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# MODERATING PARTIAL LEAST SQUARE TO THE MANAGEMENT INFORMATION SYSTEM WITH TOTAL QUALITY MANAGEMENT OF STUDY PROGRAM PERFORMANCE

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## ABSTRACT

*Education at higher education institutions need support in particular of human resources facilitate so that the educational process can run well. Lecturer highly affects the quality of the lecture and the output generated by the higher education institution. To achieve this, the lecturer is desirable social sensitivity and academic competence in transforming the existing science to his students. The purpose of this research is to know the influence of organizational culture on performance through Total Quality Management (TQM) and involves Management Information Systems (MIS) as moderating variable. The results of the study with partial least square (PLS) approach scheme "path" indicates that moderating MIS with indicator of information systems and information systems network at TQM with indicator of sustainable process management and improvement is a model that fit based on the criteria value of  $R^2$  and  $Q^2$ . MIS as a moderating TQM provides a strengthening effect on performance. Dominant influence organizational culture with indicator of organizational clarity and reward systems on TQM and subsequently affect studies program performance with indicator of involvement research and teaching qualification.*

**Key words:** TQM, MIS, Organizational Culture, Performance, Moderating, PLS.

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## 1. INTRODUCTION

Education at higher education institutions need support in particular of human resources facilitate so that the educational process can run well. The educational background of lecturers as well as the good performance of the lecturers will greatly influence the quality of the lecture and the quality of the output generated by the higher education institution. Bafadal (2006) states the primary task education in schools is learning. There is no school quality without the quality of learning. There is no intelligent output comprehensive and competitive without learning ritualization comprehensive intelligence and positive competition among students, thus, necessary educational staff, especially professors in the administration system of quality education.

Ministry for Research, Technology and Higher Education (*Kemenristekdikti*), the Republic of Indonesia has a vision of the year 2015 to 2019, namely: "The realization of good-quality higher education and scientific and technological capability and innovation to support the competitiveness of the nation". Lecturer as a responsible on campus in the learning process in the classroom to students obliged to ensure achievement of the lecture material that it provides. Lecturer in the implementation of the learning required to have an element of leadership, namely: 1) has a strong personality, 2) understand the conditions of colleagues, employees and students, 3) has a vision and understand the mission lecture higher where the lecturer is teaching, 4) have the ability to make decisions and 5) the ability to communicate (Reinhartz & Beach, 2004).

Wilson (2010) states on the path-goal theory of the relationship between organizational citizenship behavior with the performance of subordinates and work activities. This theory explains the importance of leaders assist its members in achieving the goals and give direction, or support or both are needed to ensure this objective is achieved in accordance with the objectives of the organization. Lecturer in achieving these objectives require such management functions: planning, organizing, actuating and controlling. Lecturers must also ensure its role as a leader in the learning process to students with the ability to position themselves as: educator, the manager, administrator, supervision, the leader, provider of innovation and provider motivation. Harrison (2016) mentions that high lecture climate is the end product of the interaction between campus residents who work to achieve a balance between organizational dimensions to the dimensions of the individual.

Olsen and Fuller (2003) states that the climate of educational institutions is a characteristic that exists, which describes the characteristics of a psychological than a particular institution, which distinguishes an institution of educational institution to another, affecting the behavior of teachers and students and is a psychological feeling owned by educators and learners at a particular institution. Bryman (2007) stated that the ability and skill are factors that influence the behavior and performance of individual work directly. To obtain performance conditions facilitate lecturer, the stimulus is needed to motivate lecturers to be able to carry out their duties properly. Quality-oriented organizational culture that is applied simultaneously thought to contribute to the achievement of the implementation of TQM. The condition is back by the availability of MIS, which is integrated in the entire course thus might contribute to the effectiveness of the performance of each operating plant and preventive action. MIS resource availability is expected to support continuous improvement and implementation of TQM in the future. This is in line with the demands of competition in the market to be fast, accurate and qualified in serving the demands of performance. Qasim and Zafar (2016), in his research stated, "... that information systems support a total quality management in the manufacturing industry". Black (2015) who conduct quantitative research on higher education institutions, that the work environment (Samudro and Mangkoedihardjo, 2012), interpersonal relationships

between teachers, and reward or appreciation of the institution is a stimulus that can improve the performance of lecturers.

