RESEARCH METHODS IN THE SOCIAL AND MANAGEMENT SCIENCES

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CHAPTER SIX

MEASUREMENT AND MEASUREMENT METHODOLOGY

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6.1 Introduction

This chapter on measurement and measurement methodology is devoted to the nature, rules and levels of measurement as well as scaling and techniques of scale construction. The methods for constructing scales are divided into two broad categories: attitude scales and value scales. The major types of attitude scales, which include Thurstome scales, Likert scales and Guttman scales, are first discussed and these are followed by a discussion on value scales which include rank order scales as well as normative and ipsative measures.

6.2 Nature of Measurement

Simply defined, measurement is a procedure by which one assigns numbers, or other symbols to empirical properties (variables) according to some specified rules. From this simple definition, three basic concepts are involved in defining measurement. These are, numerals, assignment and rules. We can illustrate this with the example of a man who wants to buy a new car. He probably observes that there are not much differences in the prices of a range of cars that he desires to choose from. He may then decide to buy the one that best meets the following requirements: design, fuel efficiency and availability of spare parts. These three criteria vary from one car to the other. For example, a car may be well designed and the spare parts readily available, but it may consume a lot of fuel. The buyer, therefore, decides to rank each of the three features using numbers 6, 7, 8, 9 and 10, with 6 and 10 representing the lowest and the highest degrees of satisfaction, respectively, and 7, 8 and 9, increasing degrees of satisfaction with respect to each of the features being examined. Table 6.1 presents a summary of the evaluation of each of the five cars examined by the buyer on the basis of the three criteria set by him.

Table 6.1: Evaluation of Cars on the Basis of Requirements.

	Design	Fuel Efficiency	Availability of Spare Parts
Peugeot 505	7	6	8
Volvo760	8	6	7
Toyota Camry	9	10	7
Datsun Laurel	10	10	10
Mercedes 200	9	8	9

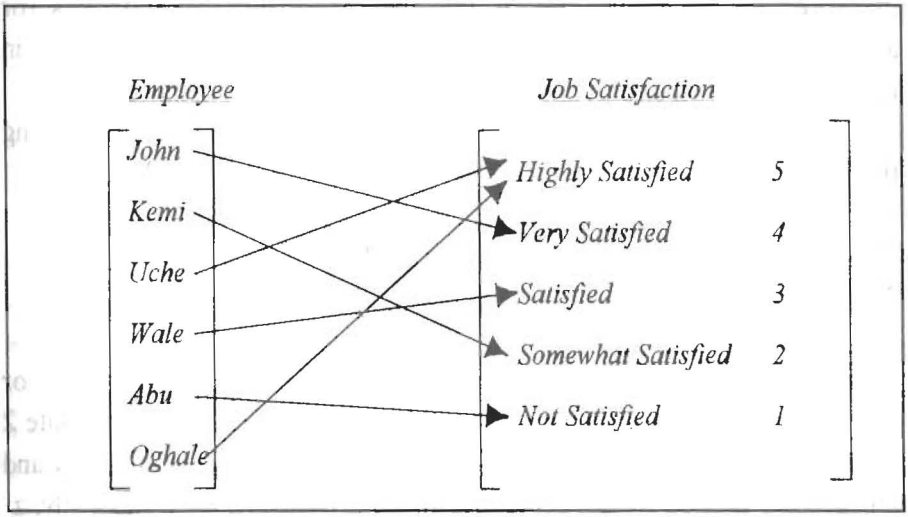
After examining the scores, the buyer decides to buy a Datsun Laurel because it has the highest scores which indicate the highest degree of satisfaction based on the three criteria.

The above illustration may be considered overly simplistic. However, it conveys the idea of measurement as the assignment of numerals to objects or empirical properties according to specified rules. The numerals that are assigned enable one to compare, evaluate and assess the relations between various properties or variables. For instance, the relation between design and fuel efficiency or between design and availability of spare parts can be computed.

