Statistical Analysis of Factors Affecting Average Monthly Saving Money of Lecturers in Case of Natural and Computational Science

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Abstract

Background: This study entitled by determinants of average money saving in university lecturers in case of Mizan-Tepi University Tepi campus in the college of Natural and Computational science. The amount of saving is influenced by different factors: monthly income, Family size, and Age and Family consumption per capital. **Objective:** The objective of the study was to examine the responsible factors on average saving monthly income of lecturer's im Mizan- Tepi University, Tepi Campus.**Methodology**: The study included about 135 teachers (lecturers).The data for the research was collected from primary source and average money saving of university teachers' (lecturers') and structural questionnaires was administered. The selected dependent variable was average saving monthly income and the independent variables are factors like; Family consumption per month, Family size, recreation, Age, marital status, religion, donation, house rent, sex, and work experience.**Result**: From multiple linear regression analysis on the effect of monthly income; family consumption, family size, and age are significant on the average money saving. The data were analyzed using SAS version 9.2 and finding also compared with relevant literatures, lastly conclusions drawn and recommendation was for warded from the result. It was concluded that from 135 teachers (lecturers), 86.79% of the teachers (lecturers) are male and 13.21% are females who saved money prevalently and age ,net salary ,family size and consumption per month were significantly influencing on average saving money of lecturers' in case of Natural and Computational science.
Key words: Income, Multiple Linear Regression, saving

Introduction

Personal saving has two primary functions. First, savings provide the economic security of a safety net. By transferring resources from the present to the future via savings, individuals are prepares to face unexpected and irregular financial circumstances. Second, saving leads to accumulation of wealth that enables individuals to improve their living standard and to response to new opportunities (Gokhale, 2000).

People used traditional money saving system because modern money saving system was not improved at that time (B.E Mark Hans on old(ed) (1989) Statistics for Business and Economics: 8th edition). When it comes to saving, people in general and the poor in particular might not be completely rational and completely knowledgeable (Karim, 2010). The goal of promoting financial saving habit is to make people more aware of financial opportunities, choices, and possible consequences. There is a growing recognition of the importance of financial education as it relates to saving (Greenwald et al., 2001; Gill, 2004).

But there was plenty of ways to help you began saving money on the tightest budget.(Paula new and B.E Mark Hans on old(ed) (1989) Statistics for Business and Economics: 8th edition). Naturally, some have turned towards the high yield saving accounts of on time banks. They could save money throughout the year, but watch Temperatures of summer provided a few additional tips that could help they saved ever more money (E. Mark-Hanson. (1992 Educational Demonstration and Organization 5th edition).

The methods of saving include putting money aside in bank or pension plan and include reduced expenditure. Saving is closely related with investment. It is possible for resource to be invested by being used to produce fixed capital variable like factories and machinery. It can therefore be vital to increase the amount of fixed capital variable, which contribute to economic growth. However, increase saving do not always corresponding to increase investment (TeferaTades (1998) Basic concepts of Education and curriculum: 3rd edition). Financial education is one way of increasing savings and asset accumulation. The extent to which an individual understands the process and benefits of asset accumulation is likely to affect their willingness to save. Thus, Mizan-Tepi University was selected for present study (Sherraden et al., 2007). Saving money is a deposit account paying interest is typically used to hold money for future need. In case there was some disagreement about Money saving. For example, one part of people (teachers) income that was spent on mortgage loan repayments it was not spent on increase without increase investment. So, by the above definition even though teachers do not always thought repaying as saving because others said it was hard to save a portion of their income due to extravagance(.B.E Mark Hans on old(ed) (1989) Statistics for Business and Economics: 8th edition)..

The recent appreciation in housing value could have large effect on money saving. However, may save more

to assist their children in buying the now more expensive housing wealth affect saving. On the other hand, some of they would use inferior goods to save money regularly. But others used superior goods. They could not save money for future.

Statement of the problem

Now a day, the numbers of teachers increased from time to time, but they could not be seen in a funny page because they were not participants in economy. Some of they said we cannot as we want. Also they said the interaction in to the world economy is limited with our income. When the problems go on, the monthly income and the money that we spent will be equal. So, our saving capacity is low.

Money saving is hokum when the individuals consumption level is high. It must more relate than the money they spent on consumption but also the value that they spent on house rent and recreation has its own effect on the amount of money that they save. When the above level of factors high, it pushes the capacity to save low. Nevertheless, the money saving is depend on the value of their earnings. On the other hand, teachers use money for holiday, ceremony and others. In case, they need extravagance. So, this is leads loss of money and break down money saving capacity.

