ROLE OF NON−PARAMETRIC TEST IN MANAGEMENT & SOCIAL SCIENCE RESEARCH

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ROLE OF NON-PARAMETRIC TEST IN MANAGEMENT & SOCIAL SCIENCE RESEARCH

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ABSTRACT

Research scientifically studies the relationship between variables and generalizes the finding to make additions to existing stock of knowledge. The assumption, idea or an opinion researcher has stated in researchable terms, is called research hypothesis. Hypothesis testing results, lead to the strengthening of an existing theory or proposing a new improved theory, in the branch of knowledge. All hypothesis test offered by statistics are basically divided into two types, Parametric versus nonparametric test. Parametric tests are used when certain properties of the parent population are known, from which samples are drawn. In social science when we perform research, often we don't know the parameters of the population. Besides, collected data is qualitative in its nature and measured at nominal or ordinal level. Another important assumption that has to be followed while using parametric test is that samples are drawn from the population that follows a normal distribution. Failure of the normality assumption makes use of parametric hypothesis test invalid. In a way, nonparametric tests are more suitable for testing the hypothesis in social science research. Nonparametric tests are the distribution free test as they do not require any distribution to be satisfied before their application. The social science research scholars face problem in knowing which test is to be used for testing given hypothesis. The objective of this paper is to explain the use of important nonparametric tests with its management and social science applications. The paper illustrates step by step procedure to perform the nonparametric test and interpret the results of the SPSS outcome.

KEYWORDS: *Social Science, Hypothesis Testing, and Non Parametric test*

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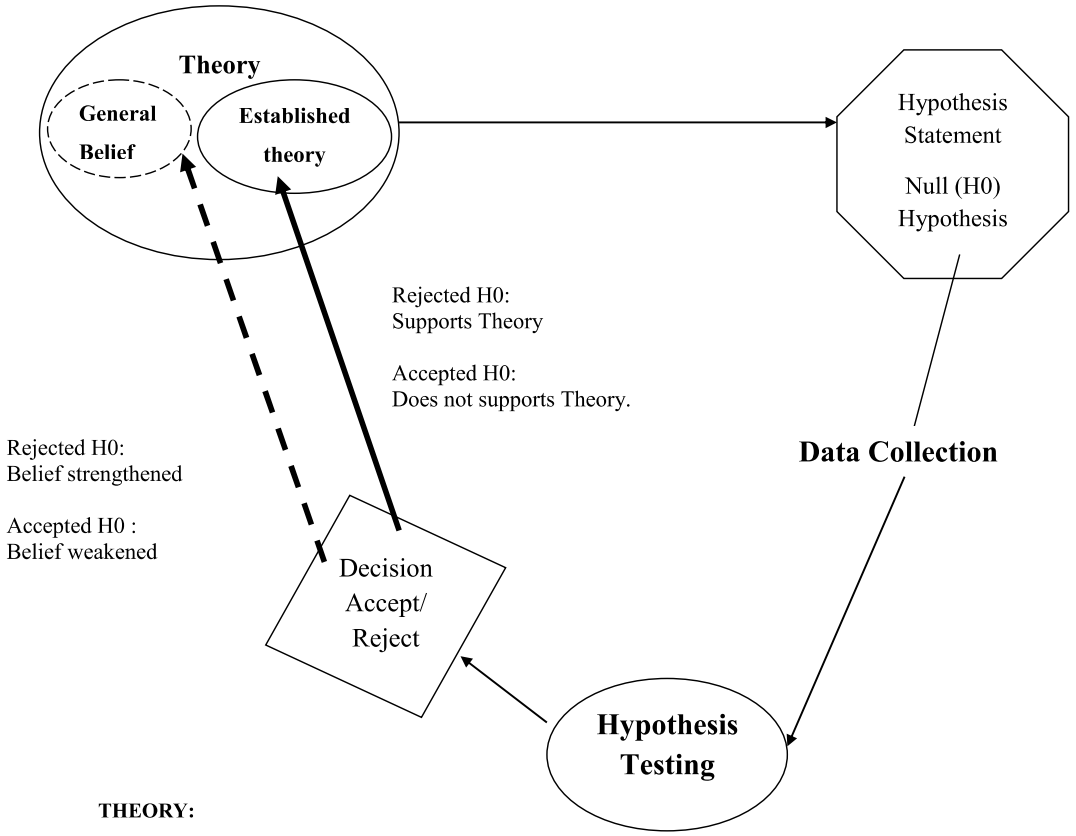
INTRODUCTION

It is the research that scientifically studies the relationship between variables and generalizes the finding to make additions to existing stock of knowledge. All research whether it is in physical sciences or in social sciences involves the scientific methods. The scientific method is the way researchers go about using knowledge and evidence to reach objective conclusions about the real world. (Thakur, 2003). The assumption, idea or an opinion researcher has stated in researchable terms, is called research hypothesis. A hypothesis is a proposition that is stated in a testable form and that predicts a particular relationship between two or more variables (Bailey & Kenneth, 1978). The next step involves testing the hypothesis against empirical evidence. Evidences either support the hypothesis or do not support it (Zikmund, 2013). It is through continued replication of hypothesis testing results; a proposition of relationship is accepted or rejected. The Hypothesis testing result, lead to a strengthening of an existing theory or proposing a new improved theory in the branch of knowledge (Dyer, 2015). The purpose of science is an expansion of knowledge and the search for truth. Through theory building, researcher tries to achieve this purpose. The process of theory building is illustrated in the following diagram.



