A STUDY ON STRESS, ORGANIZATIONAL COMMITMENT AND TASK PERFORMANCE OF WHITE COLLAR WORKERS IN BANGKOK

TEERADEJ PUAPRADIT

Abstract: White-color workers whose jobs must deal with daily dynamic and abrupt change, hence they are found to be vulnerable to stress and its negative effects. This research intended to investigate task performance of white-collar workers in Bangkok in respect to stress and organizational commitment. The research was also extended to investigate the social claim that different university background yields different level of performance. Passing and failing or not-participating in the entrance examination was regarded a differentiating factor. Job stress, physiological stress and burnout were assigned to be negative predictors of task performance; whereas organizational commitment was its positive predictor. The survey was conducted through collecting 200 questionnaires from white-collar workers in Bangkok. Pearson's correlation analysis was used to inspect the relationships; while independent sample T-test was used to find significant difference between two different university background groups. Findings revealed that job stress was negatively related to task performance; whereas organizational commitment was positively related to it. The group passing the entrance exam were lesser susceptible to the negative effect of stress and have higher degree of correlation between organizational commitment and task performance than those who did not passed the exam. Job stress level was found to have significant difference between these two groups. The results potentially contribute to performance and human resource management to design proper courses of action to enhance employees' performance.

Keywords: Stress, white-collar workers, task performance, organizational commitment

Introduction: Performance has gained interest from management field for a long time; however, there are no a solid theoretical framework for an optimal measurement of performance, in spite of its significance. Koopmans and others (2011) suggested that because performance was diverse from job to job, there have been extensively different work performance measures used.

For a rigorous research on white-collar workers who work in office setting with a dynamic change in environment posing threats on their psychological and physical well-being, the construct in this research specified on aspects of stress and commitment which entail both positive and negative alteration of work performance.

Stress has been known to deteriorate the quality of work and impair job performance; conversely organizational commitment

contributes to increasing the performance of the workers (Leung et al., 2010; Park et al., 2008). It is questionable in applicability of the concept to white collar workers in Bangkok, hence; investigating this premise is to ensure the consistency and validity of the theories.

Apart from stresses and commitment, the majority in Thai society also strongly believe in higher education background and the entrance examination system. The group passing the entrance examination has been claimed to be more competent and skillful than those who have no entrance exam experience or have failed the exam before. As a result, they are more likely to get better career opportunity than them. This claim should be inspected and justified.

Literature review:

Job stress:According to the theory of cognitive appraisal, proposed by Lazarus and

Folkman (1984), stress was the outcome of a dynamic interaction between a person and environments in which the individual comparatively appraises that environmental demand which outweighs his or perceived resources (Carlton & Manderson, 2014). Job Stress of white-collar workers The sources of task-related stress in white-collar workers typically are workload, extensiveness of responsibilities, mismatching with bosses' attitude which affect quality of task and lack of control problem. Twenty five per cent of job stressors were found in the overall internal office factors workload (Bhatti, 2010).

Physiological Stress:Berzwinsky (1992)defined stress as "internal reactions of body against unfavourable physiological effects like extreme cold and heat, difficulty and distress, poverty, damage, pain, etc." (as cited in Ahari et al., 2013). If a person experiences the stressors for a long time, it results in physical responses such as headaches, back pain, muscle tension, hair loss, diarrhea and loss of appetite. When physiological theses symptoms prolonged or ineffectively handled, they can impair job performance and eventually become more serious health problems (Blaug, 2007).

Physiological Stress of white-collar workers: Since white-collar workers experience stress through work anxiety, on a daily basis, working overtime unpaid and fear of losing job, the body reaction to the stress – revealed by medical study and the employees themselves (Condon, 2013) - is in form of headache, circular problem, and various physical illness.

Burnout:Leiter and others (2001) referred burnout as "state of emotional and mental exhaustion caused by long-term chronic, emotional, and interpersonal stress while carrying out a role" (as cited in Leung et al., 2011). Burnout generally comprises of three characteristics: emotional exhaustion, depersonalization, and reduced personal accomplishment.

Burnout of white-collar workers: White collar workers who experience long-term or prolonged stress caused from overwhelming demand of jobs and are afraid of losing jobs, in the psychological approach, they will develop transitional process of burnout. The however, research. adopt only characteristic of burnout, emotional exhaustion - feeling of being depleted of resources - to assess; it has been found to be the most related characteristic of burnout (r = 0.647) to stress in the study of Hayes and Weathington (2007).