6.3 Rules of Measurement

Rules explain the manner in which numbers or numerals are to be assigned to objects or empirical properties (variables). By assignment, we simply mean mapping. Numbers are mapped onto objects or events. A rule might say: "Assign numerals 1 through 5 to employees of a company, according to their level of job satisfaction. If an employee is highly satisfied with his job, let the number, 5, be assigned to him; if an employee is not at all satisfied with his job, let the number, 1, be assigned to him; to employees between these limits, assign numbers between these

limits." That is the rule. The different employees could then be mapped onto their different levels of job satisfaction as follows:



In the above example, we have mapped out the employees' level of job satisfaction on a job satisfaction scale using the rule above. The rule has guided us in the way in which the assignment of the numbers was done. Uche and Oghale are highly satisfied, hence they are assigned the number, 5; John is very satisfied and he is assigned the number, 4; Wale is satisfied and he is assigned the number, 3; Kemi is somewhat satisfied and she is assigned the number, 2; while Abu is not satisfied at all and he is assigned the number, 1.

Rules determine the quality of measurement. Poor rules make measurement meaningless. Rules, therefore, are the most important component of a measurement procedure. The purpose of rules is to ensure that measurement is not meaningless. For the measurement to be meaningful, the rules must tie the measurement procedure to reality. In other words, the measurement procedure must empirically correspond with reality.

When stating the rules of measurement, we should be guided by certain measurement postulates based on comparative relations among the objects of measurement or the attributes of these objects of measurement. For example, if we are measuring three objects (or attributes of three objects) x, y, z, we are, in addition, interested in knowing their relative positions on the measurement scale.

The following are some possible relationships that could exist among them:

1. $x = y = z$ or $x \neq y \neq z$
2. If $x > y$ and $y > z$, then $x > y > z$.
3. If $x > y$ and $y = z$, then $x > z$, etc.

From the above example, postulates 1 and 3 enable us to rate or categorise the objects of measurement. On the other hand, postulate 2 enables us to rank the objects. In other words, if x is greater than y and y is greater than z, then x is ranked highest, followed by y and lastly, z.

6.4 Levels of Measurement

Levels of measurement and measurement scales are used interchangeably. There are four levels or scales of measurement: nominal, ordinal, interval and ratio. We shall now discuss them one after the other.

6.4.1 Nominal Level

This is the weakest scale of measurement. It involves the classification of objects or properties into categories. For example, a population can be classified on the basis of race, that is, white or black; ethnic origin, such as Hausa, Igbo, Isoko, Yoruba, etc; sex: male or female; religion: Christianity, Islam, Traditional Religion; and political party: Peoples Democratic Party (PDP), All People's Party (APP), Alliance for Democracy (AD). All these are nominal level variables. At this level, numbers or other symbols are used to classify objects or observations.

These numbers or symbols constitute nominal or classificatory scale. With the use of numbers 1 and 2, for example, we can classify a population into males or females, with 1 representing males and 2, representing females. The same can be done with other variables such as race, ethnic origin, religion and political party.

The nominal scale has three logical properties of equivalence. These are *reflexivity, symmetry* and *transivity.* Reflexivity means that every object of the categories is equal to itself. For example, a = a in the "Christians" or "Muslims" category. Symmetry is the relationship which exists when if a = b, then b = a. The different categories are equal. In other words, they cannot be ranked or ordered because the "greater than" relation does not exist between the different categories. Transivity is the relationship which exists when if a = b, and b = c, then a = c. These three logical properties only apply to objects within categories and not between categories. For example, these relations can apply to persons classified as "Christians", but not between "Christians" and "Muslims". A nominal level variable has categories which are only mutually exclusive (i.e. no case in more than one category) and mutually inclusive (i.e, exhaustive or include all cases). Each category is unique . For example, one is either a Christian or Muslim, male or female; there is no middle way.

Nominal level variables cannot be used directly in most statistical analyses. Owing to the fact that they involve classification into categories, they can only permit such statistical analyses as chi square (χ^2), and contingency coefficients of correlation. The mode is the only appropriate measure of central tendency with a nominal scale.

