

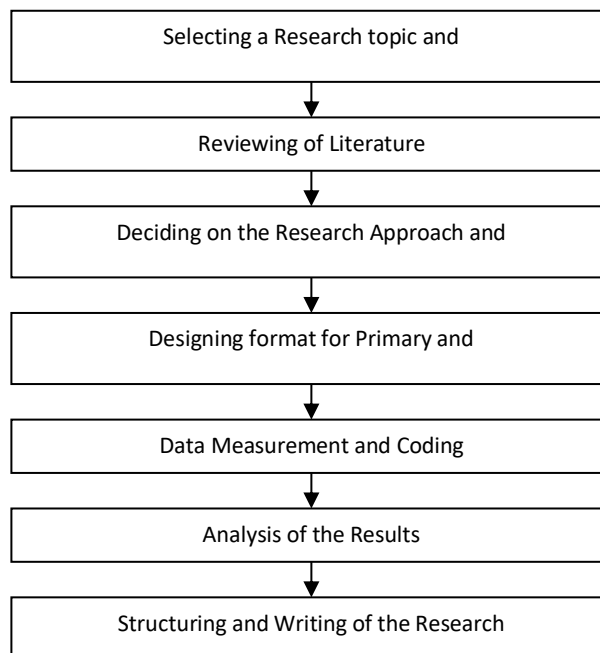
**HANDOUT #2**

**EM200 Methods of Research**  
 Engr. Reynaldo P Ramos, PhD

**Summer 2020**  
 CED Building

**1. The Research Process**

**Figure 1** illustrates the basic stages in the conduct of research (Naoum, 1998). Each stage is related to each other and revisited at different points throughout the research process. The major stages of the research will be highlighted and discussed in detailed in the succeeding sections.



**Figure 1: The Research Process**

The components of the Research Process are as follows: (a) Selecting a research topic and research proposal writing, (b) Reviewing of literature, (c) Deciding on the research approach and technique to data collection, (d) Designing formal for primary and secondary data collection, (e) Data measurement and coding, (f) Analysis of the results, (g) Structuring and writing the research.

According to Paler-Calmorin & Calmorin (2007), the research process consists of the following: (1) problem/objectives, (2) hypotheses, (3) theoretical/conceptual framework, (4) assumptions, (5) review of related literature, (6) research design, (7) data collection, (8) data processing and statistical treatment, (9) analysis and interpretation, (10) summary, conclusions and recommendations



## 2. Research Problem Identification/Research Topic Selection

Prior to the research design setting selection, the very early step to undertake in a research design is the selection of a research topic or research problem. Selection of a research problem has also a substantial influence in terms of resources (time, energy and money). The statement of the research topic (or in the form of a problem to be investigated) serves as a signpost and a boundary marker in terms of the specific path and the territory to be covered in the study. Thus, the significance of a research problem rests upon its 'contribution to knowledge'.

Furthermore, the choice of a research topic is influenced by motives, purpose, interest and expertise (personal interests/goals, academic/discipline contribution or social contribution); the literature (accessibility, complexity and difficulty of the theories, models and research), relevance and restrictions (audiences/participants, politics and feasibility); facilities and resources (Blaikie, 2000; Riley et al, 2000; Depoy & Gitlin, 1998). Indeed, framing the research problem is a critical to the entire research project and influences all subsequent research processes. It requires a thorough thinking from the selection of a broad topic area to the framing of a tangible research problem (Depoy & Gitlin, 1998).

(Miller, 1991) identifies a preliminary checklist in evaluating the overall research design:

- type of underlying theory
- study design
- access to organisation and respondents
- research control over the system to be studied
- data for test of hypotheses
- type of datum
- temporal dimension
- sample (population) and number of cases to be studied
- source and method of gathering data
- number and types of variables involved
- selection of scales for measurement (data analysis)
- character of distribution of variables
- treatment/handling of data
- time/duration for study
- funding required and availability



Finally, there are also five basic sources for research topic and problem identification as identified below (Depoy & Gitlin, 1998):

- professional experience – the most and immediate source of information
- societal trends – as reflected in the policies, legislation, and funding priorities
- professional trends – as reflected in newsletters and professional publications
- published research – research studies from journals and reports
- existing theory – as puts forward a number of relationships between concepts

### 3. The Research Questions

The research question is the most critical part or element of any research design. The formulation of research questions is the real starting-point in the preparation of a research design – answer the three main types of questions, namely: what, why and how.

It defines the nature and scope of the research which guides the arguments and inquiry, and provokes the interests among the readers. Thus, it is not uncommon to spend more time on the researching, conceptualising and forming of each individual word of the research question than on any other part of the research design.

The process of formulating and assessing research questions is not easy to spell out. Research questions are critical because of the following reasons (Bryman, 2004):

- it guide the literature search for the study
- it guide the decisions about the kind of research design to be employed for the study
- it guide the decisions about what data to be collected/needed and from whom/where
- it guide the analysis of the data
- it guide the writing up of the data
- it stop the study from going off in unnecessary directions and tangents

In other words, research questions organise, delimit and provide a framework for both the data needed and writing up of the study. It is also often involves developing a conceptual framework for the research as well, wherein the research questions operationalise the conceptual framework by focusing and delimiting the study and giving direction to the sampling decisions that will be required (Punch, 2005).

To write strong research questions, it should have the following features (Punch, 2005; Bryman, 2004):

- evocative or suggestive
- make it timely
- frame it as a paradox



- substantially relevant
- fill in the missing gap
- make connections or interconnected and related or linked to each other
- clear and easily understood
- specific and limit the variables
- researchable and answerable
- neither too broad nor too narrow
- potential for making a contribution to knowledge

Research questions need to be clearly "doable." Writing a research question is an iterative process and need to be carefully considered in the research design and budget.

