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HIERARCHICAL LINEAR MODEL'S FACTOR THAT AFFECTS THE EFFECTIVENESS OF RAJAMANGALA UNIVERSITY OF TECHNOLOGY PHRA NAKHON, BANGKOK, THAILAND.

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ABSTRACT

The purpose of this study was aimed to study the hierarchical linear model's factor that affects the effectiveness of Rajamangala University of Technology Phra Nakhon (RMUTP). The participants were recruited from teaching staff and heads of departments of RMUTP. The self-reported questionnaire developed under the concept of effectiveness measure to the balance scorecard theory (BSC) was used as data collection instruments. The hierarchical linear model (HLM) program was utilized to examine the effects of the independent variables of head of department towards the fixed rate and regression coefficient was employed for data analysis. The HLM model was consisting of the null model, simple model, and hypothetical model. The t-test was used to examine fixed effect, and Chi-square (χ^2)-test was employed to examine the random effect.

The result showed that the fixed rate of the analysis of department level significantly influenced the dependent variables at the level of 0.05 (t = 166.558). This fix rate could be explained that the effectiveness of HLM model at RMUTP in each department was significantly observed at 0.05 level, while the variables of department level was significantly influenced the RMUTP's effectiveness at 0.05 level, i.e., variables of administrator creating thinking (THINK), administrator's administrative behavior (ADMIS), administrator's communication behavior (COMM), and administrator's academic leadership behavior (ACADE), with the observed coefficients as -0.196, 0.349, -0.278 and 0.221, respectively (p = 0.025, 0.035, 0.012 and 0.042).

Keyword: RMUTP, Hierarchical linear model, HLM and effectiveness.

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INTRODUCTION

The Rajamangala University of Technology Phra Nakhon (RMUTP) was established by the Act of Rajamangala University of Technology on January 18, 2005. The university consists of five former campuses, namely, Teves campus, Chotiwet campus, Bangkok Commercial campus, Chumphon Khet Udomsak campus and Technology North Bangkok campus. RMUTP comprises nine faculties, i.e., Faculty of Industrial Education, Faculty of Home Economics Technology, Faculty of Mass Communication Technology, Faculty of Business Administration, Faculty of Science and Technology, Faculty of Engineering, Faculty of Liberal Arts, Faculty of Industry Textile and Fashion Design, and Faculty of Architecture and Design.

All administrators and staff of the university have to adjust their roles and responsibilities in accordance to the new structure of the university, which creates various problems and difficulties on the performance. This strongly affects the quality and effectiveness of the management of RMUTP. Furthermore, the educational management of the RMUTP is directly responded to the higher education management in order to produce more manpower to the investment sector. The university has to create the outstanding point and pro-actively plan to precede the appropriate educational management in accordance to the educational plan of the nation and to develop the graduates' proficiency in associated with their degree. Moreover, they can use the knowledge application in daily life appropriately and become the qualitative citizens of the country. However, the administrators and the concerns are the persons whose duties directly involve teaching and learning management (Fullan, 1991), therefore, they have to realize the vital role in running educational management effectively, reinforcement and positive attitudes to the staff that involve education.

According to the analysis of weakness and strength of RMUTP (Songthanapitak, 2005), it reveals that the university still has weak points in several aspects which are considered to be a new university at the early age of the adjustment, the performance of various organizations still rather perform unskillfully and usually encounter with the governmental procedures overdo and also lack of accuracy of various rules and regulations of the performance which may affect the teaching and learning management and staff development. Moreover, some rules and regulations may not support the administration, which may create the problem of the university's administration to achieve the goals effectively. RMUTP also encounters the threatened conditions from the educational requirement in terms of society, economy and politics which trigger RMUTP to attempt to fight with problems and obstacles originated from threatened conditions of performance.

