Module 1 -Unit 1 Part 8 Role of theory in Research		
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Meaning of theory

Theory is derived from Greek word 'theoria' means contemplation or speculation.

Theory not only explain or predict a phenomena, but also specify the casual relationship among variables. Theory is defined as a set of systematically interrelated concepts, definitions, and propositions that are advanced to explain and predict a phenomenon. It is a set of logically interrelated statements in the form of empirical assertions about properties of infinite classes of events or things. A theory may, not only explain or predict phenomena, but also specify causal relationship among variables.

For example, "The standard of living of a family is dependent on its income, size and life style". This is a theory which provides a basis for studying consumer behavior and formulating appropriate marketing strategies.

1.8.1Role of Theory in Research

Theory serves research in many useful ways.

1. Theory narrows the range of facts to be studied. It helps to select a few relevant aspects of a phenomenon. What is needed and what is not needed, can be oriented properly by theory.

2. Theory provides a conceptual framework for a study. Every science is a structure of interrelated concepts with precise definitions. The theory helps the researcher to define the terms and concepts that are commonly used, and classify

them properly. A researcher selects a few facts from the theory and develops conceptual structure of their interrelationships.

3. Another function of theory is to summarize concisely what is already known about the object of study.

4. Theory state a general uniformity beyond the immediate observations. A person sitting under a mango tree may observe ripe mangoes falling on the ground. But beyond these observations, there is the general law of gravitation.

5. Theoretical generalization can be used to predict further facts. The most obvious is the extrapolation from the known to the unknown.

1.8.2 Methods for formation of theory

The methods used for formulating theories are (i) deduction (ii) induction (iii) retroduction.

Deduction: It is one of the important methods employed in theory building. It is a process of drawing generalizations, through a process of reasoning on the basis of certain assumptions which are either self evident or based on observation. By deduction, is meant reasoning or inference from the general to particular or from the universal to the individual.
Deduction follows an approach which is 'top down' or from general to particular.

In deduction, we start from a theory and try to prove it right with the help of available information.

It is a reasoning process of applying a generally accepted principle to a specific individual case.

Deductive research approach When conducting deductive research, you always start with a theory (the result of inductive research). Reasoning deductively means testing these theories. If there is no theory yet, you cannot conduct deductive research.

The deductive research approach consists of four stages:

- **Start with an existing theory**
  - All biological life depends on water to exist
- **Formulate a hypothesis based on existing theory**
  - All land mammals depend on water to exist
- **Collect data to test the hypothesis**
  - Study all land mammal species to see if they depend on water
- **Analyze the results: does the data reject or support the hypothesis?**
  - All land mammal species depend on water = support hypothesis
- **Limitations of a deductive approach**

The conclusions of deductive reasoning can only be true if all the premises set in the inductive study are true and the terms are clear.

The conclusion follows from the two premises logically. Therefore it is valid. The deduction is the logical conclusion obtained by deducting it from the statements, called premise of the argument. The argument is so constructed that if the premises are true, conclusion must also be true. The logical deduction derives only

conclusions from given premises and it cannot affirm the truth of given statements. It serves in connecting different truths and thus logical derivation is not a means to find ultimate truth.

2. Inductive research approach

Induction: It is the process of reasoning from a part to the whole, from particular to general or from the individual to the universal. It gives rise to empirical generalizations. It is a passage from observed to unobserved. It involves two processes namely observation and generalization. Induction may be regarded as a method by means of which material truth of the premises is established. Generating ideas from empirical observation is the process of induction. As a matter of fact, concepts can be generated from experience which justifies the description of particular situations towards theory- building. It is generally observed that experience is regarded as a sum of individual observations held together by the loose tie of association and constantly extended by the idea of inductive inferences.

When there is little to no existing literature on a topic, it is common to perform inductive research because there is no theory to test. The inductive approach consists of three stages:

- Observation
  - Elephants depend on water to exist
- Observe a pattern
  - All observed animals depend on water to exist
- Develop a theory

- All biological life depends on water to exist

- Limitations of an inductive approach

A conclusion drawn on the basis of an inductive method can never be proven, but it can be invalidated.

Induction method

- The induction method consists of studying several individual cases and drawing a generalization.
- Moves from particular to general
- Induction method is bottom to up in nature
- It is developmental
- This does not give 100% guarantee of truth but probability of being true.

Conditions for Induction

- Observation must be correctly performed and recorded, then the data should be accurate.
- Observation must cover representative cases drawn from a specific universe.
- Observation must cover an adequate number of cases.
- Conclusions must be confined to inferences drawn from the findings.

Deduction & Induction. In logic, we often refer to the two broad methods of reasoning as the deductive and inductive approaches. Deductive reasoning works from the more general to the more specific. ... Inductive reasoning works the other way, moving from specific observations to broader generalizations and theories. The main difference between inductive and deductive reasoning is that inductive reasoning aims at developing a theory while deductive reasoning aims at testing an existing theory. Inductive reasoning moves from specific observations to broad

generalizations, and deductive reasoning the other way around. Both approaches are used in various types of research.

Deduction	Induction
• General to particular approach • Method of verification • Very quick method • Downward movement	• Particular to general approach • Method of discovery • Very slow method • Upward movement

3. **Retroduction:**

It is a technique of successive approximation by which, the concepts and assumptions of theories are brought into closer alignment with relevant evidence. At the same time it maintains the logical consistency required of deductive systems.

