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THE MEDIATING EFFECT OF WORK ENVIRONMENT IN THE RELATIONSHIP BETWEEN LECTURERS COMMITMENT AND RESEARCH COMMERCIALISATION EXCELLENT

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Abstract :*The new direction of our universities is to get involved in research and commercialisation. The question is, how many lecturers in Malaysian university response to this new ministry policy. The ministry has stress on the important of research and commercialization among the lecturers to comply with high ranking university policy and the policy of science and technology as establish in 1995. Hence, this paper investigates the role of work environment such as teaching workload as the mediators in determining the relationship between commitment and lecturer's intensity to involve in research and commercialisation along their services. In completing this study, a total of 200 lectures were selected from universities across northern region of Peninsular Malaysia as respondents. Questionnaire are distributed to these respondents as part of quantitative research method. The result proves that work environment has a mediating impact on the relationship between work commitment and research and commercialization activities. Relevant suggestion is described clearly at the end of this paper*

Keywords: *Workload, Awareness, Commitment, Research, Commercialization, National Science and Technology Policy*

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1. Introduction

The original focus of our National Science and Technology Policy Tier 1 is to increase research and commercialization activities in Malaysia. Institution of Higher Education is the target agencies that can support this agenda when it was launching on 1986. Universiti Teknologi Malaysia headed this policy dimension by highlighting four tools to measure research and commercialization incentive which are the number of patent, trade mark, product commercialization and R&D potential. The various initiatives and programmes that were implemented under these policies, including the enhancement of national capabilities and capacities of Research and Development (R&D), the forging of partnerships between public funded research organisations and industries, enhancement of commercialisation through National Innovation Model, and development of new knowledge-based industries, have accelerated the advancement of country's STI.

Table 1: University Research Commercialisation until August 2018

Universities	Patent	Trade mark	Total Commercialised Products	Total R&D with Potential for Commercialised Products	Total No. of IP
Universiti Teknologi Malaysia (UTM)	9	28	6	110	153
Universiti Putra Malaysia (UPM)	12	27	16	15	70
Universiti Kebangsaan Malaysia (UKM)	3	20	0	33	56
Universiti Malaya (UM)	0	11	3	31	45
Universiti Sains Malaysia (USM)	11	4	15	9	39
Universiti Teknologi Mara (UiTM)	5	22	8	0	35
Universiti Malaysia Pahang (UMP)	0	0	1	29	30
Universiti Malaysia Sabah (UMS)	0	0	0	26	26
Universiti Utara Malaysia (UUM)	0	0	0	21	21
Universiti Tun Hussein Onn Malaysia (UTHM)	0	0	3	16	19
Universiti Malaysia Sarawak (UNIMAS)	0	8	0	4	12
Universiti Islam Antarabangsa Malaysia (UIAM)	0	2	2	4	8
Universiti Pendidikan Sultan Idris (UPSI)	0	0	0	8	8
Universiti Malaysia Terengganu (UMT)	0	0	2	4	6
Universiti Malaysia Perlis (UniMAP)	0	0	2	3	5
Universiti Teknikal Malaysia Melaka (UTEM)	0	0	0	0	0
Total	**40**	**122**	**58**	**313**	**533**

(Source: MOHE)

Table 2: 10th Malaysia Plan Ministry of Higher Education R&D Schemes (Source: MOHE)

		No. Scheme Allocation (2011 – 2012)
1	Fundamental Research Grant Scheme (FRGS)	300 million
2	a. Exploratory Research Grant Scheme (ERGS) b. Long-Term Research Grant Scheme (LRGS) c. Prototype Research Grant Scheme (PRGS)	300 million
3	Research Incentive	41 million

4	MOHE Special Project	100 million
	TOTAL	741 million

The 10th Malaysia Plan by Ministry of Higher Education clearly describe the allocation of financial assistant for research grant which bring an amount of 741 million for year 2011 to 2012. The government policy on research and commercialization encouragement scheme are very serious and always become a priority in education development. It is up to university management on how to grab this opportunity in order to fight for this budget allocation. The above table highlight the five criteria in measuring the achievement of NSTP among universities in Malaysia. Universit Teknologi Malaysia heading the achievement by getting the highest score in the total of Research and Development and commercialization of R&D product in the nation. Base on the data on 2008, the achievement of universities is inconsistent and this situation gives an evident that the achievement of NPST through the involvement of academic staff still at the critical stages.