These problems forced to initiate the research for study. Not only their salary but also their own problems like money need for extravagancy leads no save more money. Therefore, this study concerned relies up on improving low money saving habit of the lecturers in case of College of Natural and Computational science.

General objective of the study

The main objective of this study was to determine the determinant factors that affect of average money saving in University lecturers in case of College of Natural and Computational Science.

Specific objectives of the study were:

❖ To identify the factors that affect lecturer's average money saving in College of natural and Computational Science
❖ To estimate and predict average saving money of Lecturers
❖ To fit multiple linear regression model and fit the data well

Significance of the study

Money saving could serve as reference to subsequent research works in the area of money saving in context of Ethiopia. It helps policy makers to know the effect of factors to modify the results of money saving in lecturers and to found the best way to reduce the effect of those factors and to make the teachers more effective in their average money saving per month.

Theoretical Literature Review

Saving is a mechanism by which people meet their future need. The basis of saving helps their own Future interest or their family interest or for in parting education to their or for building or as a safe guard against hard shipping during old age sickness. Saving is defined the difference between income and consumption. From the psychological point of view saving can be considered the result of a deliberate decision making process and saving is the act of regularly putting away some resource for a goal (Friedman, 1957).

Saving money or the saving as Friedman it so many years ago, It the function of all financial success, including investing. Having money saved is what provides the mean for you take advantages of situation. Weather it is going back to collage starting a new business or buying shares of stock when the markets cashes.

These saving money resources will provide a foundation and answer the question such as "how much money I should saving" and "what is difference between saving and investing?" You will also learn the mobilization of saving was forgotten half of development finance paradigm (Adams, 1998).

Methodology

Study Area

The study was conducted in Mizan-Tepi University Tepi Campus in the college of Natural and computational science which located 611km east of National capital city Addis Ababa and about 899km from the regional capital city of Hawassa. Mizan-Tepi University Tepi Campus was established or started teaching learning activities in 2000 E.C academic year as a University. The establishment of University is alone with government policy and expanding quality higher education and ensuring its equitable distribution across the country.

Target Population.

The study considered the factor that affects money saving in lecturers in case of College of Natural and Computational science. Therefore, the study was done in College of Natural and Computational science lecturers.

During the practical implementation the samples selected from the target population.

Variables of the study

The dependent variable is the amount of average money saved by lecturers per month.

The corresponding independent variables are illustrated bellow:

Table 1: Independent variables and its coding

Variable	Code(measurements)
sex	Male= 0
	female =1
Religion	Orthodox =0
	Muslim= 1
	Protestant =2
	Other= 3
Marital status	Single= 0
	Married =1
	Divorced =2
	Widowed= 3
donation	Birr spent for charity
recreation	Birr spent for recreation
Family size	Number of family in house hold
Family consumption	Birr spent for consumption
Age	Age respondents
Experience	Service year
Gross salary of lecturers	Net income per month
House rent	birr spent for house rent

Methods of data collection

This information would be collected through self administered questionnaire by preparing questions for the respondents (teachers) to make the study feasible and accurate. The questionnaire had open and closed ended questions.

Sampling techniques

Simple random sampling was used and each member in population has equal chance of being selected. The following measurements were used to determine the sample size: The degree of confidence, the margin of error (the degree of precision) is 95% and 5% respectively .From pilot survey, the variance of samples was computed and given by: $n = \frac{Z^2 \alpha/2}{d^2} S^2 = 135$, where S^2 is the sample variance of average money saving.

Methods of data analysis

It contained the data collection, organization, summarization and presentation or summary were done in descriptive statistics.

Histogram: It represents the category of the level of education and number of frequencies in each with vertical axis. Generally, descriptive statistics is used to measure the mean, median of amount of money saved per month.

Inferential statistics: It consisted of organizing from samples to populations performing hypothesis testing determining relationships among variables and making conclusions. In the inferential statistics the method of data analysis contains a regression analysis that is multiple linear regressions

Multiple linear regression model

It shows the linear function of all regresses with regressed.

$Model$: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \varepsilon$

Where: y= average money saving (regressed)

β_0 = constant, $(\beta_1 \dots \beta_{11})$= parameters of the repressors , $(X_1 \dots X_{11})$ = Regresses (monthly income, consumption, marital status, religion, sex, house rent, donation, recreation, family size, experience and age) and ε = Random of disturbance term.

