ABRN Asia eJournal OPEN ACCESS ISSN 2504-8430

Asia Pacific Journal of Social Science Research **Volume 5 Issue 1 2020**

Influence of Work Environment on Research and Commercialization: Leading & Complimenting National Policy on Science and Technology Success

Samsudin Wahab [a], Sana Malik [b], Mohd Nashriq Samsuddin [c], Afidah Yusoff [d], Mawarni Abdul Rashid [d]

[a] *Center of Postgraduate Studies, Universiti Teknologi Mara Pulau Pinang Malaysia*
samsudinw@uitm.edu.my
[b] *Assistant Professor, University of Management & Technology, Lahore, Pakistan*
sana.malik@umt.edu.pk
[c] *Agilent Technologies LDA (M) Sdn. Bhd.*
Bayan Lepas Free Industrial Zone Phase III, 11900 Bayan Lepas, Pulau Pinang
nashriqsamsuddin@yahoo.com
[d]*Post Graduate Student, Universiti Teknologi Mara Pulau Pinang Malaysia*
ladylikeone@gmail.com
afidah.yusoff@jpmpp.edu.my

Abstract: *Lecturers are encouraged to engage in multi-discipline researches following the current direction by the Ministry of Education, Malaysia. By considering one's role as a lecturer that holding an administration post or high loading of teaching hours can lecturers take on the additional responsibility of conducting research? The capacity and capabilities of these lecturers are questionable. An effective work environment and type of support required can be vital to the success of any research success or even completion. This paper studies the influence of the work environment to research work and commercialization among university lecturers. In completing this study, a total of 200 lectures selected from universities across the northern region of Peninsular Malaysia as respondents. The questionnaire was distributed to these respondents as part of quantitative research. The finding of this study indicates that with work environment factor such as good support among peers will greatly impact research and commercialization work which lead to the success National Policy on Science, Technology and Innovation (NPSTI). To conclude this study, relevant approaches and suggestions were listed to be applied following the intention of this study.*

Keywords: *Teaching Workload, Peer Support, Research and Commercialization, National Policy, Science and Technology.*

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 agency that can support this agenda when it was launching in 1986. Universiti Teknologi Malaysia headed this policy dimension by highlighting four tools to measure research and commercialization incentive which are the number of patents, trademark, product commercialization and R&D potential. The various initiatives and programs 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 publicly funded research organizations and industries, enhancement of commercialization through

National Innovation Model, and development of new knowledge-based industries, have accelerated the advancement of country's STI.

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**

Table 1: University Research Commercialisation until August 2008 (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

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

The 10th Malaysia Plan by the Ministry of Higher Education clearly describes the allocation of financial assistance for a research grant which brings an amount of 741 million for the year 2011 to 2012. The government policy on research and commercialization encouragement scheme is very serious and always become a priority in education development. It is up to university management on how to grab this opportunity to fight for this budget allocation. The above table highlight the five criteria for measuring the achievement of NSTP

among universities in Malaysia. University Teknologi Malaysia heading the achievement by getting the highest score in the total of Research and Development and commercialization of R&D products in the nation. Base on the data in 2008, the achievement of universities is inconsistent and this situation gives an evidence that the achievement of NPST through the involvement of academic staff still at the critical stages.