According to the above principles and reasons as well as the concept of modern management which focus on the result-based management and the way to assess the governmental management system including quality assurance system and self-assessment system are the parts that could push the university to adjust itself and develop the context of organization to adopt the innovation and modern management ideas which emphasize the efficiency and effectiveness of the performance by using the assessment framework holding the balance scorecard (BSC) principles in accordance with the development of Kaplan and Norton (2001), the instruments of organization assessment. It is divided into four views, which consist of financial perspective, customer perspective, internal process perspective, and learning and growth perspective in order to be attained according to the mission, vision, and purposes of the university.

One of interesting thing is that if the constructed hierarchical linear model (HLM) of the factors affecting the quality of RMUTP is to find out the development and effectiveness to support RMUTP, which could achieve the higher-education with full of quality and reputation not only the local but national acceptance level as well.

RESEARCH METHODOLOGY

Conceptual research framework

The purpose of this study was aimed to study hierarchical linear model's factor that affects the effectiveness of Rajamangala University of Technology Phra Nakhon (RMUTP). The conceptual research framework was developed based on information available on all published documentations, as shown in Figure 1.

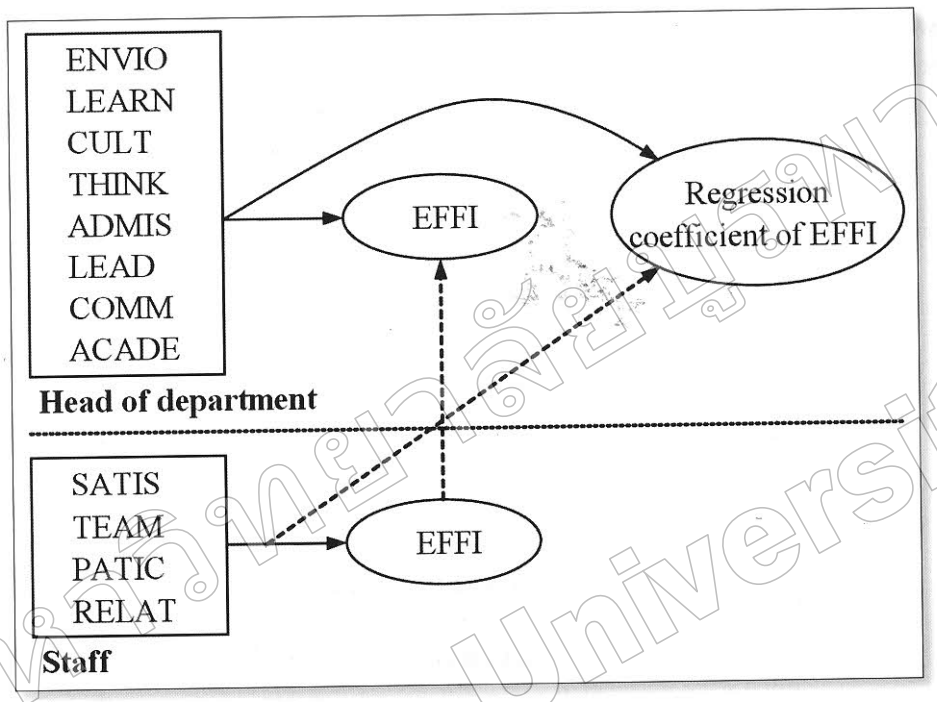

Figure 1. The schematic diagram shows variables influencing the effectiveness of HLM's factors.

Sample group

All faculty members of RMUTP were requested to participate in the study, and there were 647 participants during the study, and the study was conducted in 2008. The population consisted of 42 heads of departments and 605 staff members at RMUTP.

Research instrument

The instrument used was five-rating scale questionnaire and was developed based on existing documents of factors affecting the effectiveness of activities of human resources of RMUTP. The developed questionnaire was scrutinized and checked for the content validity by five experts using index of item-variable congruence (IVC) technique. The developed questionnaire was preliminary tried out at Rajamangala University of Technology Rattanakosin resulting in the validity of several factors was observed. It was found that the validity of the organizational environment aspect was equivalent to 0.72. The validity of learning organization aspect was equivalent to 0.69, while that of organizational culture aspect was equivalent to 0.77. The validity of creating thinking aspect was equivalent to 0.78, while that of administrational behavior aspect was equivalent to 0.80. The validity of leadership condition aspect was equivalent to 0.85, while that of communication behavior was equivalent to 0.83. The validity of academic leadership behavior aspect was equivalent to 0.83. When those factors relevant to staff were considered,

the validities of the performance satisfaction, team performance, performance participation aspect, and organizational relationship of staff were equivalent to 0.89, 0.75, 0.91, and 0.89, respectively.