Assumption for multiple regressions model.

All statistical procedures and results extracted from such analysis are valid and have meaning only if the standard

regression assumptions are satisfied. When these assumptions are violated, the standard results quoted previously do not hold and an application of them may lead to serious error. In addition, gross violations of the assumptions may lead an unstable model in the sense that a different sample could lead to a totally different models with opposite conclusions.   Therefore, the regression assumptions should be checked before drawing statistical conclusions from the analysis because the validity of these statistical procedures hinges on the validity of the assumptions.

These standard regression assumptions are given as follows:

✓ Assumption of linearity: The relationship between the response y and the regressor x is linear, at least approximately. This is: $y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \beta_4 x_{i4} + \beta_5 x_{i5} + \beta_6 x_{i6} + \beta_7 x_{i7} + \beta_8 x_{i8} + \beta_9 x_{i9} + \beta_{10} x_{i10} + \beta_{11} x_{i11} + \varepsilon_i$

✓ Assumption of non-stochastic repressors: The predictor variables are non random (or they are deterministic) and they are measured without error.

✓ Assumption of no multi-co linearity: The predictor variables are linearly independent of each other.

✓ Assumption of zero mean error: The error terms, $\varepsilon_i's$ have zero mean. This is: $E(\varepsilon_i) = 0 \ for \forall i = 1, 2, \cdots, n$

✓ Assumption of constant variance: The error terms, $\varepsilon_i's$ have unknown and constant varThis is: $Var(\varepsilon_i) = E[(\varepsilon_i - E(\varepsilon_i)]^2 = E(\varepsilon_i^2) = \sigma^2 for \forall i = 1, 2, \cdots, n$

✓ Assumption of no autocorrelation: The errors$\varepsilon_i's$ are uncorrelated.This is: $Cov(\varepsilon_i) = E\left[\left(\varepsilon_i - E(\varepsilon_i)\right)\left(\varepsilon_j - E(\varepsilon_j)\right)\right] = E(\varepsilon_i^2) = \sigma^2 for \forall i \neq j = 1, 2, \cdots, n.$

✓ .Assumption of normality: The errors are normally distributed.

✓ Assumptions on the error terms can collectively expressed by:

$\varepsilon_i \sim NID(0, \sigma^2)$,   where NID stands for "Normally and independently distributed".The model rewrites in matrix form as follows: $Y = sX_\beta + \varepsilon$

The estimation of regression parameters applies by using least square estimation. $e = y - \hat{y} \ where \ \hat{y} = X\beta$, $e^T e = [y - X\beta]^T[y - \hat{y}] = [y - X\beta]^T[y - X\beta]$

By applying partial derivative with respect to β, gives: β= $(X^TX)^{-1}X^TY$ and t-test was used to test the individual parameter of the model.

Model Adequacy Checking

This model would be checked whether the major or standard assumptions of multiple linear regression model assumption are meet.

Checking Model Assumptions (Model Diagnostics Checking)

Linearity, homoscededicity, Autocorrelation, multicollinearity were tested

Correlation analysis: Correlation analysis is used to measure the degree of correlation between variables. It also measures the degree of no association between any of variables. Correlation coefficient is a statistical measured that used to measure the relationship between the variables. The values of the correlation coefficient lie between -1 and 1.

➢ 1 indicates a strong positive relationship.

➢ -1 indicates a strong negative relationship.

➢ A result of zero indicates no relationship at all.

Result and Discussion

The summary of descriptive statistics and result of inference statistics were interpreted and discussed below:

Table 2.summary of descriptive Statistics   for continuous variables

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
Saved	106	3486	2242	369547	1000	25000
Age	106	29.41509	2.94349	3118	24.00000	47.00000
Salary	106	10986	7435	1164528	8000	80000
Fam_Size	106	2.17925	1.43293	231.0000	1.00000	10.00000
Consum	106	3308	3843	350600	1200	35000
Rent	106	966.50943	347.21488	102450	0	2000
Don	106	322.68868	287.16278	34205	0	1200
Rec	106	267.56604	177.29545	28362	0	1000
Experience	106	3.37028	1.88232	357.2500	0.25000	11.00000

Table2:revealed that the average values of monthly consumption of lecturers, monthly recreation of lecturers, monthly donation of lecturers, monthly salary of lecturers, monthly save of lecturers, Family size of lecturers, years of lecturers working in this area, Age of lecturers, monthly house rent of lecturers, are 3308, 267.56604,

322.68868, 10986, 3486, 2.17925, 3.37028, 29.41509 and 966.50943 respectively.

