

OPTIMUM PERFORMANCE LEVEL OF CONSTRUCTION ENGINEERING ORGANIZATION IN BANGKOK OF THAILAND

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ABSTRACT: This analytical descriptive quantitative research study was conducted in an effort to improve the optimum performance level of the Construction Engineering Organizations. The analysis showed that the performance can be improved that can help develop the staff members skills in learning dynamics, knowledge management, people empowerment, organization transformation, and technology application. That showed the performance could be improved by conducting the mastery of the 5 elements in building a learning organization and the formula for optimum performance level. The data the performance level assessment were statistical analysis using to validate the improvements in significant performance at 0.05 alpha levels. The results showed that the overall performance level in mastering the skills in building a learning organization of the COEs improved to very good (4.06) for the engineering staffs that same improved to very good for the non-engineering staffs (3.68). The mean of both groups of optimum performance level evaluation data show that building a learning organization improved to very good (3.87). The COEs focused on improved the performance level in the mastery of the skills associated with the elements in building a learning organization. The study conclusively shows that the formula for optimum performance level to improve the individual level of mastery of the skills associated with the learning organization factors can also significantly improve the overall the performance level of COEs indicating that the organization performance offered were successful.

Keywords: Optimum performance level, construction engineering organizations, formula

I. INTRODUCTION

A. Background

Construction Engineering Organizations (CEOs); The principal forms of Engineering Organization are a business organization in construction engineering works under Thai law (civil and commercial code B.E. 2468 (A.D. 1925) and its amendments) are limited companies, public limited companies, ordinary partnerships, limited partnerships, and non-government organizations.[1], [2]. In addition, branches of foreign corporations are recognized, and may be required to be registered to do business in many construction sectors. The CEOs in Thailand are many business and non-business organizations. The managerial hierarchy, the chief executive (CE) is the leader of the department or firm as the government minister, general manager or managing partner at the 'top'. The top manager receives resources and the authority to use them from company shareholders, partners or central or local government, and is responsible to them for the result. Organization chart or 'organigrams' or the organizational structure of this form are commonly used in firm showing the name of department and the manager' job title. A managerial hierarchy is a system of authority, essentially over expenditure and other decisions on resources by Stephen Wearne.[3]. The performance level in the COEs can be improved for building a learning organization (LO).

B. The Purpose

The focus of this study was to determine the optimum performance level in building the learning organization among the 116 employees of the CEOs. The study aimed to determine the assess the effects to improve the performance level of mastering the 5 elements in building a learning organization among the engineering staff (58) and non-engineering staffs (58) of CEOs. The study also aimed to determine what behavioral changes were observed among the research subjects after interventions were administered to increase the optimum performance level (OPL) and writing formula for OPL of mastering the 5 elements in building the learning organization in CEOs.

C. Theoretical and Conceptual Framework

This study use strategies in building a LO theory by Michael J. Marquardt that requires Learning Dynamics, Organization Transformation, People Empowerment, Knowledge Management, and Technology Application. All five subsystem are necessary to sustain viable, ongoing organizational learning and ensuing corporate success are; 1) Learning subsystem, 2) Organization Subsystem, 3) People Subsystem, 4) Knowledge Subsystem and 5) Technology Subsystem. The theoretical framework used in this study is based on M.J Marquardt (2002) [4] strategies in building a learning organization (BLO), five phase cyclical action researches are, diagnosing, action planning, action taking, evaluation, and specifying learning is used as the conceptual framework to improve the level of performance among the employees of COEs. Learning Organization Model is systems learning in organization that enrich knowledge & wisdom by the Fifth Discipline by Peter Senge. [5] The idea of the optimum theory is to consider not the manifold of solutions of the basic equations for a particular problem, but a larger manifold of vector fields, which includes the actual solutions by F.H.Busse. [6]. The Theory of Performance by Don Elger [7], develops and relates six foundational concepts; Designing , Problem Solving , Selling , Presenting , Life Management , and Playing a sport or a musical instrument, to form a framework that can be used to explain performance as well as performance improvements. Kongsong W.[8] showed that the overall level of performance in mastering the skills in building a learning organization its focused on building learning dynamics, knowledge management, empowering and enabling people, technology application and organization transformation improved the level of performance in the mastery of the skills associated with the elements in building a learning organization. The skills associated with the learning organization factors can also significantly improve the overall level of the faculty performance.