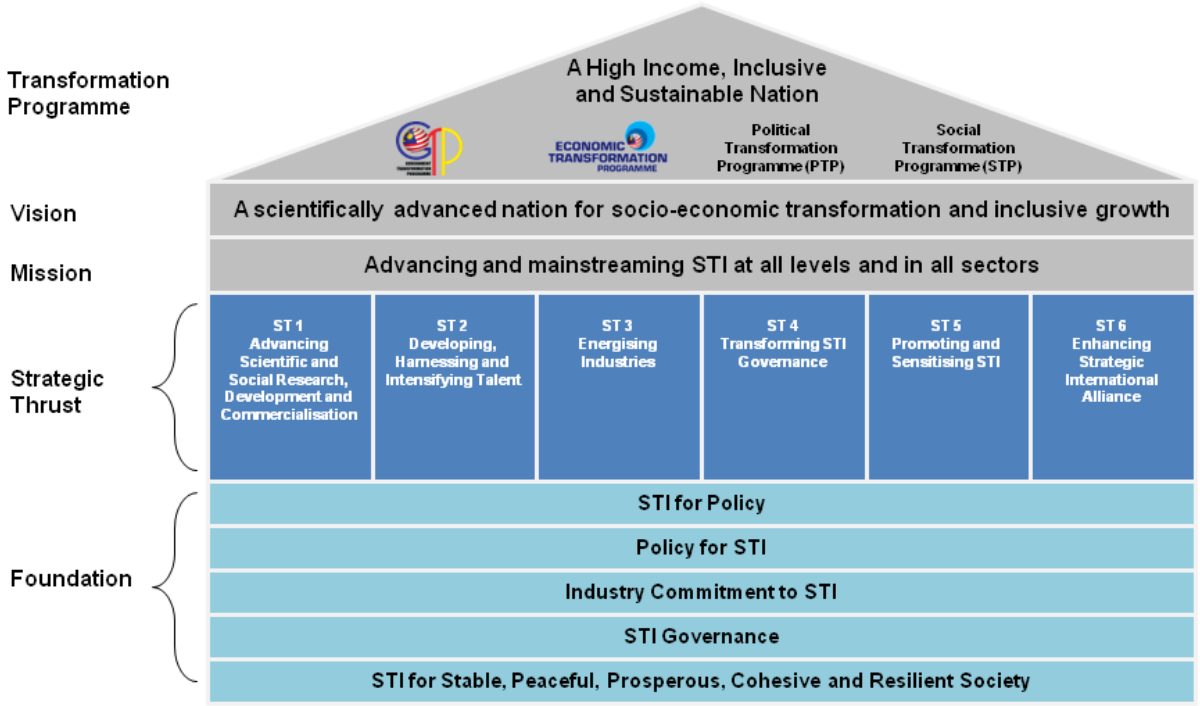


Figure 1: Framework for the National Policy on Science, Technology and Innovation (NPSTI)

The framework for NPST consist of six strategic thrust as the basis for supporting the mission and mission of the transformation programme. The above figure shows that the aims of the policy is to achieved a high income, inclusive and sustainable nation through social transformation, political transformation, economic and lastly technology transfer. Out of six strategic trust that support the vision and mission, this research only focus on strategic trust no 1 which stress on advancing Scientific and social research, development and commercialization. In short, this research only focus on the possible factors that contribute to strategic trust 1 which are measured by the achievement of academic lecturers in research and commercialization compliment inline to the NPST vision.

The achievement of this Key Performance Indexed (KPI) is measured by the numbers of patent, trademark and commercialization of the product which released from the output of the complete research project. Generally, the increment numbers of patent, trademark by university are inline to the numbers of research completed by the academic staff. However, there are too many barriers for them to complete any single research every semester. The numbers of completed research are depending on the numbers and duration of research grant successfully

awarded to university lecturers. The issue is whether the university lecturers have a capability in winning the research grant every semester or academic year along their services. There are many limitations for them to win the research grant especially the staff holding the administration post in university. Beside that the limitation on the numbers of grant that offers by the ministry also effect on the number of research in university. Hence the lecturers teaching loading that covers face to face classroom appointment, online monitoring and student evaluation may cause the life of lecturer more fatigue and stress. At the same time, the difference group age of lecturers and their length of service, seniority might contribute to individual effort of lecturer's on research and commercialization work as a hole.