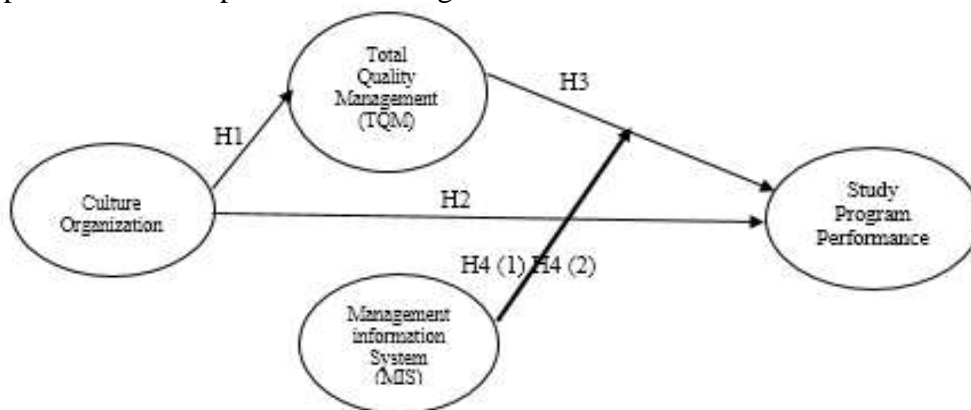
Methods associated with latent variables namely Confirmatory Factor Analysis (CFA) (Brown, 2006; N. Rusdi, et.al., 2014) and Structural Equation Modeling (SEM) (Mulaik 2009; Raykov & Marcoulides, 2006; Hair et al, 2006; Bollen, 1989). Some studies relating SEM, namely Setiadi, et.al. (2017), work ethic with indicators as actualization (78.8%), call (74.2%) and religious (72.6%) was influenced by the work climate and discipline, while labor productivity seen from measurements found that working with the academic ability and motor skill development (efficacy) 82.2%, which works with the principle of effectiveness of 76.5% and that works using the principle of efficient 84.0% influenced by working climate, work discipline and work ethic. The work ethic provides indirect effect on the working climate on work productivity. Research related to Partial Least Square (PLS) methods in real data, namely Anekawati et.al. (2017), comparison of factor score scores using three schemes on PLS; Rodliyah et.al. (2016), remuneration modeling uses three schemes in PLS; Purnomo, et.al. (2015), modeling of taxpayer compliance using moderating PLS; and N. Rusdi, et.al. (2015), mandatory satisfaction level tax provides the greatest indirect effect on the quality of taxpayer services to taxpayer compliance in the field of hotel business.

This study examines the indicators and variables that affect the performance of lecturers and involves the management information system as moderating variable, as well as the impact theoretically, which is then compiled into a theoretical model which will be evidenced by empirical data. This study is expected to provide information about performance enhancement courses in higher education institutions, particularly the University of Batam.

## 2. METHODOLOGY

The data in this study using primary data at the University BATAM, obtained from the questionnaire to officials of the study program (Levy & Stanley, 1999). Further analysis with the CFA and SEM methods PLS. CFA is part SEM of (Brown, (2006). Moderating SEM is done by using Partial Least Square (PLS) has analysis steps as follows: *Outer Model*, including the validity of the test is seen from the loading factor, and reliability test views of the value of Composite reliability. Indicator is valid if it has a value loading factor,  $\lambda > 0.5$ , and is said to be reliable if composite reliability values  $> 0.7$ . Furthermore, *Inner Model*, this test may be the result of inner value of weight which examine the research hypothesis through bootstrap samples t test and goodness of fit model. The model can be declared to have the goodness of fit if it has a value of  $R^2 > 0$  and the value  $Q^2 = 1 - (1 - R_1^2)(1 - R_2^2) > 0.35$  giving high accuracy. (N. Rusdi, et. al. (2018); Wibisono, et.al. (2018))

Conceptual research is presented as in figure 1.



**Figure 1.** Conceptual model of organizational culture, TQM, Study Program Performance, and MIS as Moderating

The hypothesis in this study

- H1 : Cultural organizations significant effect on Total Quality Management
- H2 : Organizational culture significantly influence study program performance
- H3 : Total Quality Management significant effect on study program performance
- H4 (1) : Management Information System significant effect on study program performance
- H4(2) : Management Information System moderate Total Quality Management affect positively (strengthen) the study program performance

Modeling moderating the interaction method consists of two stages. The first stage, proved that the moderating variables significantly influence the performance Higher Education, while the second stage, if proved influential, then the variable is suspected as a moderating variable, and then performed the modeling PLS scheme "path" (Anekawati et. al. (2017), Rodliyah et.al. (2017)) involves moderating variables (Management Information System) and interaction variables Information Management System with Total Quality Management on the study program performance at the University BATAM. (N. Rusdi, et al (2018), Wibisono, et.al. (2018)).