II. MATERIALS AND METHODS

A. Methods Used

This descriptive analytical quantitative research study utilized 2 research methods. The first method was evaluation which involved analysis of the problems and evaluation of the effect of the performance on the identified problems. The second method used was descriptive research because the study involved establishing a hypothesis and testing the effect of the performance level in COEs.

B. The Research Respondents

Subjects were all full time staff in the COEs. The research subjects include 58 engineering staff and 58 non-engineering staff in the working year 2012-2013. The 116 subjects are the same respondents in the assessment and the participants in the scheduled performance improvement valuable practice in career and who wish to develop by their own companies.

C. Research Instrument

The instrument used in the study is Learning Organization Profile by Michael J. Marquardt.[4] The instrument is an assessment of the level of mastery of the 5 elements of the Learning Organization. The questionnaire has 50 items stratified to the 5 learning organization elements. The items were scored with the modified scaled values of 1-5 with the following description: 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, and 5-Strongly Agree. The responses were interpreted according to the following hypothetical categories: 1.00-1.79 Needs Improvement, 1.80-2.59 Fair, 2.60-3.39 Good, 3.40-4.19 Very good, and 4.20-5.00 Excellent.

D. Statistical Analysis

The Statistical Formulas used for the interpretation of data were the following; Percentage, Arithmetic Mean, To test the comparison of the means of the scores between the Engineering and Non-engineering staffs performance level measurement the t-test. The Optimum performance level of COEs predicted by linear regression programming equation and determining formula for optimum performance levels for

III. RESULT

A. Performance Level of The Evaluation Measurements

1). Learning dynamics

The performance level in building the learning dynamics improved to Very good. The result showed in Table 1 that performance level improved the learning dynamics by training participants to think and act with a comprehensive systems approach encourage them to manage their own learning, use action learning process and learn from each other.

2) Organizational transformation

The finding shows in fig. 1, that performance improved the level of organizational transformation by streamlining the levels of management, making communication easy across levels rewarding learning, designing ways to share knowledge and encouraging support for the vision of a learning organization. That organization transformation improved by 81.73% after interventions. The finding supports Pedlers' assertion that enhancing organization member's continuous learning will promote organization change.[9], [10]