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THEORY

A theory is a formal testable explanation of some events that includes predictions of how things relate to one another. Theories can be basically classified into two types;

1. **General Beliefs:** Society has certain beliefs about things happening around them. These beliefs have cause and effect relationship among variables. However, the relationship is not yet tested empirically. Researchers convert those beliefs into null hypothesis statements and test the relationship empirically. Rejecting of null hypothesis signifies the relationship between variables and the belief strengthen. Testing and retesting of the belief eventually leads to addition into existing stock of knowledge and formation of a new theory. Acceptance of null hypothesis reveals that there is no significant relationship and if relationship reveals it is only a matter of chance.
2. **Established theories are the stock of knowledge.** However, the knowledge has to be tested and retested in different time period, in different contexts. It has to be ensured that the theory holds good even in changed context. Retesting of the theory improves it and enforces the relationship between variables stated in the theory. Henceforth, testing of hypothesis is imperative in knowledge building, whether it is natural science or social science.

PHYSICAL SCIENCE AND SOCIAL SCIENCE:

Conducting a scientific research is up to a large extent possible in physical science. Physical sciences are sciences such as Physics, Chemistry, Biology, Engineering and Agriculture et. In physical sciences, scientific research can be conducted and the relationship between variables can be tested in controlled laboratory.

However social science is distinct from Physical science. Wbester's third new international dictionary defines; Social science is a branch of science that deals with the institutions and functioning of human society with the interpersonal relationships of individuals as members of society (Vyas, 1992).

Social Science includes the branches of knowledge as, Economics, Sociology, Politics, Commerce, and Management et. All social sciences study the human behavior, its actions, and reactions. It is a debated that whether human behavior can be studied and predicted with certainty, whether conducting a scientific research is possible in social science. The social science philosophers and researchers have advocated that it is possible to conduct a scientific research in social science as well. As like physical science, social science also seeks to discover the degree of regularity in human behavior, although the degree and accuracy differs to physical science (Mishra, 2015).

Measurement and scaling technique in Social Science:

An important utility of any scientific research is to measure the variables and establish the relationship between variables. The term measurement means assigning numbers or some other symbols to the characteristics of certain objects. The measurement means not measuring the object but characteristics of it (Chawla & Sondhi, 2016). Most of the time social science studies variables that are qualitative in nature. As Attitude, Perception, Satisfaction, Loyalty, empowerment etc.

Scaling is an extension of measurement. Scaling involves creating a continuum on which measurements on the object are located (Malhotra & Dash, 2011). For example suppose you want to measure the customer satisfaction level towards services provided by a particular restaurant and five-point Likert item statement is used for the same purpose, where 1 indicate Highly Dissatisfied and 5 indicate Highly Satisfied. The Measurement means actual assignment of number for each respondent, whereas the scaling is a process of placing respondent on a continuum with respect to their satisfaction (Chawla & Sondhi, 2016).

The techniques adopted in measuring these qualitative variables are very much different from physical science. Use of statistical techniques for analysis and hypothesis testing tests to be used, dependents

upon the level of measurement adapted to measure the variables. Basically, there are four levels of measurement; they are Nominal, Ordinal, Interval and Ratio (Singh, 2015).

Nominal scale: Nominal scale is simply a system of assigning number symbols to events in order to label them. The numbers function as a name or label and do not have numeric meaning. (Boslaugh & Watters, 2008)

Ordinal Data: Ordinal data refers to data that has some meaningful order so that higher values represent more of some character than lower values. (Boslaugh & Watters, 2008)

Interval Data: Interval data has a meaningful order and also has the quality that measures equal intervals between measurements, represent equal changes in the quantity of whatever is being measured. (Boslaugh & Watters, 2008)

Ratio Data: Ratio data has all the qualities of interval data (natural order, equal intervals) plus a natural zero point. Many physical measurements are ratio data, for instance, height, weight, and age. (Boslaugh & Watters, 2008)

Parametric Versus Non-Parametric Hypothesis Tests:

All hypothesis test offered by statistics are basically divided into two types, Parametric versus non-parametric test. Parametric tests are used when certain properties of the parent population are known from which samples are drawn (Kothari, 2010). Parametric tests are useful when samples are drawn from known continuous distributions and data is measured at ratio or at least interval scale. While using parametric test the important assumption that is samples are drawn from the population that follows the normal distribution, has to be fulfilled. (Zikmund, 2013). Important parametric tests are product movement correlation analysis, regression, Z test, t-test, and analysis of variance (ANOVA) for comparing a significant mean difference.

One of the important assumptions that have to be fulfilled while using parametric test is that samples are drawn from the population that follows the normal distribution. When normality assumption for the data is failed, non-parametric statistics tests are suitable (Heiman, 2011). Non-parametric tests are the distribution-free test of hypotheses, they are useful even when samples are drawn from unknown distribution or data is measured at nominal or ordinal scale (Heiman, 2011). The tests are highly used in social science because they can be used even for a small sample, more specifically in pilot surveys in social science research (Scahdeva, 2014). Important non-parametric tests are the Chi-Square test, One Sample Wilcoxon Signed-Rank Test, Wilcoxon Signed-Rank Paired sample Test, The Kruskal-Wallis Test, Mann-Whitney U Test, and Spearman's Rank Correlation Test.

TESTING OF HYPOTHESIS:

There are basically two popular approaches towards hypothesis testing, one is critical region method also called as a traditional method, and other is P-value method. The critical value is more suitable when hypothesis test statistic value is manually calculated. Under this approach, calculated test statistic value is compared with some standard sampling distribution value at the specified level of significance (alpha). If the calculated test statistic value is greater than standard value null hypothesis is rejected otherwise not.