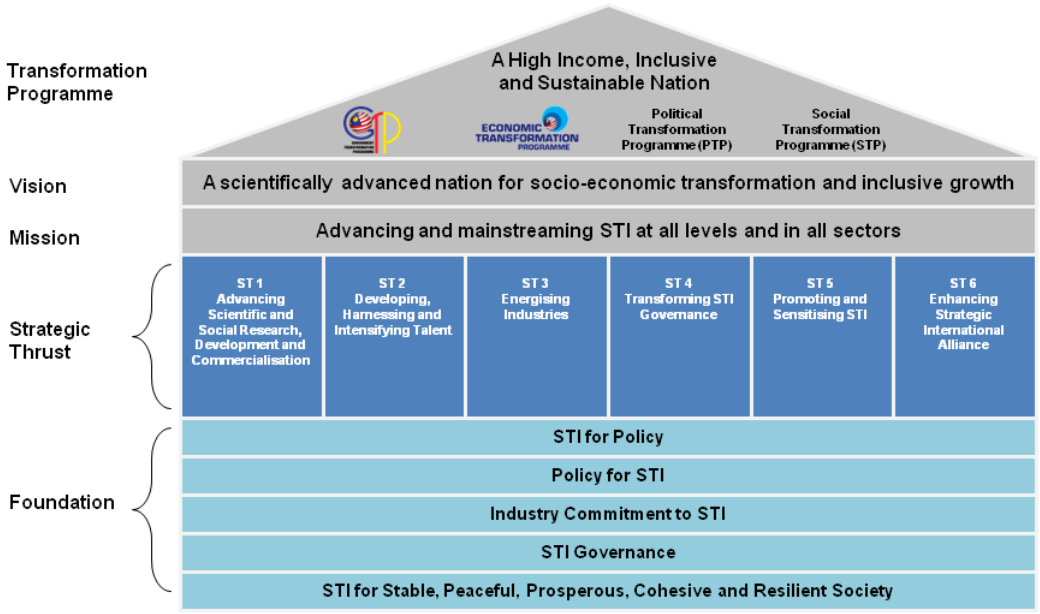

Figure 1: Framework for the National Policy on Science, Technology and Innovation (NPSTI)

The framework for NPSTI consists of six strategic thrusts as the basis for supporting the mission and mission of the transformation program. The above figure shows that the policy aims to achieve a high income, inclusive and sustainable nation through social transformation, political transformation, economics and lastly technology transfer. Out of six strategic trusts that support the vision and mission, this research only focuses on strategic trust no 1 which stresses advancing Scientific and social research, development and commercialization. In short, this research only focuses 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 NPSTI 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 patents, trademark by the university are in line with 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 the research grant successfully awarded to university lecturers. The issue is whether the university lecturers have the capability of winning the research grant every semester or academic year along with their services. There are many limitations for them to win the research grant especially the staff holding the administration post in a university. Besides that, the limitation on the numbers of grant that offers by the ministry also effects on the number of research in the university. Hence

the lecturers teaching loading that covers face to face classroom appointments, online monitoring and student evaluation may cause the life of the lecturer more fatigue and stress. At the same time, the different age-groups of lecturers and their length of service, seniority might contribute to the individual effort of the lecturer's own research and commercialization work as a whole. 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 NSTPI policy. The inconsistent achievement of universities in research and commercialization as shown in the table has confirmed the missing link between this NSTPI policy and university focus towards the policy. Ministry of Higher Education has formally categorized our university into three mainstream which is teaching university, a research university and moderate categories.

This paper will present a more generous scenario on the antecedent of awareness, commitment to the lecturer's workload and its impact on NSTP achievement by measuring the emotional perception of individual lecturers on research and commercialization activities. The previous study has empirically identified the problems that contributed to low commercialization 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). The previous study suggests that future research can explore the concept of university commercialization in a different context (Rasyid, 2015).

2. LITERATURE REVIEW

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 commercialization activities. Rationally the increasing numbers of the postgraduate student will increase the numbers of findings or a new model that applicable for industrial usage. Instead of that, the encouragement of ministry for the university to set up the partnership program indirectly will increase the research and collaboration network. To achieve this, the universities are encouraged to partner with industry, government, and local communities to incubate, develop, and commercialize their ideas. The universities are also encouraged to set up a Technology Transfer Office (TTO) to manage and support the commercialization activities of the research outputs (Decter & Bennett, 2003).

The government has to launch a list of research grants for universities to increase the lecturer's involvement in research and commercialization. Although much emphasis and encouragement have been put forward to accelerate research products commercialization related activities, however, commercialization of research products especially among academics in Malaysia is less progressing and encouraging. According to Collier and Gray (2010), "commercialization is often characterized 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 prerequisite for the commercialization of the product by the university. Therefore, there is a significant relationship between research and commercialization activities. However, the transformation from research and development into commercialization is a path strewn with many pitfalls (Aziz, Haris and Norhashim, 2011). The commercialization 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 grants and the numbers of patents, trademark and innovation registered by each university in Malaysia. This study only focuses on the selected variable as the determinant of research and commercialization activities among university lecturers. From the reviewing of literature, there is a lack of study investigating the possible factors that contribute to research and commercialization intensity by lecturers.