Hence the awareness and commitment of the lecturers as the main player in the university are important in complying with research and commercialization as line up in the NSTP policy. The inconsistent achievement of universities in research and commercialization as shown in the table has confirmed the missing link between this NSTP policy and university focus towards the policy.

Ministry of Higher Education has formally categorized our university into three mainstream which are teaching university, research university and moderate categories.
This paper will present more generous scenario on the antecedent of awareness, commitment on lecturer's workload and its impact on NSTP achievement by measuring the emotional perception of individual lecturers on research and commercialization activities. Previous study has empirically identified the problems that contributed to low commercialisation rates of R&D in the Malaysian universities from the industrial perspective. Further studies should be conducted to enhance the results and make it more representative (Ali, Leman, Sunar, & Ahmad (2017). Previous study suggests that future research can explore the concept of university commercialization in different context (Rasyid, 2015).

2. Literature Review

2.1 Research and Commercialization among University Lecturers

Recently, in the 11th Malaysia Plan, the government had stressed on increasing the number of quality graduates; and strengthening research for innovation as part of promoting commercialisation activities. Rationally the increasing numbers of the postgraduate student will increase the numbers of findings or new model that applicable for industrial usage. Instead of that, the encouragement of ministry for university to set up the partnership program indirectly will increase the research and collaboration network. In order to achieve this, the universities are encouraged to partner with industry, government, and local communities to incubate, develop, and commercialise their ideas. The universities are also encouraged to set up a Technology Transfer Office (TTO) to manage and support the commercialisation activities of the research outputs (Decter & Bennett, 2003).

The government has launching a list of research grant for universities in order to increase lecturer's involvement in research and commercialization. Although much emphasises and encouragement have been put forward to accelerate research products commercialisation related activities, however, commercialisation of research products especially among academics in Malaysia is less progressing and encouraging. According to Collier and Gray (2010), "commercialisation is often characterised as the „third mission"". Researchers in the universities produce innovations as a result of their research activities which in turn can be exploited commercially. We can have concluded that research work is the pre requisite for commercialization of the product by university. Therefore, there is a significant relationship between research and commercialization activities. However, the transformation from research and development into commercialisation is a path strewn with many pitfalls (Aziz, Haris and

Norhashim, 2011). The commercialisation and innovation development has been assigned as Niche 1‟ by the Malaysian Ministry of Higher Education which implies the emphasis and urgency (MOHE, 2010) under the Tenth Malaysian Plan. As been discussed in the introduction, there is a possible effect of the numbers of research grant and the numbers of patent, trademark and innovation registered by each university in Malaysia. This study only focus on the selected variable as the determinant of research and commercialization activities among university lecturers. From the reviewing of literatures there is lack of study investigating the possible factors that contribute to research and commercialization intensity by lecturers.

Previous study by Heng, Rasly and Senin (2011) investigate main factors affecting commercialization, they found that academic researchers who perceive the engagement of commercialization activities as feasible are more likely to commercialize their innovations. Once paired with the right person, the key researcher became more confident and is willing to go the extra mile of having his research commercialized. This finding shows that the research partners might give more influence on commercialization decision by the main investigator. Teamwork can be one of the determinant for research and commercialization. Work as a team will open to more idea and awareness level of the researcher.

Human studies has concluded that individual behaviour most probably influence their confident and ability in doing things. Teamwork will increase personal confident in term of their action and decision in practising academic research as part of their job responsible along their appointment as academician. Therefore, teamwork factor might contribute to research culture among lecturers in university. Thus, self-efficacy influences not only our choice of action but also the sum of our effort. Research on team efforts also found that a team's belief about their collective abilities and effectiveness to execute a series of actions to yield a certain level of acceptable performances had the same influence as individual self-efficacy (Shepherd and Krueger, 2002). Rashid (2015) study the influence of leadership style of university leaders towards commercialization of research, the findings revealed a direct relationship of transformational and transactional leadership styles with commercialization of academic research. In addition, entrepreneurial orientation has significant influence on the commercialization of academic research. Previous research has investigated the variety of variables as the determinant of the research and commercialization activities by lecturers. It is indicating that research and commercialization issues are very significant nowadays, since the most university looking forward to get international certification and world ranking.