P-value method: P-value means the probability value; it is the probability of getting given the sample when the null hypothesis is true. The smaller the p-value, the less like it is that the observed sample would have come from the assumed population (Sharma & Gupta, 2010). The p-value defines the smallest value of a level of significance for which the null hypothesis can be rejected. For example, if the p-value of a test is .038, the null hypothesis cannot be rejected at = .01 because .038 is greater than alpha (0.01) value for which the null hypothesis can be rejected. However, the null hypothesis can be

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rejected for = .05. (Black, 2010). In case of one-tailed test, the reported P-value is to be divided by 2 to obtain the desired p-value and compared with alpha. (Chawla & Sondhi, 2016). Advancement in computer technology has simplified the task of researchers, almost all software compute both test statistic value and p-value. The advantage of P-value approach is that the p-value can be directly compared to the level of significance.

CHI-SQUARE TEST (X^2):

Chi-square is an important non-parametric test highly used in social science to test the association between variables. The test is most popular in social science as it is not based on rigid assumptions in respect of the type of population (Kothari, 2010).

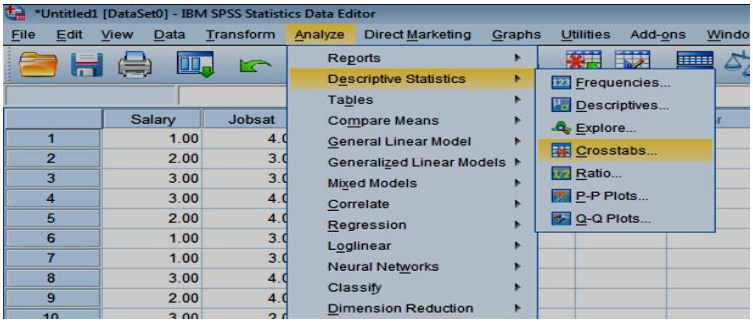
As a test of independence, Chi-Square test enables us to explain whether two attributes are associated with each other or not. Chi-Square test is used to test the significance of association or relationship between two attributes when data is measured at nominal or ordinal level scale. It is to be noted that X^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 association or relationship between two attributes. (Kothari, 2010). To measure the strength of association the phi coefficient is used in 2 X 2 contingency table (Chawla & Sondhi, 2016).

Example: If researchers want to know whether employee's job satisfaction is associated with the employee's perception about their salary package offered to them by the company Chi-Square test can be performed. To know the employee's perception about their salary they were asked to grade their salary in terms of High Salary, Medium Salary, and Low Salary. Next employees where asked to grade their Job Satisfaction on 5 points Likert item.

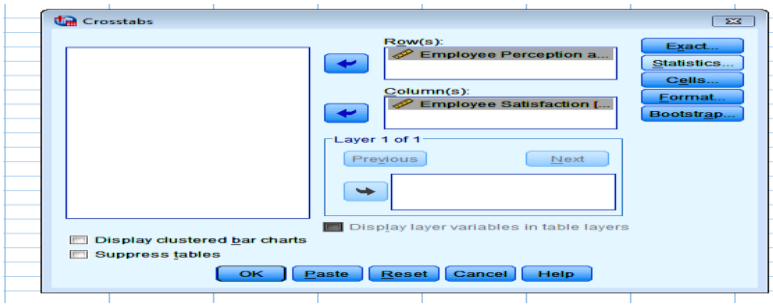
Hypothesis:

H0: Employee's Job satisfaction is independent of their salary perception.

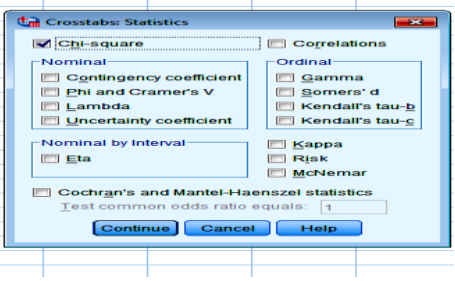
H1: Employee's Job satisfaction dependent on their salary perception.



Step 1: *Analysis > Descriptive Statistics > Cross Table.*



Step 2: Transfer the Variables to Test Fields



Step 3: Statistics>Chi-Square

The Syntax for Performing Chi-Square analysis:

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- Analysis > Descriptive Statistics > Cross Table.
- This will open cross table dialogue box. Transfer "Employee perception about salary" (Independent Variable) to Rows Box, and "Employee Job Satisfaction" to Column(s) box.
- Click – Statistics – this will open cross table statistics box. Activate Chi-square box.
- Click- Continue – you will be directed to cross table dialog box.
- Click OK.

The following result will be displayed.

		Job satisfaction					Total
		Strongly satisfied	Satisfied	Neither Satisfied Nor Dissatisfied	Dissatisfied	Strongly Dissatisfied	
Salary	Low Salary	6	14	14	6	6	46
	Not Low, Not High	10	14	10	10	6	50
	High	16	10	12	8	8	54
Total		32	38	36	24	20	150

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	7.024(a)	8	.534
Likelihood Ratio	7.085	8	.527
Linear-by-Linear Association	.365	1	.546
N of Valid Cases	150		
a 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.13.			

Result: The calculated value of Pearson Chi**-**Square is 7.024 and 'P' value is 0.534. Here at 5% level of significance, there is no sufficient evidence to reject the null hypothesis (P>0.05). The test is not significant. Hence; the null hypothesis job satisfaction of the employees is independent to salary package offered is accepted.

ONE SAMPLE WILCOXON SIGNED-RANK TEST

The One-Sample Wilcoxon Signed-Rank Test is a non-parametric alternative to one-sample t-test (Bluman, 2009). The test determines whether the median of the sample is equal to some specified value (Gupta, 2013).