Data collections were conducted in June 2008. Only 576 out of 647 sets of the questionnaire were returned, which was equivalent to 89.03 % of the total number.

Data analysis

The analysis of the data was done to determine the consistency of the constructed HLM model and to test the constructed HLM model for factors affecting the quality of human resources of RMUTP. The empirical data analysis program of HLM, which included null model, simple model, and hypothetical model were used in data analysis.

The symbols of variables used in the analysis were as follows:

Symbol	Statement
ENVIO	Organizational environment
LEARN	Learning organization
CULT	Organizational culture
THINK	Administrator's creating thinking
ADMIS	Administrator's administrative behavior
LEAD	Administrator's leadership condition
COMM	Administrator's communication behavior
ACADE	Administrator's academic leadership behavior
SATIS	Staff performance satisfaction
TEAM	Staff team performance
PATIC	Staff performance participation
RELAT	Staff organizational relationship

RESULTS

The participants who took part in answering the self-reported questionnaires were analyzed according to their educational background and sex. Results are summarized in Table 1.

Table 1. Numbers and percentage of the participants were categorized by gender, educational background, position and faculty/department.

General data		Number	Percentage
Gender	Male	253	43.92
	Female	323	56.08
Educational background	Bachelor degree	184	31.94
	Master degree	386	67.01
	Doctoral degree	6	1.05
Position	Head of the Department	42	7.29
	Staff	534	92.71
	Faculty of Business Administration	130	22.57
	Faculty of Liberal Arts	47	8.16

General data		Number	Percentage
Faculty/ Department	Faculty of Industrial Education	46	7.99
	Faculty of Mass Communication	18	3.13
	Home Economics Technology	73	12.67
	Faculty of Industry Textile and Fashion Design	42	7.29
	Faculty of Science and Technology	71	12.33
	Faculty of Engineering	137	23.78
	Faculty of Architecture and Design	12	2.08

It was found that most of the respondents were female (56.08 %), with 67.01 % of them holding master degree. The highest number of respondents was from the Faculty of Engineering, which was equivalent to 23.78%.

The analysis of the constructed HLM.

Attempts to analyze the consistency of the constructed HLM were carried out by using null model, simple model, and hypothetical model. Null model was used to analyze the university effectiveness variable (EFFI), which considered being the dependent variable. Results are summarized in Table 2.

Table 2. An analysis of fixed effect and random effect of RMUTP's effectiveness variable (EFFI) from the analysis of internal variance between heads of departments and Null model staff

Component	Fixed effect	Random effect	
	EFFI-INTRCPT1, G00	INTRCPT1	Level-1
Coefficient	3.42**	–	–
Variance component	–	0.04**	0.10**
Standard error	0.03		
S.D.		0.20	0.31
df	–	41	–
t-ratio	100.41	–	–
Chi-square	–	251.87	–
p-value	0.00	0.00	–

Results of the analysis of null model dealing with heads of the departments revealed that the means of effectiveness were equivalent to 3.42, whereas the fixed rate of the fixed effect was significantly influenced the RMUTP's effectiveness at 0.01level.

Once the random effect was considered, it was found that the fixed rate or the mean of RMUTP's effectiveness showed the variation between heads of departments and staff, which was significantly different at 0.01 level in which the variance of parameter estimation equal to 0.04 and 0.10, respectively.

Results of analysis of null model revealed that the means of RMUTP's effectiveness of the internal variation between heads of departments and staff were significantly different at 0.01 levels. The constructed model was subsequently assessed and analyzed using the simple model, and results are summarized in Table 3.