Retroductive arguments are those in which an explanation is suggested to account for an observed fact or set of facts. The explanation is suggested by what I call a "concomitance," i.e. any type of similarity or co-occurrence, including location in time or space, but not restricted to these. For example, "Jones was in the building during each of the murders. Perhaps he is the killer," or "The blood on the victim's shirt matches Jones' blood type. Perhaps Jones is the killer." Because retroductive arguments turn only upon observed concomitances, and concomitances can always be merely coincidental, retroductive arguments run a high risk of being mistaken. Hence, in terms of establishing the truth of the conclusion, retroduction is the weakest type of argumentation. However retroduction is the only type of argumentation that suggests new connections in the structure of the world, so without this type of argumentation the growth of knowledge

would be impossible.

In *retroduction* the **major premise** is a **RULE**, as it is in deduction - a general statement about the structure of the world.

However, the **minor premise** is the **RESULT of an observation - a fact**, often a surprising fact, that we are attempting to explain. **A CASE,** subsuming the subject of the result under a known rule, suggests a possible explanation.

A retroduction moves from RULE and RESULT to CASE

All **men** are **morta**l.	A RULE - a known regularity (and it has a concomitance with the observation below about Socrates).
Socrates is **mortal**.	A RESULT of observation. Poor Socrates!
Hence, **Socrates** is a **man**.	A CASE - the fact that Socrates is an instance of this class could explain his death as a predictable instance of a known regularity.

1.8.3 Theory and fact

Theory and Fact are interrelated. While a fact is an empirically verifiable observation, a theory specifies the relationships between facts. Facts gathered at random, like counting the number of vehicles plying on a road, cannot 'produce' a body of knowledge. Only when related facts are gathered and studied, the development of science can take place.

Theory indicates the kinds of data to be gathered, offers a conceptual scheme for systematizing a phenomenon, summarizes facts into empirical generalizations and predicts facts.

Facts help to initiate theories, lead to the formation of an existing theory, cause the rejection of theories which do not conform to facts and clarify and modify theories.

The researchers use some techniques to bridge to gap between theory and fact. Conceptualization is one of the techniques used for bridging theory and fact. Theory uses concepts for explaining a phenomenon. When new facts invalidate a theory, new concepts are developed to reformulate the theory.

Classification is another technique used for bridging theory and fact. Classification is an attempt to impose some sort of order on mass of facts. It is an attempt to trace interrelationships through the process of grouping. Scientists in various disciplines have made effective use of classification as a tool of analysis.

Theory development is essentially a process of describing phenomena at increasingly higher levels of abstraction.

1.8.4 A **concept** or **construct** is a generalized idea about a class of objects, attributes, occurrences, or processes that has been given a name. If you, as an organizational theorist, were to describe phenomena such as supervisory behavior or risk aversion, you would categorize empirical events or real things into concepts. Concepts are the building blocks of theory. In organizational theory, leadership, productivity, and morale are concepts. In the theory of finance, gross national product, risk aversion, and inflation are frequently used concepts. Accounting concepts include assets, liabilities, and depreciation. In marketing, customer satisfaction, market share, and loyalty are important concepts.

Concepts abstract reality. That is, concepts express in words various events or objects. Concepts, however, may vary in degree of abstraction. For example, the concept of an asset is an abstract term that may, in the concrete world of reality, refer to a wide variety of things, including a specific punch press machine in a production shop.

The abstraction ladder indicates that it is possible to discuss concepts at various levels of abstraction. Moving up the **ladder of abstraction**, the basic concept becomes more general, wider in scope, and less amenable to measurement.

The basic or scientific business researcher operates at two levels: on the **abstract level** of concepts (and propositions) and on the empirical level of variables (and hypotheses).

At the **empirical level**, we "experience" reality—that is, we observe, measure, or manipulate objects or events.

For example, we commonly use the term job performance, but this is an abstract term that can mean different things to different people or in different situations. To move to the empirical **concept (or construct)**

A generalized idea about a class of objects that has been given a name; an abstraction of reality that is the basic unit for theory development.

ladder of abstraction

Organization of concepts in sequence from the most concrete and individual to the most general.

Abstract level

In theory development, the level of knowledge expressing a concept that exists only as an idea or a quality apart from an object.

Empirical level

Level of knowledge that is verifiable by experience or observation.

In research, we use the term **latent construct it** refers to a concept that is not directly observable or measurable, but can be estimated through proxy measures. Job performance, customer satisfaction, and risk aversion are just three examples of the many latent constructs in business research. While we cannot directly see these latent constructs, we can measure them, and doing so is one of the greatest challenges for business researchers.

If an organizational researcher says "Older workers prefer different rewards than younger workers," two concepts—age of worker and reward preference—are the subjects of this abstract statement.

If the researcher wishes to test this relationship, John, age 19, Chuck, age 45, and Mary, age 62—along with other workers—may be questioned about their preferences for salary, retirement plans, intrinsic job satisfaction, and so forth. Recording their ages and assessing their reward preferences are activities that occur at the empirical level. In this example, we can see that researchers have a much easier time assessing and measuring age than the latent construct of reward preference.

In the end, researchers are concerned with the observable world, or what we shall loosely term reality. Theorists translate their conceptualization of reality into abstract ideas. Thus, theory deals with abstraction. Things are not the essence of theory; ideas are Concepts in isolation are not theories. To construct a theory we must explain how concepts relate to other concepts as discussed below.

How to use concepts?

Operational definition

Conceptual definition

- **Operational definition**

Operational definitions convert theoretical concepts into observables. So the act of providing a measure of a concept is referred to as operational definition. Measurement provides the basis for more précised estimates of the degree of relationship between concepts. Eg, it is easy to distinguish student who secured 40% mark in mathematics and another student who secured 95% marks in the same subject but it is difficult to distinguish between a student who got 95.6% and another who secured 96.2 % in the same subject.

- **Conceptual definition**

It conveys the meaning we attach to concept. Each concept has different meaning. It is the duty of the researcher to decide what the concept is meant.