### 3. RESULTS AND DISCUSSION

Validity test is done using confirmatory factor analysis on each of the latent variables namely organizational culture (X), Total Quality Management (Y1), Study Program Performance (Y2), and Management Information System (Z) as the moderating effects. Reliability test used composite reliability with a minimum cut-off value is 0.7. The results of model testing complete with SmartPLS program can be seen in the following table 1:

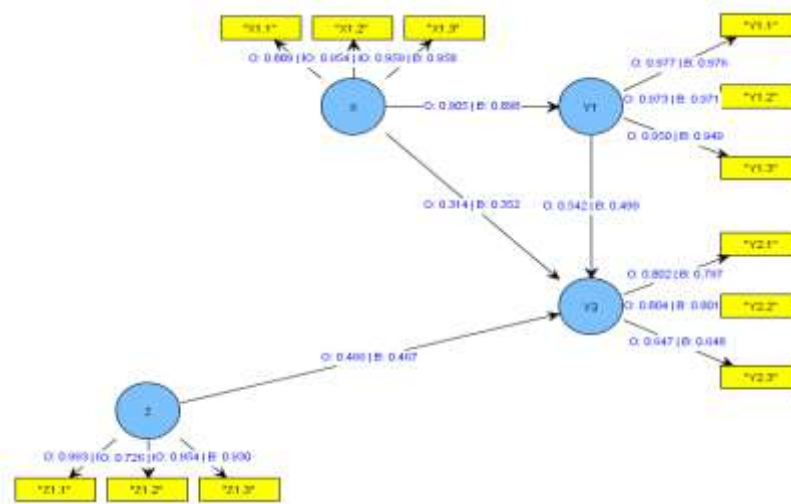
**Table 1** Results Statistics Convergent Validity and Reliability Indicators Reflective On Research Variables

Latent Variables	Indicator	Convergent validity			Composite Reliability
		Loading Factor	Standard deviation	T-Statistic	
Cultural Organizations (X)	Management Support (X1.1)	0.889	0.021	41.441	0.954
	Choice System (X1.2)	0.954	0.006	149.389	
	Clarity Organizations (X1.3)	0.959	0.004	227.587	
Management Information System (Z)	Infrastructure Information System (Z1.1)	0.993	0.042	23.767	0.925
	Information System Capabilities (Z1.2)	0.726	0.144	5.041	
	Network Information System (Z1.3)	0.954	0.074	12.886	
Total Quality Management (Y1)	Process Management (Y1.1)	0.977	0.001	802.898	0.977
	Sustainable improvement (Y1.2)	0.973	0.004	246.271	
	Focus Employees (Y1.3)	0.950	0.006	167.162	
Study Program Performance (Y2)	Teaching Qualification (Y2.1)	0.802	0.048	16.591	0.797
	Involvement Research (Y2.2)	0.804	0.044	18.067	
	Involvement of Community Service (Y2.3)	0.647	0.024	27.240	

Table 1, shows all the individual indicators latent variable has a value above the loading factor of 0.5 to T-Statistic is greater than t-table = 1.96, then it is valid and significant indicators. Furthermore, it also provides composite reliability value above its cut-off value of 0.7, so it can be said of all latent variables is reliable. Cultural organizations (X) is formed by

clarity indicators organizations (X1.3) (0.959), choice system (X1.2) (0.954). Management Information System (Z) dominant indicator of information systems infrastructure (Z1.1) (0.993) and the network information system (Z1.3) (0.954). The Total Quality Management (Y1) the dominant indicator process management (Y1.1) (0.977) and the sustainable improvement (Y1.2) (0.973). Study program performance (Y2) with the dominant indicator involvement research (Y2.2) (0.804), and teaching qualification (Y2.1) (0.802).

The results of the original estimate and the estimation of the bootstrap, B = 200 moderating PLS (MPLS) stages - 1 presented in the following figure 2.