Table 3. Results of analysis of fixed effect, random effect of RMUTP's effectiveness variables (EFFI) from the analysis of internal variation between heads of departments and staff using simple model.

Component	Fixed effect					Random effect					
	INTRCPT$_2$, G_{00}	SATIS, G_{10}	TEAM, G_{20}	PATIC, G_{30}	RELAT, G_{40}	INTRCPT$_1$, U_0	SATIS Slope,U_1	TEAM Slope,U_2	PATIC Slope,U_3	RELAT Slope, U_4	LEVEL-1, R
Coefficient	3.37**	0.14*	0.14*	0.24**	0.41	-	-	-	-	-	-
Variance component	-	-	-	-	-	0.02	0.09	0.14	0.09	0.11	0.02
Standard error	0.02	0.06	0.07	0.06	0.06	-	-	-	-	-	-
S.D.	-	-	-	-	-	0.12	0.30	0.38	0.30	0.33	0.14
df	-	-	-	-	-	41	41	41	41	41	-
t-ratio	154.09	2.53	2.03	3.88	0.64	-	-	-	-	-	-
Chi-Square	-	-	-	-	-	175.25	151.46	163.41	89.43	123.59	-
p-value	0.00	0.02	0.02	0.00	0.53	0.00	0.00	0.00	0.00	0.00	-

Results in Table 3 revealed that the score of quality of RMUTP dealing with fixed effect was not zero (coefficient, G_{00} = 3.37, t = 154.09). The regression coefficient of level variable of the staff showed positive influence on the quality of RMUTP, which was significantly different at 0.01 level by relying on the regression coefficient of the variables of staff performance participation, staff performance satisfaction, staff team performance, where t values were 3.88, 2.53, and 2.03, while p-values were 0.001, 0.016, and 0.049, respectively. It suggested that the quality was increasing, but there was no positive effect to the quality because there was no statistical significant at 0.05 level that related to organizational relationship variable (t = 0.636, p = 0.528).

Results of random effect dealing with the fixed rate of the quality of RMUTP revealed that the variation among the staff was significantly different at 0.01level (χ^2= 175.25), where the variance of parameter estimation was equivalent to 0.01.

Therefore, it was indicated that the mean of the quality of RMUTP was significantly influenced from all three independent variables. The constructed model was subsequently further analyzed for effectiveness of the hypothetical model.

The analysis for the effectiveness of the hypothetical model was carried out and results are summarized in Table 4.

Table 4. Results of the analysis of the effectiveness of the constructed model concerning fixed effect and random effect of variables (EFFI) from the analysis of the internal variation between heads of departments and staff of hypothetical model

Fixed effect	Coefficient	Standard error	t-ratio	p-value
INTRCPT2	3.37	0.02	166.56	0.00
ENVIO	0.07	0.09	0.87	0.39
LEARN	0.27	0.23	-1.16	0.26
CULT	0.10	0.12	0.83	0.41
THINK	-0.20	0.08	-2.34	0.03
ADMIS	0.35	0.16	2.19	0.04
LEAD	0.03	0.15	0.20	0.85
COMM	-0.28	0.10	-2.67	0.01
ACADE	0.22	0.13	1.73	0.04
SATIS slope, INTERCEPT2	0.14	0.56	2.55	0.02
TEME slope, INTERCEPT2	0.14	0.07	1.93	0.06
PATIC slope, INTERCEPT2	0.24	0.06	3.89	0.00
RELAT slope, INTERCEPT2	0.03	0.06	0.42	0.67

Results of constructed model revealed that the mean of the effectiveness value of fixed effect was not zero (coefficient = 3.37, t = 166.56) when the dependent variable was taken into consideration. The constructed model was further analyzed for the relationship of other independent variables, which were considered as predicted variables.