Concepts are the building block of a theory. Concepts abstract reality. That is, concepts are expressed in words, letters, signs, and symbols that refer to various events or objects. For example, the concept "asset" is an abstract term that may, in the concrete world of reality, refer to a specific punch press machine. Concepts,

however, may vary in degree of abstraction and we can put them in a ladder of abstraction, indicating different levels.

Types of concepts:

Two categories

1. Postulational concepts
2. Intuitive concepts

Postulational concepts

Its meaning will be different when it will be used in some other context or theories. Eg, 'function' has one meaning in economics and another meaning in physics.

Intuitive concepts

It has a particular meaning. The meaning is never changed by the people who use it. Eg, 'black' as a colour, its meaning is abstracted from wider and empirical context.

Concepts are the basic units of theory building. Therefore the theory is a statement of the meaningful relation between concepts.

Constructs

It is a concept that is not directly observable. Eg, satisfaction is a construct. Researchers use indicators as a way of measuring or classifying most of the particulars of the construct.eg HDI (human development index can be measured only in terms of certain indicators.

Indicators

Indicators used as a measure of a concept. Eg, monthly salary may be the direct measure of personal income. Personal income used as an indicator of social class, it becomes an indirect measure.

Conceptual scheme

It is the interrelationship between concepts and constructs

Identifying Variables: In a research study it is important that the concepts used should be operationalised in measurable terms so that the extent of variations in respondents' understanding is reduced if not eliminated.

Techniques about how to operationalise concepts, and knowledge about variables, play an important role in reducing this variability.

Their knowledge, therefore is important in 'fine tuning' your research problem.

For example:

-'Jet Airways' is a perfect example of quality cabin service.

- Food in this restaurant is excellent.

- The middle class in India is getting more prosperous.

When people express these feelings or preferences, they do so on the basis of certain criteria in their minds. Their judgment is based upon indicators that lead them to conclude and express that opinion. These are judgments that require a sound basis on which to proclaim. This warrants the use of a measuring mechanism and it is in the process of measurement that knowledge about variables plays an important role.

A variable is a measurable concept such as height, age, income etc. it takes quantitative values. It may vary from individuals to individuals or groups to groups.

Unit of analysis: A variable can be measured and analyzed by statistical units. The statistical units used for analysis and interpretation are known as units of analysis. Ratios, percentages, coefficients etc are such units. They can be used for the purpose of comparison.

1.8.5 The definition of a variable:

An image, perception or concept that can be measured – hence capable of taking on different values- is called a variable.

Very simply, a **VARIABLE** is a measurable characteristic that varies. It may change from group to group, person to person, or even within one person over time.

A variable can be classified in a number of ways.

1. Causal relationship;
2. Study design;
3. Unit of measurement.

From the viewpoint of causal relationship

In studies that attempt to investigate a causal relationship or association, four sets of variables may operate

1. *Change* variables, which are responsible for bringing about change in a phenomenon, situation or circumstance;

2. *Outcome* variables, which are the effects, impacts or consequences of a change variable;

3. Variables which *affect or influence* the link between cause-and-effect variables;

4. *Connecting* or *linking* variables, which in certain situations are necessary to complete the relationship between cause-and-effect variables.

In research terminology, change variables are called **independent variables**, outcome /effect variables are called **dependent variables**, the unmeasured variables affecting the cause-and-effect relationship are called **extraneous variables** and the variables that link a cause-and-effect relationship are called **intervening variables**.

Hence:

Dependent and Independent variables

Dependent variable is one which is dependent on another variable. On the other hand, the variable which influences other variable is known as independent variable.

For e.g. with the increase in temperature, the sales of ice cream may go up. If so, one can say that the sale of ice cream depends upon the temperature. In such case, the sale of ice cream is a dependent variable whereas the temperature is an independent variable.

Extraneous variable: several other factors operating in a real-life situation may affect changes in the dependent variable. These factors, not measured in the study, may increase or decrease the magnitude or strength of the relationship between independent and dependent variables. Extraneous variables are those factors in the research environment which may have an effect on the dependent variable(s) but which are not controlled. Extraneous variables are dangerous. They may damage a study's validity, making it impossible to know whether the effects were caused by the independent and moderator variables or some extraneous factor. If they cannot be

controlled, extraneous variables must at least be taken into consideration when interpreting results.

Intervening variable:

Intervening Variables: - Variable which theoretically affect the observation or results but cannot be measured or manipulated is called intervening variable. It is inferred after watching the effects of the independent and moderating variables on dependent variables.