The 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 the commercialization decision by the main investigator. Teamwork can be one of the determinants for research and commercialization. Work as a team will open to more ideas and awareness level of the researcher.

Human studies have concluded that individual behavior most probably influences their confidence and ability in doing things. Teamwork will increase personal confidence in terms of their action and decision in practicing academic research as part of their job responsibilities along with their appointment as an academician. Therefore, the 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 the commercialization of academic research. Also, entrepreneurial orientation has a 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 most universities looking forward to getting international certification and world ranking. Ali, Leman, Sunar, & Ahmad (2017) has identified the problems related to low commercialization rates empirically and to gather information on how to increase the commercialization rates in Malaysian universities from the industrial perspective. They found that the factors contribute to low commercialization are industry culture and motivation; mismatch university R&D; funding; and communication and networks.

Influence of Working Environment of Lecturers on Research and Commercialization

Academic staff working environment is surrounded by the leadership style of management, co-workers support and their job content that covers teaching activities and student activities involvement. Recently, the performance appraisal of lecturers is more sophisticated when the policy of ministry in line with the national policy of ministry towards world-class ranking. Job satisfaction contributes to happiness and a positive environment for employees to build teamwork for research and commercialization effort. 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). There are many factors contribute to job satisfaction, however not all job requires personal or individual initiative such as research and commercialization job by lecturers. Good teamwork will

support the group basis work such as research and commercialization. There was clear evidence that teamwork and other measures of team performance are positively related to organizational performance. The result of the study by Boakye (2015) shows that there was a significant positive impact of teamwork on organizational performance. Sanyal and Hisam (2018) research academic staff at Dhofar University, the objective of this research was to highlight the effects of teamwork on faculty members in Dhofar university. The results reveal that is a strong and significant connection between the independent variables viz. teamwork, the climate of trust, leadership and structure, performance evaluation and rewards and the performance of the faculty members of Dhofar University in the Sultanate of Oman. This finding gives an evident variety of work environment factors might contribute to the lecturer's performance. Positively we assume that there is a linking between lecturer's performance and certain KPIs that been set by management to them. Among the KPIs is successfully complying with the research and commercialization works as listed in the seventh criteria in academic staff promotion. The support from the team and management gives some figures on motivation and research incentives.This research will only be looking at work environment factors as the determinant of research and commercialization works from the perspective of team support and work loading of lecturers.

Workload and Student Behaviour had statistically significant to teacher's satisfaction (Ferguson, Frost and Hall (2012). Therefore, the workload of lecturers one of the important elements that contribute to their happiness. This study proposes that workload of lecturers as one of the dimensions for work environment factors as the determinant of research and commercialization activities on the campus. Workload refers to the amount of work that is allocated to an employee to do. Several researchers have supported a positive relationship between workload, stress and turnover intention [33]. Glaser et al. [34] 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 the workload of the lecturers is too high there is no tendency for them to do research and consultation. 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 the perception of the job. In competing for the research proposal and winning the grant, lecturers have to maintain their positive mental and emotional workload.

Strong leadership and an environment of trust among team members come across as significant factors that can help increase the level of employee performance. Somehow, employee performance for academic staff still differences in other service industries. The seventh criterion still popular in their performance appraisal and annual evaluation by employers whereas research and commercialization are part of the component. Several other factors may impact the performance of academicians, and these need to be investigated further (Sanyal and Hisam. 2018). Hence this study intends to investigate the role of work environment which represent by team support and workload as the main contributors for research and commercialization initiatives that lead to National Policy on Science and Technology aims of our government.

3. METHODOLOGY

According to Sekaran (2011), the research design is referring to either the qualitative or quantitative nature of research. Roughly qualitative research means the data for the research is collected through questionnaires and qualitative research gathered the data from the 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.