#### **4. The Research Objectives**

A research objective is particular with the type/body of knowledge to be produced which ranges from simple to complex ones, and encompasses both 'basic' and 'applied' research. Research objectives include exploration, description, explanation, understanding, prediction, change, evaluation, and impact assessment as explained further below (as quoted from Blaikie, 2000):

- to explore is to attempt to develop an initial, rough description or understanding of a phenomenon/event;
- to describe is to provide a detailed account or the precise measurement and reporting of the characteristics of some population, group or phenomenon/event, including establishing regularities;
- to explain is to establish the elements, factors or mechanisms that are responsible for producing the state of or regularities in a phenomenon/event
- to understand is to establish reasons for particular action, the occurrence and course of an event, these reasons being derived from the ones given by the respondents;
- to predict is to use some established understanding or explanation of a phenomenon to postulate certain outcomes under particular conditions;
- to change is to intervene in a situation by manipulating some aspects of it, or to assist the participants/respondents in doing so, based on established understanding or explanation; and
- to evaluate is to monitor intervention programmes to assess whether they have achieved their desired outcomes, and to assist with problem-solving and policy-making
- to assess impacts is to identify the likely consequences of planned projects, technological change or policy actions on structures, processes and or people.



## 5. Characteristics of a Research Problem/Research Objectives

S-specific: the problem should be specifically stated

M-measurable: it is easy by using research instruments, apparatus, or equipment

A-achievable: can be achieved using correct statistical tools to arrive at precise results

R-realistic: real results are attained because they are gathered scientifically and not manipulated or maneuvered

T-time-bound: time frame is required in every activity because the shorter completion of the activity, the better.

In addition, a good research problem should be: (a) interesting, (b) innovative, (c) cost-effective, (d) relevant to the needs and problems of the people, (e) relevant to government thrusts, (f) measurable and time-bound.

**Research Objective** is defined as statement of purpose for which the investigation is to be conducted. It is a guide to be accomplished by the researcher in conducting a study. It has the same characteristics, SMART with research problem.

## 6. The Research Hypotheses

A simple definition of a hypothesis is that “it is a proposition to be tested or a tentative statement expressed in terms of a relationship between independent and the dependent variables” (Neuman as cited by DePoy & Gitlin, 1998; Frankfort-Nachmias & Nachmias, 1996). It is also considered as a ‘tentative’ answer to a research problem because this will be verified after it has been tested empirically (Frankfort-Nachmias & Nachmias, 1996).

A research study can be directed by one or more hypotheses, but on the other hand, there are some types of research which inappropriate to set out with hypotheses. Hypotheses are considered to be essential and stated precisely which are drawn from a variety of sources. Including research problems, hypotheses can be derived in many ways – from theories, observations, and from the professional literature (Frankfort-Nachmias & Nachmias, 1996).

The hypotheses can also be viewed to tentatively answer to ‘why’ and ‘how’ research questions (Blaikie, 2000). Further, hypotheses have some connections with the literature review, wherein in some cases it is possible to derive such an answer from existing theory or it construct a new theory. Specifically, in the ‘deductive research strategy’, the development of a theory from which hypotheses can be deduced/realised is an essential part of answering ‘why’ questions. On the other hand, in the ‘abductive’ research strategy, the hypotheses are integral part of the continuing process of data collection and analysis, observation, and testing.

The formulation of usable hypotheses is considered as a central importance. Thus, there are criteria for evaluating hypotheses’ validity which distinguish them other forms of statements (Walliman, 2006; Frankfort-Nachmias & Nachmias, 1996; Miller, 1991).

- assertions but not suggestions
- should have empirical referents



- must be specific but limited in scope
- should be related to available techniques
- should be related to current body of theory/knowledge
- expressed as economically using correct terminology
- must be conceptually clear statements about relationships between variables
- must be testable with available methods and value-free

Ultimately, a good hypothesis is a very useful aid to organising the research which somehow limits the inquiry to the interaction of certain variables (Walliman, 2006). It also suggests the appropriate methods to be used in the collection, analysis and interpretation of the data gathered. Accordingly, the confirmation and rejection of the hypotheses using empirical or experimental testing gives a clear indication of the extent of knowledge obtained. A set of questions, propositions, or a statement of intent to investigate and evaluate critically are alternatives to hypotheses. Question or questions should be derived from the research problem which also gives a clear indication of the subject under study and the methods to be used. Proposition is a theoretical statement which also indicates clear direction and scope of the research study, allowing the study to concentrate on particular relationships between events, without having to comply with the rigorous requirements of a hypothesis. Not all research study needs to test a hypothesis or to answer a question, but instead, the subject and scope of the study are expressed in a statement of intent which also derived from the research problem.

## 6. Designing a Research Strategy

Developing a research strategy depends on the following major issues: (a) type of study to be undertaken, (b) timetable or schedule to undertake the research study, and (c) appropriate data and information required for the study/topic.

The following questions will help determine the best and appropriate research strategy (<http://library.wustl.edu/research/design.html>):

- **What type of research topic/study are you working?** The depth of research depends on the nature of the study to be undertaken. It also depends on the guidelines specified by the institutions or individuals involved in the conduct of the study
- **How much time do you have?** For a limited time, it is recommended to limit gathering of information from books, journals, and magazines available in the library or on the web. Having more time to conduct the research, it is advisable to incorporate a variety of materials on the study and to obtain resources from other available sources.
- **What type of information do you need?** Research design and methodology to be employed in the study determine the type of resources to be needed. It also needs to consider the sources of data, either primary or secondary or both in the context of the study.