The range of variable contained in the minimum and maximum column level indicates that, the consumption, recreation, donation, house rent, salary, family size, age, working in this area and save of the instructors are 1200 to 35000,0 to 1000,0 to 1200,0 to 2000, 8000 to 80000,1.0000 to 10.0000,24 to 47, 0.25000 to 11.00000 and 1000 to 25000 from respectively.

Table 3: The summary of descriptive Statistics   for categorical variables

Variable	Category	Average saved money	Average	St.deviation
sex	Male	92(86.79%)	3497.25	2382.971
	Female	14(13.21%)	3414.29	924.751
Marital status	Single	59(55.6%)	3278.76	798.715
	married	47(44.4%)	3746.81	3247.799
Religion	Orthodox	53(50%)	3248.58	776.463
	Muslim	15(14.15%)	3325.33	732.060
	protestant	33(31.13%)	3336.12	819.516
	other	5(4.72%)	7480.00	9794.488

Results displayed in table3 we have seen that 86.79% of respondents are male and 13.21% of the respondents are female. In the above table 55.6% of the respondents are single, 44.4%of respondents are married and from the above table 50% of respondents are orthodox, 14.15%are Muslim, 31.13%are Protestants and 4.72%are others.

Inferential Statistics

It is the set of methods used to generalize from sample to population. By performing hypothesis testing determining relationship of variables and making prediction. It is drawing conclusion based on the obtained numerical analysis.

Table 4: Model Summary

Model	R	R Square	Adjusted R square	Std. Error of the Estimate
1	.953[a]	.908	.897	719.624

Table 4: showed that multiple coefficients of determination (R^2) show that about 90.8% of the proportion of variation in saving teacher (instructor) explained by all the predictors. On the other hand, 9.2% (100-90.8) identify as the elastic factors that is uncontrollable. Adjusted R Square indicates that 89.7% of variation in saving caused by other factors. R^2= 0.908 this implies that 90.8% of the amount of variation in the Lecturers money saving that is explained by the variation of predictors such as age of lecturers, sex of lecturers, family size of lecturers, religion of lecturers, Gross salary of lecturers, marital status of lecturers, Family size of lecturers, Donation of lecturers, Recreation of lecturers, house Rent of lecturers, and Experience.

Table 5: Over all Model Assessment Analysis

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	8	478351161	59793895	116.94	<.0001
Error	97	49597611	511316		
Corrected Total	105	527948772			

Table 5 showed that predictors: (Constant), Age of lecturers, donation per month, Family size of lecturers, family consumption of lecturers, monthly income of lecturers. The p- value for all parameters is 0.00 which is less than the level of significance. So we reject Ho. We conclude that the regressor is jointly significance. Sum square regression shows there is a relationship between saving and predictors.

Table 6:Parameter Estimate of Multiple Linear Regressions by using Forward Selection Method

Parameter	Est(S.E)	95% CI		P-Value
Intercept	-2434.21(965.5427)	-4326.64	-541.778	0.0117
Age	107.7312(34.3973)	40.3137	175.1488	0.0017
Salary	0.5223(0.0400)	0.4439	0.6008	<.0001
Family _Size	-241.460(97.9105)	-433.361	-49.5588	0.0137
Consumption	-0.4805(0.0841)	-0.6453	-0.3156	<.0001

From table 6 the fitted regression Model is $\hat{Y}$ -2434.21+107.7312X_1+0.5223X_2-241.460X_3-0.4805X_4.Where $\hat{Y}$ = Money saving, X_1=Age, X_2=salary, X_3=F-size, and X_4=consumption.

Interpretation of coefficients: is. β_0=-2434.21 the value of lecturers money saving when the predictor variables are zero. β_1=107.7312 Age of lecturer is the change in the lecturers money saving when the change (increased) by one unit taking other variables as a constant.

