

Developing an Estimation Application for Pensions and Contributions for the Permanent Employees of the University of PGRI Yogyakarta Using Matlab R2009a

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The supervisory foundation of the University of PGRI Yogyakarta possesses a particular mechanism to decide the amount of pension to be provided for the employees. This research aims to establish an application design for the pension amount which should be allocated to permanent employees actively working for the institution. The research method that was employed is quantitative. The quantitative method was used for collecting data through questionnaires. The waterfall was employed to design the application, using analysis, design, implementation, trial and maintenance. The process of calculation was conducted by employing the sequence and series. PLS-SEM was used to test the hypotheses. This application can be used and developed by considering the employee rank and class.

Key words: *Estimation, Tuition, Pension, Matlab.*

Background to the Research

The University of PGRI Yogyakarta has a lot of employees, among them there are 138 lecturers and 67 academic staff. The lecturers consist of government employed lecturers and foundation ones; the staff are a combination of permanent and impermanent. This university has a particular type of funding management, and a foundation builder as well. The university's income and expenditure are set every year in September. Employee well-being is also considered from year to year and increases periodically. In 2016, the prosperity of the university was increased through elevating the main salaries, meal allowances, the 13th salary and the religious holiday allowance (Buchory, 2016).

On 5th December 2016, the foundation of the PGRI University of Yogyakarta announced the letter-number 049/SK/YP-UPY/XII/2016 regarding the pension for permanent employees. The contents described the terms and mechanisms of the pension fund as differing from other pension management funds. The letter was distributed by the foundation to the rector and unit leader staff and forwarded to all employees. However, there is currently no means of fairly calculating the pension amount to provide a better understanding to the permanent employees.

Matlab stands for Matrix Laboratory, firstly introduced by the University of New Mexico and Stanford University in 1970. This software was firstly used for numerical analysis, Algebra Linear, and theories about the matrix. Now, the abilities and existence of features by the Matlab have been largely completed due to the amazing toolbox. Some benefits of using Matlab are (1) mathematical calculation; (2) numerical computation; (3) simulation and modelling; (4) visualisation and data analysis; (5) graphic making for the sake of science and technique; (6) application development, such as using GUI. The application of tuition and pensions for the employee requires special mathematical calculations based on regulations that make it perfect to use Matlab. Based on the description above, this research will develop an application that can calculate the amounts for tuition and pensions. This research is entitled “Developing an Estimation Application for Pensions and Contributions for the Permanent Employees of the University of PGRI Yogyakarta Using Matlab R2009a.”

Based on the description of the background to the research, the problem identifications are: (1) the institution foundation, on 5th December 2016, announced the regulation letter-number 049/SK/YP-UPY/XII/2016 regarding pensions for the permanent employees of the University of PGRI Yogyakarta. The regulations and mechanisms regarding funds for a pension are different from other pension regulations, so this university has developed regulations based on the new regulation letter-number 049/SK/YP-UPY/XII/2016. (2) the regulation letter describes the mechanisms, details, obligations and rights of every permanent employee of the University of PGRI Yogyakarta in relation to the tuition and pension. However, there is no other equipment to clearly and objectively calculate the computational application to provide simulation as a clear perspective to gain an understanding for all permanent employees. (3) some of the permanent employees gave recommendations regarding fixing the gap related to the mechanisms and details for tuition and pensions, so that all employees would be benefited from the application of this pension mechanism. (4) on the other hand, there is a discipline that can be used to develop this kind of computational application, that is computer or informatics engineering. There are a lot of computational program languages available to develop such an application. Matlab is one of these sophisticated tools with the ability to perform the numerical calculation, which makes it perfect for developing an application to calculate tuition and pensions for permanent employees.