6.4.2 Ordinal Level

An ordinal level variable has categories that are not only mutually exclusive and inclusive but can also be rank ordered. In other words, ordinal level variables have categories that can be meaningfully arranged along some dimension from more to less or smaller to greater, or on some other unidimensional feature. Indeed, many properties studied by

social and management scientists are not only classifiable but also exhibit some kind of relation. Typical relations are "higher", "greater", "more desired", "more difficult", etc. In considering social class, for example, a study population can be classified into the upper class, the middle class and the lower class. Also, on the basis of the level of education attained, the population can be classified into the no formal education category, primary category, secondary as well as tertiary categories. When we consider such a property as "social acceptability", it could be said that all members of the upper class are higher than members of the middle class, who are in turn higher than members of the lower class. Similarly, in considering conservatism, primary school certificate holders are more conservative than secondary school certificate holders, who, in turn, are more conservative than university degree holders. Although the equivalence relation holds among members of the same social class or members of the same educational category, the "greater than" relation holds between the different classes as well as between the different educational categories.

The "greater than" relation as found in ordinal scales is *irreflexive*. This means that for any a, it is not true that $a > a$. It is also *asymmetrical*. That is, if $a > b$, then $b \not> a$. Another logical property of ordinal scales is *transivity*. This means that if $a > b$ and $b > c$, then $a > c$. That is, if a variable such as conservatism, in the above example, is measured at the ordinal level, one can infer that if primary school certificate holders are more conservative than secondary school certificate holders, and if secondary school certificate holders are more conservative than university degree holders, then primary school certificate holders are more conservative than university graduates.

In ordinal scales, there is no attempt at stating the magnitude of difference. That is, there is no fixed interval or known distance between one category and the other. We only know in general that one category is higher than the other. Consequently, such mathematical operations as addition, subtraction, multiplication and division cannot be performed at the ordinal level. The median is the statistic that describes the central

tendency of ordinal numbers. Other statistics appropriate for ordinal scales are Spearman rank order correlations, Kendals T, Range. Gamma, and tau- b and tau -c (Asika, 1991; Nachmias and Nachmias, 1985). (See chapter 14 of this book for more on the statistical applications on ordinal scale data.)

6.4.3 Interval Level

Interval level variables have categories which are not only mutually inclusive and exclusive, and can be rank ordered, but also have known distance between their scores (midpoints). In other words, in addition to the "greater than" relation, one also knows the exact distance between each of the observations - a distance which is constant. One can say that one object is greater than the other, and can also specify by how many units one object is greater than the other. For example, in addition to saying that Dele is taller than Emeka, one can say precisely that he is, say, 6 inches taller. Also, the interval separating IQ scores of 105 and 110 may be regarded as the interval separating scores of 120 and 125. There are established units of measurement in interval scales. Such variables as height, temperature, time, age and income, all of which are of interval level of measurement are measured in metres, degrees, hours, years and naira and kobo, respectively.

The formal properties which are operative at the interval level of measurement have been identified by Nachmias and Nachmias (1985: 139) as follows:

1. Uniqueness: if a and b stand for real numbers, then a + b and a + b represent one and only one real number.
2. Symmetry: if a = b, then b = a.
3. Commutation: if a and b denote real numbers, then a + b = b + a, and ab = ba.
4. Substitution: if a = b and a + c = d, then b + c = d; and if a = b and ac = d, then bc = d.
5. Association: if a, b, and c stand for real numbers, then (a + b) + c = a + (b + c), and (abc)c = a (bc).

There is great precision at the interval level of measurement. Consequently, very powerful statistical tools can be used. The mean is an appropriate measure of central tendency and other descriptive statistics can also be applied. In addition, most inferential statistics including t and f tests, and Pearson Product Moment Correlation can be conveniently applied to interval level measurement. In other words, all the common statistics are applicable to interval level data. (See Chapter 14 for details).

6.4.4 Ratio Level

The ratio level of measurement has categories which are mutually exclusive, mutually inclusive and can be rank ordered. Ratio measurements have a determinable distance between them and proportional statements can describe them. They include such properties as weight, time, length and area. These have natural zero points. One can relate two categories in terms of their numbers. For instance, if 12 female and 24 male students enrolled for a course in Sociology or Accounting, then the ratio is 1:2. Similarly, a relational statement such as 100 kilogrammes is twice as much as 50 kilogrammes or 5 minutes is to 30 minutes as 10 minutes is to 60 minutes could be made.