Example: To increase employee's loyalty towards the company, the company wants to provide quality welfare facility. They want to assess what extent employees are satisfied with present welfare facility offered by the company. To assess the employee's welfare satisfaction, 5 points Likert scale is prepared. In the scale 1 represent highly satisfied, 2 Satisfied, 3 Neither satisfied nor dissatisfied, 4 satisfied and 5 highly satisfied. The employee's welfare satisfaction score is measured against value 3. Here 3 is the midpoint, employee's response below 3 indicate lower employee satisfaction. Statement of the hypothesis is as follows:

H0: Welfare facilities in the company are satisfactory.

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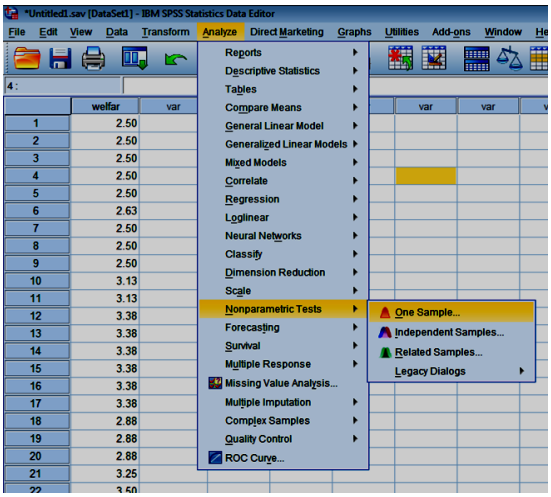
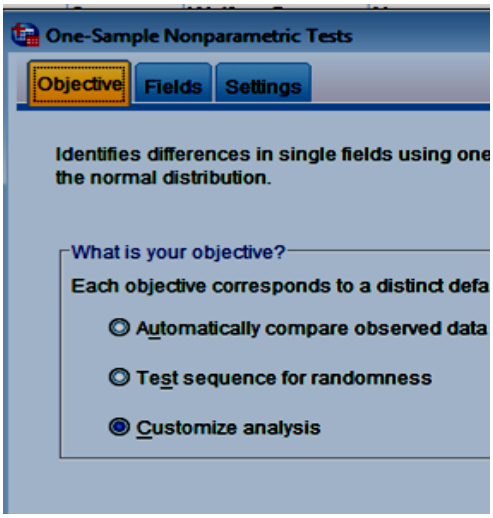
H1: Welfare facilities in the company are not satisfactory.

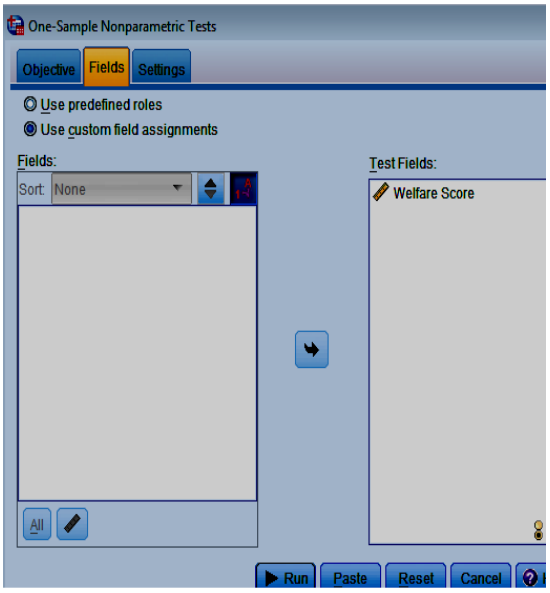
. H_0: $\eta = 3$ H_1: $\eta \leq 3$



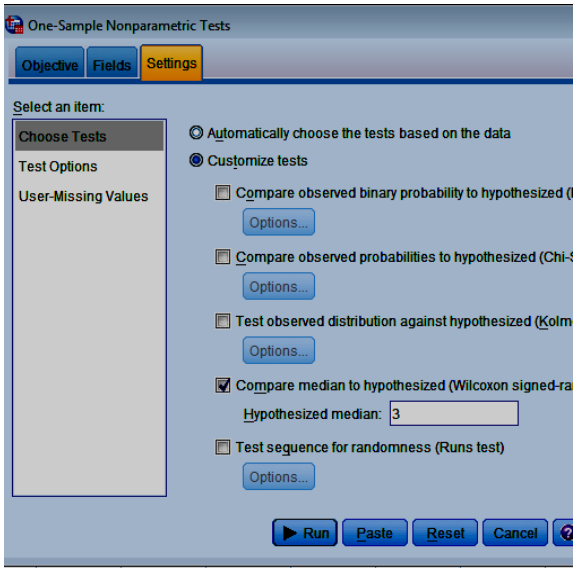
Step1:*Analysis > Nonparametric Test > One Sample***.**



Step 2*: Objective activate "Customize Analysis"*



Step 3: *Fields>Use custom field assignments*



Step 4: *Settings>Choose Test> Customize Tests> Compare Median to hypothesized (Wilcoxon Signed Rank Test)>Test value.*

The Syntax for performing Wilcoxon one Sample sign test.

- ***Analysis > Nonparametric Tests > One Sample.***
- This will open **One Sample Nonparametric Test Dialog box**.
- From Menu Click "Objective" and activate "Customize Analysis".
- From Menu Click "Fields" and activate "Use custom field assignments".
- From Fields column, transfer the variable to be tested for hypothetical value to "Test Fields".
- From Menu Click Settings
- From setting select an Item Column-"Click Choose Test" and Select "Customize Tests".
- Activate Checkbox "Compare Median to hypothesized (Wilcoxon Signed Rank Test)".
- Specify the hypothesis test value in below given "Hypothesized Median". In the above example test value is "3".

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- Finally Click "Run".

The following result will be displayed.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of Welfare Score equals 3.00.	One-Sample Wilcoxon Signed Rank Test	.623	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

The calculated value of One-Sample Wilcoxon Signed Rank Test 'P' value is 0.623. Here at 5% level of significance, there is no sufficient evidence to reject the null hypothesis (P>0.05). The null hypothesis welfare facilities in the company are satisfactory is accepted.