Predicted variables of level 1. It was shown that the values of regression coefficient of the level variable showed positive influence on the quality of RMUTP, and coefficient values were significantly different at the level of 0.01, where the coefficient values were 0.56, 0.07, 0.06, and 0.06, respectively. This revealed that the quality of heads of departments increasingly influence the quality of RMUTP. The regression coefficient level variable of the heads of departments showed positive influence on the quality of RMUTP, where the coefficient values were significantly different at the level of 0.01. The values of regression coefficient of the staff performance participation variable, staff performance satisfaction, staff team performance, and of t were 3.89, 2.55, and 1.93, respectively, whereas the p-values were 0.00, 0.02, and 0.06, respectively. It was shown that the quality of RMUTP was increasing. This increasing value of the quality was relevant to the positive influence on the relationship variable of staff organization.

Predicted variables of level 2. It was found that the regression coefficient of the staff variables showed positive influence on the quality of RMUTP, and the regression coefficient values were significantly different at the level of 0.05, as shown in Table 4. The regression coefficient values of several variables, i.e., administrator's administrative behavior, administrator's academic leadership behavior, administrator's creating thinking, and administrator's communication behavior were 0.35, 0.22, -0.20 and 0.28, whereas the p-values were 0.04, 0.04, 0.03, and 0.01, respectively. These results suggested that staff variables did not influence significantly the quality of RMUTP.

The coefficient value of the other variances concerning the random effect at the heads of departments and staff level was 0.02. This result suggests that there are other variables that could be used as the predicted variables with coefficient value, and are significantly different at the level of 0.01 (χ^2 = 103.35), where the coefficient value of the variance of the parameter was 0.01.

DISCUSSION

The constructed hierarchical linear model (HLM) dealing with the factors affecting the quality of RMUTP was carried out in order to find out the development and quality of RMUTP as a whole. Results of the analysis using this model revealed the current quality of staff of RMUTP, which could be used as guidelines for the executive member of the university for human resources development to push the university to achieve the higher-education with full of quality and reputation not only the local but national acceptance level as well.

The constructed HLM was developed to test the validity of the proposed factors that might affect the quality of the staff of the university. All plausible factors that might affect RMUTP's human resources development consisting of empirical data were used to construct this model. The hypothesis of this study was accepted by all invited experts that scrutinized the constructed model. The individual variables were separately considered in order to find out the fixed and random effects of variables.

It was shown that several factors concerning administrators were turned out to be good ones. Those four factors that influenced the quality of heads of departments were discussed in the points as shown in Table 4 and in the following statements.

Administrator administrative behavior (ADMIS). Results revealed that the administrator's administrative behavior level had the highest score, which suggest that it is the highest influenced factor. Since the effective administrators influence various performances, namely, performance plan, performance schedule determination, subordinates activity coordination, essential materials provision, instruments provision and various technique help, the administrators realize the way to determine the

performance goal and can adjust themselves in accordance with the various situations. The effective leaders create group members who focus on the performance result at a high level (Reddin, 1970), with high standard determination, the leaders expect that their staff will increase products and they tend to be increasing when the administrative leaders are confident that the group members will achieve their goal (Goetsch, 2002). Moreover, the leaders are the ones who perform the duties with stable emotion although the situations are uncertain by creating effective contributions and can help the group members to perform with the situations as well as long as their leaders still have calmness. At the same time, the group members are confident, pleased and secure, these can help the leaders perform calmly in the pressured situations including persons who contribute to the progress of the organization and achieve the goals. Leaders are persons who play the important roles to present the relationship among people who are the subordinates or leaders, resulting in the development in security and help various people to achieve the goals of the group (DuBrin, 1998)

Administrator academic leadership behavior (ACADE). It has been described by Yukl (Yukl, 1981) that the good academic leaders should have several characteristics, i.e., good vision on teaching and lesson plan which respond to the international standard criteria, information technology application helping to make a decision, support the vocational development, and learning communities development. The administrators should express their behavior towards such issue clearly (Supovitz and Poglinco, 2001). DuFour(2002), who indicated that when the standard criteria of educational quality assurance was proposed, the roles of academic leaders have changed from lecturers' teaching advice to taking care of student learning (Kolb et al., 1991). Therefore, instructional leadership was substituted into the learning leader.