Interval and ratio scales are very similar and the rules by which numbers are assigned in both are the same. The only exception is that while we apply the operations and numbers to the total amount measured from an absolute zero point in the case of ratio scales, we apply the operation to differences from one arbitrary point in the case of interval scales. Ratio scales are more commonly used in the physical sciences. Only very few situations in the social and management sciences qualify for the application of ratio scales.

Statistically speaking, the ratio scale is the most powerful measurement scale in research. In other words, it is the strongest level of measurement. This is because the statistical analyses of ratio measurements are many. Indeed, ratio scales can be used in all statistical analyses.

In summary, the formal properties which characterize each of the different levels of measurement are presented in Table 6.2.

Table 6.2: Levels of Measurement and their Characteristic Properties.

Characteristic of numbers	Level of Measurement			
	Nominal	Ordinal	Interval	Ratio
Uniqueness (Equivalence)	Yes	Yes	Yes	Yes
Order/Ranking (Greater than)	No	Yes	Yes	Yes
Known distance between (Fixed Interval)	No	No	Yes	Yes
Zero point/proportions (Natural zero)	No	No	No	Yes

6.5 Scaling

Unlike the physical and natural sciences, the social and management sciences principally study the attitudes, feelings, opinions and perceptions of human beings. These concepts are abstract and to a very large extent, subjective. In order to be able to study them objectively, the researcher must design the appropriate means of measuring such highly abstract and subjective concepts.

In the preceding sections, we considered the different levels or scales of measurement which include the nominal, ordinal, interval and ratio levels. In order for the researcher to be able to convert the verbal expressions of attitudes, feelings, opinions and perceptions of respondents (qualitative information) into numerals (quantitative data), the researcher makes use of scales. The different levels of measurement have different measurement scales attached to them which enable the researcher to accomplish this purpose. For example, the Thurstone and Likert scales are concerned with the measurement of attitudes on an ordinal and interval level of measurement. On the other hand, the Guttman scale can be applied to nominal and ordinal levels of analysis.

These examples are described in greater detail later in this chapter.

6.5.1 Techniques of Scale Construction

Unlike in the physical sciences, there is no uniform way of constructing scales in the social and management sciences. The difficulty stems from the fact that we cannot apply laboratory tests on measurements and scaling to some attributes of human beings such as opinions, attitudes, motivation, feelings, etc. The approach we use here can be easily understood by researchers and students and more so highly recognised in some professional literature. A common method for constructing scales involves their categorisation into two parts. These are:

i. Attitude Scales; and
ii. Value Scales.

6.5.1.1 Attitude Scales

Kerlinger (1973) described an attitude as "an organised predisposition to think, feel, perceive and behave toward a referent or cognitive object". As human beings, the way we perceive an object or variable, for instance, differs. However, social and management researchers will still need to analyse those ways and come up with a result which is truly representative of the various respondents' responses.

Attitude scales involve a battery of questions that are selected on *a priori* basis. Numerical values are assigned to the item (or question) responses and these values are summed to obtain total scores. These scores are then interpreted as indicating the attitude of the respondents. Let us illustrate an attitude scale by considering the following three statements designed to measure alienation:

i. The future looks very bleak.

☐ Strongly Agree ☐ Agree ☐ Uncertain
☐ Disagree ☐ Strongly Disagree

ii. I feel helpless in the face of what is happening to me every day.

☐ Strongly Agree ☐ Agree ☐ Uncertain
☐ Disagree ☐ Strongly Disagree

iii. People like me have no influence and connection and therefore are not recognised in the society.

☐ Strongly Agree ☐ Agree ☐ Uncertain
☐ Disagree ☐ Strongly Disagree

Assuming a researcher scores the responses in the following manner: strongly agree (= 4), agree (= 3); uncertain (= 2); disagree (= 1); and strongly disagree (= 0), a respondent who answers, "strongly agree" to all the three questions will have a total score of 12 indicating a high degree of alienation. On the other hand, a respondent who answers, "strongly disagree" to all three questions will have a total score of zero, indicating that the person is not alienated. In reality, most respondents will obtain scores between these two extremes and the job of the researcher is to obtain a good scoring system classifying respondents according to their degree of alienation. For instance, respondents that score between 0 and 4 can be regarded as not alienated, respondents who score between 5 and 8 are somewhat alienated, and those whose score is between 9 and 12 are most alienated.