Based on the above problem identification, the research will be limited to: (a) the analysis of the calculation of tuition (as the active employee) and pension (when the employee is retired) based on the regulation letter of the University of PGRI Yogyakarta number 049/SK/YP-UPY/XII/2016 regarding the pension to be given for permanent employees, which was been regulated in 5th December 2016, (b) the computational program that would be developed as the application design to estimate the amount of tuition and pension for all permanent employees in the University of PGRI Yogyakarta is Matlab R2009a, (c) the basic salary that would be used is fully based on the data possessed by the University of PGRI Yogyakarta, (d) the first assumption to calculate is: the working life which is based on the tenure decision of the foundation for permanent employees, annual pay hike, life expectation estimation, the accepted salary and pension as at 25th September 2016, the change of annual salary in September, for example, 2016 means that September 2016 to August 2017. (e) the application data input will include names, date of birth, basic salary, annual pay hike, life expectation estimation, types of employment: lecturer or academic staff member. (f) the outputs of the application are name, year of retirement, the estimation of year when the retired individual stops getting the pension, the estimation of tuition that has been deposited, and the estimation of pension that would be received, (g) the trial would be conducted on some of the permanent employees of the University of PGRI Yogyakarta.

Based on the problem identification above, the problem of the research can be formulated as follows:

- a. How to calculate the tuition and pension for permanent employees based on the regulation that has been formulated?
- b. What is the design of estimation application of tuition and application for the permanent employees of the University of PGRI Yogyakarta?

The regulation letter of the foundation of the PGRI University number 049/SK/YP-UPY/XII/2016 is used as the guidance of this university to build a mechanism to process the fund collection of pension participation and pension allocation to all of the employees. Some things that have been regulated in the decree are as follows: (1) the amount of pension is 50% of the last received basic salary, (2) 70 years old is the age of the pension for the lecturers and 60 years for the other staff members until they die, (3) five% would be taken off from the monthly payments as the pension participation when the employee is still active, (4) if the employee dies before he retires, he will not get the pension, just six times the basic salary, (5) if an employee resigns, he will get three times the basic salary, (6) however, if he resigns before 20 years of service, he will get nothing, (7) the participation tuition was started from 25th September 2016, (8) the participation tuition collection is in accordance with the payment of the salary, (9) as a reward for the retired employee, the last salary payment will be transferred, although the time of the retirement is before the 25th.

The object of this research is the implementation of pension fund management for all permanent employees of the University of PGRI Yogyakarta, especially regarding the calculation of tuition collection and the amount of the pension. The data collection was conducted by doing an interview and library research. The interview process was conducted to ascertain the data regarding the basic salary and the pension tuition participation, and also to develop a description regarding regulation for a pension in the University of PGRI Yogyakarta. The system of development method conducted is the waterfall method.

Literature Review

Various views have inserted some considerable arguments about the contribution of pensions towards the employees; the pathway towards contribution consists of various steps. The ultimate contribution is collected internally from an organisation based on rates decided following the policies of organisations (Polat, Bal, & Jansen, 2017). Employees are provided for by companies on behalf of savings that have been deducted from their salaries or allowances in the context of retaining amounts that have to be delivered at the time of retirement. The contribution from employees is deducted within a time frame on a monthly basis from their earnings, while the organisations are liable to do so on the same percent or higher for compiling such amounts to be given at the time of their retirement (Mudanya, 2019). Literature has been found on various studies that denote various implications for the sake of deducting amounts for their employees, while many people are also allowed in some context to withdraw amounts earlier for any emergency cases. Usually, many organisations have developed variant strategies for obliging the employees who are working with them, whereas the applications have also been made in various studies that had contributed some significant factors of compiling (Budko & Fedotov, 2017). Many employees are retained and are convinced at various stages to make use of the pension plans via the contribution procedures that companies usually adapt. Most of the employees are indulged with various contributions, pensions are not the single factor for deduction from salaries, but many other factors are also involved in the deduction procedures where employees usually take advantage despite the pension (Melguizo, Bosch, & Pages, 2017).