Organizational Commitment: Merriam-Webster online dictionary defines commitment the organizational as agreement or pledge to do something in the future - the state or an instance of being obligated or emotionally impelled. (as cited in Wu and Liuan, 2007). There were three mainstream concepts of organizational which were: affective. commitment basis and continuance normative commitment, according to Meyer and Allen's Model (Magsood, 2011).

Commitment of white-collar workers: Among three types of commitment, the most desirable one for every organization is affective commitment. De Loria (2001) addressed that affective commitment was best suited to apply for work-firm relation indicator and organizational attachment study; because it was highly correlated with a wide range of key variables such as job performance, turnover, organization behavior and so on.

Task Performance: Campbell (1990) defined task performance as "the proficiency with which individuals perform the core substantive or technical tasks central to his or her job". In terms of behavioural study, Rotundo and Sackett (2002) extended the definition of task performance from Campbell (1990) including work quantity

and quality, job skills, and job knowledge (as cited in Koopmans et al., 2013).

performance Task of white-collar workers: Office employees are appraised as having high task performance when they have high productivity and their work quality is positively evaluated by managers. According to Campbell (1990), performance is generally conceptualized with work quality and quantity; this research, therefore, adopts these dimensions as the main evaluating factors.

Stress and Performance: Yerkes-Dodson law (1908) law presented the relation in the form of inverted U-shape. At the initial stage, the performance increases as stress is aroused. At the optimum, the performance is regarded at the highest level, stress acts as a motivator contributing positive effects to a person. Then, until the aroused stress goes beyond the threshold, the performance begins to drop. The upside down U- shape graph, therefore, represents the positive effect of low-to-medium level of stress and the negative effect of high level of stress on the performance (Carlton & Manderson, 2014).

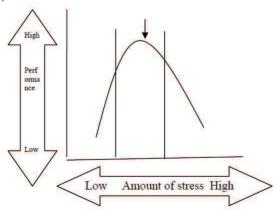


Figure 1: relationship between performance and stress (Jehangir et al, 2011)

Conceptual framework: Moo's social ecological model (as cited in Maqsood, 2011) and the study of stress-performance for C-PMs (Leung et al, 2011) contribute to the construction of this research's conceptual framework.

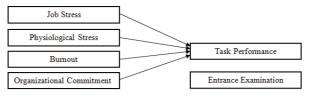


Figure 2: Hypothetical framework for white-collar workers

Each independent variable was presumed to have a correlation with the criterion variable, task performance.

H₁: Job stress of white-collar workers in Bangkok is negatively related to their task performance.

H₂: Physiological stress of white-collar workers in Bangkok is negatively related to their task performance.

H₃ Burnout of white-collar workers in Bangkok is negatively related to their task performance.

H₄ Organizational commitment of white-collar workers in Bangkok is positively related to their task performance. Furthermore, every relationship's degree of correlation was to compare between two groups of the respondents – the group passing the entrance exam and the group not passing nor participating in the exam.

H₅ Correlation coefficient between job stress and task performance of white-collar workers who passed the entrance exam is lower than those who did not pass or participate in the exam.

H₆ Correlation coefficient between physiological stress and task performance of white-collar workers who passed the entrance exam is lower than those who did not pass or participate in the exam.

H₇ Correlation coefficient between burnout and task performance of white-collar workers who passed the entrance exam is lower than those who did not pass or participate in the exam.

H₈ Correlation coefficient between organizational commitment and task performance of white-collar workers who passed the entrance exam is higher than those who did not pass or participate in the

exam. Due to the difference in participation in the entrance exam experience, the level of three types of stress, organizational commitment and task performance between two groups are presumed to be significantly different

H₉ There is significant difference in the level of job stress between the white-collar workers who passed the exam and who did not pass or participate in the exam.

H₁₀ There is a significant difference in the level of physiological stress between the white-collar workers who passed the exam and who did not pass or participate in the exam.

H_{II} There is a significant difference in the level of burnout between the white-collar workers who passed the exam and who did not pass or participate in the exam.

H₁₂ There is a significant difference in the level organizational commitment between the white-collar workers who passed the exam and who did not pass or participate in the exam.

H₁₃ There is a significant difference in the level of task performance between the white-collar workers who passed the exam and who did not pass or participate in the exam.

