THE MODERATION EFFECT OF INFORMATION SYSTEMS ON VOCATIONAL HIGH SCHOOL PRINCIPAL DECISION-MAKING MODEL

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Abstract: A decision-making process in an organization is more effective if it is supported by reliable and valid information systems. Management Information System (MIS) and Decision Support System (DSS) are two systems commonly used by organizational leaders to collect information for making the Quality of Decision (QD). This study aimed to empirically investigate MIS influences on vocational high school principals' QD. Besides, this study examined the moderation effect of the DSS on the decision-making processes. This quantitative research employed the survey method and purposive sampling technique. As many as 60 vocational high school principals and vice-principals in Yogyakarta, Indonesia were the participants of this study. They filled in questionnaires consisting of 19 items that were developed using the Likert scale. The quantitative data obtained were analyzed using Structural Equation Modeling. The research findings show that MIS has a significant effect on the quality of the decision-making process by vocational high school principals. However, for improving the decision quality, the model must be assisted by DSS as the moderator variable. MIS carries information required for principals while DSS provides data, model, and analysis instruments used for special cases in vocational high schools.

Keywords: management information system, decision support system, decision-making, vocational high school principals.

INTRODUCTION

The decision-making process is a series of logical thinking activity. Making decision in a school organization involves almost all managerial functions from the problem identification to the decision implementation processes (Yukl, 2003). It determines the organization performance in achieving its goal (Rochaety, Rahayuningsih, &
This also implies that the decision-making remains critical activity in a management system (Robbins, 2003; Hoy & Miskel, 2013). The decision-making process takes a substantial role as its process should be based on the organization motivation, leadership, communication, coordination, and transformation (Engkoswara & Komariah, 2010).

Robbins (2003) lists five steps of rational decision-making as follows: a) identify the problem, b) identify the decision criteria, c) allocate the criteria weight, d) develop the solution alternative, e) evaluate the solution alternative, and f) choose the best solution alternative. Basically, the decision-making is a systematic approach on recognizing problem, collecting facts and data, deciding the alternative solution, and executing the precise planning (Skalski & Romero, 2011). This means that the leader makes a decision in planning, implementing, supervising, and organizing (Abduh, 2015). The role of a managerial leader in decision-making process is very essential mainly employ skills and knowledge from their organizational experience (Anwar, 2014).

The industrial revolution 4.0 pushes organization to respond the change quickly as its real time. Hermann, Pentek, & Otto (2016) state that in industrial era 4.0, school principals need technical supports such as a system which can merges and evaluate information in order to solve urgent problems quickly. This means that the school principals have to own technology literacy. Aryawan (2019) expounds that one of school principal leadership principles applied in industrial revolution 4.0 is oriented to the facility and infrastructure improvement on the communication and information technology. In education contexts, the school principals have to shift their leadership style from a sole decision maker to inviting others and support instrument in decision-making process (Slater, 2005).

The Management Information System (MIS) and Decision Support System (DSS) are operational supporting systems in an organization. Keshtegar & Vakili (2018) stated that the MIS provides information needed in organization management, while the DSS carries data, model and analysis instruments for helping the organization leaders in adopting the unstructured cases.

The Management Information System (MIS) is very significant for assisting the school principals in running decision-making process (Abduh, 2015). The system allows the school principal to identify problems easily, exposing the alternative solutions, choosing the best solution and carrying out the solution (Bryson, 2004). Information systems are often described as a technology intended to regulate staff actions and produce information to improve the ability of managers to oversee work results (Baglieri, Metallo, Rossignoli, & Iacono, 2014). Information systems become agents of organizational change that are important for principals to manage the changes effects (Lake & Drake, 2014).