WILCOXON SIGNED-RANK PAIRED SAMPLE TEST

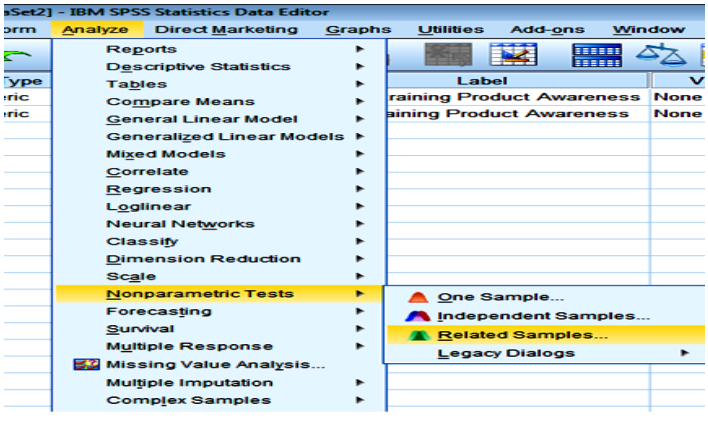
When the sample data consists of paired observations, where subjects are studied before and after experimentation Wilcoxon signed rank test shall be used. The test is a non-parametric counterpart for paired sample t-test (Andya, 2009). The t-test is based on a strong assumption of a sample is drawn from a normal population. When the normality assumption is violated and a significant difference between before and after treatment is to be checked, Wilcoxon Signed-Rank Test is to be used (Dalgaard, 2008). Paired sample signed test is also a non-parametric test used to test the significant difference between before and after treatment. However, an important limitation of the test is that it is only based or direction (Positive and Negative) no weight was assigned to the magnitude of the direction. Wilcoxon Signed-Rank Paired sample Test overcomes this limitation and assigns greater weight to the matched pair with a larger difference. (Chawla & Sondhi, 2016)

Example: The area sales manager of the company has observed that performance of 20 sales executives was not improving. The manager measured product knowledge of executives and identified that poor product knowledge is the important reason for their lower performance. The company has decided to impart the product knowledge training to the sales executive. After completing the training, the company wants to assess the effectiveness of the training. They wanted to check whether there is a change in product knowledge of the employees after training. Statement of the hypothesis is as follows:

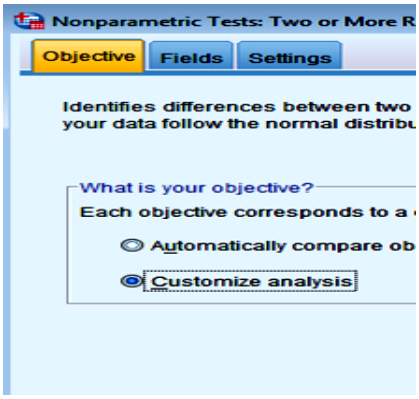
H0: There is no a significant change in product knowledge of employees after training.

H1: There is a significant change in product knowledge of employees after training.

Performing Wilcoxon Signed-Rank Paired sample Test with SPSS



Step :1 *Analysis > Nonparametric Tests > Related Samples.*



Step :2 *Objective> Customize*

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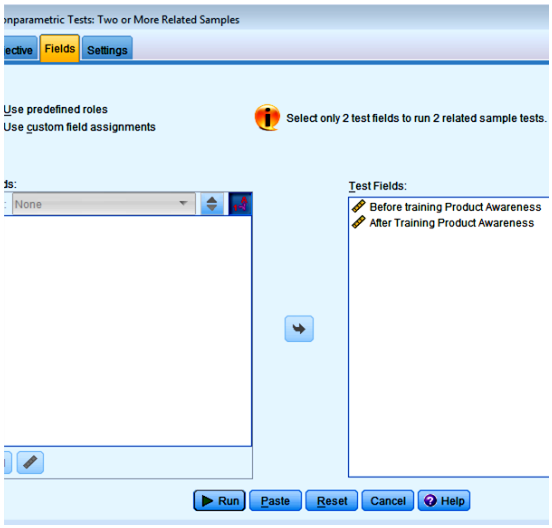
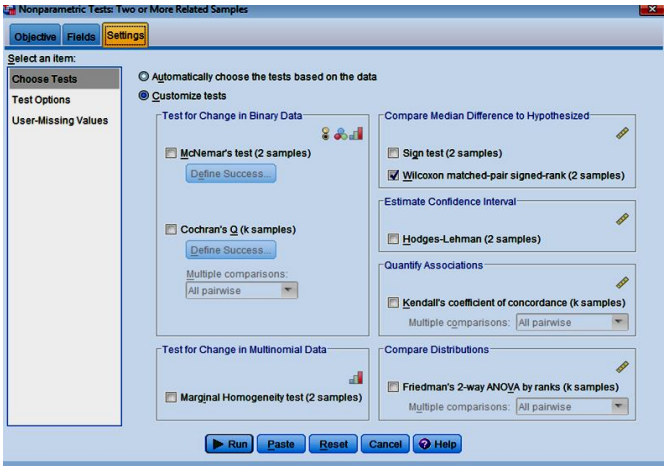


Step 3: *Transfer the Variables to Test Fields*



Step 4:*Settings>Click Choose Test>. Wilcoxon Matched-Pair Signed-rank (2 Samples)*

The Syntax for performing Wilcoxon Signed-Rank Paired sample.