Research Methodology: The hypotheses were tested through the questionnaire surveying on 200 white-collar workers in Bangkok. The questionnaires were made by two channels: online and paper-based form. The online form was constructed by using Google survey function and distributed via Line application. The distribution and collection had started on March 23, 2015 and finished on March 31, 2015.

Both channels were collected through convenient sampling due to the time constraints. Besides, quota sampling was also adopted to collect an equal number (100:100) of the respondents regarding passing entrance exam and not passing or not-participating in the exam.

In the stress section, a set of job stress and physiological questions were adopted from Leung and others (2011) study. The set of burnout and organization commitment questions were adopted from Magsood performance (2011). Lastly task measured by using individual work performance questionnaire (IWPQ), developed by Koopmans and others (2012).

The questions requested the respondents to rate their perceived level of job stress from one (lowest) to seven (highest) on both expected and actual ability perspective.

Meanwhile, other variables were measured regarding five-point Likert scale, from one (less than usual) to five (much more than usual).

Reliability Test:The test was conducted using Cronbach's Alpha Coefficient when the number of the respondents reached 30.

	Constant of the state of the st
	Cronbash's alpha
Variables	(n=30; item=4)
Job Stress	0.713
Physiological	
Stress	0.830
Burnout	0.891
Organizational	
commitment	0.830
Task	
Performance	0.694

Table 1: Consistency of the scales test

Research Findings Male respondents are accounted for 26.5% (N = 53), and females were 73.5% (N = 147). They belonged to the age range between 18-25 most, 40% (N = 82), followed by 26-33 at 21% (N = 42); whereas there were the same number at the range of 34-41 and 42-65, which is considered 19% (N= 38). Mean and standard deviation of each variable were found as follow;

Variables	Mean and standard deviation scores				
	Mean = 0.98, SD =				
Job stress	0.93				

Physiological	
stress	Mean = 2.5, SD = 0.8
	Mean = 2.86, SD =
Burnout	0.92
Organizational	
commitment	Mean = 3.36, SD = 0.93
Task	
performance	Mean = 3.48, SD =0.61

Table 2: Mean and standard deviation scores

Pearson's correlation analysis found significant relationships in two pairs of the correlation hypotheses which were job stress and task performance and organizational commitment and task performance.

Job stress and task performance were significantly negatively correlated, r (198) = .34, p < .05.

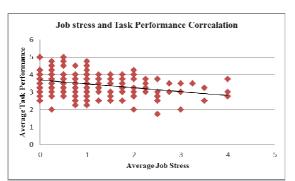


Figure 3: Job stress and task performance correlation

Correlations					
		Agv_JS	Agv_TP		
Agv_JS	Pearson Correlation	1	342**		
	Sig. (2-tailed)		.000		
	N	200	200		

^{**.} Correlation is significant at the 0.01 level (2-tailed)

Table 3: Job stress and task performance correlation (SPSS report)

Task performance were significantly positively correlated, r(198) = .31, p < .05.

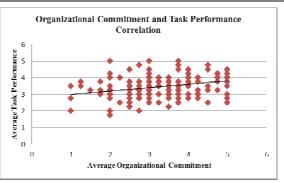


Figure 4: Organizational commitment and task performance correlation

	Correlations					
	Agv_OC Agv_Ti					
Agv_OC	Pearson Correlation	1	.312			
	Sig. (2-tailed)		.000			
	N	200	200			

^{**.} Correlation is significant at the 0.01 level (2-tailed).

Table 4: Organizational commitment and task performance correlation (SPSS report) Nonetheless, both relationships of physiological stress and task performance and burnout and task performance were not significantly correlated.

Additionally, significant after the correlations were found, they were run using SPSS separately again to compare the degree of correlation (r), between the respondents passing the entrance exam and not passing or not participating in the exam. Within the group passing the entrance exam, job stress and task performance were significantly negatively correlated, r(98) = .28, p < .05; meanwhile job stress and task performance within the group not passing or not participating the exam were significantly negatively correlated, r(98) = .38, p < .05. Hence, the correlation coefficient of the group not passing or not participating the exam was found negatively stronger than the group passing the entrance exam.

	Correlations					
		Avg_JS	Avg_TP			
Avg_JS	Pearson Correlation	1	283**			
	Sig. (2-tailed)		.004			
	N	100	100			

^{**.} Correlation is significant at the 0.01 level (2-tailed).