Decision support system is an interactive software-based computerized information system intended to help decision makers compile useful information from raw data and documents to identify and solve problems and to make decisions (National Forum on Education Statistics, 2006). A decision support systems (DSS) is a computer-based interactive system, it used to help decision-makers properly use data and models (Chiu & Huang, 2016). The DSS as a part of knowledge management system is used to support the decision-making process in an organization. This interactive information system provides information, modeling, and data manipulation in semi-structured and unstructured situations (Silich, Savelev, & Isaev, 2016).

The decision support system in educational settings has an imperative role in organizational and quality development. It is used by school principals to integrate the information in their planning and execution of mission. Several studies have reported the positive impact of data decision support by acknowledging its contribution in assessing how various factors influence teaching and learning at the schools (Thorn, 2002).

The school principal places the highest position that plays an important role in decision making (Triwiyanto, 2015). A school principle as a school management executor and decision maker formally owns a great responsibility in leading the school. According to the Government Regulation No. 19 / 2017, one of a school principal’s duties is managerial that required due to the heterogeneous problems the school faced. The school principal leadership focus, of course, lays on the decision-making on whole schools problems and program (Nurhidayati, 2015). No
matter how critical or insignificant the problem is, the school principal must find the way out since all decisions made determine the next school performance and orientation (Kadir, 2017). So, as a decision maker, the school principal should possess professional and capability in leadership for generating rational solutions.

Yet, a school principal has faced some troubles during their decision-making process. First, the decision-making process of the school principal has been influenced by unreliable factors. Psychological factors such as perception, roles, attitude, personality, motivation and job satisfaction (Astuti, 2018), for example, have affected on the decision-making process. The other factors are individual worth, personality and risk-taking tendency (Ayub, Wahyudi, & Syukri, 2014), gender, experience, and competency (Kasprzhak & Bysik, 2015). Those implausible factors can be ignored if the school principal has an access to the accurate data system.

Second, the school principal has found technical problems in the decision-making and planning processes. Third, there is a leadership line boundary. The school principal has not gained full autonomy in decision-making process. Structurally, the school principal has to follow the upper-line leaders’ decisions. For instance, the school principal has slowly run the decision-making process on the school infrastructure management due to the complicated and lengthy bureaucracy and regulation (Ayub et al., 2014). Hence, the difficulties faced by the school principals above are generally because of the lack of data and up-to-date information availability on planning parameters.

Nowadays, not many school principals applied the data-driven in their decision-making and planning processes. However, there is still hope that the use of data-driven is used massively among school principals (Bigner, 2017). There were two significant variables in determining the effectiveness of the school planning implementation, namely the managerial performance of the school principal, and the utilizing of the school management information system (Wiguna, 2017).

For gaining the decision-making effectiveness, the school principle should conform between the problem and solution. Lamentably, in the conformation process, some troubles may appear. Putra (2014) identifies five prominent obstacles in decision-making process; 1) the school principle rarely invites teachers in the decision-making process, 2) the school principle makes ineffective decision due to the lack of quality and teachers’ acceptance considerations, 3) the school principle employs insufficient data and information, 4) the school principle is less adaptable to the new situation and conditions before making decisions, 5) the school principle is in hurry in making decisions and ignore the appropriate procedures. Thus, the school principal plays a center role in establishing the school planning implementation.

Another prominent variable noted in determining the school planning accomplishment is the school data and information system. The absence of the comprehensive data and information causes incompatible decision (Yanti, 2013). The lack of data and information comprise several conditions, such as; 1) the unavailable accurate and factual data for strategic planning formulation, 2) the inaccessible decision-making support system as a part of education management information system, 3) the absence of facility and infrastructure for establishing the management information system, 4) the lack of management information system use. If the school principal fails in formulating the school strategic planning which is not supported by the adequate management information system, the school principal might make wrong decisions (Wiyardi, 2016). Therefore, the management information system plays a fundamental role in decision-making process.

