Volume-3, Issue-7, July-2014 • ISSN No 2277 - 8160

Research Paper | Management

Role of Research Methodology in Academic projects of Management Students

RINOJ P K

FACULTY MEMBER, CENTRE FOR MANAGEMENT STUDIES, KANNUR UNIVERSITY MAIN CAMPUS, MANGATTUPARAMBA, KANNUR-KERALA 670567

ABSTRACT

The Research paper reviews the Research Methodology role in academic projects of Management students. It explains various methodologies adopted in decision making. It also high lights the availability of software in Methodology. Study has undertaken in the campus after reviewing the application of scientific tools used by students in academic projects.

KEYWORDS : Hypothesis, decision making, Testing Chi square, ANOVA,F test, T test, Z test, , Error ,MINITAB,SPSS,EXCEL,SAS, etc

Introduction

The modern management students pay less attention to the Research Methodology and its tools in decision making. Even though a 100% precision is not possible in Management decision making using these tools, accuracy can be brought if RM is used scientifically.

Hypothesis

A Hypothesis is an assumption or a statement that may or may not be true. The hypothesis is tested on the basis of information obtained from sample. Hypothesis tests are widely used in business, and industry for making decisions

Null Hypothesis:

The hypothesis that are proposed with the intent of receiving a rejection for them are called null hypothesis. This requires that we hypothesize the opposite of what is desired to be proved. For example if we want to show that sales and advertisement expenditure are related, we formulate the null hypothesis that they are not related

Alternative Hypothesis:

Rejection of null hypothesis leads to the acceptance of alternative hypotheses. The rejection of null hypothesis indicates that the relationship between variables (eg. Sales and advertisement expenditure.

Steps in Testing of Hypothesis

1) Establish the hypothesis to be tested
2) Setup a suitable significance level.(it denotes the probability of rejecting null hypothesis when it is true
3) Determination of suitable test tool like Z ,F, ANOVA etc
4) Calculate the critical region to accept or reject null hypothesis
5) Calculate the value of test statistic using any of test tools
6) Making decision

Tools available for testing Hypothesis and decision making

Chi Square Test

Chi-square is an important non-parametric test and as such no rigid assumptions are necessary in respect of the type of population. We require only the degrees of freedom (implicitly of course the size of the sample) for using this test. As a non-parametric test, chi-square can be used (i) as a test of goodness of fit and (ii) as a test of independence.

As a test of goodness of fit,

chi square test test enables us to see how well does the assumed theoretical distribution (such as Binomial distribution, Poisson distribution or Normal distribution) fit to the observed data. When some theoretical distribution is fitted to the given data, we are always interested in knowing as to how well this distribution fits with the observed data. The chi-square test can give answer to this. If the calculated value of $\chi 2$ is less than the table value at a certain level of significance, the fit is considered to be a good one which means that the divergence between the observed and expected frequencies is attributable to fluctuations of sampling. But if the calculated value of $\chi 2$ is greater than its table value, the fit is not considered to be a good one.

As a test of independence

$\chi 2$ test enables us to explain whether or not two attributes are associated. For instance, we may be interested in knowing whether a new medicine is effective in controlling fever or not, $\chi 2$ test will helps us in deciding this issue. In such a situation, we proceed with the null hypothesis that the two attributes (viz., new medicine and control of fever) are independent

which means that new medicine is not effective in controlling fever. On this basis we first calculate the expected frequencies and then work out the value of $\chi 2$. If the calculated value of $\chi 2$ is less than the table value at a certain level of significance for given degrees of freedom, we conclude that null hypothesis stands which means that the two attributes are independent or not associated (i.e., the new medicine is not effective in controlling the fever). But if the calculated value of $\chi 2$ is greater than its table value, our inference then would be that null hypothesis does not hold good which means the two attributes are associated and the association is not because of some chance factor but it exists in reality (i.e., the new medicine is effective in controlling the fever and as such may be prescribed). It may, however, be stated here that $\chi 2$ is not a measure of the degree of relationship or the form of relationship between two attributes, but is simply a technique of judging the significance of such association or relationship between two attributes.