- ***Analysis > Nonparametric Tests > Related Samples.***
- This will open **Nonparametric Test: Two or More Related Samples** dialog box.
- From Menu Click "Objective" and activate "Customize Analysis".
- From Menu Click "Fields" and activate "Use custom field assignments".
- From Fields column transfer the Variable that is to be tested for hypothetical value to "Test Fields".
- From Menu Click Settings
- From setting select an Item Column-"Click Choose Test" and Select "Customize Tests".
- Activate Checkbox at front of "**Wilcoxon Signed-Rank Paired sample**".
- Finally Click "Run".

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Before training Product Awareness and After Training Product Awareness equals 0.	Related-Samples Wilcoxon Signed Rank Test	.001	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

The Wilcoxon Matched-Pair Signed-rank 'P' value is 0.001. Here at 5% level of significance test is significant and the null hypothesis is rejected (P>0.05). The null hypothesis, that there is no significant change in product knowledge of employees after training is rejected and it is concluded that there is a significant change in product knowledge of employees after training.

The Kruskal-Wallis Test

Analysis of Variance (ANOVA) is a technique commonly used to test whether there are statistically significant differences between two or more independent groups. (Boslaugh & Watters, 2008). ANOVA test is based on a strong assumption of samples are drawn from a normal distribution and multiple samples to be tested for having an equal variance, violation of this assumption makes use of ANOVA

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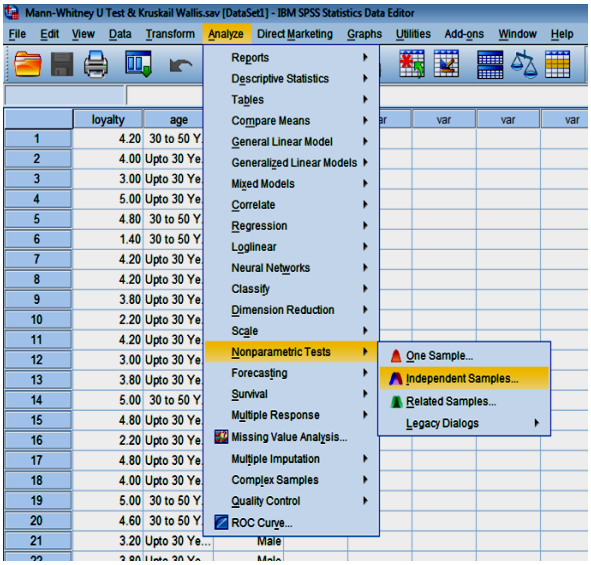
inappropriate. The Kruskal-Wallis test offer the solution to test the hypothesis that whether there are statistically significant differences between two or more independent groups (Kanji, 2006)

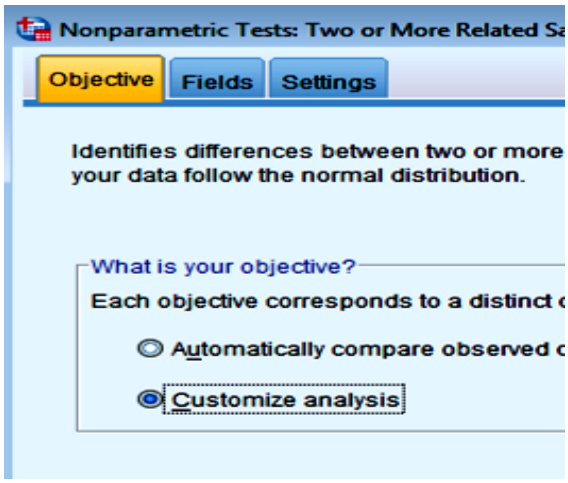
Example: A market leader Telecom Service provider wants to devise the marketing strategy to increase customer Loyalty. The company measured the level of customer loyalty and wants to know whether customer loyalty defers as per the age group of the customer. The company has conducted a sample study on its 480 customers and measured their customer loyalty. Total sampled customers were classified in terms of their age stating up to 30 years, "Young age", 30 to 50 years "Middle age" and above 50 years "Older age".

H0: Customer loyalty is independent of the age group of the customer.

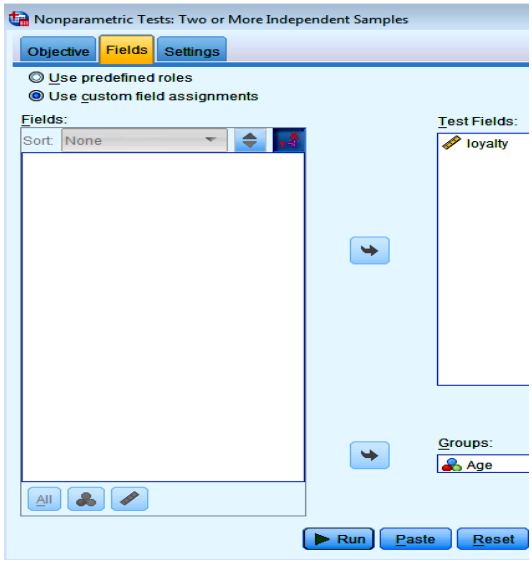
H1: Customer loyalty dependent on the age group of the customer.