Administrator's creating thinking (THINK). It has been shown that creative thinking is so essential for the society that can affect the social change while the new problems occur all the time. Thus, staff should put creative thinking into practice to solve various problems in the daily life. It was shown that the administrators have to encourage their staff and try to support creative thinking systematically (Edwards, 1991). Therefore, the administrators should be more concerned about creative thinking. Moreover, the administrators should be patient with the uncertainty condition, particularly the pressure conditions in seeking or solving problems. The administrators have to bear in mind that their key roles are to inspire other persons and support them the intellectual development (Dusitsutirat, 2008).

Administrator's communication behavior (COMM). The communication is the important part for the administration, and the administrators have to manipulate this skill very effectively. The good communication will help better understanding between staff and administrators, and other concerns in the organization, which cannot only eliminate problems among themselves in the organization but create effectiveness for the performance as well. According to Kisukpan (1995), the communication was the process in delivering messages among persons or organizations throughout the same understanding and purpose. If the administrators were mistakenly communicated or convey information from person to person via some symbols, it would damage the university will and their reputations. It has been documented by Keawsrinam (1987) that the communication plays an important role for the educational administration system in planning procedures, policy determination, supervision, coordination, control, and reveals the result. This will need an effective combination among the staff in the educational institution to understand directly and correctly. Moreover, it has been emphasized that it should be employed two-way communication which is the communication that the senders and the receivers respond to each other and create the same clearly understanding (Cassata, 1979;

Wisalaporn, 1982). This is considered to be an essential and important issue for the administration system. There are several materials that were commonly used, i.e., discussion conference, information, and report of performance. Therefore, the effective communication in the organization is vital to the success of organization. It has been shown that good communication of the organization cannot be measured simply (Berlo, 1960). However, the communication can reflect the results in various sides as well as encouragement will cause the cooperation and satisfaction in working. When there is a good environmental work climate in the organization, it will automatically lead to a good result.

Once the factors concerning staff were taken into consideration, it turned out that only three factors happened to be the good ones, as shown in Table 4. Those three factors that influenced the quality of staff were staff performance participation, staff performance satisfaction, and staff team performance, respectively. The roles of those individual factors were discussed as shown in the following statements.

Staff performance participation (PATIC). The contribution of co-performance between the university administrators and staff is in accordance with the purpose or the goals that has been setup. This may be the effectiveness of administrators who can apply the wisdom and experience in administration to persuade the subordinators to perform the results relating to the goal that has been setup (Cheumtong, 1993), which include the solving of the problems within educational institution very well by using the least resources but gaining the highest benefits, and also achieving the goal or objectives in educational management.

Staff performance satisfaction (SATIS). The staff should be satisfied with their performance, dedicate time to performance, and are responsible for creating the confidence, and admiration to the students, which will affect the students' high learning achievement. It has been shown that the positive attitudes are important in helping students to develop, as well as to adjust themselves in accordance with the changing world of social, economic, politics, science and technological environments. This can be designated as the view of effectiveness for all systems (Hoy and Miskel, 1991).

Personal team performance (TEAM). All staff can be considered as the important machines of performance. The good administrators have to realize that the important role of the leader is to conduct various policies to encourage the performance of various staff, especially in terms of creating satisfaction, team performance and performance participation (Hersey and Kenneth, 1993). This role is relevant to the concept of Strauss and Sayless (1990) who have demonstrated that the performance satisfaction and willing to perform contributed to the achievement of the goals and objectives of the organization. The staff will be satisfied with their performance which gives them the benefits for both materials and spirits, and be able to meet their needs. Due to the performance, it should be determined whether each staff should know his or her roles and duties as well as the responsible scope clearly. Moreover, the team has to determine the performance plan and develop the essential skills to perform, and it will develop staff's willing to perform and participate in order to make decision and solve the existing problem. Several other important factors that play important roles, i.e., freedom, autonomy, opportunity to use special skills, and a whole capability to identify work or products which will be achieved or the project which will affect other persons, emphasize the promotion to increase members' motivation in team, and increase the effectiveness of the team are also contributed to the success of performance (Redding, 1988).

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