In order that we may apply the chi-square test either as a test of goodness of fit or as a test to judge the significance of association between attributes, it is necessary that the observed as well as theoretical or expected frequencies must be grouped in the same way and the theoretical distribution must be adjusted to give the same total frequency as we find in case of observed distribution. $\chi 2$ is then calculated as follows:

$$\chi 2 = \frac{\Sigma(Oij - E\,ij)^2}{E\,ij}$$

Oij = observed frequency of the cell in i^{th} row and j^{th} column.
Eij = expected frequency of the cell in i^{th} row and j^{th} column.

If two distributions (observed and theoretical) are exactly alike, $\chi 2 = 0$; but generally due to

sampling errors, $\chi 2$ is not equal to zero and as such we must know the sampling distribution of $\chi 2$ so that we may find the probability of an observed $\chi 2$ being given by a random sample from the hypothetical universe. Instead of working out the probabilities, we can use ready table which gives probabilities for given values of $\chi 2$. Whether or not a calculated value of $\chi 2$ is significant can be ascertained by looking at the tabulated values of $\chi 2$ for given degrees of freedom at a certain level of significance. If the calculated value of $\chi 2$ is equal to or exceeds the table value, the difference between the observed and expected frequencies is taken as significant, but if the table value is more than the calculated value of $\chi 2$, then the difference is considered as insignificant i.e., considered to have arisen as a result of chance and as such can be ignored.

As already stated, degrees of freedom*play an important part in using the chi-square distribution and the test based on it, one must correct-

ly determine the degrees of freedom. If there are 10 frequency classes and there is one independent constraint, then there are (10 – 1) = 9 degrees of freedom. Thus, if 'n' is the number of groups and one constraint is placed by making the totals of observed and expected frequencies equal, the d.f. would be equal to (n – 1). In the case of a contingency table (i.e., a table with 2 columns and 2 rows or a table with two columns and more than two rows or a table with two rows but more than two columns or a table with more than two rows and more than two columns), the d.f. is worked out as follows:

d.f. = (c – 1) (r – 1) where 'c' means the number of columns and 'r' means the number of rows.

CONDITIONS FOR THE APPLICATION OF χ^2 TEST

The following conditions should be satisfied before χ^2 test can be applied:

(i) Observations recorded and used are collected on a random basis.
(ii) All the items in the sample must be independent.
(iii) No group should contain very few items, say less than 10. In case where the frequencies are less than 10, regrouping is done by combining the frequencies of adjoining groups so that the new frequencies become greater than 10. Some statisticians take this number as 5, but 10 is regarded as better by most of the statisticians.
(iv) The overall number of items must also be reasonably large. It should normally be at least 50, howsoever small the number of groups may be.
(v) The constraints must be linear. Constraints which involve linear equations in the cell frequencies of a contingency table (i.e., equations containing no squares or higher powers of the frequencies) are known as linear constraints.

ANALYSIS OF VARIANCE (ANOVA)

Analysis of variance (abbreviated as ANOVA) is an extremely useful technique concerning researches in the fields of economics, biology, education, psychology, sociology, and business/industry and in researches of several other disciplines. This technique is used when multiple sample cases are involved. The significance of the difference between the means of two samples can be judged through either z-test or the t-test, but the difficulty arises when we happen to examine the significance of the difference amongst more than two sample means at the same time. The ANOVA technique enables us to perform this simultaneous test and as such is considered to be an important tool of analysis. Using this technique, one can draw inferences about whether the samples have been drawn from populations having the same mean

The ANOVA technique is important in the context of all those situations where we want to compare more than two populations such as in comparing the yield of crop from several varieties of seeds, the gasoline mileage of four automobiles, the smoking habits of five groups of university students and so on

F Test

The main use of F-test is to test the hypothesis whether the two samples are from the same normal population with equal variance or from two normal populations with equal variances. F-test was initially used to verify the hypothesis of equality between two variances, but is now mostly used in the context of analysis of variance

When we use the F-test, we assume that

(i) The populations are normal;
(ii) Samples have been drawn randomly;
(iii) Observations are independent; and
(iv) There is no measurement error.