From past studies, the prevailing factor of pensions has enhanced the level of retaining employees within single organisations. Some studies have mentioned long term plans which usually have an influence on the various mind level of employees, due to the future forecasting opportunities of which many employees avail themselves (Vogel, Ludwig, & Börsch-Supan, 2017). A variety of literature has also endorsed some sort of variant applications that have been developed by various organisations for the distribution and deduction of different allocations; however, welfare is also quoted as an important aspect. The hinder plans of organisations when revealed to the employees are mostly admired due to their time in some organisations (de Oliveira, Filomena, Perlin, Lejeune, & de Macedo, 2017). While the consistency of pensions

and contributions has gained much attention over time, many other factors have been found mentioning plenty of other types of contributions for employees. Therefore, literature has elaborated on a vast area of variables that are prevalent in past studies and have a significant contribution to make concerning the circumstances of existing and retired employees. The matter of knowledge has enhanced the capability of understanding of employees, whether in organisations of making profits or organisations of providing services (Bielawska, Chłoń-Domińczak, & Stańko, 2017). The service factor could vary upon prevailing circumstances, whereas universities are also an element belonging to the service industry. The term permanent employees has been enumerated to a great extent in the literature, and has gained much importance with regard to contribution assessments. Usually, companies or organisations have set some sort of criteria for employees to get permanent status in the organisation (Chan & Marques, 2017). The broader era of savings has also been elaborated upon by a variety of studies where employees are unable to get acquainted with it, although some older status employees are well acquainted due to the bearing levels. Most of the employees adapt to earn earlier as compared to the old ones which are probable in saving means (Ceylan, Gürsev, & Bulkan, 2018).

The university services to its students are dependent on its employees, who are performing their duties for the satisfaction of the students as well as themselves. The developments and innovations in delivering the deducted items to employees of organisations have grown up with the improvement of quality services and self-saving levels. Some levels of retaining amounts with organisations have been defined in various ways which have not only benefited the employees but also have benefited the organisation itself (Latunde, Esan, Richard, & Dare, 2020). Most organisations deduct a certain amount from each of their employees and aim to deliver it at the time of retirement, while the whole period is not for putting such an amount into a box. The upgrading of systems in organisations has much endorsed some beneficial means through which many organisations have gained increased earnings on the amounts that have been deducted from their employees monthly. The adequacy of such savings have not been changed over time, but have been found to be upgraded in a variety of studies (Dong & Zheng, 2020). Many studies have significant elements that have contributed beneficial means for the maintenance of such saving adequacy. In the past literature, the term of pension was inherited from various aspects, while the contribution term has not gained much attention as compared to the pension fund, although applications for the estimations have also not contributed much, so far the growth of literature in various studies that has gained much attention is the prevailing factor of pensions (Al Shobaki, Naser, & Kassab, 2017).

Moreover, the element of contributions was also hindered by its prevailing element, although the literature has revealed a backing for employees that work with organisations on a long term basis. Some studies have contributed literature on pension funds which somehow have been replaced with various terms that have been rising in the current literature. Many organisations

have planned strategies with various applications that would be used for various estimations, while such estimations are well regarded in the area of pensions and contributions (Chłoń-Domińczak, Strzelecki, & Łatkowski, 2017). Where some factors also prevail, some elements have been considered viable for the retaining and sustaining of employees within the organisation, some factors have been briefly viewed in the literature enumerating the role of variant applications. Some views for further and better plans have also been endorsed in the literature, specifying some techniques that have been used where alternative methods of estimation have been used for numerous contributions. It is necessary to be well acquainted with the relationship between participants and contribution channels, although the responsibility relies upon the contributor to proceed, for some responsibility is also pertinent to employees (Ferreira, 2017).

When there is an understanding of relationships, the rules and procedures are then prevalent, where better plans are always required to establish the design of such an application. The contribution is set by organisations while the satisfaction element always belongs to the person whose amount is to be shared. Therefore, many studies have analysed the relationship amid pensions and contributions that is pertinent to employees of various organisations, while the important aspect for such examination is the development of an application that is esteemed for effectiveness (Szczepanski, 2018). Numerous organisations have launched better plans with plenty of applications for making designs of applications, not only for contribution or pension applications, but also for savings on an individual basis. It is understood that saving belongs to the salaries of individuals from whom the amount is deducted, so the variation of percentage also relies on organisations. Usually, companies use such amounts to invest in some relative fields for better profits to companies, although the amounts belong to individuals. These payments are always placed on call due to the projections and forecasted procedures of companies and organisations, however, some time frame is always required to react accordingly within time (Zhao, Shen, & Wei, 2017). Various studies inserted some findings from certain implications of rates upon the savings of individuals which asserted some meaningful results and endorsed the lack of motivation when organisations are responding less than the deduction from their individuals.