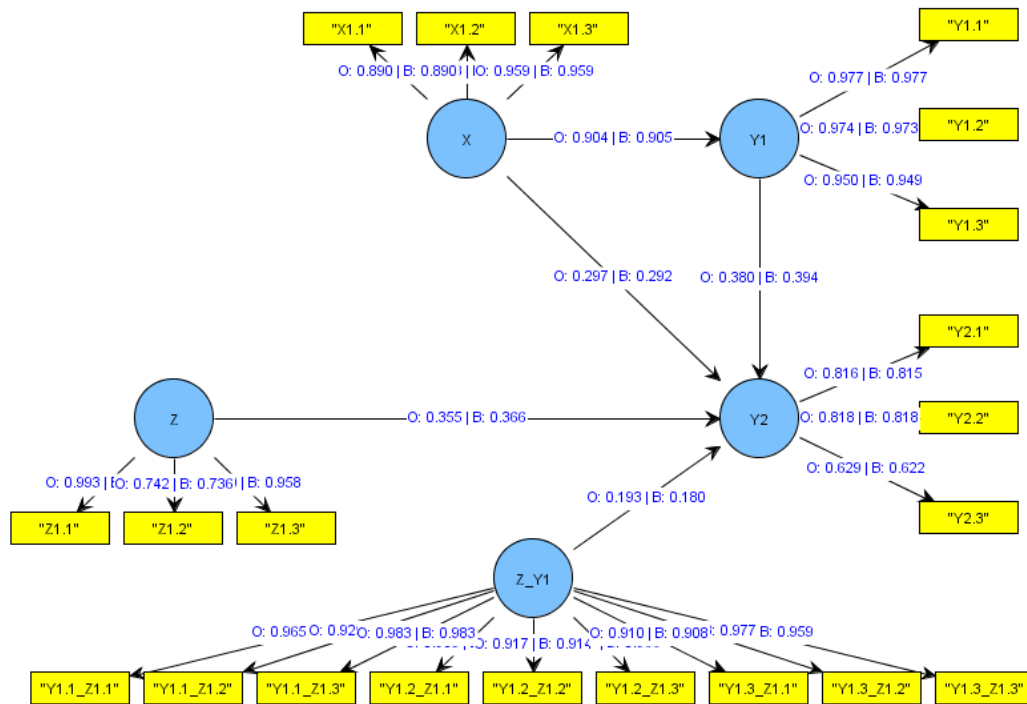
**Figure 2** Relations Cultural Organization, TQM, Performance, and MIS as Moderating Stage - 1  
 Testing the path coefficients in Figure 2 in detail is presented in the following table 2:

**Table 2** Test Result Path Coefficient Moderate MIS in TQM on Performance (MPLS Stage - 1)

Variables	Coefficient	Standard deviation	T-Statistic	Information
Cultural organization (X1)→ Total Quality Management (Y1)	0.905	0.013	71.868	Significant
Management information systems (Z)→ Performance (Y2)	0.466	0.057	8.168	Significant
Cultural organization (X1)→ Performance (Y2)	0.314	0.106	2.967	Significant
Total Quality Management (Y1) → Performance (Y2)	0.542	0.126	4.308	Significant

Based on Table 2, it can be interpreted in the research hypothesis moderating variable direct influence on the performance management information system. Management information systems (Z) positive and significant impact on the performance (Y2). It is seen from the path marked positive coefficient of 0.466 with T-Statistic a value of 8.168 larger than t-table = 1.96. Thus the Management Information System (Z) direct effect on performance (Y2) of 0.466, which means that every increase in Information Systems Management (Z) will increase the performance (Y2) of 0.466. This indicates that the management information system is suspected as a moderating variable that is strengthening the influence of Total Quality Management (Y1) on the performance. Model Moderating partial least square (MPLS) at stage 2 which involves the interaction of variables Management information systems with Total Quality Management (Y1) with bootstrap to test the research hypotheses through t test, and bootstrap stop if the estimate of the original and the estimation

of the bootstrap has a value approaching. The results of the original estimate and the estimation of the bootstrap, B = 200, in Stage-2 are presented in the following figure.



**Figure 3** Relations Cultural Organization, TQM, Performance, and MIS as Moderating (MPLS) Stage - 2

The test results can be seen from the complete model R-square value that describes the goodness-of-fit of the model.  $R^2$  value recommended is greater than zero.  $R^2$  value are presented in Table 3 below:

**Table 3** Goodness of Fit of  $R^2$  Moderating Partial Least Square (MPLS) Stage - 2

Exogenous variables → Endogenous variables	$R^2$
Cultural organization (X) → Total Quality Management (Y1)	0.819
Cultural organization (X), Total Quality Management (Y1), Management Information System (Z), Management Information Systems * Total Quality Management (Z_Y1) → Performance (Y2)	0.766

Table 3 explains that:

- Proportion of organizational culture variable (X) in explaining the variation around the variable Total Quality Management (Y1) of 0.819.
- Proportion of organizational culture variable (X), Total Quality Management (Y1), Management Information System (Z), Management Information Systems\*Total Quality Management (Z\_Y1) in explaining the variation around the performance variable (Y2) of 0.766.