Z test

Z test is based on the normal probability distribution and is used for judging the significance of several statistical measures, particularly the mean. The relevant test statistic*, z, is worked out and compared with its probable value (to be read from table showing area under normal curve) at a specified level of significance for judging the significance of the measure concerned. This is a most frequently used test in research studies. This test is used even when binomial distribution ort-distribution is applicable on the presumption that such a distribution tends to approximate normal distribution as 'n' becomes larger. z-test is generally used for comparing the mean of a sample to some hypothesized mean for the population in case of large sample, or when population variance is known. z-test is also used for judging he significance of difference between means of two independent samples in case of large samples, or when population variance is known. z-test is also used for comparing the sample proportion to a theoretical value of population proportion or for judging the difference in proportions of two independent samples when n happens to be large. Besides, this test may be used for judging the significance of median, mode, coefficient of correlation and several other measures.

t- test

t-test is based on t-distribution and is considered an appropriate test for judging the significance of a sample mean or for judging the significance of difference between the means of two samples in case of small sample(s) when population variance is not known (in which case we use variance of the sample as an estimate of the population variance). In case two samples are related, we use paired t-test (or what is known as difference test) for judging the significance of the mean of difference between the two related samples. It can also be used for judging the significance of the coefficients of simple and partial correlations. The relevant test statistic, t, is calculated from the sample data and then compared with its probable value based on t-distribution (to be read from the table that gives probable values of t for different levels of significance for different degrees of freedom) at a specified level of significance for concerning degrees of freedom for accepting or rejecting the null hypothesis. It may be noted that t-test applies only in case of small sample(s) when population variance is unknown.

Availability of Statistical software packages

The following softwares are extensively used by research management students and graduates.

MS Excel :

The simplest and widely used method of presenting and tabulating data is on ms excel. The basic mathematical functions can be calculated here. Secondly the software is easy to understand and used by most computer users.The data entered on Excel can be transported to most statistical packages for a higher level of analysis

SPSS (Statistical Package for Social Sciences) :

This is one of the most popular software packages to perform statistical analysis on survey data. its first version was released on 1968 and since then it has come longway.it is used by researchers in educational institutes ,research organizations ,government, marketing firms etc

Minitab:

it was developed more than 20 years ago. It can be used with considerable ease and effectiveness in all business areas. It was originally used by statisticians. However today it is used for multiple applications especially quality control, six sigma and the design of experiments.

System for Statistical analysis(SAS):

It was created in the late 1960s at North Carolina State University. It has been actively and extensively used in managing and storing and analyzing information. It has the advantage of being able to manage really bulk data sets with considerable ease. Linear models like Regression, Analysis of Variance , Analysis of Covariance ;multivariate methods like Discriminant analysis, Factor analysis , cluster analysis etc. All the standard techniques for descriptive and confirmatory statistical analysis are possible with SAS. it finds a higher usage amongst industry than students who are more comfortable with SPSS

Conclusion

If the above explained methods are followed and effective use of statistical software, Management students can complete their study with accuracy and can prepare the report on the basis of their work.

REFERENCES

• Kothari C.R.- Research Methodology Methods and Techniques. 2nd Revised Edition .New Delhi, New Age International Publishers 2004. | • Zikmund, William G. Business Research methods, 5th Edition. Dryden Press. | • Aggarwal L N and Diwan, Parag. Research methodology and management Decisions. New Delhi:Global business press. | • Bhattacharya, Dipak Kumar Research Methodology. New Delhi. Excell books. | • Michael , V P Research Methodology in Management Mumbai. Himalaya Publishing house. 2000. | • Pannerselvam , R. Research Methodology. New Delhi.Prentice Hall of India Pvt Ltd. 2004. |