CHAPTER 11

Measurement of variables: Operational definition

LEARNING OBJECTIVES

After completing Chapter 11, you should be able to:

1. Explain how variables are measured.
2. Explain when operationalization of variables is necessary.
3. Operationally define (or operationalize) abstract and subjective variables.

INTRODUCTION

Measurement of the variables is an integral part of research and an important aspect of research design (see shaded portion in Figure 11.1). Unless the variables are measured in some way, we will not be able to find answers to our research questions. Surveys and experimental designs, discussed in the previous chapters, often use questionnaires to measure the variables of interest. In this chapter we will discuss how variables lend themselves to measurement.

HOW VARIABLES ARE MEASURED

To test the hypothesis that workforce diversity affects organizational effectiveness we have to measure workforce diversity and organizational effectiveness. *Measurement* is the assignment of numbers or other symbols to characteristics (or attributes) of objects according to a prespecified set of rules. *Objects* include persons, strategic business units, companies, countries, bicycles, elephants, kitchen appliances, restaurants, shampoo, yogurt, and so on. Examples of *characteristics* of objects are arousal-seeking tendency, achievement motivation, organizational effectiveness, shopping enjoyment, length, weight, ethnic diversity, service quality, conditioning effects, and taste. It is important that you realize that you cannot measure objects (for instance, a company); you measure characteristics or attributes of objects (for instance, the organizational effectiveness of a company). In a similar fashion, you can measure the length (the attribute) of a person (the object), the weight of an elephant, the arousal-seeking tendency of stockbrokers, the shopping enjoyment of women, the service quality of a restaurant, the conditioning effects of a shampoo, and the taste of a certain brand of yogurt. To be able to measure you need an object and attributes of the object, but you also need a judge. A *judge* is someone who has the necessary knowledge and skills to assess "the