The results of all the  $R^2$  value indicates that is greater than zero, it means that our model already meets the required Goodness of Fit. Value  $Q^2 = 0.958$ , which means that the model has high accuracy performance moderating. The coefficients of these pathways is hypothesized in this study, which can be presented in the following structural equation:

$$Y1 = 0.904 X1$$

$$Y2 = 0.297 X1 + 0.380 Y1 + 0.355 Z + 0.193 Z\_Y1$$

with:

- X : Organizational culture
- Y1 : Total Quality Management
- Y2 : Performance
- Z : Management information System

Testing the path coefficients in Figure 3 and the above equation in detail presented in the following table 4:

**Table 4** Path Coefficient Test Results Model Moderation Management Information Systems in Total Quality Management on Study Program Performance, Stage - 2

variables	Coefficient	Standard deviation	T-Statistic	Information
Cultural organization (X1) → Total Quality Management (Y1)	0.904	0.003	272.537	Significant
Cultural organization (X1) → Performance (Y2)	0.297	0.032	9.274	Significant
Total Quality Management (Y1) → Performance (Y2)	0.380	0.040	9.418	Significant
Management information systems (Z) → Performance (Y2)	0.355	0.051	6.910	Significant
Management information systems * Total Quality Management (Z_Y1) → Performance (Y2)	0.193	0.067	2.862	Significant

Source: Data processed

Based on Table 4, it can be interpreted each hypothesis of the research, as follows:

H1: Cultural organization (X1) positive and significant effect on Total Quality Management (Y1). It is seen from the path marked positive coefficient of 0.904 with T-Statistic a value of 272.537 larger than t-table = 1.96. Thus the organizational culture (X1) direct effect on Total Quality Management (Y1) of 0.904, which means that every increase in organizational culture (X1) will increase the Total Quality Management (Y1) of 0.904.

H2: Cultural organization (X1) positive and significant impact on the performance of courses (Y2). It is seen from the path marked positive coefficient of 0.297 with T-Statistic a value of 9.274 larger than t-table = 1.96. Thus the organizational culture (X1) directly affect the performance of courses (Y2) of 0.297, which means that every increase in organizational culture (X1) will increase the performance of courses (Y2) of 0.297.

H3: Total Quality Management (Y1) positive and significant impact on the performance of courses (Y2). It is seen from the path marked positive coefficient of 0.380 with T-Statistic a value of 9.418 larger than t-table = 1.96. Thus the Total Quality Management (Y1) directly affect the performance of courses (Y2) of 0.380, which means that every increase in Total Quality Management (Y1) will raise the performance of courses (Y2) of 0.380.

H4 (1): Management information systems (Z) positive and significant impact on the performance of courses (Y2). It is seen from the path marked positive coefficient of 0.355 with T-Statistic a value of 6.910 larger than t-table = 1.96. Thus the Management Information System (Z) directly affect the performance of courses (Y2) of 0.355, which means that every increase in Information Systems Management (Z) will raise the performance of courses (Y2) of 0.355.

H4 (2): Management information systems (Z) \* Total Quality Management (Y1) positive and significant impact on the performance of courses (Y2). It is seen from the path marked positive coefficient of 0.193 with T-Statistic a value of 2.862 larger than t-table = 1.96. Thus

Management information systems (Z) \* Total Quality Management (Y1) directly affect the performance of courses (Y2) of 0.193, which means that every increase in Information Systems Management (Z) \* Total Quality Management (Y1) (Z\_Y1) then will raise the performance of courses (Y2) of 0.193. Or, Management Information System (Z) moderate the Total Quality Management (Y1) significantly which is strengthening the performance of lecturers by 0.193.

## CONCLUSIONS

The conclusion from the data analysis and discussion are:

- Organizational Culture, Management Information Systems, Total Quality Management and Performance reflective study program is a valid and reliable indicator.
- Organizational Culture indicator dominant organizational clarity and reward systems. Management Information Systems Infrastructure dominant indicator of Information Systems and Information Systems Network. Total Quality Management dominant indicator Sustainable Process Management and Improvement. Performance Studies Program with a dominant indicator Involvement Research and Teaching Qualification.
- Model performance by moderating Program Management Information System at Total Quality Management is a model that fit based  $R^2$  and  $Q^2$  criterion. Management information system as a moderating variable Total Quality Management provides a strengthening effect on performance. Dominant influence organizational culture of Total Quality Management and subsequently affect study program performance.

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