Attitude scales are concerned with rating attitudes as exhibited by respondents. These scales do not involve ranking of respondents' attitudes. Thus, attitude scales are safely regarded as rating scales. The following are the major types of rating scales commonly in use:

i. Thurstone scales;
ii Likert scales; and
iii Guttman scales.

(i) Thurstone Scales

The Thurstone technique of scaling was developed as a method of converting nominal scores to an interval scale. The general procedure of the Thurstone technique is to ask judges to rank items (questions) into

categories. The researcher then selects from these categories a number of items (usually 15 to 20) to form the scale. Items are selected from each of the ordered categories, giving preference to items on whose ranking the judge agreed.

In the preparation of this scale, Thurstone applied two criteria. First, the full range of the scale has to be represented. This is done by ensuring that at least one item is selected from each of the categories. Second, items in each category are selected according to how much agreement there was among judges that the item belongs to that category; the items that are selected in this way have the least dispersion. Thurstone used the Quartile (Q) values to determine the least dispersion. It should also be noted that a graph of Q values is to be constructed for each item.

Let us illustrate the Thurstone scale's construction by looking at some hypothetical data on the distribution of judges' selections for an item: "whenever I perform very well, my boss gives me incentives" (motivation of staff) (see Table 6.3).

Table 6.3: Hypothetical data on the distribution of Judges' selection for an item.

Category number	Number of Judges	Cummulative percentage
1	0	0
2	100	3.3
3	200	10.0
4	350	21.7
5	600	41.7
6	800	68.4
7	490	84.7
8	300	94.7
9	150	99.7
10	10	100
	N = 3000	

The graph of Quartile (Q) values for the above data is shown in Fig. 6.1.

