Research Data Processing Through Structural Equation Model-Partial Least Square (SEM-PLS) Method

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ABSTRACT

Structural Equation Modeling (SEM) is one type of multivariate analysis in the social sciences. Multivariate analysis is the application of statistical methods to analyze several research variables simultaneously. This community service activity was held and aimed at the academic community (lecturers and students) from partner campuses of the Faculty of Economics, State University of Jakarta, they are FEB UHAMKA, STIE Indonesia, and Tempo Polytechnic with the aim of providing knowledge about research methodologies, especially the Structural Equation Modeling method (SEM) – Partial Least Squares (PLS) which has various advantages compared to other PLS software as described above. Another goal is expected to help improve the ability of the partner academic community in making scientific articles to be published in national and international journals. In addition, in this training, partners are also trained for hands-on practice using the Warp PLS Ver Software. 5.0. The method of implementing this community service activity is in the form of a workshop that includes providing material related to the SEM-PLS method as well as direct practice in using the WarpPLS software. During the workshop, the partner academic community was also given time to discuss and ask questions directly with the instructor.

INTRODUCTION

Lecturers and students face various challenges not only from the aspect of learning ability, but also the demands in conducting research (Kurniati & Fidowaty, 2017; Nurkhaerani, Wijayanto, & Syah, 2013). Research (research) is basically a scientific way to obtain data with a specific purpose and use. Research is an activity based on scientific characteristics, namely rational, empirical, and systematic (Oviyanti, et al, 2017). The research was conducted using a scientific method. According to (Irawan, 2014) the scientific method is a way or way to seek knowledge by following a scientific logical structure that starts from the formulation of the problem, then with the collection of relevant data, continued with data analysis and interpretation of the findings and ends with drawing conclusions of the findings. Until now, there are many lecturers, students and researchers who do research that has not been qualified. Data from the ministry of education and culture and higher education, from 31 thousand publications per year, there are still many that are not of good quality. In ASEAN, Indonesia is currently ranked 1 in terms of the number of lecturers and researchers making international publications. However, in contrast to Malaysia, which has 70% articles, we only have 40% of that number of articles, the rest are proceedings. So, the quality is still lacking (Mukti, 2019). Scientific publications are still few compared to the number of students and lecturers in Indonesia, causing Indonesian research at the global level to be less well known. Publications play an important role as evidence of scientific accountability for research results, so that they can be widely known in the global arena (Widyanuratikah, 2019). Although currently there has been an increase in the making of research journals, the achievement of the citation index is still inferior to other state journals. The citation index is one indicator of publication quality because more and more other researchers cite scientific journal publications will be a reflection of the level of research quality (Hardjanti, 2018). Scientific publications are of course based on a certain operational standard, namely there is a review of the articles to be published. Scientific publications are important to improve the quality of learning in universities. This can be done by reading a lot of scientific journals. The content of his writings and the types of journals must be continuously improved. The higher the quality, so that our citations improve and global university rankings improve (Widyanuratikah, 2019).

Based on the analysis of the situation and the exploration of problems with partner universities of the Faculty of Economics, State University of Jakarta, namely FEB UHAMKA, Tempo Polytechnic and STIE Indonesia, there are several problems in their academic community, which is:

1. Lack of partner knowledge about research methodology.

2. Lack of expertise of lecturers in using software that supports the making of scientific research/ articles.

Therefore, it was agreed that based on the above background where the ability of students and lecturers in research methods is not optimal and the use of data processing media is also a problem that hinders research, this community service activity intends to organize training related to research methodology, so that it can help lecturers and students in improving their competence. The Structural Equation Model-Partial Least Square (SEM-PLS) application was chosen because of the various advantages mentioned above.

LITERATURE REVIEW

Structural Equation Modeling (SEM) is one type of multivariate analysis in the social sciences. Multivariate analysis is the application of statistical methods to analyze several research variables simultaneously or simultaneously. Hair et al. (2013) divided the multivariate analysis method into two groups according to the time of its development as shown in Table 1.