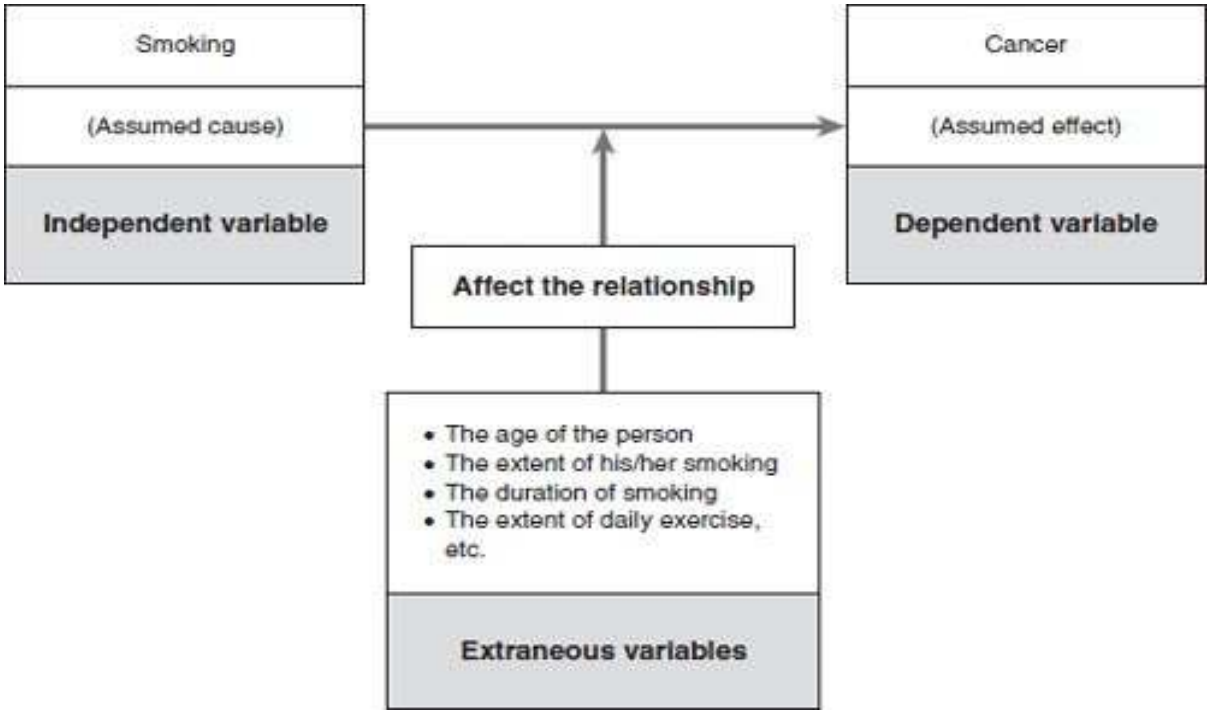
- For example, if the use of a particular teaching technique is the independent variable and mastery of the objectives is the dependent variable, then the language learning processes used by the subjects are the intervening variables.

It sometimes called the confounding variable it links the independent and dependent variables. In certain situations the relationship between an independent and a dependent variable cannot be established without the intervention of another variable. The cause, or independent,variable will have the assumed effect only in the presence of an intervening variable.

To explain these variables let us consider some examples.Suppose you want to study the relationship between smoking and cancer. You assume that smoking is a cause of cancer.

Studies have shown that there are many factors affecting this relationship, such as the number of cigarettes or the amount of tobacco smoked every day; the duration of smoking; the age of the smoker; dietary habits; and the amount of exercise undertaken by the individual. All of these factors may affect the extent to which smoking might cause cancer. These variables may either increase or decrease the magnitude of the relationship.

In the above example the extent of smoking is the independent variable, cancer is the dependent variable and all the variables that might affect this relationship, either positively or negatively, are extraneous variables.



Moderating Variable

We know that independent variable affects the value of dependent variable and there has been cause and effect relationship between these two. The variable that affects the cause and effect relationship between these two variables is called moderator variable. It means the effect of independent variable on dependent variable may be different in the presence of moderator variable.

Moderate variable is a second independent variable that is included because it believed to have a significant contributory or contingent effect on the originally stated intervening variables and dependent variable relationship.

For eg) a good speaker can increase understanding of students on a particular topic. Here, good speaker is independent variable while understanding is depending variable. Good environments like air conditioned room, good lecture hall, good facilities in the hall etc act as moderating variables. If the speaker was good, environments were excellent, yet the students could not recall the basics of the class when asked the very next day. There may be some intervening variables which blocks the minds of students.

E.g. In the study of Value Awareness (VA) of urban, rural and semi urban students, the area will be independent variable and VA will be dependent variable. But here, if researcher thinks that the gender of students may also affect the relationship between area and VA of students, the gender will be considered as moderator variable. Various moderator variables may be there for one pair of independent and dependent variable. Researcher has to decide, in such cases, which variable he wants to take as moderator **variable**.

Table – 1
Variable of Study

Sr.	**Variable**	**Type of Variable**	**Level/Strata of Variable**
1	Area	Independent	1. Urban 2. Rural 3. Semi Urban
2	Gender	Moderator	1.Boy 2. Girl

3	Socio – Economic Status	Moderator	1. Higher 2. Middle 3. Lower
4	Value Awareness	Dependent	

Intervening Variable

Any such variable is called intervening variable, that may affect the cause and effect relationship of dependent and independent variables but either cannot be measured clearly or is to be ignored during research. It means, intervening variables are neither controlled nor taken care of during research. In other words, any moderator variable, that cannot be measured or observed clearly or ignored is called intervening variable. In our earlier mentioned example of study of value awareness of students, researcher has classified variables like Area, SES, Gender and Value awareness as shown in Table 1. But besides the moderator and controlled variable, mentioned in tables, the following variable can also affect the cause and effect relationship of dependent and independent variables of our example.

- School Environment
- Social environment
- Culture of family
- Value Awareness of Parents
- Extra Reading
- Friend Circle / Peer group of Student
- Emotional Maturity of Students
- Parenting style of parents
- Age of student

➢ **From the viewpoint of the study design**

A study that examines association may be a controlled/contrived experiment, a quasi experiment or an *ex post facto* or non-experimental study. In controlled experiments the independent (cause) variable may be introduced or manipulated either by the researcher or by someone else who is providing the service. In these situations there are two sets of variables

Active variables are those variables that can be manipulated, changed or controlled.

Attribute variables are those variables that cannot be manipulated, changed or controlled, and that reflect the characteristics of the study population, for example age, gender, education and income.

- **From the viewpoint of the unit of measurement**

From the viewpoint of the unit of measurement, there are two ways of categorizing variables: whether the unit of measurement is **categorical** (as in **nominal and ordinal scales**) or **continuous in nature (as in interval and ratio scales)**; whether it is qualitative (as in nominal and ordinal scales) or quantitative in nature (as in interval and ratio scales).