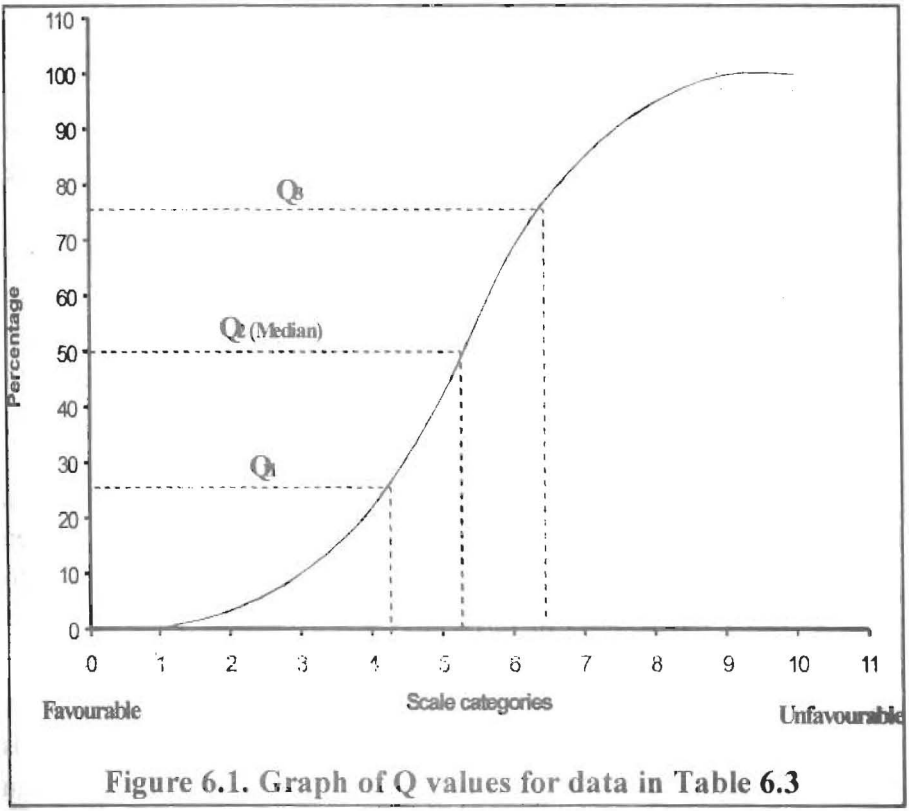


Figure 6.1. Graph of Q values for data in Table 6.3

From the diagram above, one can see that 41.7% of the judges ranked the item in category 5 or lower: 84.7% ranked it in category 7 or lower and so on. The 0.417 (i.e. 41.7%); 0.847 (i.e 84.7%), etc, are the ogive levels. The median (Q2) can be derived by looking at the category class corresponding to 50%. From the above diagram, this is 5.3. The median value represents the scale value of the item.

Also, different levels of quartiles such as lower quartile (Ql) and the upper quartile (Q3) could be derived. This could be done by looking at the category class corresponding to 25% and 75% for Ql and Q3 respectively. These are 4.2 and 6.5. The interquartile range (i.e Q3 - Ql)

which is 6.5 - 4.2 = 2.3 in this case could also be derived. This range is referred to as the *coefficient of ambiguity.* If this is the lowest Q value for any item in that particular category, that item will be selected for the final scale because it reflects the highest degree of agreement among the judges. A low level of the coefficient of ambiguity indicates a low degree of ambiguity in regard to an item. The scale is then constructed when the above parameters have been taken care of.

Thurstone scale is not often used in research today, primarily because of the tremendous expenditure of energy and time required to have ten to fifteen judges score the items. This will also involve the use of professional researchers (as judges) who, in any case, are difficult to get, especially in a developing country like Nigeria, and where available, may be too expensive for the research.

Above all, the meanings conveyed by the several items indicating a given variable tend to change over time. Thus, an item having a given weight at one time might have quite a different weight later on. For it to be effective, it would have to be periodically updated.

(ii) Likert Scales

Likert scale is also referred to as the technique of *summated rating.* It is one of the most commonly used in contemporary questionnaire design especially by university student researchers, the more matured social researchers, as well as in marketing studies in the private sector.

The Likert scale measures the intensity or degree of agreement by the respondents to a research question. As a simple illustration, suppose we wish to measure prejudice against women, the following statements can be used to measure the perception of respondents to this phenomenon.

Item (I) Women should not be allowed to vote.

☐ Strongly Agree ☐ Agree ☐ Uncertain
☐ Disagree ☐ Strongly Disagree

Item (II)Women are too lazy at work - place

☐ Strongly Agree ☐ Agree ☐ Uncertain
☐ Disagree ☐ Strongly Disagree

Item (III). Women are bad car -drivers

☐ Strongly Agree ☐ Agree ☐ Uncertain
☐ Disagree ☐ Strongly Disagree

Item (IV). Women cannot be my bosses

☐ Strongly Agree ☐ Agree ☐ Uncertain
☐ Disagree ☐ Strongly Disagree

The scoring system is simply done by assigning weight for response alternatives. The weights could be assigned as follows: Strongly agree (= 5); Agree (= 4); Uncertain (= 3); Disagree (= 2); and Strongly disagree (= 1). Alternatively, the weights could be as follows: Strongly agree (= 2); Agree (= 1); Uncertain (= 0); Disagree (= -1); and Strongly disagree (= -2). However, the choice of deciding the scoring system should be left to the researcher but the researcher should take into consideration the nature of responses envisaged from respondents before he finally adopts the scoring system. It is pertinent to note that the first scoring system is preferable to others because when scores are added togther it is easy to draw a conclusion based on the total value.

Let us see how the total value (or score) is derived. Using the above example, a total score for each respondent is calculated by summing the value of each item that is asked. Suppose a respondent answered "strongly agree" in item I (score = 5), "uncertain" in item II (score = 3); "disagree" in item III (score = 2) and "strongly agree" in item IV (score = 5), his or her total score will be 5 + 3 + 2 + 5 = 15. By this method, the total value for all respondents could be easily derived.