Some of the advantages of WarpPLS over other PLS software:

a. WarpPLS can provide illustrations of non-linear relationships.

b. Can estimate p value for path coefficient automatically.

c. Can provide several indicators of model fit such as Average R-Squared (ARS), Average Path Coefficient (APC), and Average Variance Inflation (AVIF).

d. Can provide the results of the coefficients and P values for the moderation model directly;

e. Warp PLS can provide an effect size value, namely f-squared effect size, as a proxy for the significance of the predictor effect from a practical point of view (practical point-of-view).

f. Warp PLS can provide a full collinearity test value to analyze vertical and lateral multicollinearity problems.

g. Warp PLS provides predictive validity values in the form of Stone-Geisser Q Squared.

MATERIAL AND METHOD

The method of implementing this community service activity is in the form of a workshop that includes providing material related to the SEM-PLS method as well as direct practice in using the WarpPLS software.

This activity is carried out using the Zoom Meeting application with virtual face-to-face, but this training is still packaged interactively. The training activities will be carried out using the classical method with a lecture approach (exposure to material), practice, and discussion with the aim that the material can be well received by participants/partners. The targets of the participants are active students from FEB UHAMKA, STIE Indonesia, and the final-level Tempo Polytechnic students who are taking thesis/final project courses. The types of activities that will be carried out in this series of PKM activities include: a. Identification and targeting of participants; b. Identification of activity needs; c.

Table 1.
The multivariate analysis method into two groups

	The Main Purpose of Exploration	The Main Purpose of Confirmation
First Generation Techniques	• Cluster analysis • Exloratory Factor Analysis • Multidemensional Scaling	• Analysis of variance • Multiple Regression • Logistical Regression
Second Generation Techniques	Partial-Least Squares SEM (SEM-PLS)	Covariance-Based SEM (CB-SEM)

Implementation of training; d. Activity evaluation.

The activity implementation plan consists of several activities. The first activity is participant registration. Other activities are opening events, main events, and closing events. In the core event the method used is more emphasized on practical methods. Partners are required/recommended to use a laptop and have downloaded their respective applications to make the training process easier. Meanwhile, the arrangement of events and the Zoom virtual background that must be used by all participants and committees will be held on July 14, 2022.

RESULT AND DISCUSSION

The implementation of community service which is carried out online with the zoom method runs smoothly according to the schedule and arrangement of events designed and opened by the Vice Chancellor for Academic Affairs, State University of Jakarta, Prof. Dr. Suyono., M.Si.

After the instructor delivered and refreshed the SEM-PLS module to the participants, the training began to discuss a sample question material whose material had been previously shared by the instructor and the committee in a Whatsapp group that had been created to facilitate and provide a training model effective and efficient. In the example case, which has been explained simultaneously and simultaneously by the instructor in delivering and refreshing the SEM-PLS module above, what will be tested is the influence of the internal auditor competency construct on the effectiveness of audits in 60 universities (30 BLUs). code 1 and 30 non-BLU code 0).

As the results of the discussion, where the details and descriptions are clear as described above in the discussion of the initial module, the following are only a few of the results, where there is no significant difference between the two models, the rambig variable is proven to be a mediating variable in the form of partial mediation and shows that the influence of competence on effectiveness indirectly and through role ambiguity is 0.343 with a p significance of <0.001. In other words, there is a significant indirect effect through the variable role ambiguity in the form of partial mediation.

ScriptWarp Systems - WarpPLS, as part of the continuous training after this event, and as part of the Warp-PLS module itself, the ScriptWarp Systems - WarpPLS link was also shared for participants to continue practicing by accessing the link, downloading and then install it for the need to practice independently. There are various free trial methods that can be used in this application as well as by using premium paid applications for the needs of all access to the features needed by researchers with this WarpPLS application system in the implementation of research data processing.