Categorical variables are measured on nominal or ordinal measurement scales, whereas for **continuous variables** the measurements are made on either an interval or a ratio scale. There are three types of categorical variables:

Constant variable–has only one category or value, for example taxi, tree and water etc.

Dichotomous variable has only two categories, as in male/female, yes/no, good/bad, head/tail, up/down and rich/poor;

Polytomous variable can be divided into more than two categories, for example religion (Christian, Muslim, Hindu); and attitudes (strongly favourable, favourable, uncertain, unfavourable, strongly unfavourable).

Continuous variables, on the other hand, have continuity in their measurement, for example age. They can take any value on the scale on which they are measured. Age can measured in years, months and days. Similarly,income can be measured in rupees. In many ways qualitative variables are similar to categorical variables as both use either nominal or ordinal measurement scales. However, there are some differences.

For example, it is possible to develop categories on the basis of measurements made on a continuous scale, such as measuring the income of a population in rupees and then developing categories such as 'low', 'middle' and 'high' income. The measurement of income in rupees classified as the measurement of a continuous variable, whereas it's subjective measurement in categories such as 'low', 'middle' and'high' groups are qualitative variable.

Similarities and differences among the various types of variable.

Categorical			Continuous	Qualitative	Quantitative
Constant	Dichotomous	Polytomous			
• water • tree • taxi	• yes/no • good/bad • rich/poor • day/night • male/ female • hot/cold*	Attitudes • strongly favourable • favourable • uncertain • strongly unfavourable Political parties • Labor • Liberal • Democrat Age* • old • child • young Income^ • high • middle • low	Income ($) Age (years) Weight (kg)	Gender • female • male Educational level • high • average • low Age* • old • young • child Income • high • middle • low Temperature+ • hot • cold	Educational level ___ no. of years completed Age:* ____ years/months Income^ ____ $ per year Temperature+ ____ °C or °F

Other variables

Latent variable: it is a variable that cannot be observed. The presence of latent variables, however, can be detected by their effects on variables that are observable. Most constructs in research are latent variables. Latent Variable -An underlying variable that cannot be observed directly. (Hidden) eg; intelligence

Manifest variable: it is a variable or factor that can be directly measured or observed. It is the opposite of a latent variable, which is a factor that cannot be directly observed, and needs a manifest variable assigned to it as an indicator to test whether it is present. Manifest Variable- Indicate the presence of a latent variable. Also known as an indicator variable. eg; IQ test Score

The difference between a concept and a variable:

Concepts are mental images or perceptions and therefore their meaning varies markedly from individual to individual. A concept cannot be measured whereas a variable can be subjected to measurement by crude/refined or subjective/objective units of measurement. It is therefore important for the concept to be converted into variables.

Concept	Variable
-Subjective Impression -As such cannot be measured	-No uniformity as to its understanding among different people -Measurable though the degree of precision varies from scale to scale and

	variable to variable
Concept	Variable
e.g • Excellent • High achiever • Rich • Satisfaction • Domestic •violence	. e.g.-gender(M/F) Age (xYrY Month) -weight (--Kg.) height (--cms) -religion(Cath. Hindu) income(Rs.—Per Year

Concepts, indicators and variables:

If you are using a concept in your study, you need to consider its operationalisation- that is, how it will be measured. For this, you need to identify indicators- a set of criteria reflective of the concept which can then be converted into variables.

The choice of indicators for a concept might vary with researchers, but those selected must have a logical link with the concept.

__Concepts	Indicators	Variables	Working definition
Rich	1. Income	3. Income	Rs. 100000
	2. Assets	4. Total value of home,	Rs.200000

1.8.6 Research Propositions and Hypotheses

As we just mentioned, concepts are the basic units of theory development. However, theories require an understanding of the relationship among concepts. Thus, once the concepts of interest have been identified, a researcher is interested in the relationship among these concepts.

Propositions are statements concerned with the relationships among concepts. A proposition explains the *logical* linkage among certain concepts by asserting a universal connection between concepts. For example, we might propose that treating our employees better will make them more loyal employees. This is certainly a logical link between managerial actions and employee reactions, but is quite general and not really testable in its current form.

A **hypothesis** is a formal statement explaining some outcome. In its simplest form, a hypothesis is a guess. A sales manager may hypothesize that the salespeople who are highest in product knowledge will be the most productive. An advertising manager may hypothesize that if consumers' attitudes toward a product change in a positive direction, there will be an increase in consumption of the product. A human resource manager may hypothesize that job candidates with certain majors will be more successful employees.

A hypothesis is a proposition that is empirically testable. In other words, when one states a hypothesis, it should be written in a manner that can be supported or shown to be wrong through an empirical test. For example, using the color of the background for a Web site discussed previously,

the researcher may use theoretical reasoning to develop the following hypothesis:

H1: A web site with a blue background will generate more sales than an otherwise identical Web site with a red background.

We often apply statistics to data to empirically test hypotheses. **Empirical testing** means that something has been examined against reality using data. The abstract proposition "Treating our employees better will make them more loyal employees" may be tested empirically with a hypothesis.

that "Increasing the monetary benefits will reduce intention to leave the organization" is an empirical counterpart of this proposition.

Monetary benefits and intention to leave are **variables**, reflecting the concepts of employee treatment and employee loyalty. When the data are consistent with a hypothesis, we say the hypothesis is *supported*. When the data are inconsistent with a hypothesis, we say the hypothesis is *not supported*. We are often tempted to say that we prove a hypothesis when the data conform to the prediction, but this isn't really true. Because our result is based on statistics, there is always the possibility that our conclusion is wrong. Now, at times we can be very, very confident in our conclusion, but from an absolute perspective, statistics cannot prove a hypothesis is true. Because variables are at the empirical level, variables can be measured. In this case, monetary benefits might be measured quite easily and precisely (e.g., the actual percentage change in matching monetary funds), while the latent construct of intention to leave would be more challenging for the researcher. This step is known as **operationalizing** our variables—the process of identifying **propositions**

Statements explaining the logical linkage among certain concepts by asserting a universal connection between concepts.