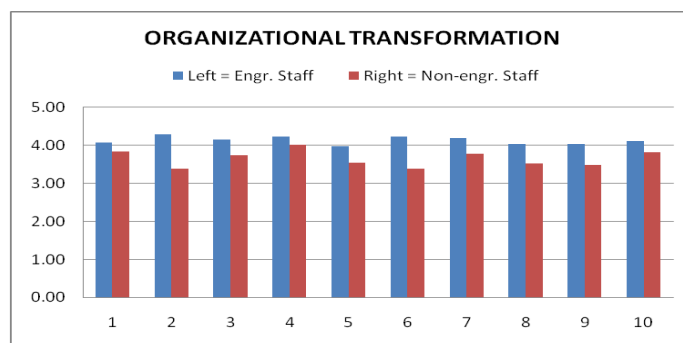


Fig 1 Organization transformation

Table 1 Performance Level of Learning Dynamics

ITEMS	Engineering Staff			Non-engineering Staff		
	MEAN	SD	INTERPR.	MEAN	SD	INTERPR.
1. Continuous leaning by all employees is a high academic priority	3.90	0.872	Very Good	3.81	0.736	Very Good
2. Manage their own learning environment	3.79	0.894	Very Good	3.47	0.777	Very Good
3. Avoid distorting information and blocking communication channels	3.83	0.920	Very Good	3.62	0.791	Very Good
4. Training and coaching in learning how to learn	3.74	0.947	Very Good	3.43	0.752	Very Good
5. Using accelerated learning technologies	3.74	0.890	Very Good	3.64	0.788	Very Good
6. Expand knowledge through adaptive anticipatory learning approach	3.83	0.861	Very Good	3.66	0.715	Very Good
7. Use of action learning process	3.81	0.826	Very Good	3.43	0.797	Very Good
8. Learning from one another	3.60	0.857	Very Good	3.55	0.799	Very Good
9. Think and act with comprehensive systems approach	3.66	0.928	Very Good	3.33	0.685	Good
10. Training in how to work in groups	3.81	0.888	Very Good	3.66	0.807	Very Good
AVERAGE	3.77	0.886	Very Good	3.56	0.772	Very Good

3. *People empowerment*

The performance level in people empowerment improved to Very Good. All means improved with a t-test value greater

Table 2 Performance Level of People Empowerment

ITEMS	Engineering Staff			Non-engineering Staff		
	MEAN	SD	INTERPR.	MEAN	SD	INTERPR.
1. Strive to develop and empower workforce	4.12	0.839	Very Good	3.98	0.805	Very Good
2. Decentralization and delegation of authority	4.17	0.752	Very Good	3.98	0.848	Very Good
3. Working in partnership to learn and solve problems	4.21	0.744	Excellent	3.71	0.918	Very Good
4. administrators take on roles as coaches, mentors and facilitators of learning	4.12	0.818	Very Good	3.97	0.794	Very Good
5. Administrators generate and encourage learning opportunities	4.24	0.823	Excellent	3.97	0.725	Very Good
6. Faculty sharing information and obtain ideas from other institutions	3.95	0.826	Very Good	3.43	0.901	Very Good
7. Enough opportunities given to participate in learning and training	4.14	0.782	Very Good	3.503	0.706	Very Good
8. Learning from other institution is maximized through planning of resources	4.45	0.654	Excellent	3.26	0.715	Good
9. Participation in learning events	4.09	0.844	Very Good	3.48	0.978	Very Good
10. Actively seeking partnerships	4.64	0.520	Excellent	3.97	0.748	Very Good
AVERAGE	4.21	0.783	Very Good	3.73	0.855	Very Good

The finding shows that performance improved people empowerment by supporting the engineering staff and non-engineering staff with opportunities to participate in training events, work together in solving problems and sharing information with other institutions. This finding confirms Peter Senge's [5] assertion that when the organization focuses on learning how to face and solve problems to reach better results, it renews thinking and doing by developing attitudes, values, skills for both groups.

4. *Knowledge management*

The performance level in knowledge management improved for Engineering staff to Excellent but Non-engineering staff to Very Good, which means the Engineering staff need to improve performance for self-developing for them. All means improved with a t-test value greater than the critical value showing significant change at .05 alpha levels that showed in Fig 2.

The finding confirms that transformation can be stimulated by condition in the external environment or by a vision of how to do things differently. It can be revolutionary or evolutionary and it can also be a one-time or continuous event so that finding confirms Jackson. [11] Fig. 2 shows that knowledge management improved by 76.89% after analytical data. The engineering staff in an accessible system to collect internal and external information as maximum is 4.60 excellent performance level. The non-engineering staffs in cross-functional teams transfer important learning across groups as maximum is 3.95 Very good performance level.

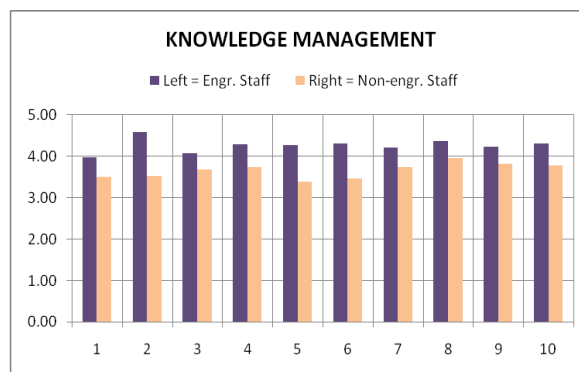


Fig. 2 Knowledge management

5. *Technology application*

The performance level in technology application improved all staff to Very Good. All means improved with a t-test value greater than the critical value showing significant change at .05 alpha levels. The finding shows in Table 3, that interventions improved technology application by enhancing groupware technology for managing group process, adapting to software systems to collect, code, store and transfer information, facilitating full access to data needed to do jobs effectively and incorporating electronic media support to sufficiently meet the learning requirements. The finding confirms that components that lead the organization to be a learning organization must create opportunities and atmosphere that facilitate continuous learning enhance members to develop learning that confirm Watkin. [12].