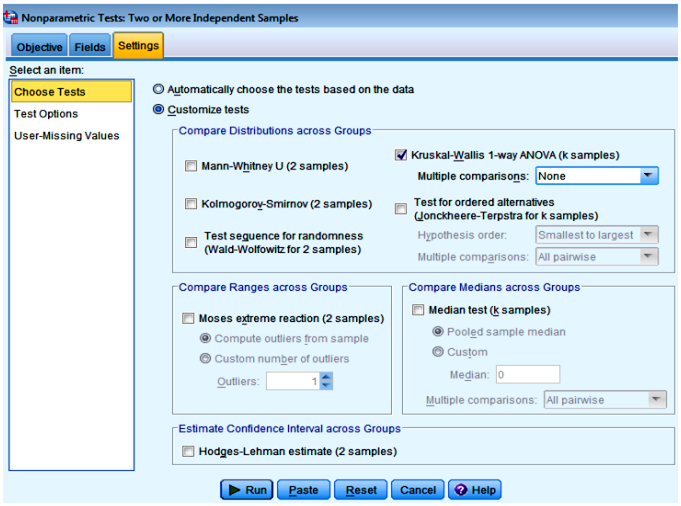
Step :1 *Analysis > Nonparametric Tests > Independent samples.*



Step :2 *Objective> Customize Analysis".*



Step 3*: Transfer the Variables to Test Fields*



Step 4:*Settings>Click Choose Test>. Kruskal-Wallis 1-way ANOVA (k samples)*

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The Syntax for performing Kruskal-Wallis Test.

- *Analysis > Nonparametric Tests > Independent Samples.*
- This will open **Nonparametric Tests: Two or More Independent Samples** Dialog box.
- From Menu Click "Objective" and activate "Customize Analysis".
- From Menu Click "Fields" and activate "Use custom field assignments".
- From Fields column, transfer dependent Variable (Customer Loyalty) to "Test Fields" and an independent variable into "Groups" (Age).
- From Menu Click "Settings".
- From select an Item Column-"Click Choose Test" and Select "Customize Tests".
- Activate Checkbox at front of "Kruskal-Wallis 1-way ANOVA (k samples)".
- Finally Click "Run".

The following result will be displayed.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of loyalty is the same across categories of Age.	Independent-Samples Kruskal-Wallis Test	.117	Retain the null hypothesis.

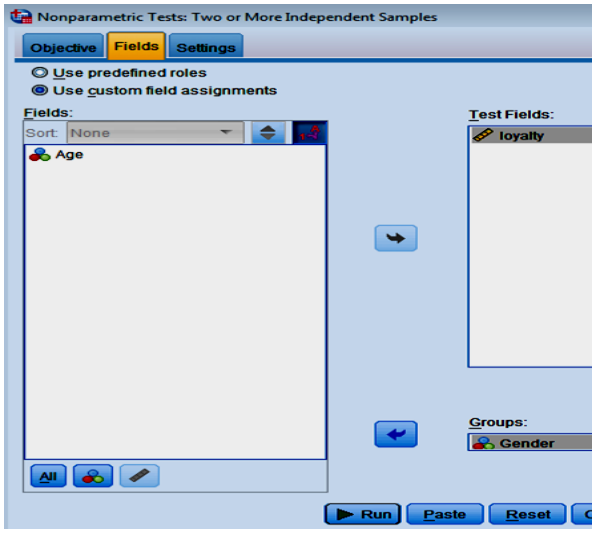
Asymptotic significances are displayed. The significance level is .05.

Above table reveals that the Independent Samples Kruskal-Wallis Test 'P' value is .117 (P >0.05). Here null hypothesis is accepted. The result indicates that Customer loyalty is independent to age group of the customer.

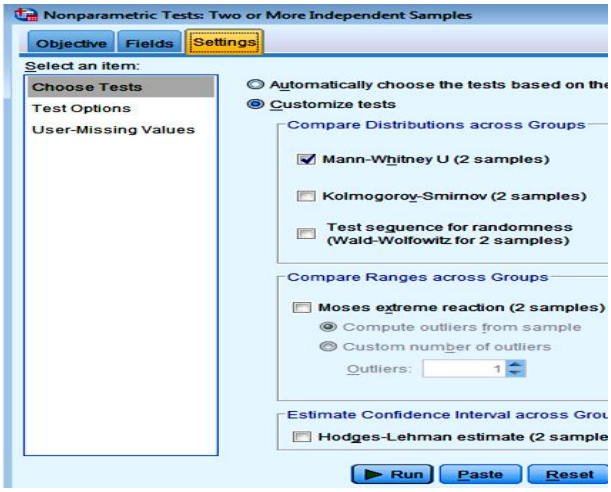
Mann-Whitney U Test

This test is a non-parametric alternative to't-test' for testing the equality of means of two independent samples. While using t test it is important to follow the assumption that sample is drawn from a normal population. If normality assumption is violated, Mann-Whitney U Test can be used as an alternative to a t-test. (Chawla & Sondhi, 2016)

Example: Now the telecom company wants to assess whether customer loyalty differs to the gender of the customer. Here to test the significant difference between two independent samples Mann-Whitney U Test is useful.



Step 3: *Transfer the Variables to Test Fields*



Step 4*:Settings>Click Choose Test>. Mann-Whitney U Test*

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The Syntax for performing **Mann-Whitney U Test**.

- ***Analysis > Nonparametric Tests > Independent sample***
- This will open **Nonparametric Tests: Two or More Independent Samples** Dialog box.
- From Menu Click "Objective" and activate "Customize Analysis".
- From Menu Click "Fields" and activate "Use custom field assignments".
- From Fields column, transfer dependent Variable (Customer Loyalty) to "Test Fields" and an independent variable into "Groups"(Gender).
- From Menu Click "Settings".
- From select an Item Column-"Click Choose Test" and Select "Customize Tests".
- Activate Checkbox at front of "**Mann-Whitney U Test** (2 samples)".
- Finally Click "Run".

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of loyalty is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.753	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Above table reveals that the Independent **Mann-Whitney U Test** 'P' value is .753 (P >0.05). Here null hypothesis is accepted. The result indicates that Customer loyalty is independent of the gender of the customer.