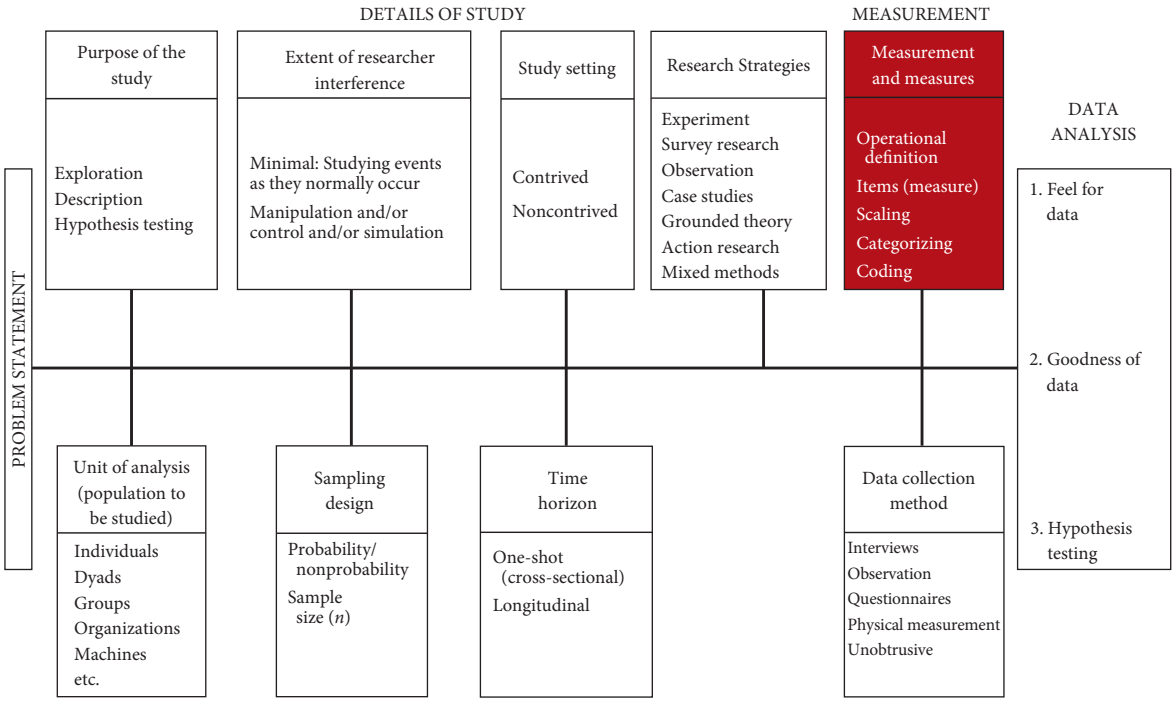

FIGURE 11.1

Research design and where this chapter fits in

quality" of something, such as the taste of yogurt, the arousal-seeking tendency of stockbrokers, or the communication skills of students. In many cases the object and the judge are the same person. For instance, if you want to measure the gender (the attribute) of your employees (the objects), or the shopping enjoyment (the attribute) of women (the objects), you can simply ask the objects (employees and women respectively) to provide you with the necessary details via a self-administered questionnaire. However, it is unlikely that the object has the necessary knowledge and skills to act as a judge when you want to measure the taste (the attribute) of yogurt (the object), the service quality of a restaurant, the communication skills of students, or even the managerial expertise of supervisors.

Now do Exercise 11.1.

EXERCISE 11.1

Identify the object and the attribute. Give your informed opinion about who would be an adequate judge.

a. Price consciousness of car buyers.

b. Self-esteem of dyslexic children.

c. Organizational commitment of school teachers.

d. Marketing orientation of companies.

e. Product quality of tablets (such as the Apple iPad and the Samsung Galaxy Tab).

Attributes of objects that can be physically measured by some calibrated instruments pose no measurement problems. For example, the length and width of a rectangular office table can be easily measured with a measuring tape or a ruler. The same is true for measuring the office floor area and for measuring the weight of an elephant (at least to some extent). Data representing several demographic characteristics of office personnel are also easily obtained by asking employees simple, straightforward questions, such as: "*How long have you been working in this organization?*" or "*What is your marital status?*"

The measurement of more abstract and subjective attributes is more difficult, however. For instance, it is relatively difficult to measure the level of *achievement motivation* of office clerks, the *shopping enjoyment* of women, or the *need for cognition* of students. Likewise, it is not straightforward to test hypotheses on the relationship between workforce diversity, managerial expertise, and organizational effectiveness. The problem is that we cannot simply ask questions like "*How diverse is your company's workforce?*" or "*How effective is your organization?*" because of the abstract nature of the variables "workforce diversity" and "organizational effectiveness." Of course, there are solutions to this problem. One of these solutions is discussed next. But let us, before we discuss the solution, summarize the problem.

Certain variables lend themselves to easy measurement through the use of appropriate measuring instruments; for example, physiological phenomena pertaining to human beings, such as blood pressure, pulse rates, and body temperature, as well as certain physical attributes such as length and weight. But when we get into the realm of people's subjective feelings, attitudes, and perceptions, the measurement of these factors or variables becomes more difficult. Accordingly, there are at least two types of variables: one lends itself to objective and precise measurement; the other is more nebulous and does not lend itself to accurate measurement because of its abstract and subjective nature.

OPERATIONAL DEFINITION (OPERATIONALIZATION)

Visit the companion website at **www.wiley.com/college/sekaran** for **Author Video: Operational definition (operationalization)**.

Despite the lack of physical measuring devices to measure the more nebulous variables, there are ways of tapping these types of variable. One technique is to reduce these abstract notions or concepts to observable behavior and/or characteristics. In other words, the abstract notions are broken down into observable behavior or characteristics. For instance, the concept of *thirst* is abstract; we cannot see it. However, we would expect a thirsty person to drink plenty of fluids. In other words, the expected reaction of people to thirst is to drink fluids. If several people say they are thirsty, then we may determine the thirst levels of each of these individuals by the measure of the quantity of fluids that they drink to quench their thirst. We will thus be able to measure their levels of thirst, even though the concept of thirst itself is abstract and nebulous. Reduction of abstract concepts to render them measurable in a tangible way is called **operationalizing** the concepts.