Table 3 Performance Level of Technology Application

ITEMS	Engineering Staff			Non-engineering Staff		
	MEAN	SD	INTERPR.	MEAN	SD	INTERPR.
1. Learning is facilitated by effective and efficient computer based information system	4.12	0.818	Very Good	3.69	0.706	Very Good
2. Ready access to the information highway	3.86	0.736	Very Good	3.71	0.879	Very Good
3. Learning facility incorporate enough electronic multimedia support	3.98	0.827	Very Good	3.86	0.907	Very Good
4. Readily available Computer assisted learning programs	3.71	0.817	Very Good	3.84	0.933	Very Good

5. Software manage group process	3.74	0.828	Very Good	4.10	0.986	Very Good
6. Support just in time learning	4.03	0.858	Very Good	4.36	0.742	Excellent
7. Electronic performance support system enables staff to learn and perform better	3.97	0.772	Very Good	3.59	0.899	Very Good
8. Design of electronic support system is sufficient to meet requirement	4.36	0.742	Excellent	3.90	0.852	Very Good
9. Every have full access to the data needed to do the job effectively	4.26	0.664	Excellent	3.45	0.882	Very Good
10. Adequate skills in adapting software systems for collecting, coding, storing, creating, and transferring information	3.34	0.836	Very Good	3.66	1.052	Very Good
AVERAGE	3.94	0.830	Very Good	3.82	0.917	Very Good

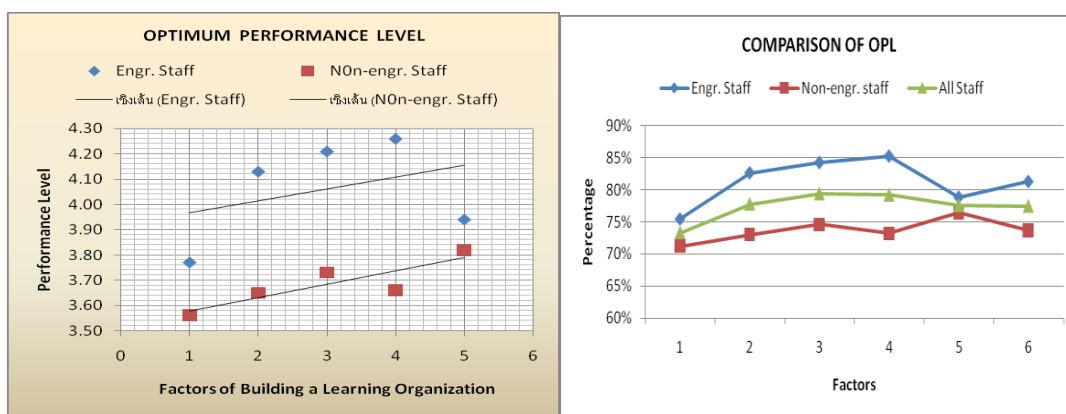
B. Comparison of Optimum Performance Level

Table 4 shows the comparison of the improvements on the optimum performance level (OPL) in building a learning organization of the COEs after in process of collected were

made. The table shows that t-test in all the 5 factors are 2.436 were greater than the critical value 2.002 and showed significant difference at 0.05 alpha levels.