In the illustration above, if the total value for all respondents is very high, then the result is that those respondents are in support of prejudice

against women. However, if the total value is low, then the respondents are not in support of prejudice against women.

Likert scales, no doubt, are widely used by social and management researchers. The scale has the following merits.

i. It is very easy to construct and interpret
ii. It is much simpler to understand; simpler in all ramifications than Thurstone scales.
iii. It is also flexible and can be used to measure the degree of intensity of feeling or attitudes.

The Likert scale has a limited use because it is an ordinal scale. It is also regarded as an arbitrary scale and so has the problem of validity and reliability.

(iii) Guttman Scales

Guttman scale is also known as *cummulative rating scale*. It was first developed by Louis Guttman in the 1940s and was designed to incorporate an empirical test of the unidimensionality of a set of items as an integral part of the scale-construction process.

Guttman scales are both unidimensional and cummulative. Norman *et. al* (1970) observed that its cummulativeness implies that "the component items can be ordered by degree of difficulty and that the respondents who reply positively to a difficult question will always respond positively to less difficult items or vice-versa". Thus, information on the position of any respondent's last positive response allows the prediction of all his or her other responses to the other questions, all other things being equal.

It is however, not possible to have a perfect Guttman scale in real life situation. This is because human behaviour cannot be so predicted accurately. Sequel to this, some inconsistencies are present.

Guttman developed the *co-efficient of reproducibility* (CR) to evaluate the unidimensional and cummulative assumptions, and this

measures the degree of conformity to a perfect scalable pattern. The coefficient of reproducibility (CR) is derived by using the following formular:

$$CR = 1 - \frac{Ni}{Nr}$$

where,

CR = Coefficient of reproducibility
Ni = Total number of inconsistencies
Nr = Total number of responses.

For example, if there are 500 responses and 30 of these are inconsistent, then,

$$CR = 1 - \frac{30}{500}$$

$$= 1 - 0.06$$
$$= 0.94$$
$$= 94\%$$

It is generally observed as a rule that CR of 90% is the minimum standard for accepting a scale as unidimensional. It should however be noted that a high degree of reproducibility does not ensure that the scale constructed in fact measures the concept under consideration, although it increases confidence that all the component items measure the same thing. The following example illustrates the construction of a Guttman scale. "I am joining politics to make money and I am not afraid to be classified as a looter of treasury". Let us look at the reaction to the above statement as shown in Table 6.4.

Table 6.4: Hypothetical Response Pattern in Constructing Guttman Scale.

	Respondents	People will be suspicious of my ill-gotten wealth	My conscience will be affected negatively	I am only afraid of being sent to jail	Score
Scale types	Not Corrupt	+	+	+	3
	May be Corrupt	+	+	-	2
	Corrupt	+	-	-	1
	Very Corrupt	-	-	-	0.
Mixed types		+	-	+	-
		-	+	-	-
		+	-	-	-

The first four response patterns give a perfect scalar structure of the Guttman scale. Following a respondent in the first pattern (score = 3 points), we could predict accurately that since all the three responses are positive, he is not corrupt and if he selected all the three responses negatively, then we can predict accurately that the respondent is very corrupt.

The second part of the table presents those response patterns that fail to obey the scalar structure of the questions. They are described as mixed types because of respondents responses which were inconsistent.

Constructing a usable Guttman scale will demand analysing many responses received from respondents. Moreover, the researcher, as observed by Asika (1991 p. 7), "has to try different arrangements and patterns of the statement by trial and error until inconsistences or mixed responses are reduced to the minimum".

6.5.1.2 Value Scales

Value scales are ranking scales and are used to measure value concepts and perceptions. The value scale is very easy to design. It involves identification of two extreme values (such as good and bad; brilliant and

dull, beautiful and ugly, etc. which are put in a continua scale. Respondents are accordingly ranked according to their positions along the continua.

The following are the two value scales commonly in use:

i. Rank order scales; and
ii. Normative and Ipsative measures.