Operationalizing is done by looking at the behavioral dimensions, facets, or properties denoted by the concept. These are then translated into observable and measurable elements so as to develop an index of measurement of the concept. Operationalizing a concept involves a series of steps. The first step is to come up with a definition of the construct that you want to measure. Then, it is necessary to think about the content of the measure; that is, an instrument (one or more items or questions) that actually measures the concept that one wants to measure has to be developed. Subsequently, a response format (for instance, a seven-point rating scale

with end-points anchored by "strongly disagree" and "strongly agree") is needed, and, finally, the validity and reliability of the measurement scale has to be assessed. The next chapter discusses steps 3 and 4. In this chapter we will discuss step 2: the development of an adequate and representative set of items or questions.

EXAMPLE

Operationalizing the concept "need for cognition"

We have just reduced the abstract concept *thirst* into observable behavior by measuring the amount of drinks people use to quench their thirst. Other abstract concepts such as need for cognition (the tendency to engage in and enjoy thinking (Cacioppo & Petty, 1982)) can be reduced to observable behavior and/or characteristics in a similar way. For instance, we would expect individuals with a high need for cognition to prefer complex to simple problems, to find satisfaction in deliberating hard and for long hours, and to enjoy tasks that involve coming up with new solutions to problems (examples taken from Cacioppo & Petty, 1982). We may thus identify differences between individuals in need of cognition by measuring to what extent people prefer complex to simple problems, find satisfaction in deliberating hard and for long hours, and enjoy tasks that involve coming up with new solutions to problems.

In 1982, Cacioppo and Petty reported four studies to develop and validate a measurement scale to assess need for cognition. In a first study, a pool of 45 items that appeared relevant to need for cognition was generated (based on prior research) and administered to groups "known to differ in need for cognition." The results of this study revealed that the 45 items exhibited a high degree of interrelatedness and thus suggested that need for cognition is a *unidimensional* construct (that is, it does not have more than one main component or dimension; we will come back to this issue further on in this chapter). This finding was replicated in a second study. Two further studies (studies three and four) were carried out to validate the findings of the first two studies. The outcome of this validation process was a valid and reliable need for cognition measure containing 34 items, such as "I would prefer complex to simple problems," "I find satisfaction in deliberating hard and for long hours," and "I really enjoy tasks that involve coming up with new solutions to problems."

Now do Exercise 11.2.

EXERCISE 11.2

a. Read the paper by Cacioppo and Petty (1982) and describe how the authors generated the pool of 45 scale items that appeared relevant to need for cognition.

b. Why do we need 34 items to measure "need for cognition"? Why do three or four items not suffice?

Operationalization: dimensions and elements

The examples of thirst and need for cognition illustrate how abstract concepts are operationalized by using observable and measurable elements, such as the amount of drinks people use to quench their thirst, and the extent to which people prefer complex to simple problems. You may have noticed that whereas only one item is

needed to measure thirst ("*how many drinks did you use to quench your thirst?*"), 34 items are needed to measure need for cognition. These 34 items are needed because if we used fewer than these 34 items, our measurement scale would probably not represent the entire domain or universe of need for cognition; in other words, our measure would probably not include an adequate and representative set of items (or *elements*). As a consequence, our measure would not be valid. A valid measure of need for cognition thus contains 34 items even though need for cognition is a unidimensional construct.

An example of a construct with more than one dimension is aggression. Aggression has at least two *dimensions*: verbal aggression and physical aggression. That is, aggression might include behavior such as shouting and swearing at a person (verbal aggression), but also throwing objects, hitting a wall, and physically hurting others (physical aggression). A valid measurement scale of aggression would have to include items that measure verbal aggression and items that measure physical aggression. A measurement scale that would only include items measuring physical aggression would not be valid if our aim were to measure aggression. Likewise, a scale that would only include items measuring verbal aggression would also not be a valid measure of aggression. Thus, a valid measurement scale includes quantitatively measurable questions or items (or elements) that adequately represent the domain or universe of the construct; if the construct has more than one domain or dimension, we have to make sure that questions that adequately represent these domains or dimensions are included in our measure.

Now do Exercise 11.3.

EXERCISE 11.3

Try to come up with two unidimensional and two multidimensional abstract concepts. Explain why these concepts have either one or more than one dimension.