The accountability demands encourage the school principal to employ and analyze more delicate data. Yet, a vocational school principals who must organize 9 expertise areas, 49 expertise program, and 146 expertise competences (Permendikbud RI 2018 No. 06/D. D5/KK/2018). In this case, it is mandatory that the vocational school principal must have access on the complete database which provides information for supporting the decision-making process. The data-driven decision-making process has been the school leadership practice focusing on the education policy and practices (Luo, 2008; James, Milenkiewicz, & Bucknam, 2008). In other words, the vocational school principals should be capable in managing the data as well as matching to the government regulation.

However, the vocational school principals...
often miss in making appropriate decisions due to the less accurate data accessed. This leads to the unmeasured decisions made. In other words, the quality of the decision made is still questionable. Thus, the present research is to obtain the influence of Management Information System on the quality of decision making of the vocational school principals. Another goal is to obtain the moderation effect of the decision-support system on the vocational school principals’ decision processes.

METHODS

The present quantitative research with survey method. It employs a questionnaire with a purposive sampling technique. The research was run in June – August 2019 by applying three research variables, namely the Management Information System (MIS), Decision Support System (DSS) and the Quality of Decision (QD). The correlation among those variables are presented on the Figure 1.

The data collection tool used in the research is a questionnaire consisting of four sections. The first section contains the introductory information about respondents. The respondents involved in the current research are 60 vocational school principals and vice principals in Yogyakarta, Indonesia. The second section is Management Information System (MIS). The four items employed in the present study are derived from the questionnaire from Abu-Samaha & Shishakly (2008); Keshtegar & Vakili (2018). The third section of the questionnaire is depicted to the Decision Support System (DSS). The DSS variable is measured in five items modified from Fakeeh (2015); Keshtegar & Vakili (2018). The last section named the Quality of Decision (QD). The ten instruments of QD is adopted from Lizarraga, Baquedanoa, Olivera, & Closas (2009) and Doherr, Christalle, Kriston, Harter, & Scholl (2017). The 19 questionnaire items above are responded in 5-Likert scale between (1) Strongly Disagree and (5) Strongly Agree.

Here is the description and validity test results of the three current research variables (see Table 1); the Management Information System (MIS), the Decision Support System (DSS), and the Quality of Decision (QD). The test of validity and reliability used 30 respondents of vocational school principals and vice principals. The validity test used Confirmatory Factor Analysis (CFA) with loading factor > .50. The reliability test used Average Variance Extract (AVE) and Composite Reliability (CR).

| Item Number | Factor Loadings |
|-------------|-----------------|
| MIS.1       | .847            |
| MIS.2       | .868            |
| MIS.3       | .901            |
| MIS.4       | .830            |
| DSS.1       | .902            |
| DSS.2       | .839            |
| DSS.3       | .859            |
| DSS.4       | .814            |
| DSS.5       | .626            |
| QD.1        | .774            |
| QD.2        | .752            |
| QD.3        | .764            |
| QD.4        | .766            |
| QD.5        | .688            |
| QD.6        | .881            |
| QD.7        | .821            |
| QD.8        | .894            |
| QD.9        | .859            |
| QD.10       | .895            |

The Table 1 also indicates that all variable items tested using the factor loadings were valid and feasible. This means that those research variable items fulfilled requirements to be used as the research instruments. The validity test is used to check whether the variable items designed enable to describe the valid variables of the research. A variable item passes a validity test if its factor loadings is above .50. From the Table 1, it can be seen that the factor loadings values of the three variables ranged from .626 to .902. This identifies that the variable items are valid.
Besides, the Average Variance Extract (AVE) and Composite Reliability (CR) were also applied to test the validity and the reliability of the current research variables. The minimum requirement values of the validity and reliability of the research variables are more than .50 and .70 respectively. The Table 2 displays the test result of the AVE and CR of the present research.

**Table 2. Average Variance Extract (AVE) and Composite Reliability (CR)**

|       | MIS   | DSS   | QD   |
|-------|-------|-------|------|
| AVE   | .743  | .662  | .660 |
| CR    | .920  | .906  | .951 |

The Table 2 shows that the AVE values of the research variables were between .660 and .743, while the CR values ranged from .906 to .920. This means that all three variable used, namely MIS, DSS, and QD are valid and reliable to be used on the next research stages.