Ali, Leman, Sunar, & Ahmad (2017) has identified the problems related to low commercialisation rates empirically and to gather information on how to increase the commercialisation rates in Malaysian universities from the industrial perspective. The found that the factors contribute to low commercialization are industry culture and motivation; mismatch university R&D; funding; and communication and networks.

2.2 Lecturers Commitment on Research Work and Commercialization

The university management always work for the goal and direction or university in achieving ministry vision and mission. The organization structure of university and branch campus are design to ensure the efficient of strategic planning unit that monitored this vision achievement. The initiative taken by strategic planning unit, industrial linkages and research grant sometime move toward difference direction with their personal emotion as individual interest and personal agenda. Behaviour of privacy teamwork with quiet agenda can damage organization whereas it can create informal college in organization. In one small campus, the Rector played an important role in reducing cronyism and informal group in organization. From the effort taken by management and rapid intention by university management it is confident the lecture is more aware and commit to research and commercialization work.

Instead of awareness, commitment of lecturers on the research and commercialization also support the internationalization and international recognition of university. However, it is sound that high awareness of academic staff on the management policy will contribute to high commitment of academic staff toward research and commercialization. Reichers (1985) presented a pluralistic view of commitment by defining commitment as a process of identification with the goals of an organization's multiple constituencies like top management, customers, unions etc. Understanding the goal of organization are the features of commitment, this statement confirms that awareness and commitment can come together and predicting the research and commercialization activities among university staff. Literatures has confirmed that awareness and commitment not directly affect research and commitment activities it might mediate by work environment which is the loading hours of the lecturers.

2.3 The Mediating effect of Working Environment on Research and Commercialization Activities

Kyriacou (2001) defines teacher stress as "the experience by a teacher of unpleasant, negative emotions, such as anger, anxiety, tension, frustration or depression, resulting from some aspect of their work as a teacher" (p. 28). Teacher stress appears to be prevalent in the teaching profession. Similar to the lecturers teaching environment, the unpleasant environment can have caused the teaching work complete with negative performance. The 2006 Ontario College of Teachers annual survey, entitled The State of the Teaching Profession, found Ontario teachers are experiencing high levels of stress, with 13% of teachers indicating that they feel stressed all the time, compared to only 7% of workers in the general public (Jamieson, 2006). Therefore, the commitment itself is not enough to predict research and commercialization, work environment possibly mediates the relationship. The lecturer's commitment affects towards research and commercialization activities sometime interrupted by the work load and total teaching hours of lecturers. Literature has proved that team strength and co-worker's attitude al important in mediating the relationship. In other situation, research has also been undertaken to investigate predictors of job satisfaction. In nursing, for example, predictors of job satisfaction include stress (Flanagan, 2006), perceived relations with co-workers, social support from the supervisor, reward, and control over work (Gelsema et al., 2006). This is evident that work environment might contribute to their satisfaction of doing professional and operational job.

Workload and Student Behaviour had statistically significant to teacher's satisfaction (Ferguson, Frost and Hall (2012). According to literature, there are more tendency of lecturers to comply with the research work when they have enough free time to start with writing the proposal. In this case, lecturers with low loading are more satisfied in following the management policy to involve in research team. The inconsistent of teaching hour within universities effect the research involvement between them. As example, learning and teaching universities are more focus on teaching compare to research universities which are more focus on research and commercialization. Therefore, workload of lecturers one of the important element that contribute to their happiness. This study propose that workload of lecturers will affect their readiness to do research.

Workload refers to the amount of work that is allocated to an employee to do. A number of researchers have supported a positive relationship between workload, stress and turnover intention Glaser et al. (1999) found that significant relationships between workload and stress and stress and turnover, this research assumes that stress will play an arbitrator role between workload and turnover intentions. Heavy stress not only encourage lecturers to do other extra work but it also can cause them to leave their job. Logically if workload of the lecturers is too high there is no tendency for them to do research and consultation.