Table 5: Job stress and task performance correlation of passing entrance exam group

Correlations					
		Avg_JS	Avg_TP		
Avg_JS	Pearson Correlation	1	381"		
	Sig. (2-tailed)		.000		
	N	100	100		

^{**.} Correlation is significant at the 0.01 level (2-tailed).

Table 6: Job stress and task performance correlation of not passing or participating in the entrance exam group For the organizational commitment and task performance, there was a significantly positive correlation within the group passing the entrance exam, r(98) = .39, p < .05; while a significantly positive correlation within the group not passing or not participating the exam was found to be r (98) = .25, p < .05. Therefore, the group passing the entrance exam had a higher positive correlation coefficient than the group not-passing or not-participating in the exam.

	Correlatio	ns	
		Avg_OC	Avg_TP
Avg_OC	Pearson Correlation	1	.390**
	Sig. (2-tailed)		.000
	N	100	100

^{**.} Correlation is significant at the 0.01 level (2-tailed).

Table 7: Organizational commitment and task performance correlation of the group passing the entrance exam

	Correlations					
	Avg_OC Avg_Ti					
Avg_OC	Pearson Correlation	1	.250			
	Sig. (2-tailed)		.012			
	N	100	100			

^{*.} Correlation is significant at the 0.05 level (2-tailed).

Table 8: Organizational commitment and task performance correlation of not passing entrance or not participating in exam group Nonetheless, the correlation coefficient of the relations between physiological stress and task performance and burnout and task performance were not put into consideration due to their non-significant values found in the earlier analysis.

Furthermore, independent sample T-tests was conducted on every variable to inspect the significant difference between the group passing the entrance exam and not passing or not participating the exam. Passing the entrance exam group (M = .77, SD = .72) reported significantly lower levels of job stress than not passing or not participating the exam group (M = 1.20, SD = 1.05), t (198) = -3.343, p < .05.

Group Statistics							
Entrance	N Mean Sto		Std. Deviation	Std. Error Mean			
Agv_JS Yes	100	.7700	.73227	.07323			
No	100	1.1975	1.04826	.10483			

			In	depende	ent Sam	ples Test				
			Test for fVariances	t-test for Equality of Means						
		F				Sig. (2-	Mean Differenc	Std. Error Differenc	95% Confidence Interval of the Difference	
		٢	Sig.	t	df	tailed)	е	e	Lower	Upper
Agv_ JS	Equal variances assumed	11.968	.001	-3.343	198	.001	42750	.12787	67966	17534
	Equal variances not assumed			-3.343	177.0 37	.001	42750	.12787	67985	17515

Table 9: Mean difference and significance report on job stress between the group passing the exam and the group not passing or not participating in the exam

However, there was no significant difference in the level of physiological stress, burnout, organizational commitment and task performance between the group passing the entrance exam and not-passing or notparticipating in the exam.

Discussions and conclusions Low mean score of job stress is explainable by easygoing and having the present-oriented behavior of Thais because of prevailing of Buddhist teachings in the society. Nevertheless, the negative effect of the low level of stress on task performance which is contradictory to inverted U-shape model, according to Yerkes-Dodson law (1908), needs to be clarified through a further research.

The relationships between job stress and task performance as well as organizational commitment and task performance among white-collar workers in Bangkok indicate that the employees' work performance tend to be affected by stress resulting from excessive levels of workload, difficulty,

responsibility and work extent. The greater level of job stress the workers suffer, the lower job performance they have. The result is compatible with Lang and others (2011), the study found a relatively low job stress (Mean = 0.089, SD = 0.786) and have negative relationship (r = -0.22) with task performance.

For the organizational commitment, the workers tend to have a better task performance when they have affection towards the organization. In other words the stronger sense of belonging and identification in the organization, they would work better in the aspects of task quality and quantity. The finding is found to be supported by Memari and others (2013), the study revealed a positive significant relationship 0.218) (r between organizational commitment and employees performance in Meli Bank.

Although physiological stress and burnout found not to have significant relationship with task performance, they might do in others performance dimensions, as proposed by Lang and others (2011). Physiological stress rather negatively contributes to the effects of organizational performance due to less dedication spent on the organization but health care. Similarly, burnout also reported affecting organizational performance because emotional exhaustion in burnout enables withdrawal behaviors and absenteeism, impacting in a collective scale.