Hypothesis

Formal statement of an unproven proposition that is empirically testable.

Empirical testing means Examining a research hypothesis against reality using data.

Variables Anything that may assume different numerical values; the empirical assessment of a concept.

Operationalizing The process of identifying the actual measurement scales to assess the variables of interest

Thus, the scientific inquiry has two basic levels: . . . the empirical and the abstract, conceptual. The empirical aspect is primarily concerned with the facts of the science as revealed by observation and experiments. The abstract or theoretical aspect, on the other hand, consists in a serious attempt to understand the facts of the science, and to integrate them into a coherent, i.e., a logical, system. From these observations and integrations are derived, directly or indirectly, the basic laws of the science.

Hypothesis testing & characteristics

We have already seen that propositions are statements about variables considered to be true or false. If the phenomenon under consideration happens to be observable reality then the said statement could be empirically tested. A proposition that can be verified to determine its reality is a hypothesis. Therefore one can say that a hypothesis is a verifiable counterpart of a proposition. A hypothesis may be defined as a logically conjectured relationship between two or more variables, expressed in the form of a testable statement. Relationship is proposed by using a strong logical argumentation. This logical relationship may be part

of theoretical framework of the study. Let us look at some of the hypotheses:

1. Officers in my organization have higher than average level of commitment (variable).

2. Level of job commitment of the officers is associated with their level of efficiency.

3. Level of job commitment of the officers is positively associated with their level of efficiency.

4. The higher the level of job commitment of the officers the lower their level of absenteeism. These are testable propositions.

First hypothesis contains only one variable. The second one has two variables which have been shown to be associated with each other but the nature of association has not been specified (non-directional relationship). In the third hypothesis we have gone a step further where in addition to the relationship between the two variables, the direction of relationship (positive) has also been given. In the fourth hypothesis level of efficiency has been replaced with level of absenteeism, the direction of relationship between the two variables has been specified (which is negative). In the following discussion you will find these hypotheses being quoted as part of the examples.

Types of Hypotheses

Descriptive Hypothesis

Descriptive hypothesis contains only one variable thereby it is also called as univariate hypothesis. Descriptive hypotheses typically state the existence, size, form, or distribution of some variable. The first hypothesis contains only one variable. It only shows the distribution of the level of commitment among the officers of the organization which is higher than average. Such a hypothesis is an example of a Descriptive Hypothesis. Researchers usually use research questions rather than descriptive hypothesis. For example a question can be:

What is the level of commitment of the officers in your organization?

- **Relational Hypothesis**

These are the propositions that describe a relationship between two variables. The relationship could be non-directional or directional, positive or negative, causal or simply co relational. While stating the relationship between the two variables, if the terms of positive, negative, more than, or less than are used then such hypotheses are directional because the direction of the relationship between the variables (positive/negative) has been indicated (see hypotheses 3 and 4). These hypotheses are relational as well as directional. The directional hypothesis is the one in which the

direction of the relationship has been specified. Non-directional hypothesis is the one in which the direction of the association has not been specified. The relationship may be very strong but whether it is positive or negative has not been postulated (see hypothesis

- **Co relational hypotheses**

State merely that the variables occur together in some specified manner without implying that one causes the other. Such weak claims are often made when we believe that there are more basic causal forces that affect both variables. For example: Level of job commitment of the officers is positively associated with their level of efficiency. Here we do not make any claim that one variable causes the other to change. That will be possible only if we have control on all other factors that could influence our dependent variable. Explanatory (causal) hypotheses Imply the existence of, or *a change in, one variable causes or leads to a change in the other variable.* This brings in the notions of independent and the dependent variables. Cause means to "help make happen." So the independent variable may not be the sole reason for the existence of, or change in the dependent variable. The researcher may have to identify the other possible causes, and control their effect in case the causal effect of independent variable has to be determined on the dependent variable. This

may be possible in an experimental design of research. **Different ways to state hypotheses** ·

- *High motivation causes High efficiency.*
- *High motivation leads to High efficiency.*
- *High motivation is related to high efficiency.*
- *High motivation influences High efficiency.*
- *High motivation is associated with High efficiency.*
- *High motivation produces High efficiency.*
- *High motivation results in High efficiency.*
- *If High motivation then High efficiency.*
- *The higher the motivation, the higher the efficiency*
- **Null Hypothesis**

It is used for testing the hypothesis formulated by the researcher. Researchers treat evidence that supports a hypothesis differently from the evidence that opposes it. They give negative evidence more importance than to the positive one. It is because the negative evidence tarnishes the hypothesis. It shows that the predictions made by the hypothesis are wrong. The null hypothesis simply states that there is no relationship between the variables or the relationship between the variables is "zero." That is how symbolically null hypothesis is denoted as "H0". For example: H0 = There is no relationship between the level of job commitment and the

level of efficiency. Or H0 = The relationship between level of job commitment and the level of efficiency is zero. Or The two variables are independent of each other. It does not take into consideration the direction of association (i.e. H0 is non directional), which may be a second step in testing the hypothesis. First we look whether or not there is an association then we go for the direction of association and the strength of association. Experts recommend that we test our hypothesis indirectly by testing the null hypothesis. In case we have any credibility in our hypothesis then the research data should reject the null hypothesis. Rejection of the null hypothesis leads to the acceptance of the alternative hypothesis.