The researcher operated the Structural Equation Modeling (SEM) using WarpPLS software for analyzing the data. The type of software was chosen since it enables to analyze variant-based SEM model well-known as Partial Least Square. Additionally, the recent research data analysis allows the researcher to identify as well as to estimate the correlation among latent variables whether it was either linear or non-linear. Besides, the chosen software also has ability in measuring the moderation effects in SEM accurately (Sholihin & Ratmono, 2014).

**FINDINGS AND DISCUSSIONS**

**Findings**

The current research set 19 items which were divided into three groups namely MIS, DSS, and QD. The MIS was covered four items; 1) the information quality, 2) the flexibility of the MIS used, 3) the punctuality, and 4) the accessibility. The five items focused on the DSS functions in; 1) providing understandable information, 2) playing its roles, 3) serving integrated and consistent data, 4) improving the school principal’s skills in decision-making process, and 5) increasing the effectiveness of the school principal’s task. Last, the QD was compiled 10 items namely; 1) systematically and structurally process, 2) clear role and responsibility, 3) relevant decision criteria, 4) bias influence evaluation, 5) optional exploration, 6) uncertainty consideration, 7) re-evaluation, 8) impact analysis, 9) transparency and documentation, and 10) effective communication. From the 60 respondents called for the current research, the responses result on the 19 questionnaire items is showed in Table 3.

**Table 3. Statistic Description of Research Variables**

| Item Number | Item                                           | Mean | SD  |
|-------------|-----------------------------------------------|------|-----|
| MIS.1       | The information quality of MIS                 | 3.700| .849|
| MIS.2       | The flexibility in using the MIS               | 3.767| 1.047|
| MIS.3       | The punctuality of the information processing   | 3.650| 1.022|
| MIS.4       | The accessibility ease of the MIS features     | 4.000| .864|
| DSS.1       | The DSS information is easy to understand.     | 3.767| .722|
| DSS.2       | The DSS performs as it should be               | 3.783| .783|
| DSS.3       | All DSS data are fully integrated and consistent.| 3.867| .724|
| DSS.4       | The DSS improves the ability in good decision making.| 3.967| .688|
| DSS.5       | The DSS increases the task effectiveness.      | 3.617| .904|
| QD.1        | The decision making process is done systematically and structurally. | 3.617| .585|
| QD.2        | The decision maker has clear role and responsibility | 3.583| .591|
| QD.3        | The decision criteria are relevant to the goal and decision contexts. | 3.783| .454|
| QD.4        | Evaluating the internal and external bias influences | 3.683| .504|
| QD.5        | Actively exploring the possible options         | 3.400| .718|
| QD.6        | Concerning the uncertainty factors             | 3.517| .725|
| QD.7        | Re-evaluating when the new information is available | 3.367| .688|
| QD.8        | Conducting a decision impact analysis          | 3.500| .770|
| QD.9        | Ensuring the transparency and documentation of the decision notes | 3.367| .688|
| QD.10       | Effectively communicating the decision basis   | 3.500| .748|
Generally, the Table 3 shows that the respondents assessed pretty good toward the given variable items. The Mean values among the three variables were between 3.367 and 4.000. The MIS which were comprised 4 items had Mean values from 3.650 to 4.000. The DSS with its 5 items supported the Mean values between 3.617 and 3.967. While the QD containing 10 items had the Mean values ranged from 3.367 to 3.783.

The Goodness-Of-Fit test is to find out whether the research model fits the criteria set. By applying WarpPLS, seven criteria used in Goodness-of-Fit test on the current research are presented in Table 4.