Operationalizing the (multidimensional) concept of achievement motivation

Suppose that we are interested in establishing a relationship between gender and achievement motivation. To test this relationship we will have to measure both gender and achievement motivation. At this point, you will probably understand that whereas measuring gender will not cause any problems, measuring achievement motivation probably will, because the latter construct is abstract and subjective in nature. For this reason we must infer achievement motivation by measuring behavioral dimensions, facets, or characteristics we would expect to find in people with high achievement motivation. Indeed, without measuring these dimensions, facets, or characteristics we will not be able to arrive at bottom-line statements about the relationship between gender and achievement motivation.

After we have defined the construct, the next step in the process of measuring abstract constructs such as achievement motivation is to go through the literature to find out whether there are any existing measures of the concept. Both scientific journals and "scale handbooks" are important sources of existing measures. As a rule, empirical articles published in academic journals provide a detailed description of how specific constructs were measured; information is often provided on what measures were used, when and how these measures were developed, by whom, and for how long they have been in use. Scale handbooks are also a useful source of existing measurement scales. Scale handbooks, such as the *Marketing Scales Handbook* or the *Handbook of Organizational Measurement*, provide an exhaustive overview of measurement scales that have appeared in the academic literature. These handbooks help you to determine whether a measurement scale exists and, if more than one measurement scale exists, to make a logical selection between available measures. The use of existing

measurement scales has several advantages. First, it saves you a lot of time and energy. Second, it allows you to verify the findings of others and to build on the work of others (this is very important in scientific research but impossible if you use measures that differ from those that our predecessors have used!). Hence, if you want to measure something, see if it has been measured before and then use this measure (adapt it to your specific needs whenever this is needed). Make sure that you document the use of existing measurement scales properly.

EXAMPLE

Documenting the use of existing measurement scales

Service encounter dissatisfaction and anger were measured with seven-point, multi-item rating scales adapted from previous studies (Crosby & Stephens, 1987; Izard, 1977). These scales were introduced with the following question: "*How did you feel about your service experience on this particular occasion?*" A seven-point, multi-item measurement scale adapted from prior research (Nasr-Bechwati & Morrin, 2003) was used to measure the desire to get even with the service provider. Scales measuring customers' behavioral intentions closely followed existing scales measuring reactions to service failure. Intentions to engage in negative word-of-mouth communication, complaint filing (Zeithaml, Berry & Parasuraman, 1996), and switching (Oliver, 1996) were assessed by having participants indicate the degree to which they were inclined to such behavior on a seven-point rating scale, anchored by "not at all" and "very much."

There are several measures of achievement motivation available from the literature (Amabile, Hill, Hennessey & Tighe, 1994; Gordon, 1973; Heggestad & Kanfer, 1999; Super, 1970). But what if there were no existing measures available? In such a case, we would have to develop a measure ourselves; this means that we would have to break down the concept "achievement motivation" into observable behavior or characteristics, as detailed next.

Dimensions and elements of achievement motivation

Let us try to operationalize "achievement motivation," a concept of interest to educators, managers, and students alike. What behavioral dimensions, facets, or characteristics would we expect to find in people with high achievement motivation? They would probably have the following five typical broad characteristics, which we will call dimensions:

1. They would be driven by work; that is, they would be working almost round the clock in order to derive the satisfaction of having "achieved and accomplished."
2. Many of them would generally be in no mood to relax and direct their attention to anything other than work-related activity.
3. Because they want always to be achieving and accomplishing, they would prefer to work on their own rather than with others.
4. With mind and heart set on accomplishment and achievement, they would rather engage in challenging jobs than easy, hum-drum ones. However, they would not want to take on excessively challenging jobs because the expectation and probability of accomplishment and achievement in such jobs would not be very high.

5. They would be yearning to know how they are progressing in their jobs as they go along. That is, they would like to get frequent feedback in direct and subtle ways from their superiors, colleagues, and on occasion even their subordinates, to know how they are progressing.

Thus, we would expect those with high achievement motivation to drive themselves hard at work, find it difficult to relax, prefer to work alone, engage in challenging (but not too challenging) jobs, and seek feedback. Although breaking the concept into these five dimensions has somewhat reduced its level of abstraction, we have still not operationalized the concept into measurable elements of behavior. This could be done by examining each of the five dimensions and breaking each one down further into its elements, thus delineating the actual patterns of behavior that would be exhibited. These should somehow be quantitatively measurable so that we can distinguish those who have high motivation from those with less. Let us see how this can be done.