The burden always prevails on the organisations for estimation procedures, where in the current environment the majority of employees look for better plans, the long term planning also involves pensions and contributions which could be reliable for their futures after retirement (Alonso-García, Boado-Penas, & Devolder, 2018). Certain facts may prolong the estimation process, because most of the organisations in question are politically using a vast number of employees for better outcomes, while at the time of contributions towards such employees most of the companies come up with no applications which usually results in various drawbacks to organisations (Gaguk & Achmad, 2017). The drawbacks have been well presented in the literature, discussing various scenarios where, when the contribution is pending, employees

are forced to act in a variety of ways to get along with some sorts of activities which then result in loss to various companies. The application of contributions has not only enhanced the performance of organisations in a vast area of literature but is also a renowned term in most of the organisations which are known due to the applications (Podestà & Marzadro, 2017). Some studies mention reluctant estimation of application towards contributions and pensions for the employees, the category is open for all such persons who have attained the level of a permanent job.

Although many organisations follow various procedures to restrain contributions or pensions for employees of various sectors, the growing organisations are well acquainted with this. The outnumbered organisations have established contribution and pension estimation applications while keeping in view with beneficial ways for both employees and organisations (Paradi, Sherman, & Tam, 2018). The literature has noted some elective views by the electiveness of applications and has also highlighted some organisations that are not following some reputable means for their employees. The vast area of studies has been established based on surveys that have positively reported some factors that are deemed influencing elements on the organisations and are noted as being acquainted with contribution and pension estimation applications.

H1: The quality of the application has a significant impact on pension funds satisfaction of the employees.

H2: The estimation method of application has a significant impact on the satisfaction of the employees with their pension funds.

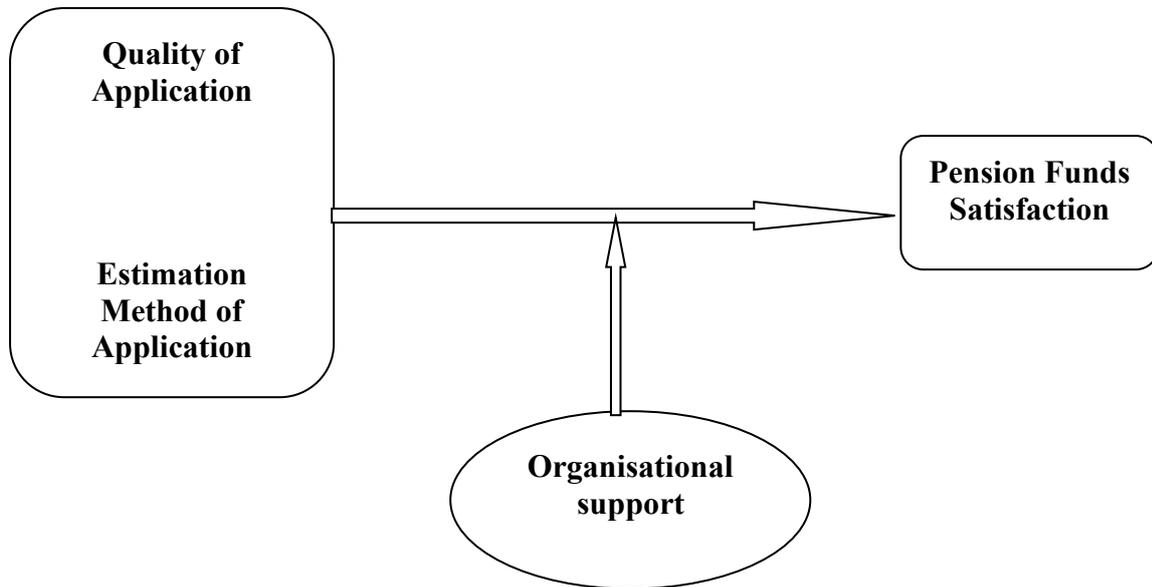
H3: Organisational support has positive moderation for linking the quality of application and pension funds with the satisfaction of the employees.