### Tabel 4. Goodness-of-Fit Result

| Model Fit and Quality Indices                  |     |
|-----------------------------------------------|-----|
| Average Path Coefficient (APC)                | .291|
| Average R-Squared (ARS)                       | .219|
| Average Adjusted R-Squared (AARS)             | .191|
| Average block VIF (AVIF)                     | 1.086|
| Average Full Collinearity VIF (AFVIF)         | 1.268|
| Tenenhaus GoF (GoF)                           | .371|
| R-Squared Coefficients QD                     | .219|

The model was assessed as ideal model as the AVIF and AFVIF criteria values were less than 3.3. Based on the Tenenhaus GoF, the research gained high assessors which was showed by its value at .371. From the R-Square, the QD value was .219, indicating that MIS moderated by DSS elaborated the QD in 21.9% while the rest, i.e. 78.1% was detailed by other research variables and model. As some criteria values have fulfilled the Goodness-of-Fit test requirements, overall, the research model fits the criteria set on the Goodness-of-Fit test.

The first hypothesis was tested to examine whether the MIS as an independent variable was related to the QD of the vocational school principal. The result revealed that the model fitted to the given data (R-Square = .219 shown in Table 4). As presented in Table 5, the MIS had a significant positive impact on the QD of the vocational school principal ($b = .265; p$-value = .014). This signifies that the better MIS results on the higher QD and in vice versa. In other words, the MIS affects on the QD of the vocational school principals.

### Tabel 5. Path Coefficients and $p$-Values

| Path            | Coefficients | $p$-Value |
|-----------------|--------------|-----------|
| MIS => QD       | .265         | .014      |
| MIS*DSS => QD   | .318         | .004      |

The second hypothesis was tested to investigate the moderation effect of DSS on the decision-making model of the school vocational principal. As seen in Table 5, the DSS had a significant positive impact as a moderator variable ($b = .318; p$-value = .004). This signals that the DSS demonstrated a moderation effect which enabled in increasing the correlation between the MIS and QD of the vocational school principals.

### Structural Equation Modeling Analysis

The Structural Equation Modeling (SEM) has been used broadly in many research for modeling a correlation between latent and manifest variables. The recent research presents a SEM approach by involving moderation effect on the decision-making process of the vocational school principal. Here is the model designed.

The structural modeling is commonly applied to identify the hypothesized correlation among the research variables i.e. exogenous or endogenous interrelated to the conceptual model. Figure 2 indicates that the MIS influenced QD in .265 while the DSS as a moderator variable between MIS and QD showed the value in .318.

### Discussions

In the Management Information System (MIS), data, information and decision-making process are correlated each other. The data is transformed into needed information as a basic principle in decision-making process (Pornpandejwittaya, 2012). The accurate information gained from the valid and reliable data allows the organization leader to make accurate decision as well. This means that information plays a crucial role in decision-making process.

The recent research has proven that the MIS has affected on the quality of decision of the vocational school principals. The existence of a DSS will make the quality of the principal’s decisions robust. The novelty of the research is finding the valid model that explain quality of decision can improve by management.
The most interesting thing found was that the accessibility aspect which supported the highest Mean value, i.e. 4.00 showed in Table 3. This means that the respondents mostly did not find any difficulties in accessing the MIS including its system features. The vocational school principals need several information such as input, resources, management, operation and education system product, which are very important as the consideration in the school problem identification. Those information is easily accessed through the MIS.

The easy access on the information needed has resulted on the effectiveness of the decision-making process. The vocational school principals are able to gain quick, reliable and valid information for supporting their decisions. The effective MIS results on the effective decision-making process. Due to its prominent role, the MIS is highly required in managing the school effectively (Gehlawat, 2014). Besides the effectiveness consideration, accountability demands have forced the school principal to put MIS as the primary reviews in making decisions.

The MIS enables the school principal access and analyze the provided information quickly for getting the accountable decision. The MIS, in this case, has promoted a prominent reference for the vocational school principals in recognizing the school problems which became the initial step in making decisions effectively.