- **Alternative Hypothesis**

The alternative (to the null) hypothesis simply states that there is a relationship between the variables under study. In our example it could be: there is a relationship between the level of job commitment and the level of efficiency. Not only there is an association between the two variables under study but also the relationship is perfect which is indicated by the number "1". Thereby the alternative hypothesis is symbolically denoted as "H1". It can be written like this: H1: There is a relationship between the level of job commitment of the officers and their level of efficiency.

- **Research Hypothesis**

Research hypothesis is the actual hypothesis formulated by the researcher which may also suggest the nature of relationship i.e. the direction of relationship. In our example it could be: Level of job commitment of the officers is positively associated with their level of efficiency.

- **The Role of the Hypothesis In research, a hypothesis serves several important functions**

1. It guides the direction of the study: Quite frequently one comes across a situation when the researcher tries to collect all possible information on which he could lay his hands on. Later on he may find that only part of it he could utilize. Hence there was an unnecessary use of resources on trivial concerns. In such a situation, hypothesis limits what shall be studied and what shall not be.

2. It identifies facts that are relevant and those that are not: Who shall be studied (married couples), in what context they shall be studied (their consumer decision making), and what shall be studied (their individual perceptions of their roles).

3. It suggests which form of research design is likely to be the most appropriate: Depending upon the type of hypothesis a decision is made about the relative appropriateness of different research designs for the study under consideration. The design could be a survey design,

experimental design, content analysis, case study, participation observation study, and/or Focus Group Discussions.

4. It provides a framework for organizing the conclusions of the findings:

The Characteristics of a Testable Hypothesis·

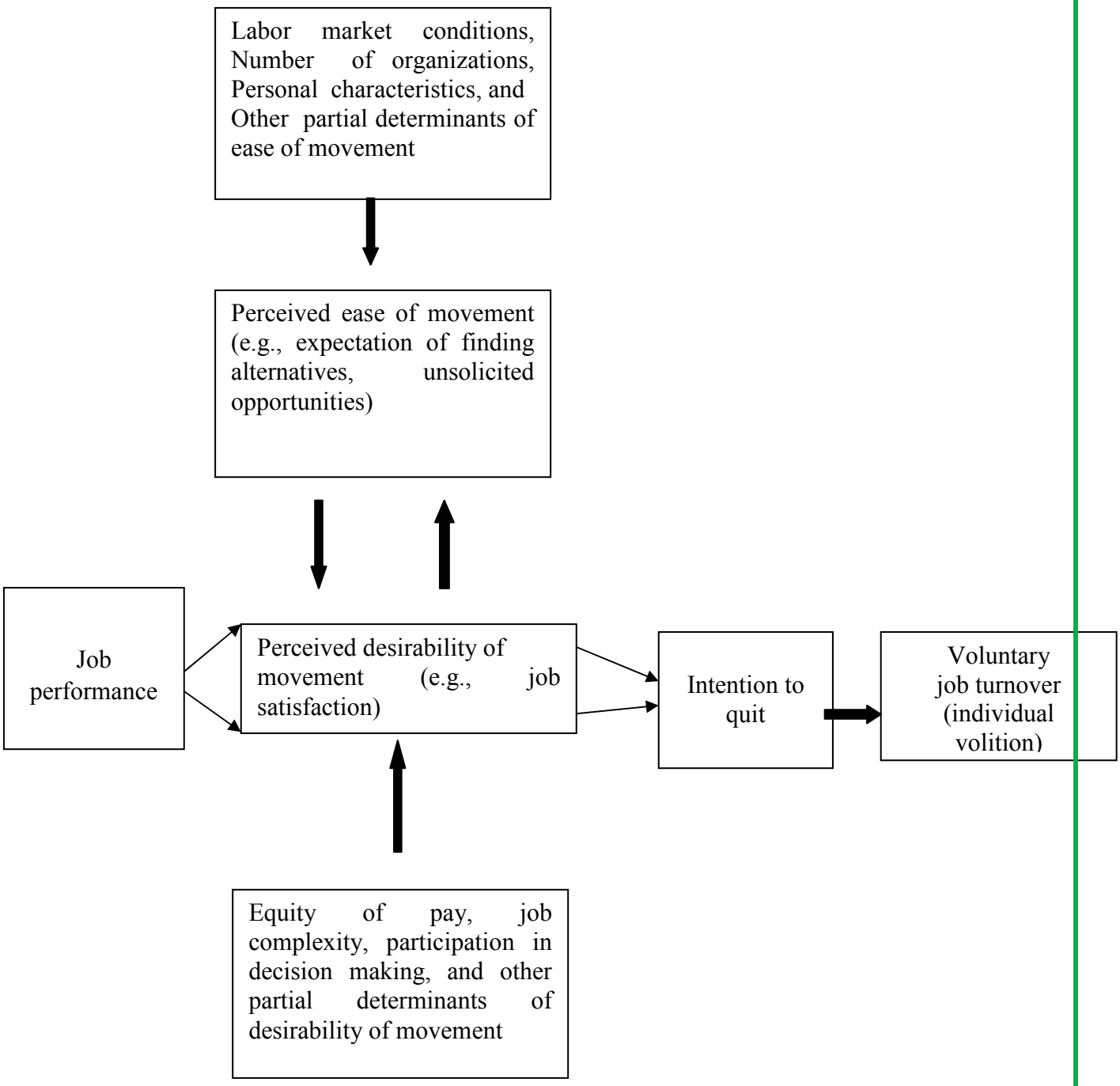
- **Hypothesis must be conceptually clear.** The concepts used in the hypothesis should be clearly defined, operationally if possible. Such definitions should be commonly accepted and easily communicable among the research scholars.
- **Hypothesis should have empirical referents.** The variables contained in the hypothesis should be empirical realities. In case these are not empirical realities then it will not be possible to make the observations. Being handicapped by the data collection, it may not be possible to test the hypothesis. Watch for words like ought, should, bad.
- **Hypothesis must be specific.** The hypothesis should not only be specific to a place and situation but also these should be narrowed down with respect to its operation. Let there be no global use of concepts whereby the researcher is using such a broad concept which may all inclusive and may not be able to tell anything. For example somebody may try to propose the relationship between urbanization and family size. Yes urbanization influences in declining the size of

families. But urbanization is such comprehensive variable which hide the operation of so many other factor which emerge as part of the urbanization process. These factors could be the rise in education levels, women's levels of education, women empowerment, emergence of dual earner families, decline in patriarchy, accessibility to health services, role of mass media, and could be more. Therefore the global use of the word `urbanization' may not tell much. Hence it is suggested to that the hypothesis should be specific.