Table 4 The Optimum Performance Level of Learning Organization

Factors of Building LO	Engineering Staff			Non-Engineering Staff			T-Test
	MEAN	SD	INTERPR.	MEAN	SD	INTERPR.	
1. Learning Dynamics	3.77	0.890	Very Good	3.56	0.772	Very Good	1.3594
2. Organization Transformation	4.13	0.808	Very Good	3.65	0.808	Very Good	3.0346
3. People Empowerment	4.21	0.783	Very Good	3.73	0.855	Very Good	3.1833
4. Knowledge Management	4.26	0.737	Excellent	3.66	0.817	Very Good	4.1995
5. Technology Application	3.94	0.830	Very Good	3.82	0.917	Very Good	0.7853
AVERAGE	4.06	0.831	Very Good	3.68	0.853	Very Good	2.4360



(a) Performance level (b) Comparison of OPL
Fig. 3 Optimum performance level in building a learning organization

The table shows that the OPL in building learning organization of the COEs for Engineering staff improved to 4.06 or Very Good and same as Non-engineering staff improved to 3.68 or Very Good.

The data rejected the null hypothesis, therefore there is significant improvement brought about by the introduction of the organization performance. The finding confirm that improvements in the effort to build a learning organization cannot be possible not can it be sustained without understanding and developing five related subsystems: Learning, organization, people, knowledge and technology. All five are necessary to sustain viable, ongoing organizational learning and ensure organizational success. (Marquardt 2002) [4]

Figure 3 show 85.20% of People empowerment (PE) their improvement on the factors is the OPL in building a learning organization at the COEs. In Fig. 3(b) shows after the combined the all staff assessment from the indicate 77.46% in the middle linear scale scored the COEs 3.78, after comparing the engineering staff was scored 4.06 from the maximum of

5.00. After comparison the non-engineering staff was 3.68 from the maximum of 5.00 so it best performing and most developed employee between the 2 factors for Engineering staff was knowledge management (KM) and Non-engineering staff was people empowerment (PE) in the COEs. The OPL for engineering staffs in Knowledge management as maximum is 4.26 excellent performance level. The OPL for non-engineering staffs in technology application as maximum is 3.82 Very good performance level. In Figure 3(b) shows the mean value of the optimum performance level of the both data groups improved to very good (3.87)

C. The Formula for Optimum Performance Level

The COEs define employee performance as the accomplishment of construction work assignment or responsibility. The OPL is the accomplishment of building a learning organization while neglected β_0 because it not affected this solution.

$$y = 0.1733X_1 + 0.1803X_2 + 0.1836X_3 + 0.2843X_4 + 0.1764X_5$$

Where y = The Optimum Performance Level or OPL, X_1 = Learning Dynamics or LD, X_2 = Organization Transformation or OT, X_3 = People Empowerment or PE, X_4 = Knowledge Management or KM, X_5 = Technology Application or TA. Thus, this can be writing in new formula for optimum performance level of COEs as showed below;

$$\text{OPL} = 0.1733\text{LD} + 0.1803\text{OT} + 0.1836\text{PE} + 0.2843\text{KM} + 0.1764\text{TA}$$

This formula is predicted the OPL of COEs in building a learning organization only. After adjusted the OPL equation that it can be proved the accuracy of the Engineering staff is 4.08 greater than the mean value of raw data 0.42% and the Non-engineering staff is 3.674 less than the mean value of raw data -0.62%. Then the formula for optimum performance level can applied in predicted of the COEs in building a learning organization.

IV. CONCLUSION

The analysis of the performance level assessment evaluation data were statistically significant therefore the organization performance offered were successful. The engineering organizations administered were effective in improving the staffs on performance level. The CEOs focused on building learning dynamics, knowledge management, empowering and enabling people, technology application and organization transformation will improve the performance level in building a learning organization. CEOs administered to improve the individual performance level in the learning organization factors can significantly improve the overall level of the organization performance.

RECOMMENDATIONS

The study recommends that an annual assessment be administered and activities be conducted in an effort to sustain and improve the performance level of the organization. The results of this study will be submitted to the Board directors and published in the annual report of the COEs in an effort to disseminate the results so it can also be used to assist other organization making the decision in implementing organization development efforts to improve optimum performance level in building a learning organization thus who can study more details in doctoral thesis [13].

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