Due to the various both internal and external problems faced, the school principals should have up-to-date information and sufficient managerial skills in decision-making process. Montana & Charnov (2008) agrees that the MIS should integrate various aspects such as organization parties, procedure, data and instrument into a comprehensive system for generating a coherent information required in all organization levels. Tatnall (2011) clearly list three components involved in the existence of the MIS, namely, organization, technology, and human resources. It can be inferred that information compiled on the MIS should be comprehensible gained from accountable sources and transmitted from the trusted system.

As an educational organization, a school externally and formally has to stick to the national education policy and system. The MIS lets the
vocational school principals access various information from the government and in vice versa. In developing a curriculum, for example, the schools must follow the national curriculum set by the Ministry of Education. In this case, the government provides the detail guidelines via the MIS provided on internet. The curriculum development results on several aspects adhered in the schools such as the students’ information, reporting, coursework, students’ assessment. Those information are very prominent data for the government in improving the national education quality standard.

The use of the MIS, in fact, is not only in Indonesia. Luena (2012) reported that Education Management Information System in Tanzania required the government involvement since the school needed qualified data and information for supporting the school policy-making, planning and managing the school resources. In other words, both schools and government as the organization have to connect each other for providing and gaining educational information policy and system. Besides, government also eases to monitor the school management through the MIS (Tatnall, 2011). In monitoring the school operational costs, for instance, the vocational school principals should document and report all the school expenses on the MIS. The report, then, can be accessed easily by the government.

Internally, the schools as education organization also take benefit from the MIS, such as the school promotion. Telem & Pinto (2006) state that the MIS allows the school principals recognize and aware of the MIS potential for school promotion means. Aldarbesti & Saxena (2014) also assert that the MIS has supported the school management potentially. By showing the students achievement records to parents, for example, the school indirectly runs a marketing strategy. The parents who notice the school surpluses become the perfect and inexpensive marketing agents. For this goal, for sure, the role of the vocational school principals in making decisions is required. The school principals have to collect the excellent students’ data, analyze their educational background, and sort the students’ achievements which are in line with the school superiority.

Furthermore, the MIS can be a change agent for school management improvement (Benwari & Dambo, 2013; Lake & Drake, 2014). The changes can be occurred in various school units such as in admission process, reporting, library, financial, and many more. By recognizing the increasing number of drop-out students, for example, the vocational school principals have to recall the data on the students’ financial background, living area and academic reports. By analyzing the students’ background, the vocational school principals may find out the problems which should be resolved. Therefore, the both external and internal problems faced by the vocational school principals spell out that the existing of the MIS becomes a compulsory at schools.

The MIS is very substantial for the vocational school principals in gaining comprehensive information used in problem identification before making decisions. This is understandable as the information system is designed to serve selected information used by the organization management in decision-making process of the organization planning, supervision and evaluation (Lestari, 2011). Each problem requires a certain procedure to pass through. However, if the school principals take wrong decisions due to the inappropriate information, it can be estimated that the problem is not solved or even it causes another problem. Aldarbesti & Saxena (2014) articulate that the failure in employing the data effectively caused the intervention of education goal achievement. Thus, valid information on the MIS becomes the significant aspect in supporting the decision-making process of the vocational school principals. Somehow, the existence of the MIS insists the school principal to master technology.

The accessibility variable item of the current research also supported the idea of technology literacy. The vocational school principals responded positively related to the accessibility item. The vocational school principals mostly were capable in operating the MIS, picking information needed, and analyzing the information easily. They were also very familiar with the MIS features shown on the computer. In this case, those vocational school principals comprehended how to use internet for accessing the MIS-internet based. This was used for more external communication with organization outside the schools. For getting the government financial support, for instance, the vocational school principals should access
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vocational schools needs to be applied because it is very appropriate to anticipate trends in the development of science and technology and globalization. Thus, it will be fascinating to conduct a future research on an Android-based principal’s decision support system.

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