- **Hypothesis should be related to available techniques of research. Hypothesis may have empirical reality**; still we are looking for tools and techniques that could be used for the collection of data. If the techniques are not there then the researcher is handicapped. Therefore, either the techniques are already available or the researcher is in a position to develop suitable techniques for the study.
- Hypothesis should be related to a **body of theory**. Hypothesis has to be supported by theoretical argumentation. For this purpose the research may develop his/her theoretical framework which could help in the generation of relevant hypothesis. For the development of a framework the researcher shall depend on the existing body of knowledge. In such an effort a connection between the study in hand and the existing body of knowledge can be established. That is how

the study could benefit from the existing knowledge and later on through testing the hypothesis could contribute to the reservoir of knowledge.

1.8.7 Understanding Theory



This figure is one of the simplified portrayal of a theory to explain voluntary job turnover—the movement of employees to other organizations.

Two concepts—(1) the *perceived desirability of movement* to another organization and (2) the *perceived ease of movement* from the present job—are expected to be the primary determinants of *intention to quit.* This is a **proposition.**

Further, the concept ***intention to quit*** is expected to be a necessary condition for the actual ***voluntary job turnover behavior*** to occur. This is a second proposition that links concepts together in this theory.

In the more elaborate theory, ***job performance*** is another concept considered to be the primary determinant influencing both ***perceived ease of movement*** **and** ***perceived desirability of movement.***

Moreover, **perceived ease of movement** is related to other concepts such as *labor market conditions, number of organizations visible* to the individual and *personal characteristics.* **Perceived desirability of movement** is influenced by concepts such as *equity of pay, job complexity,* and *participation in decision making.etc. A complete explanation of this theory is not possible; however, this example should help you understand the terminology used by theory builders.*

Theory Building

You may be wondering "Where do theories come from?" Although this is not an easy question to answer in business research.

Theory has been explained at the abstract, conceptual level and at the empirical level. Theory generation may occur at either level.

At the abstract, conceptual level, a theory may be developed with **deductive reasoning** by going from a general statement to a specific assertion. **Deductive reasoning** is the logical process of deriving a conclusion about a specific instance based on a known general premise or something known to be true. For example, while you might occasionally have doubts, we know that *all business professors are human beings.* If we also know that *Barry Babin is a business professor,* then we can deduce that *Barry Babin is a human being*.

At the empirical level, a theory may be developed with **inductive reasoning**. **Inductive reasoning** is the logical process of establishing a general proposition on the basis of observation of particular facts. All business professors that have ever been seen are human beings; therefore, all business professors are human beings.

Summary

1. Define the meaning of *theory*. Theories are simply models designed to help us better understand reality and to understand the logic behind things we observe. A theory is a formal, logical explanation of some events that includes predictions of how things relate to one another.

2. Understand the goals of theory. There are two primary goals of theory. The first is to understand the relationships among various phenomena. A theory provides a picture of the linkages among different concepts, allowing us to better comprehend how they affect one another. The second goal is to predict. Once we have an understanding of the relationships among concepts, we can then predict what will happen if we change one factor. For example, if we understand the relationship

between advertising expenditures and retail sales, we can then predict the impact of decreasing or increasing our advertising expenditures.

3. Understand the terms *concepts, propositions, variables,* and *hypotheses*. A concept or construct is a generalized idea about a class of objects, attributes, occurrences, or processes that has been given a name. Leadership style, employee turnover, and customer satisfaction are all concepts. Concepts express in words various events or objects. Propositions are statements concerned with the relationships among concepts. A proposition explains the *logical* linkage among certain concepts by asserting a universal connection between concepts: "Leadership style is related to employee turnover." A hypothesis is a formal statement explaining some outcome regarding variables of interest. Variables are the empirical reflection of a concept and a hypothesis is a proposition stated in a testable format. So, concepts and propositions are at the abstract level, while variables and hypotheses are at the empirical level.

4. Discuss how theories are developed. A theory can be built through a process of reviewing previous findings of similar studies or knowledge of applicable theoretical areas. A theory may be developed with deductive reasoning by going from a general statement to a specific assertion. Deductive reasoning is the logical process of deriving a conclusion about a specific instance based on a known general premise or something known to be true. Inductive reasoning is the logical process of establishing a general proposition on the basis of observation of particular facts.

5. Understand the scientific method. The scientific method is a set of prescribed procedures for

establishing and connecting theoretical statements about events, for analyzing empirical evidence, and for predicting events yet unknown. It is useful to look at the

analytic process of scientific theory building as a series of stages. We mentioned seven operations may be viewed as the steps involved in the application of the scientific method: (1) Assessment of relevant existing knowledge of a phenomenon, (2) formulation of concepts and propositions, (3) statement of hypotheses, (4) design of research to test the hypotheses, (5) acquisition of meaningful empirical data, (6) analysis and evaluation of data, and (7) proposal of an explanation of the phenomenon and statement of new problems raised by the research. In sum, the scientific method guides us from the abstract nature of concepts and propositions, to the empirical variables and hypotheses, and to the testing and verification of theory.

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