Elements of dimension 1 It is possible to describe the behavior of a person who is driven by work. Such a person will (1) be at work all the time, (2) be reluctant to take time off from work, and (3) persevere even in the face of some setbacks. These types of behavior lend themselves to measurement. For instance, we can count the number of hours employees engage themselves in work-related activities during work hours, beyond working hours at the workplace, and at home, where they are likely to pursue their unfinished assignments. Thus, the number of hours put in by them on their work is an index of the extent to which work "drives" them.

Next, keeping track of how frequently people persevere with their job despite failures is a reflection of how persevering they are in achieving their goals. A student who drops out of school due to failure to pass the first exam can by no means be deemed to be a highly persevering, achievement-oriented individual. However, a student who, despite getting D grades on three quizzes, toils day and night unceasingly in order to understand and master a course he considers difficult, is exhibiting perseverance and achievement-oriented behavior. Achievement-motivated individuals do not usually want to give up on their tasks even when confronted by initial failures. Perseverance urges them to continue. Hence, a measure of perseverance could be obtained by the number of setbacks people experience on the task and yet continue to work, undaunted by failures. For example, an accountant might find that she is unable to balance the books. She spends an hour trying to detect the error, fails to do so, gives up, and leaves the workplace. Another employee in the same position stays patiently on the job, discovers the error, and balances the books, spending the entire evening in the process. In this case it is easy to tell which of the two is the more persevering by merely observing them.

Finally, in order to measure reluctance to take time off, we need only know how frequently people take time off from their jobs, and for what reasons. If an employee is found to have taken seven days off during the previous six months to watch football games, attend an out-of-town circus, and visit friends, we can conclude that the individual probably would not hesitate in taking time away from the job. However, if an individual has not been absent even a single day during the past 15 months, and has not missed work even when slightly indisposed, it is evident that he is too dedicated to work to take time off from the job.

Thus, if we can measure how many hours per week individuals spend on work-related activities, how persevering they are in completing their daily tasks, and how frequently and for what reasons they take time off from their jobs, we will have a measure of the extent to which employees are driven by work. This variable, when thus measured, would place individuals on a continuum ranging from those who are least driven by work to those whose very life is work. This, then, would give some indication of the extent of their achievement motivation.

Figure 11.2 schematically outlines the dimensions (the several facets or main characteristics) and the elements (representative behaviors) for the concept of achievement motivation. Frequent reference to this figure will help you follow the ensuing discussions.