Hugo D'Hertefelt (2002) stress that Mental and emotional workload are two other risk areas. They present more specific types of problem. Mental workload refers to how information is perceived and processed when performing work. It is determined by the inherent demands of the operation, and (the limitations of) the operator's processing ability. Most probably mental workload is more on perception of towards the job. Normally if the person perceives that their work order as one of the bad things then the emotional workload is there. There are so many factors might contribute to this perception. Historically the person culture, social norm and life experience of the person in their life. This research will investigate the role of work environment as the mediators in the relationship between lecturer commitment and research and commercialization activities by lecturers. Four public university lecturers in the northern region are selected as a sample.

3. Research Methodology

3.1 Research Design

According to Sekaran (2011), research design is referring to the either qualitative or quantitative nature of research. Roughly qualitative research means the data for the research is collected through questionnaire and qualitative research gathered the data from interview, observation, article review or experimental process. But this research represents a quantitative type of research whereas data is gathered through a set of questionnaires distributed to the respondents.

3.2 Population of The Studies

This study focus is to investigate the impact of few variables toward the achievement of National Policy on Science and Technology in Malaysia (Tier 1) that stress on research and commercialisation achievement among universities. Since all four main universities in the northern region involve in this study, the population are all the lecturer's in Universiti Sains Malaysia, Universiti Utara Malaysia, Universiti Malaysia Perlis and last but not least Universiti Teknologi MARA. The numbers of population are up to 2000 lecturers from these four universities.

3.3 Sampling Design

Sampling is the process of selecting the respondent to answer the questionnaires. According to Sekaran (2001), the sampling design for the numbers of population that we know their numbers is call probability sampling. But if the numbers of population is unknown, the sampling design is call non probability sampling. Therefore, since we know the numbers of the population this study will consider probability sampling as the nature sampling design.
Base on probability sampling design, this study considers stratified sampling as a sampling method. According to literature, stratified sampling method will open to the situation where equal numbers of respondent to be selected as respondent that represent each cluster of population. In this case, equal numbers of respondents will be selected from each university. The table below shows the stratified numbers of respondent from each universities. The numbers of sample are determining by Krejcie and Morgan (1970) table. From the table, for 2100 population the sample size is 325 respondents.

Institution	Sample	Cumulative
UUM	1000/5000 X 357 = 71	71
UiTM	1500/5000 X 357= 107	178
UNIMAP	1000/5000 X 357 = 71	249
USM	1500/5000 X 357 = 107	356

4. Data Analysis and Findings

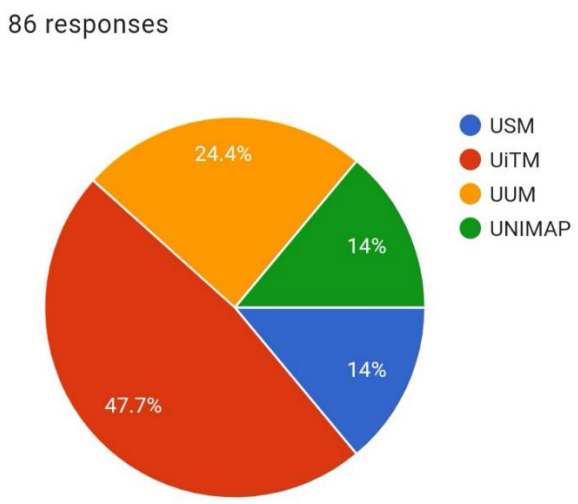
4.1 Response Rate

Out of 200 questionnaires distributed for this phase one – pilot survey, it is only 86 set of questionnaires are return. Therefore, the response rate for this study is 43%. According to research methodology literatures, 43% response rate are accepted for population generalization because it is above acceptance level which is 30%.

