roughly, it does not mean that a certain competency is irrelevant to the career level. It only means that at a certain level in the career path of a construction and engineering management employee, different competencies are prioritized.

As we go on with this study, we want to improve the traditional project management career models that are implemented in the Philippines. The common practice here is that as the position level increases, the importance of each competency decreases. It somehow became normal in every career path in project management. Based on our results, equal distribution of each competency is much better because it will give every worker at a different level an equal opportunity to show their skills and the productivity level in every career model will increase.

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