(i) Rank Order Scales

Rank order scales involve comparative ranking of items by respondents according to the level of importance attached to each of them. These scales are extensively used especially in social and management researches. When used, the researcher must make sure that too many items are not asked for ranking purpose by respondents as this might discourage them. In other words, too many questions should not be asked. Let us illustrate Ranking scales by using the following examples. "Listed below are various areas of government spending. Please rank the following five areas according to the priority to be given to them by the government in the next fiscal year".

a. Health
b. Military and Defence
c. Education
d. Transportation
e. Rural Development

The respondent will rank the listed five areas of government spending accordingly. A response can be:

1st Education
2nd Health
3rd Military and Defence
4th Transportation
5th Rural Development

The major disadvantage of this scaling method is that respondents' choices or alternatives are limited to what has been provided by the researcher. However, rank order scales are advantageous in that they are

simple in concept, easy to develop and easy to use. They also give, in most cases, results comparable with those obtained through the use of more complex techniques.

(ii) Normative and Ipsative Measures

Normative measures could be described as an extension of the Rank order scales. It involves ranking of the same set of items by different respondents, with the result that an item can occupy two or more positions in the ranking. However, if the ranking is done in such a way that none of the ranks is repeated, then we are talking of Ipsative measures. The following example illustrates the normative and Ipsative measures:

> "Five would-be voters (respondents), A, B, C, D and E ranked the three parties, (PDP, AD, APP) that were to go for the National Assembly's Elections on their expected performance as follows:"

Parties	Respondents				
	A	B	C	D	E
PDP	1	2	1	3	1
AD	2	3	3	1	2
APP	3	1	2	2	2
Total	6	6	6	6	5
Average	$\frac{6}{3}=2$	$\frac{6}{3}=2$	$\frac{6}{3}=2$	$\frac{6}{3}=2$	$\frac{5}{3}=1\frac{2}{3}$

As shown above, respondent E believed that AD and APP were to win the same number of seats in the National Assembly and so the two parties were expected to place joint second. This is a simple case of Normative measure.

On the other hand, when the ranking is done in such a way that none of the ranks is repeated (as in A, B, C, and D), then we are talking of Ipsative measures.

6.6 Summary

Measurement is a procedure in which one assigns numerals, or other symbols to empirical properties (variables) according to some specified rules. These rules explain the manner in which the numbers or numerals are to be assigned. There are four levels of measurement: nominal, ordinal, interval and ratio, with the nominal being the weakest level of measurement and ratio, the strongest.

In order to convert verbal expressions of attitudes, opinions and perceptions of respondents into numerals, the researcher makes use of scales. There is no uniform way of constructing scales by social and management researchers because human attributes cannot be too precisely measured. A common method for constructing scales involves their categorisation into attitude and value scales.

Attitude scales, which are rating scales, involve a battery of questions that are selected on an *a priori* basis. Numerical values are assigned to the item or question responses and these values are summed up to obtain total scores. The three major types of attitude scales are Thurstone, Likert and Guttman scales.

Value scales are ranking scales and are used to measure value concepts and perceptions. The two value scales commonly used are Rank order scales and Normative and Ipsative measures. A practical way of using measurement methodology is as presented in the discussion on Questionnaire in Research in Chapter 12.

Review Questions

1. What do you understand by Measurement? Explain the nature and rules of Measurement.
2. Identify the different levels of measurement and carefully discuss each of them with particular reference to their distinguishing characteristics, their logical properties as well as the permissible statistics at each level.
3. Write short notes on the following scale types:
   a. Thurstone equal appearing scales

b. Likert scales
c. Guttman scales
d. Rank order scales
e. Normative and Ipsative measures

4. Make up three questionnaire items that measure attitudes towards employment of old people in manufacturing companies and that would probably form a Guttman scale.
5. What level of measurement - nominal, ordinal, interval or ratio - describes each of the following variables? Give reasons for your answers.
   a. Race (white, coloured, Africans, Asian, etc.)
   b. Order of finish in a race (first, second, third, etc.)
   c. Number of children in families (1, 2, 3, etc.)
   d. Population of countries
   e. Attitudes toward privatisation (strongly approve, approve, disapprove, strongly disapprove)
   f. Political orientation (communist, socialist, conservative, etc).

References and Suggested Reading

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