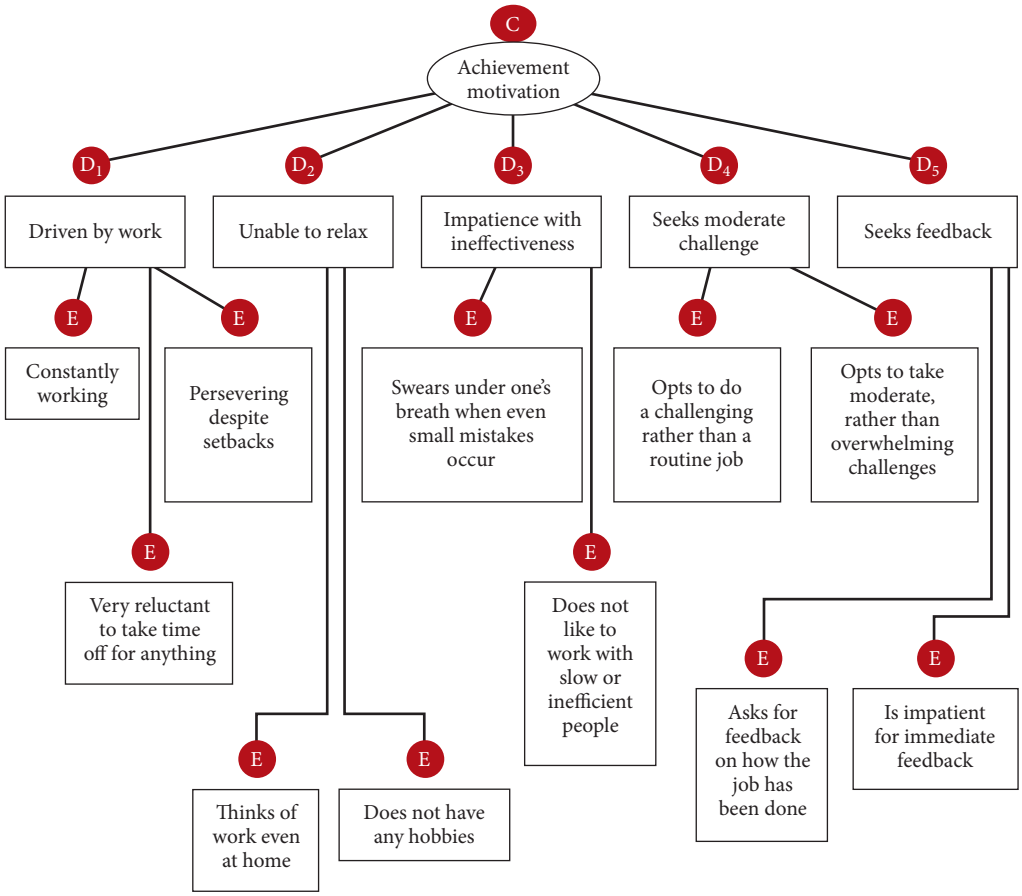

FIGURE 11.2

Dimensions (D) and elements (E) of the concept (C) "achievement motivation"

Elements of dimension 2 The degree of unwillingness to relax can be measured by asking persons such questions as:

1. How often do you think about work while you are away from the workplace?
2. What are your hobbies?
3. How do you spend your time when you are away from the workplace?

Those who are able to relax would indicate that they do not generally think about work or the workplace while at home, that they spend time on hobbies, engage in leisure-time activities, and spend their waking hours with the family or in other social or cultural activities.

Thus, we can place employees on a continuum ranging from those who relax very well to those who relax very little. This dimension also then becomes measurable.

Elements of dimension 3 Individuals with high achievement motivation have no patience with ineffective people and are reluctant to work with others. Whereas achievement-motivated persons in the organization may rank very high on these behavioral predispositions, there may be others who are not highly achievement motivated. The latter may not at all mind ineffectiveness in either themselves or others, and may be quite willing to work with almost anybody. Thus, impatience with ineffectiveness can also be measured by observing behavior.

Elements of dimension 4 A measure of how excited people are at seeking challenging jobs can be had by asking employees what kinds of jobs they prefer. A number of different job descriptions could be presented – some jobs entailing stereotyped work of a routine nature, and others with gradations of challenge built into them. Employee preferences for different types of jobs could then be placed on a continuum ranging from those who prefer fairly routine jobs to those who prefer jobs with a progressive increase in challenge. Those opting for medium degrees of challenge are likely to be more achievement motivated than those who opt for either lower or higher degrees of challenge. Achievement-oriented individuals tend to be realistic and choose jobs that are reasonably challenging and within reach of accomplishment. Heedless and overconfident persons would perhaps choose the highly challenging jobs where the success is slow in coming, oblivious to whether or not the end results will be achieved. Those who are low in achievement motivation would perhaps choose the more routine jobs. Thus, those seeking moderate challenges can also be identified.

Elements of dimension 5 Those who desire feedback seek it from their superiors, coworkers, and sometimes even from their subordinates. They want to know others' opinions on how well they are performing. Feedback, both positive and negative, indicates to them how much they are achieving and accomplishing. If they receive messages suggesting a need for improvement, they will act on them. Hence, they constantly seek feedback from several sources. By keeping track of how often individuals seek feedback from others during a certain period of time – say, over several months – employees can again be placed on a continuum ranging from those who seek extensive feedback from all sources to those who never seek any feedback from anyone at any time.

Having thus operationalized the concept of achievement motivation by reducing its level of abstraction to observable behaviors, it is possible to develop a good measure to tap the concept of achievement motivation. Its usefulness is that others could use the same measure, thus ensuring replicability. It should, however, be recognized that any operationalization is likely to, first, exclude some of the important dimensions and elements arising from failure to recognize or conceptualize them and, second, include certain irrelevant features, mistakenly thought to be relevant.