This study's 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 commercialization 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 the population are up to 2000 lecturers from these four universities. Sampling is the process of selecting the respondent to answer the questionnaires. According to Sekaran (2001), the sampling design for the numbers of the population that we know their numbers is call probability sampling. But if the numbers of the population are unknown, the sampling design is called nonprobability sampling. Therefore, since we know the numbers of the population this study will consider probability sampling as the nature sampling design.

Base on the probability sampling design, this study considers stratified sampling as a sampling method. According to literature, the stratified sampling method will open to the situation where equal numbers of the respondent to be selected as respondents 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 the respondent from each university. The numbers of the 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. FINDINGS

4.1 Response Rate

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

Descriptive Analysis - Demographic Profile of Respondent 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;

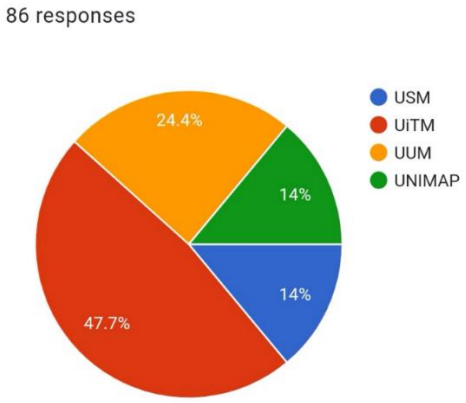

Figure 2: Response of lecturers university-wise

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.

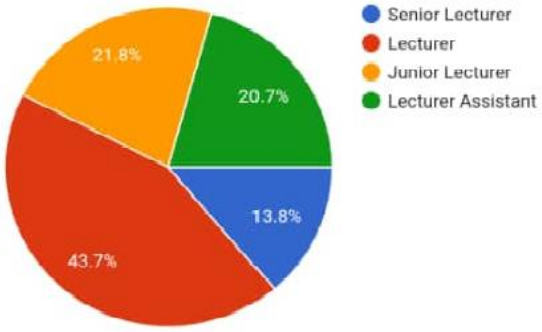

Figure 3: Different ranks of university lecturers involved in the study

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.

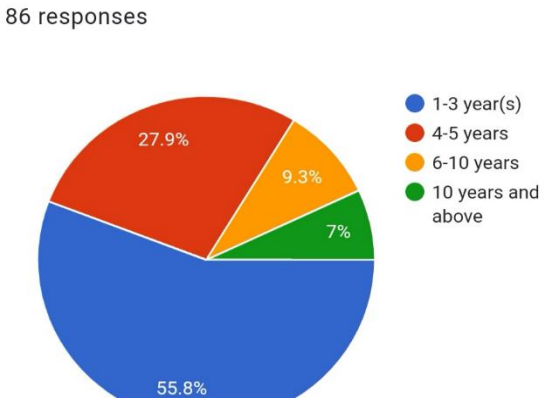

Figure 4: Working experience of involved respondents

Model Fitness

The R square value shows that the model has 63% level of fitness, this is early evidence of the role played by the work environment towards research and commercialization compliments among university lecturers in the northern region.

Work Environment

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.794[a]	.631	.627	.37164

Regression Analysis

The above coefficient and ANOVA table show that the p-value score is 0.000 which is below 0.05. This value indicates that there is a significant relationship between work environment and research and commercialization compliments among university lecturers. This finding also confirms that the research hypothesis is accepted.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.836	1	19.836	143.620	.000[a]
	Residual	11.602	84	.138		
	Total	31.437	85			

a. Predictors: (Constant), Min_Enviro

b. Dependent Variable: Min_NPST

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.049	.244		4.307	.000
	Min_Enviro	.737	.061	.794	11.984	.000

a. Dependent Variable: Min_NPST

5. DISCUSSIONS & CONCLUSION

Along with the daily routine work by university lecturers, besides dealing with heavy traffic dealing with a teaching time table, lecturers also advised to involved in writing a paper, publishing, article reviewing and winning the research grant. This working culture creates a good environment for them to enhance their research activities and commercialized it to fulfill their job specification. The lecturers might collaborate with the student especially at the postgraduate level to touch up their talent in writing the research proposal. This study has found a positive and significant relationship between workload and research and commercialization compliments. This finding also supports previous research findings by Maulidk and Isfianadewi (2019), that found job stress and work environment give a significant impact on

job performance. This finding also aligns with the research conducted among maintenance engineers in the rail industry which found that engineers with high workload will be associated to increase fatigue and fatigue associate with the negative impact on work performance.