Age of lecturer is increased by one year, and then average money saving of lecturer is increased by 107.7312. β_2=0.5223 is the change in the lecturers money saving. The salary of lecturers is increased by one taking all other variables as a constant, and then average money saving of lecturer is increased by 0.5223. β_3=241.460 Family size of lecturers is the change in the lecturers of average money saving when the change (decreased) by one unit taking other variable constant. Family size of lecturers increased by one unit the lecturer average money saving
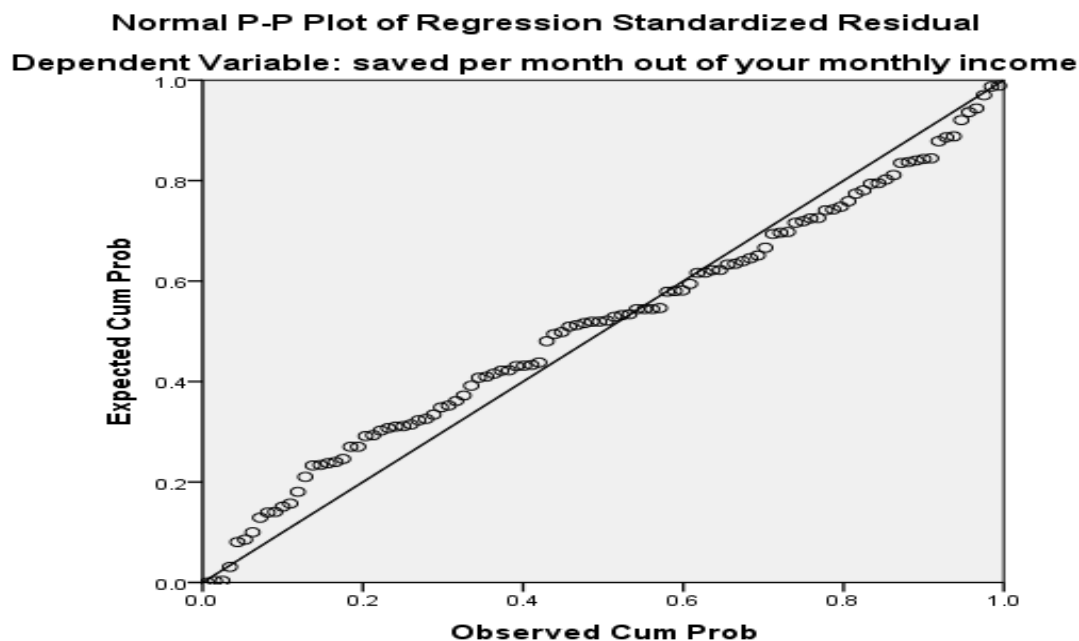
decreased by 241.460. β_4= -0.4805.Family consumption of lecturer is the change in the money saving of lecturers when the change by one unit taking other variables as a constant. This implies that Family consumption of lecturers increased by one unit, then the money saving of lecturers decreased by 0.4805.

Table 7. Test of Multi co linearity:

Model	Co linearity Statistics	
	Tolerance	VIF
(Constant)		0
sex	.949	2.39000
Age	.411	8.37712
Religion	.887	3.95080
family consumption	.041	9.41328
Experience	.603	1.97693
marital status	.467	1.20887
Family Size	.214	1.03005
Salary	.050	1.51775
House Rent	.463	0
Recreation	.868	2.39000
Donation	.824	8.37712

Table 7 revealed that the VIF as an indicator of multi-co linearity and the larger values of VIF, is the more collinear the variables. As the rule of thumb, if the VIF of a variable exceeds 10, that variable is said to be highly collinear. That means VIF is greater than 10 is the presence of multi co linearity. Generally, VIF for all explanatory variables are less than 10 which indicated that there is no Co linearity between explanatory variables.

Figure1:Test of Linearity

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: saved per month out of your monthly income

Linearity assumption: The observed values and predicted values of saving located in the line. As we can observe in the p-p plot graph indicates that all observations are lies approach to the line that means the relationship between dependant and independent variable should be linear. Due to this reason linearity assumption is satisfied.