BOX 11.1

THE POSITIVIST VIEW

You will recall that we earlier pointed out that *business research* cannot be 100% scientific because we often do not have the "perfect" measuring instruments. That is why, for a positivist, the purpose of science is to stick to what we can observe (and hence, what we can measure). Knowledge of anything beyond that is impossible. Since we cannot directly observe achievement motivation, job satisfaction, and service quality, these are not appropriate topics for a scientific study.

Box 11.1 provides the (somewhat exaggerated) viewpoint of the positivist on the measurement of abstract and subjective variables. For a pragmatist or a critical realist, operationalizing the concept, nevertheless, is the

best way to measure it. Actually observing and counting the number of times individuals behave in particular ways, even if practical, would be too laborious and time consuming. So, instead of actually observing the behavior of individuals, we could ask them to report their own behavior patterns by asking them appropriate questions, which they could respond to on some (rating) scale that we provide. In the following example we will look at the type of questions that may be asked to tap achievement motivation.

EXAMPLE

Answers to the following questions from respondents would be one way of tapping the level of achievement motivation.

1. To what extent would you say you push yourself to get the job done on time?
2. How difficult do you find it to continue to do your work in the face of initial failure or discouraging results?
3. How often do you neglect personal matters because you are preoccupied with your job?
4. How frequently do you think of your work when you are at home?
5. To what extent do you engage yourself in hobbies?
6. How disappointed would you feel if you did not reach the goals you had set for yourself?
7. How much do you concentrate on achieving your goals?
8. How annoyed do you get when you make mistakes?
9. To what extent would you prefer to work with a friendly but incompetent colleague, rather than a difficult but competent one?
10. To what extent would you prefer to work by yourself rather than with others?
11. To what extent would you prefer a job that is difficult but challenging, to one that is easy and routine?
12. To what extent would you prefer to take on extremely difficult assignments rather than moderately challenging ones?
13. During the past three months, how often have you sought feedback from your superiors on how well you are performing your job?
14. How often have you tried to obtain feedback on your performance from your coworkers during the past three months?
15. How often during the past three months have you checked with your subordinates that what you are doing is not getting in the way of their efficient performance?
16. To what extent would it frustrate you if people did not give you feedback on how you are progressing?

The foregoing illustrates a possible way to measure variables relating to the subjective domain of people's attitudes, feelings, and perceptions by first operationalizing the concept. Operationalization consists of the reduction of the concept from its level of abstraction, by breaking it into its dimensions and elements, as discussed. By tapping the behaviors associated with a concept, we can measure the variable. Of course, the questions will ask for responses on some scale attached to them (such as "very little" to "very much"), which we will discuss in the next chapter.

What operationalization is not

Just as it is important to understand what operationalization is, it is equally important to remember what it is not. An operationalization does not describe the correlates of the concept. For example, success in performance cannot be a dimension of achievement motivation, even though a motivated person is likely to meet with it in large measure. Thus, achievement motivation and performance and/or success may be highly correlated, but we

cannot measure an individual's level of motivation through success and performance. Performance and success may have been made possible as a consequence of achievement motivation, but in and of themselves, the two are not measures of it. To elaborate, a person with high achievement motivation might have failed for some reason, perhaps beyond her control, to perform the job successfully. Thus, if we judge the achievement motivation of this person with performance as the yardstick, we will have measured the wrong concept. Instead of measuring achievement motivation – our variable of interest – we will have measured performance, another variable we did not intend to measure nor were interested in.

Thus, it is clear that operationalizing a concept does not consist of delineating the reasons, antecedents, consequences, or correlates of the concept. Rather, it describes its observable characteristics in order to be able to measure the concept. It is important to remember this because if we either operationalize the concepts incorrectly or confuse them with other concepts, then we will not have valid measures. This means that we will not have "good" data, and our research will not be scientific.