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48

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CONCLUTION AND RECOMMENDATION

Targets and outcomes of this implementing community service process this time is expected to achieve the expected targets, namely:

1. Increase knowledge and ability of the academic community at STIE Nusantara campus partners, Tempo Polytechnic and FEB UHAMKA related to research methodologies that are very supportive of scientific writing, especially related to the Structural Equation Model (SEM) - Partial Least Square (PLS) method.

2. The ability of the academic community at the STIE Nusantara campus partners, Tempo Polytechnic and FEB UHAMKA increases in applying WarpPLS software that can be used in research.

When we talk about evaluation, survey has been done for this training – "Training Evaluation and Participant Satisfaction" shortly after this training activity was completed, the committee conducted an activity to distribute Google Form (G-Form) links to all participants to find out their level of satisfaction with the substance and process of the training delivered by the instructor with the support of the committee.

The results of the survey on the 2022 Community Service Training evaluation questionnaire is, from the participant responses in the form of the script above, which amounted to about 46 people, there were 33 participants who responded to the questionnaire or around 72%, of which 33 participants gave the response, suggestions that were substantially satisfied and agreed with this activity even need to be intensified there are about 32 people (97%) with only one participant respondent whose suggestion substance is not relevant to this activity. So that, in other words, this Community Service activity can be concluded as successful and constructive.

Last, as an authentic form of participant participation in this training, all participants, resource persons, committee and various other parties deemed involved are given certificates. To improve the University's Main Performance Index (KPI), this certificate is not only awarded from the Faculty of Economics, State University of Jakarta (FE UNJ), but also from one or several partner universities.

REFERENCES

Hardjanti, R. (2018, May 21). Jurnal Ilmiah Mahasiswa Indonesia Kalah Saing, Ini Solusinya. Okenews. Retrieved from https://news.okezone.com/read/2018/05/21/65/1900736/jurnal-ilmiah-mahasiswa-indonesia-kalah-saing-ini-solusinya

Irawan, Prasetya dan Aslichati, Lilik (2014). Modul Metode Penelitian Sosial. Universitas Terbuka, Jakarta.

Kurniati, P. S., & Fidowaty, T. (2017). Faktor-Faktor yang Mempengaruhi Kinerja Penelitian Dosen di Universitas Komputer Indonesia. Jurnal Ilmu Politik Dan Komunikasi, VII(2), 191–206.

Mukti, A. hari. (2019, October). Workshop Peningkatan Kualitas Publikasi, Dosen Dituntut Membuat Jurnal Internasional Berkualitas. Tribunnews. Retrieved from https://jateng.tribunnews.com/2019/10/24/workshop-peningkatan-kualitas-publikasi-dosen-dituntut-membuat-jurnal-internasional-berkualitas

Nurkhaerani, R., Wijayanto, H., & Syah, D. (2013). Eksplorasi Kinerja Dosen Tersertifikasi Dalam Melaksanakan Tridharma Perguruan Tinggi Di Indonesia. Xplore: Journal of Statistics, 1(2), 1–8. https://doi.org/10.29244/xplore.v1i2.12410

Oviyanti, Fitri, Habsi, Ibrahim (2018). Faktor-Faktor Yang Mempengaruhi Kinerja Penelitian Dosen Prodi PAI Fakultas Ilmu Tarbiyah dan Keguruan UIN Raden Fatah Palembang Tahun 2017. Journal of Islamic Education Management. Juni 2018, Vol. 4 No. 1, pp 19-34 El-Idare: http://jurnal.radenfatah.ac.id/index.php/El-idare

Widyanuratikah, I. (2019, November 26). Publikasi Ilmiah tak Sebanding Jumlah Dosen dan Mahasiswa. Republika. Retrieved from https://republika.co.id/berita/q1k9gl284/publikasi-ilmiah-tak-sebanding-jumlah-dosen-dan-mahasiswa

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50

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