In conclusion, this research concludes that work environment measured by the workload of lecturers, co-workers support has a significant impact on lecturers' commitment to research and commercialization work. Rationally, high teaching loading will give a negative impact on research work because the lecturers don't have enough time to search for new research registration and to commercialize them. The co-workers' support also can appear in a good working culture of the organization, but sometimes not all organizations equipped with a good working culture and strong teamwork like been plan by management.

References

Ali, Leman, Sunar, & Ahmad (2017) Issues Related to Low Commercialisation Rates of the University's Research and Development (R&D) Products: Industrial Perspective, Journal of Computational and Theoretical Nanoscience

Rasyid, 2015.Perceived Leadership Styles, Entrepreneuiral Orientation And Commercialization Of University Research. http://eprints.utm.my/id/eprint/78092/
Collier, A. and Gray, B. (2010 The commercialisation of university innovations–A qualitative analysis of the New Zealand situation https://www.researchgate.net/publication/228743936 as on 23 April 2020.

Aziz K. A., Harris, H. and Norhashim M. (*2011)* University Research, Development & Commercialisation Management: A Malaysian Best Practice Case Study *World Review of Business Research Vol. 1. No. 2 Pp. 179 - 192*
Heng, Rasly and Senin (2011 Enhancing Academic Researchers' Perceptions Toward University Commercialization International. Journal. Economic. Research., 2011 2(5), 33-48

Shepherd, D. A. and Krueger, N.F. (2002), "An Intentions-Based Model of Entrepreneurial Teams' Social Cognition", *Entrepreneurship Theory and Practice*, Winter, 2002, pp.167-185
Sekaran, U. (2003). *Research Methods for Business: A Skill Building Approach*. (4th Edition). New York: John Wiley & Sons Inc.
Krejcie, R. and Morgan, D. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*. 30, 607-610.
Pallant, J.F. (2001). SPSS Survival Manual: a step by step guide to data analysis using SPSS for Windows.

Decter, M., & Bennett, D. (2003). Factors influencing the success of university to business technology transfer - A UK and USA comparative study. https://doi.org/10.13140/RG.2.1.1353.3921
10th and 11th Malaysia Plan Ministry of Higher Education R&D Schemes (Source:MOHE)
Flanagan, 2006; Testing the Relationship Between Job Stress and Satisfaction in Correctional Nurses Nursing Research 55(5):316-27 DOI: 10.1097/00006199-200609000-00004

Gelsema et al., 2006 A longitudinal study of job stress in the nursing profession: Causes and consequences Journal of Nursing Management 14(4):289-99 DOI: 10.1111/j.1365-2934.2006.00635.x

Boakye (2015) The impact of teamwork on employee performance, : DOI: 10.13140/RG.2.1.4959.8804 https://www.researchgate.net/publication/284732729
Sanyal and Hisam (2018 The Impact of Teamwork on Work Performance of Employees: A Study of Faculty Members in Dhofar. University Journal of Business and Management (IOSR-JBM) e-ISSN: 2278-487X, p-ISSN: 2319-7668. Volume 20, Issue 3. Ver. I

Ferguson, K. Frost, L. Hall, D. (2012) Predicting Teacher Anxiety, Depression, and Job Satisfaction, Journal of Teaching and Learning, Vol. 8, No. 1
Glaser, D.N., B.C. Tatum, D.M. Nebeker, R.C. Sorenson and J.R. Aiello, 1999. Workload and social support: Effects on performance and stress. Human Performance, 12: 155-176.