H4: Organisational support has positive moderation linking the estimation method of application and pension funds with the satisfaction of the employees.

Research Methods

This research aims at establishing the application design for permanent employees regarding the amount of pension which should be deposited during the periods for which employees are actively working for the institution and the amount given after they are retired. The research method that was employed was quantitative. The quantitative method is for collecting data through questionnaires. PLS-SEM was used to test the hypotheses. For the sake of data collection, a total of 540 questionnaires were distributed, out of these 410 were returned, which represents around 75.92 per cent response rate. The predictors such as quality of application (QA) has four items while estimation method of application (EMA) has six items, while organisational support (OS) as a moderator has eight items and the dependent variable such as pension funds satisfaction (PFS) has five items. These are shown in Figure 1.

Figure 1: Theoretical Framework



Research Findings

The pension regulation for the employees of the University of PGRI Yogyakarta was started in September 2016. The salary is paid in every month on the 25th. Exceptions are given to the employees who will receive their last salary; the salary will be paid based on the date of the retirement, even if it is not the 25th. The tuition for the pension collected was as much as 5% of the basic salary in every payday, the amount of the basic salary remained the same for one year, which is September until August of the following year n+1. The basic salary will be increased in every year, ranging from 10% to 20%. Table 1 show the convergent validity and the values of Alpha and Cr are larger than 0.70 while loadings and AVE more than 0.50 show valid convergent validity.

Table 1: Convergent Validity

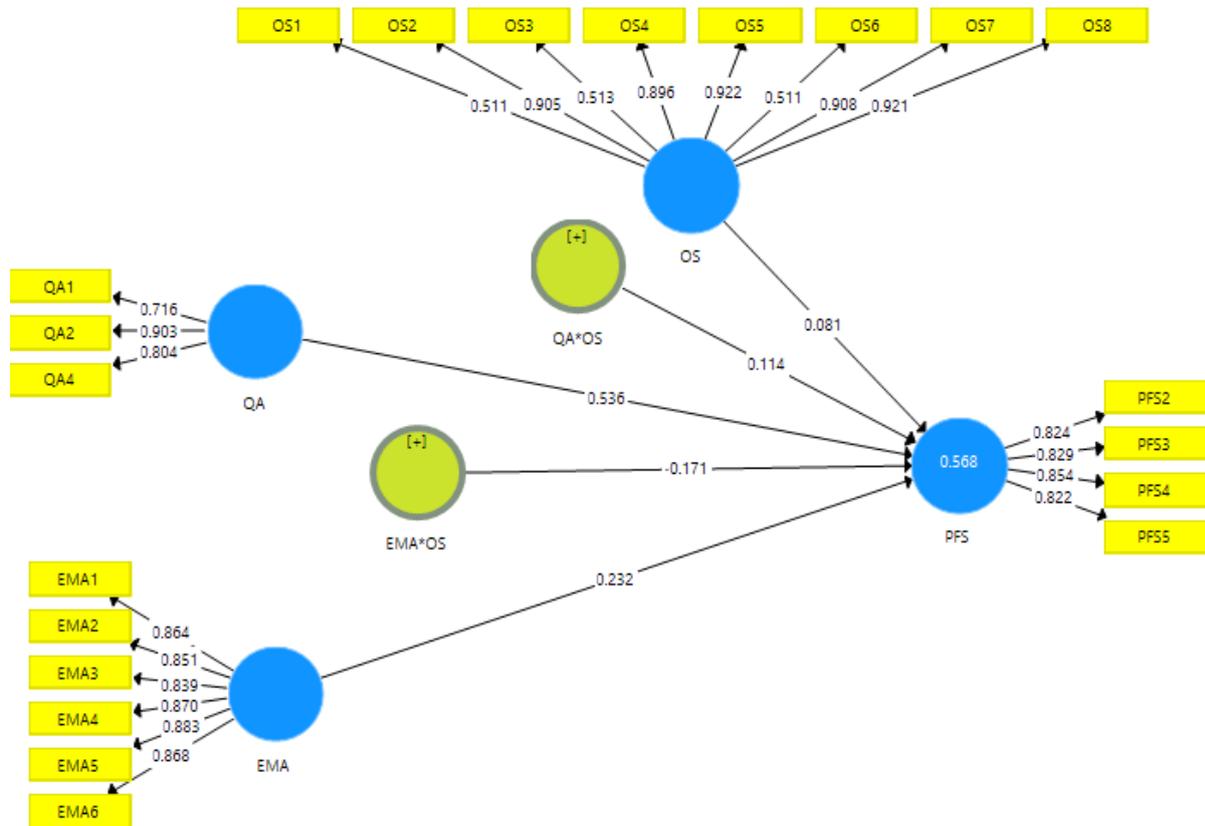
Constructs	Items	Loadings	Alpha	CR	AVE
Estimation Methods of Application	EMA1	0.864	0.931	0.946	0.744
	EMA2	0.851			
	EMA3	0.839			
	EMA4	0.870			
	EMA5	0.883			
	EMA6	0.868			
Organisational Support	OS1	0.511	0.911	0.923	0.616
	OS2	0.905			
	OS3	0.513			
	OS4	0.896			
	OS5	0.922			
	OS6	0.511			
	OS7	0.908			
	OS8	0.921			
Pension Fund Satisfaction	PFS2	0.824	0.852	0.900	0.693
	PFS3	0.829			
	PFS4	0.854			
	PFS5	0.822			
Quality of Application	QA1	0.716	0.743	0.851	0.658
	QA2	0.903			
	QA4	0.804			