Spearman's Rank Correlation

Spearman's rank correlation coefficient test is popularly known as Spearman's rho test. The Spearman's rank-order correlation is the nonparametric version of the Pearson product-moment correlation. Spearman's correlation coefficient measures the strength and direction of the association between two ranked variables when data is measured at ordinal, interval or ratio scale (Tulsian & Jhunjhnuwala, 2010). Although Pearson product-moment correlation test is used to test the correlations between variables when data is measured on interval or ratio data, the Spearman correlation can be used when the assumptions of the Pearson correlation are violated. (statistics laerd.com).

Example: In the company, Human Resource Manager has a task to continuously improve the performance of the employees. The manager wants to know the factors influencing the performance of the employees. One of the variables identified by the manager that may influence the employee's performance was motivations level of the employees. The manager contacted few sampled employees collected data on their level of motivation and performance using respective scales. The manager is interested to know whether there is a significant correlation between employee's level motivation and their performance. Statement of the hypothesis is as follows:

H0: There is no significant correlation between employee motivation and employee performance.

H1: There is a significant correlation between employee motivation and employee performance.

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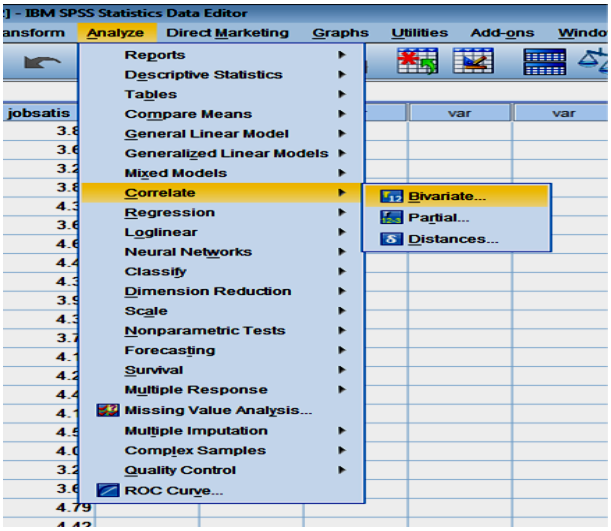
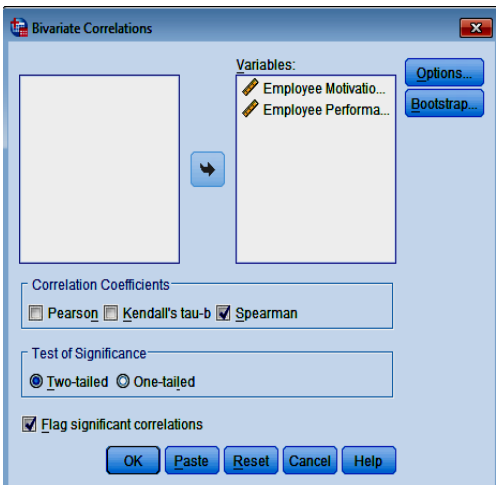


Step 1: *Analysis > Correlate > Bivariate*



Step 3*: Transfer the Variables to Test Fields*

The Syntax for performing Wilcoxon Signed-rank Test for Paired Sample test.
Analysis > Correlate > Bivariate
This will open **Bivariate Correlations** Dialog box.
Transfer the test variables into **"Variables Column".**
Activate "**Spearman**" Checkbox.
Finally, Click "OK".
This is lead to display the following result.

Correlations

			Employee Motivation	Employee Performance
Spearman's rho	Employee Motivation	Correlation Coefficient	1.000	.732**
		Sig. (2-tailed)	.	.000
		N	327	327
	Employee Performance	Correlation Coefficient	.732**	1.000
		Sig. (2-tailed)	.000	.
		N	327	327

**. Correlation is significant at the 0.01 level (2-tailed).

The table shows that **Employee Motivation and Employee Performance** p-value is 0.000 it is less than the significant level of 0.05, ($p<0.05$). Therefore, H0 is rejected and H1 is accepted. There is a correlation between **Employee Motivation and Employee Performance**.

CONCLUSION

Unlike physical science measurement in a social science is comparatively difficult. Most of the time social science intends to measure the behavior and attitude of individual or group. Measurement of qualitative variables poses a major problem, as a response is influenced by the respondent's situation, and the measurer. Getting a response in terms of absolute numbers (ratio scale) is difficult in social science; instead ranking one variable over another is a suitable alternative. In these cases, non-parametric tests are best suited for the data. The major advantage generally attributed to nonparametric tests is that they do not rely on any very seriously restrictive assumptions concerning the shape of the sampled population(s) (Howell, 2010). Use of nonparametric statistics is advised when dependent

variables score default to show normal distributions of data, population variance is not homogeneous, or when scores are measured using ordinal or nominal scales (Heiman, 2011).

The most popular non-parametric test is Chi-Square test used to test the association between categorical data. Spearman's Rank Correlation tested is also used to test the relationship when the assumption of normality of data is been violated and data is measured at interval or ratio scale. Wilcoxon one Sample sign test and Wilcoxon Signed-Rank Paired sample Test are nonparametric tests used as an alternative to the parametric t-test. Both the test are based on a median comparison, Wilcoxon one Sample sign test is used as an alternative to One sample t-test, Wilcoxon Signed-Rank Paired sample test is used as an alternative to Paired sample t-test. Mann-Whitney U Test is a useful test to compare whether there is a significant difference between two independent samples. It is alternative to two independent sampling t-test. The Kruskal-Wallis test is used to test the hypothesis, whether there are statistically significant differences between two or more independent groups. Non-parametric tests are even useful if a strong assumption of normality of data and homogeneity of equal variance (Levene's Test) are violated. The social science researcher does not need to fall into complexities of calculating hypothesis test results. Advancement in technology and availability of user-friendly software as SPSS offer help to perform the complex calculations of hypothesis testing. The prime interest of social science researcher is to interpret test result, for assessing, validating, and updating relations between social variables.

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