4.2 Descriptive Analysis - Demographic Profile of Respondent

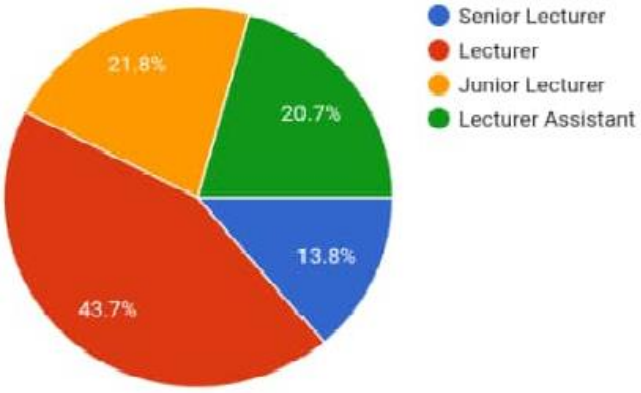
4.1.1 Universities

As been mentioned in the methodology, four universities are involved in this short period survey which are Universiti Science Malaysia, Universiti Utara Malaysia, Universiti Utara Malaysia and Universiti Malaysia Perlis. The response of university lecturers are shown below;

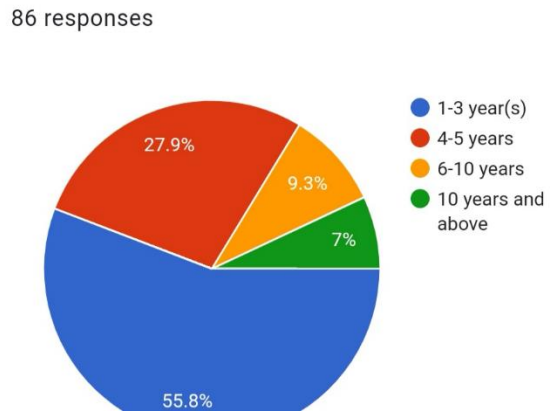


4.1.2 Job Categories

The above chart shows that 38(44%) of respondents are lecturers, 19(22%) are junior lecturers, 17 (21%) are assistant lecturers and 12(14%) are senior lecturers involved in this study.



4.2.3 Years of Experience



In term of years of experience, 48(55%) of respondents are less than 1-3 years of working experience, 24(28%) are between 4-5 years of working experience, 7(9%) between 6 to 10 years and 6(7%) are above 10 years of working experience.

4.3 Hypothesis Testing

Model 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.828[a]	.685	.678	.34515

This model presents the influence of Awareness and Commitment on Research and Commercialization work without interrupted by Work Environment. The fitness only 68%.

Model 2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.860[a]	.739	.730	.31618

This model represents the influence of Awareness, Commitment and Work Environment on Research and Commercialization activities. The R square value that representing the fitness of the model now change to 74%.

		R square Change	
Model	1	0.685	0.739-0.685/0.685x 100 = 8%
Model	2	0.739	

Model 2 is better than Model 1, the R square value has change from 0.685 to 0.739 and increase by 8%. This model shows that by adding third variable as independent the fitness is increase. Therefore, research hypothesis is failed to rejected.

5. Discussion and Conclusion

There are many ways of testing the mediating effect of variable in the relationship between another two variables. The ways this analysis is conducted is very simple that also proven the influence of tested variable. Logically, the role of work environment such as teaching workload will affect the working hours of lecturers. So that, the longer teaching hours will limit the free time of lecturers to do research. Team support also reflex to research and commercialization initiatives of lecturers. A good team in universities might contribute a very positive result in winning the research grants, but the poor teamwork will have caused inconvenient situation that bring to a very bad relationship especially in doing a routine discussion related to the research and commercialization activities. This research has found a significant mediating effect of work environment in the relationship between awareness and commitment towards research and commercialization activities. This finding is similar to the study by Munit et. al (2012) who found the significant mediating effect of work conflict on job satisfaction.

The finding has confirmed the mediating effect of work environment in the relationship between lecturer's awareness, lecturer's commitment and research and commercialization achievement in university. Rationally, teaching workload and co-worker's support are very compulsory for lecturers in doing research and commercialized it. In general, teaching workload for learning universities is between 16 to 18 hours per week, they might fail to discuss and focus on research work event during the holidays. The role of team also affected the research initiatives among lecturers, only committed members really have the space for research discussion and proposal writing.

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