For the comparing degree of correlation between two groups, the group not passing or not participating in the exam had a stronger negative relationship between job stress and task performance than the other group. The finding reflects that entrance examination could have a role moderating degree of correlation. In other words, those who had passed the entrance exam have probably developed stress management skills from that event and accordingly use the skill consciously or unconsciously to

handle the stress in working life. On the other hand, those who did not passing or not participate in the exam probably lack this skill due to the absence of the experience, and as a result, stress obviously has negative influence on them more.

For the relationship between organizational commitment and performance, the group passing the exam has a stronger positive relationship than those who had failed or did not participate in the exam. This occurrence could be explained through the institutional-affection socialization derived from the universities that the group passing the exam entered. Since those universities are traditional and usually famous for strong institutional affection mode of thinking (affective commitment), they are likely to get instilled and absorbed it, and then apply to their working life. As a result, they become more proactive in task performance than those who did not passed the exam or passed such an experience before.

Lastly, the lower level of job stress in the group passing the exam ensure that the entrance examination experience could be a factor influencing the capability to cope with stress and reduce self-perceived stress.

All in all, job stress is still found to be a negative predictor of task performance, meanwhile; organizational commitment is still found to be a positive predictor of it.

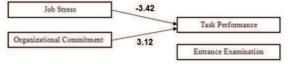


Figure 5: Conclusion of the correlations It can be said that the theories of relationship between stress and performance and organizational commitment and performance are still applicable to the group of white-collar workers in Bangkok, due to their consistency and validity of the result.

Recommendations and further research: The knowledge can be applied to human resource and task management area in an organization. To increase employees'

task performance the managers should focus on lowering job stress and boosting organizational commitment. Reducing job stress could be executed through the concept of narrowing the gap between the excessive expectations put on employees and develop employees' competency. In vice versa, the managers can detect the causes of poor individual performance by inspecting high levels of job stress and low level of commitment.

- Lower expectation place on employees - Develop individual competency - Stress management workshops Lower Job Stress - Setup commitment program to get employees' commitment fully developed Higher Organizational Commitment

Figure 6: Recommended approaches to improve task performance

It is advisable to extend the study on other potential predictors of task performance, apart from stress and commitment, in order to comprehensively and effectively enhance employees' task performance.

Furthermore, stress management and organizational commitment should be investigated to prove their moderating roles of the correlations found in this research.

References

- 1. Albdour, A., & Altarawneh, I. (2014). Employee Engagement and Organizational Commitment: Evidence from Jordan. International Journal of Business, 19(2).
- 2. Ahari, M., Mehrabi, J., Kord, K., & Karimi, F. (2013). Studying the Relation of Job stress with Job satisfaction and Organizational Productivity among the Telecommunications Employees in Lorestan Province. Interdisciplinary Journal of Contemporary Research in Business, 5(1).
- 3. Bhatti, N., Shar, A., Shaikh, F., & Nazar, M. (2010). Causes of Stress in Organization, a Case Study of Sukkur. International Journal of Business and Management, 5(11).
- 4. Blaug, R., Kenyon, R., Kenyon, A., & Lekhi, R. (2007). Stress at Work. A Report Prepares for The Work Foundation's Principal Partners.
- 5. Carlton, C., & Manderson, G. (2014). Life Stress, Work Stress, and Job performance: Does Conscientiousness Make a Difference?

- 6. Collie, D. (2004). Top 10 causes of workplace stress.
- 7. Condon, D. (2013). Many office workers 'highly stressed'
- 8. De Beer, L., Pienaar, J., & Rothmann Jr, S. (2013). Investigating the reversed causality of engagement and burnout in job demands resources theory. SA Journal of Industrial Psychology, 39(1).
- 9. DeLoria, J. (2001). Comparative Study of Employee Commitment: Core and Contract Employees in a Federal Agency.
- Department of mental health, Ministry of Public Health. (2015).
 การเตรียมตัวก่อนสอบเอ็นทรานซ์.
- Dewe, P., O'Driscoll, M., & Cooper, C. (2012). Theories of Psychological Stress at Work.Handbook of Occupational Health and Wellness. doi:10.1007
- 12. Fernet, C., Austin, S., Tre'panier, S., & Dussault, M. (2013). How do job characteristics contribute to burnout? Exploring the distinct mediating roles of perceived autonomy, competence, and