Figure 2: Test of Normality: *Normality is test by graphical method using histogram. That means the graphical normal distributed with mean and variance is constants*
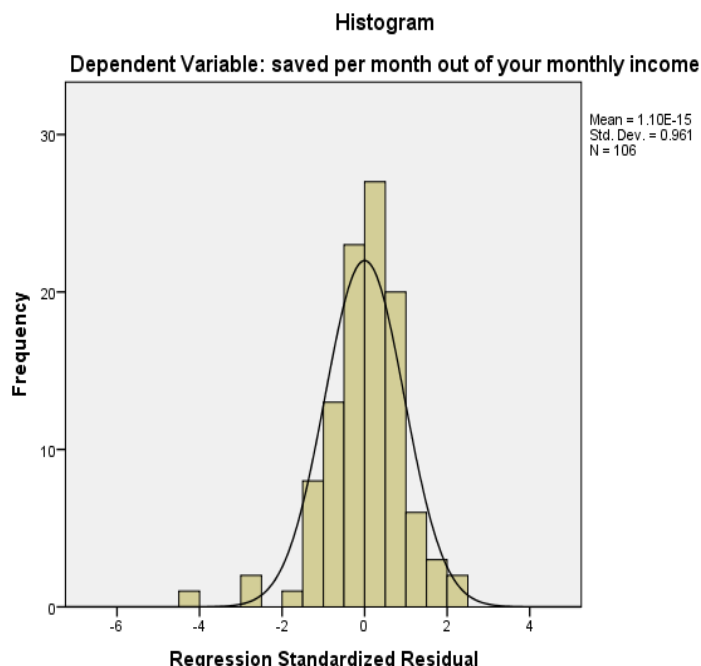

Table 2 revealed graph seems like this and indicates the error term is normally distributed with mean zero and variance sigma squared. Thus, the assumption of normality is satisfied.

Test of Correlation analysis: Correlation analysis is used to measure the degree of correlation between variables. It also measures the degree of no association between any of variables. Correlation coefficient is a statistical measured that used to measure the relationship between the variables. The values of the correlation coefficient lie between -1 and 1.

Table 8 : Correlations coefficient

Variables	Correlation	P- value
Family consumption and saving status of lecturers	0.78	<.0001
Gross salary and saving status of lecturers	0.89	<.0001
Family size and saving status of lecturers	0.39	0.0137
Age and saving status of lecturers	0.59	0.0017

From the above table 8 it has been seen that there is positive linear relationship between saving and consumption, Family size, Age and Salary of lecturers that means those four variables increase saving amount also increase. This analysis was confirmed by the above test, where the correlation is approximately strong and significant between Salary and saving, Age and saving, consumption and saving. But the correlation is approximately week and significant between family size and saving. The correlation between salary and saving is highest of others (r=0.89)

Conclusions

The main objectives of this study is to identify factors affecting the money saving of lecturers such as sex, age, donation, recreation, family size, religion of lecturers, Gross salary of lecturers, Family consumption, house rent, years of lecturers working in this area and marital status.

From multiple linear regression model Age, Family size, Family consumption, salary and donation are significantly affect the lecturers money saving. From the ANOVA table the regression value is less than 5% overall regression model is significance that the predictor variable (Age, Family size, Family consumption, donation and salary affect lecturers money saving.

Among the variables identified, age and salary of lecturers have positive effect on lecturer's money saving But Family size and Family consumption have negative effect on money saving of lecturers. From the study (recreation, Experience, sex, marital status, Donation and house rent) of the lecturers have no effect on lecturers money saving particularly based on this study

❖   The association between the saving capacity of lecturers and salary of lecturers plays an important role on saving performance.

❖   Based on the finding of the study, it is conducted that saving of lecturers is increases if it has a positive

relationship with income that means when the income increases the saving is also increases.

❖ There is a negative relationship between saving capacity of teachers with Family consumption of teacher's and Family size of the teachers that means when those Two factors increases the saving is decreases.

❖ As it has been indicated from the analysis data of inferential statistics contribution of a house rent, sex, Experience, recreation, Donation, Religion and marital status has no relationship with the saving capacity of lecturers and income and Age are the most important determinants of money saving.

Recommendation

➢ The most objective (analysis part) of this research paper shall give various result and interpretation based on saving capacity of lecturers. From that point of view, I would like to recommend some point. First, as it has been shown from the analysis of inferential statistics, lecturers maximize its saving by increasing average monthly income and by decreasing Family consumption and Family size therefore lecturers have to use these factors wisely to increase the saving capacity.

➢ The stabilized use of these described factors leads to increase contribution for both country and individuals because increasing of saving leads to increase investment as well as country's growth so, every lecturers has to responsible to stabilized use of those factors.

➢ Also for a unit increase of inflation rate, the Government must increase the income of the teachers just by that amount and he have to supply goods and services by lowering the cost of it to solve these problems.

➢ Finally, I want to recommend that teachers saving capacity have dependency within these above variables, so a person who are concerned by this saving capacity he/she will be an able to improve these activity in different angles. Make it a habit to "save as" money regularly.

Acknowledgement

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