Review of operationalization

We have thus far examined how to operationally define concepts. Operationalizations are necessary to measure abstract and subjective concepts such as feelings and attitudes. More objective variables such as age or educational level are easily measured through simple, straightforward questions and do not have to be operationalized. We have pointed out that operationalization starts with a definition of the concept. The next step is to either find or develop an adequate (set of) closed-end question(s) that allow(s) you to measure the concept in a reliable and valid way. Luckily, measures for many concepts that are relevant in business research have already been developed by researchers. While you review the literature in a given area, you might want to particularly note the reference that discusses the instrument used to tap the concept in the study, and read it. The article will tell you when the measure was developed, by whom, and for how long it has been in use. If you cannot find or use an existing measure, you have to develop your own measure. To be able to do this, you will need to become an expert in a particular domain; this enables you to include the relevant dimensions and elements in your measure. Only a well-developed instrument, which has been operationalized with care, will be accepted and frequently used by other researchers.

Now do Exercises 11.4, 11.5, and 11.6.

EXERCISE 11.4

Provide an operational definition of the concept of "service quality" and develop questions that would measure service quality.

EXERCISE 11.5

Compare your service quality measure to the measure of Zeithaml, Berry, and Parasuraman (1996) presented in the *Journal of Retailing*.

a. How does your measure differ from this measure in terms of dimensions and elements?

b. Would you prefer using your own measure or the measure of Zeithaml, Berry, and Parasuraman? Why?

EXERCISE 11.6

Find the paper "Consumer values orientation for materialism and its measurement: Scale development and validation," written by Marsha Richins and Scott Dawson.

a. Provide an overview of the dimensions and elements of Richins and Dawson's materialism scale.

b. Use Bruner, Hensel, and James' the *Marketing Scales Handbook* or your local (electronic) library to find at least two other materialism scales. Compare the scales you have found with the Richins and Dawson scale.

INTERNATIONAL DIMENSIONS OF OPERATIONALIZATION

In conducting transnational research, it is important to remember that certain variables have different meanings and connotations in different cultures. For instance, the term "love" is subject to several interpretations in different cultures and has at least 20 different interpretations in some countries. Likewise, the concept "knowledge" is equated with "jnana" in some Eastern cultures and construed as "realization of the Almighty." Thus, it is wise for researchers who hail from a country speaking a different language to recruit the help of local scholars to operationalize certain concepts while engaging in cross-cultural research.

SUMMARY

- **Learning objective 1: Explain how variables are measured.**
  To test hypotheses the researcher has to measure. Measurement is the assignment of numbers or other symbols to characteristics (or attributes) of objects according to a prespecified set of rules. There are at least two types of variables: one lends itself to objective and precise measurement; the other is more nebulous and does not lend itself to accurate measurement because of its abstract and subjective nature.

- **Learning objective 2: Explain when operationalization of variables is necessary.**
  Despite the lack of physical measuring devices to measure the more nebulous variables, there are ways of tapping these types of variables. One technique is to reduce these abstract notions to observable behavior and/or characteristics. This is called operationalizing the concepts. A valid measurement scale includes quantitatively measurable questions or items (or elements) that adequately represent the domain or universe of the construct; if the construct has more than one domain or dimension, the researcher has to make sure that questions that adequately represent these domains or dimensions are included in the measure. An operationalization does not describe the correlates of the concept.

- **Learning objective 3: Operationally define (or operationalize) abstract and subjective variables.**
  In conducting transnational research, it is important to remember that certain variables have different meanings and connotations in different cultures.

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DISCUSSION QUESTIONS

1. Define measurement.
2. Explain why it is impossible to measure an object.
3. Provide (relevant) measurable attributes for the following objects:
   a. a restaurant;
   b. an investment banker;
   c. a consumer;
   d. a bicycle;
   e. a pair of sunglasses;
   f. a strategic business unit.
4. Why is it wrong to use correlates of a concept to measure that concept?
5. What is meant by operational definition, when is it necessary, and why is it necessary?
6. Operationalize the following:
   a. customer loyalty;
   b. price consciousness;
   c. career success.
7. Is it useful to draw on existing measures to measure abstract and subjective constructs such as customer loyalty? Why (not)?
8. "Since we cannot directly observe achievement motivation, job satisfaction, and service quality, these are not appropriate topics for a scientific study." Discuss this statement.