Table 2 show the discriminant validity regarding the correlation among constructs and the values of Heterotrait Monotrait (HTMT) ratios are not greater than 0.90, showing valid discriminant validity.

Table 2: Discriminant Validity

	EMA	OS	PFS	QA
EMA				
OS	0.684			
PFS	0.456	0.461		
QA	0.372	0.454	0.848	

Figure 2: Measurement Model Assessment

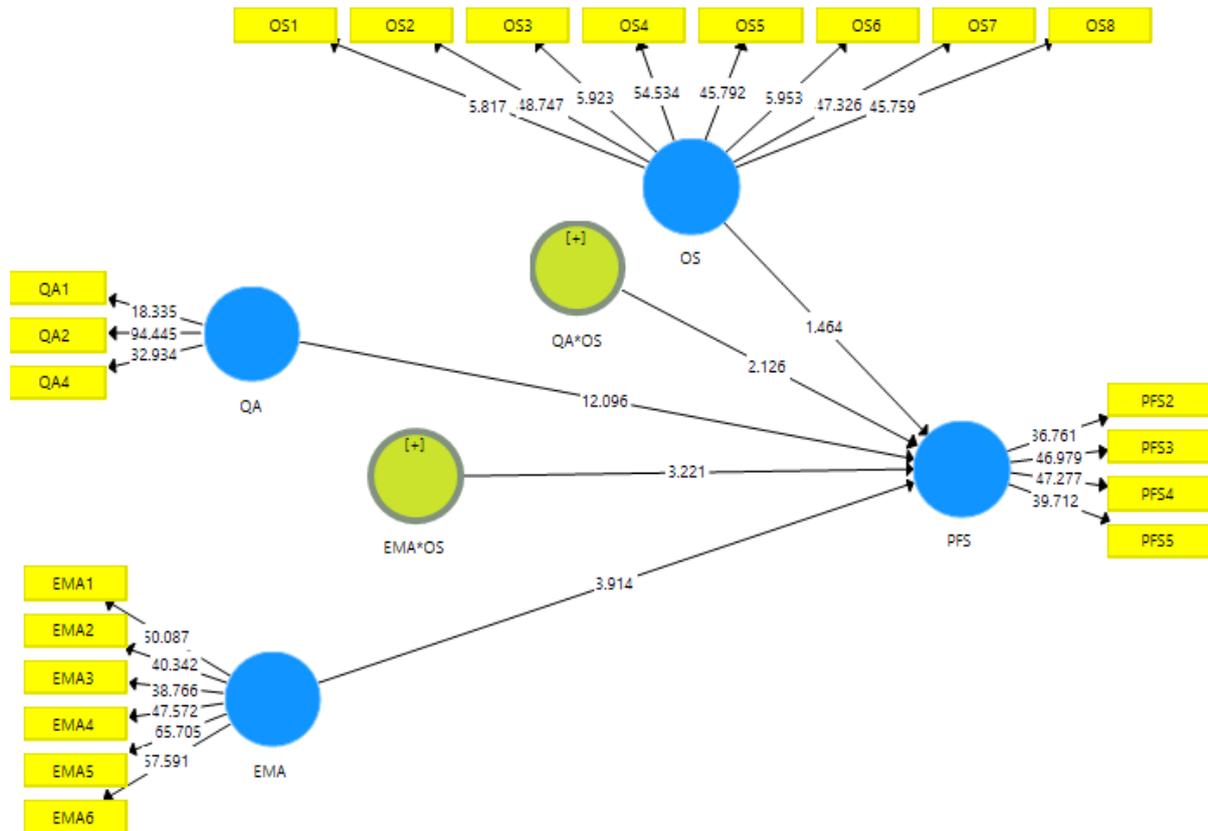


The links show that positive association among EMA, QA and PFS accept H1 and H2. In addition, OC has played a moderating role among the links of EMA and PFS, QA and PFS and accept H3 and H4. These are shown in Table 3.

Table 3: Path Analysis

Relationships	Beta	S.D.	t-statistics	p-values
QA*OC -> PFS	0.114	0.050	2.282	0.023
EMA -> PFS	0.232	0.059	3.941	0.000
QA -> PFS	0.536	0.047	11.484	0.000
EMA*OC -> PFS	-0.171	0.049	3.472	0.001

Figure 3: Structural Model Assessment



Discussion and Conclusion

The application to estimate the tuition and the retirement funds was simply developed and is easy to employ. This application also differs between lecturers and academic staff, because the regulation has stated that those two parties have different terms and conditions. This application reveals to us the amount of tuition during the time the employee is active, and the amount of pension that would be received in every month. According to the concept of computerisation, the background colour, the text and the label have been synchronised. The use of push-button to *predict* and *quit* has been appropriate, side by side, because these are choices. From the perspective of coding, this application does not need complicated coding to solve the problems. The calculation can be conducted by employing the theory of line and row.

The application to estimate the tuition and pension that has been developed is still limited to the lecturers and the academic staff whose appointment letters are before 2016, according to the the regulations. This application does not process appointment letters created after 2016. There is no rounding to the output in the form of numbers, there are some fractions. Besides, there is no full stop in the amount of money, which describes thousands, millions et cetera.



Based on the computational application that has been developed, we can conclude that: (1) the calculation of the tuition and the pension fund for the permanent employees based on the regulation can be conducted by employing the line and row theories, (2) the design of the application to estimate the tuition and pension of the permanent employees of the University of PGRI Yogyakarta requires inputs such as the employee's status, year of joining as an employee, first salary and estimation of life expectancy. The outputs are the year of retirement, the total amount of tuition and amount of pension that would be received in every month, (3) based on the trial that has been conducted using the developed application, it reveals to us that the application itself performs well.

Suggestions

Based on the application that has been developed, there are some suggestions, such as: (1) the application requires further development to be able to cover the permanent employees who joined after 2016, (2) in-depth development of the application is required to create a rounding of the numbers, especially of the amount of currency used (rupiah).

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