- relatedness. European Journal of Work and Organizational Psychology, 22(2).
- 13. Gardner, M. (2011). Cognitive hardiness, appraisal and coping: Comparing two transactional models. Journal of Managerial Psychology, 26(8), 646-664. doi:10.1108
- 14. HAYES, C., & WEATHINGTON, B. (2007). Optimism, Stress, Life Satisfaction, and Job Burnout in Restaurant Managers. The Journal of Psychology, 141(6).
- 15. Jehangir, M., Kareem, N., Khan, A., Jan, M., & Soherwardi, S. (2011). Effect of Job Stress on Job Performance & Job Satisfaction. Interdisciplinary Journal of Contemporary Research in Business, 3(7).
- 16. Kain, J., & Jex, S. (2010). Karasek's (1979) job demands-control model: "A summary of current issues and recommendations for future research" In New Developments in Theoretical and Conceptual Approaches to Job Stress. 237-268. doi:10.1108
- 17. Koopmans, L., Bernaards, C., Vincent, H., Van Buuren, S., Der Beek, A., & De Vet, H. (2013). Development of an individual work performance questionnaire. International Journal of Productivity and Performance Management, 62(1), 6-28. doi:10.1108/17410401311285273
- 18. Koopmans, L., Bernaards, C., Hildebrandt, V., Schaufeli, W., Der Beek, A., & De Vet, H. (2011). Conceptual Frameworks of Individual Work Performance A Systematic Review. JOEM, 53(8
- 19. Kounenou, & Demerouti, G. (2012). Job burnout and employees' performance. Advanced Research in Economic and Management Sciences (AREMS), 2.
- 20. Khalid, A., Murtaza, G., Zafar, A., Zafar, M., Saqib, L., & Mushtaq, R. (2012). Role of Supportive Leadership as a Moderator between Job Stress and Job Performance.

- Information Management and Business Review, 4(9), 487-495.
- 21. Leung, M., Chan, Y., & Dongyu, C. (2011). Structural linear relationships between job stress, burnout, physiological stress, and performance of construction project managers. Engineering, Construction and Architectural Management, 18(3), 312-328. doi:10.1108/09699981111126205
- 22. Lotfizadeh, M., Maimaiti, N., & Ismail, N. (2014). Occupational Stress among White Collar Employees in Esfahan Steel Company, Iran. Malaysian Journal of Public Health Medicine,14(1), 79-81.
- 23. Beheshtifar, M., Branch, R., & Nazarian, R. (2013). Role of Occupational Stress in organizations. Interdisciplinary Journal of Contemporary Research in Business, 4(9).
- 24. Maqsood, A. (2011). Work Environment, Burnout, Organizational Commitment Variables as Moderators. National Institute of Psychology.
- 25. Marandi, E., & Moghaddas, E. (2012). Motivation factors of Blue collar workers verses White collar workers in Herzberg's Two Factors theory.
- 26. Matichon. (2014, January 1). ผลวิจัยชี้เด็กไทยเครียดเรียนหนักติคอันดับโลกแต่สิ่งที่ได้ใช้กลับมาจากเรียนพิเศษ.
- 27. Memari, N., Branch, S., & Marnani, A. (2013). The impact of Organizational Commitment on Employees Job Performance. "A study of Meli bank"Interdisciplinary Journal of Contemporary Research in Business, 5(5).
- 28. Mielach, D. (2012). Who Has the Most Stressful Job in Your Office? You Might Be Surprised. Business News Daily.
- 29. Mohsan, F., Nawaz, M., & Khan, S. (2011). Impact of Stress on Job Performance of Employees Working in Banking Sector of Pakistan. Interdisciplinary Journal of Contemporary Research in Business, 3(2).

- 30. Nakao, M. (2010). Work-related stress and psychosomatic medicine. Biopsychosoc Med, 4(4). doi:10.1186/1751-0759-4-4
- 31. Park, J. (2008). Work stress and job performance. Perspectives on Labour and Income, 20(1), 7-19.
- 32. Rice, V. (2011). Theories of Stress and Its Relationship to Health. THE WORLD BANK GROUP. (2010). Towards a Competitive Higher Education System in a Global Economy.
- 33. Thorsteinsson, E., Brown, R., & Richards, C. (2014). The Relationship between Work-Stress, Psychological Stress and Staff Health and Work Outcomes in Office Workers. Psychology, 5, 1301-1311.
- 34. Wu, J., & Liu, A. (2006). A study on the relationship between organizational commitment and task performance in Chinese construction firms. Annual ARCOM Conference, 207-217.

* * *

Teeradej Puapradit, Full time student at Graduate School of Business, Assumption University, Bangkok, Thailand – This research was conducted under the supervision of Dr. Aaron Loh.