Organization and Planning of Scientific Research

ZHIDEBEKKYZY AKNUR
PHD, ASSOCIATE PROFESSOR

Lecture 1. Introduction to the course.

1. Course outline
2. What is research?
3. Importance of knowing how research is done
4. Identifying a research problem

The main **objective** of this lecture is to understand the basics of organization and planning a research.

What is **research**?

Why do we **need** it?

How **science** changes the world?

- In exploring nature of research, we need to distinguish this activity from **intelligence-gathering**.
- Intelligence-gathering is about **"what"** questions: percentage of GDP spent on R&D, number of unemployed, level of radiation etc. Descriptive information.
- Research is about **"why"** questions: goes beyond description and requires analysis. It looks for explanations, relationships, comparisons, predictions, generalizations, and theories.
- Why is GDP spending in R&D increasing slowly in Kazakhstan?
  Why are there fewer unemployed among men than women?
  Why are the radiation levels different in different areas?

Research is about acquiring knowledge and developing understanding, collecting facts and interpreting them to build up a picture of the world around us, and even within us.

Research includes creative work which is undertaken on an organized basis in order to increase the bank of knowledge, including knowledge of humans, culture and society, and the use of this bank of knowledge to formulate new applications. It is used to create or confirm facts, reconfirm the results of previous work, solve new or existing problems, support theorems, or develop new theories.

A research project may also be an extension on past work in the related field. ***Research is a continuous process and is useful in decision-making***.

What distinguishes a good research:

- **Research is based on an open system of thought**

  You are entitled to think anything

- **Researchers examine data critically.**

  Continually asking yourself “Have we got the facts right? Can we get better data? Can the results be interpreted differently? Thinking critically and asking provocative statements

- **Researchers generalize and specify the limits on their generalizations**

  The aim of research to obtain valid generalization to apply this understanding in a wide of appropriate situations. However, “All generalizations are dangerous – including this one” (Alexander Dumas). Therefore, its limits must be continually tested – where it applies and where it does not apply.

CHARACTERISTICS OF RESEARCH

1. Uses Scientific Methods: Research uses scientific methods to discover facts and tries to give solutions to specified problems. Researchers follow organized procedure to carry out research. To receive better results, scientific method is used for carrying out investigation.

2. Continuous Process: It is a continuous process as it studies existing facts and also develops new facts. Research also tries to distinguish relationship among variables.

3. Multipurpose Activity: Research is a multipurpose activity as it not only includes collection of data but also includes predicting future, establishing relationship between variables, finding solutions to problems, and developing new theories, tools, and concepts.

4. Maintains Objectivity: Research is based on suitable procedures. It collects appropriate, precise and objective data to understand research problem. After data collection, researcher process data, analyze it and arrive at appropriate solutions.

5. Empirical Nature: Empirical research can be undertaken to study situations where methods such as observation, experimentation or survey can be used for conducting research.

6. Generalization: Research conclusions can be applied to a large population. Research can be carried on sample of respondents that represents the universe where the conclusions generated through research can be applied to the complete universe.

7. Researchers Controlled Movement of the Research Procedure: In social research, there are many factors that have an effect on result. Due to various factors, some of them can be considered as controlled factors while others can be tested for possible consequences. But, it is difficult to execute controlled experiments in social researches, whereas it is easy to perform controlled experiments in pure sciences.

8. Development of Concepts and Theories: Research helps to develop new concepts and theories where these innovations can be useful for the betterment of society at a large scale.

IMPORTANCE OF RESEARCH

Research is significant both in scientific and non-scientific fields.

1. A research problem refers to a complexity which a researcher or a scientific community or an industry or a government organization or a society experiences. It may be a theoretical or a practical situation. It calls for a systematic understanding and possible solution.

2. Research on existing theories and concepts help us recognize their range and applications.

3. It is the bank of knowledge and provides strategy for solving problems.

4. It is important in industry and business for higher profits, output, efficiency and to improve the quality of products.

5. Mathematical and logical research on business and industry reduces the problems in them.

6. It leads to the identification and categorization of new materials, new living things, new stars, etc.

7. Inventions can be done through research

8. Social research helps find answers to social problems. They explain social phenomena and try to find solution to social problems.

OBJECTIVES OF RESEARCH

- To understand clearly an observed phenomenon and explain its logic and reason for happening.
- To get insights about problem.
- To find solutions for a problem.
- To test existing laws or theories.
- To develop new ideas, concepts and theories.
- To test hypothesis of a relationship between variables.
- To identify areas where research could make the difference.
- To predict future of events.

QUALITIES OF A GOOD RESEARCHER

1. Method of Approach: The researcher should adopt correct course of action for identifying a problem and then for working on it, to find a solution for that problem.

2. Knowledge: The researcher should have complete knowledge and information of the field of investigation so that he can go in for correct planning and then application of the correct and efficient methods for selection of the problem and then for solving it.

3. Qualification: The researcher should have a good background of study, which will facilitate the researcher to have a better knowledge and understanding of the subject.

4. Motivation: The researcher must be motivated to perform his work. For that, he should have a proper attitude, vision of his own, and an aim with some objectives to achieve something.

5. Perseverance: Perseverance means to carry on work strongly even though there are certain problems and difficulties in carrying out work. As a result, researcher should be stable and must have consistent thinking.

6. Communication Skills: Good Communication skills are required by researcher as he can interact with respondents efficiently and understand their opinions.

7. Organizational Skills: Researcher should use time management techniques so that work can be completed on time. Whereas maintaining budget, keeping records, filing necessary documents, keeping paper cuttings is needed to carry on work successfully.

8. Independent: Researcher must be able to work without close supervision, managing your own time and projects.

TYPES OF RESEARCH

Basic	Applied	Qualitative	Quantitative
Descriptive	Exploratory	Historical	Experimental

BASIC RESEARCH

- It is also known as **pure or fundamental research**.
- This research is mainly conducted to increase knowledge base. It is driven purely by interest and a desire to expand our knowledge.
- This type of research tends not to be directly applicable to the real world in a direct way, but enhances our understanding of the world around us.
- Pure research can be exploratory, descriptive or explanatory.
- Basic research generates new ideas, principles and theories in different fields.
- Basic research concentrates on fundamental principles and testing theories.
- It is sometimes implicitly said that basic research doesn't have practical applications.

For example, someone conducting basic research on cheating behavior may design a study examining whether students from illiterate families cheat more often than students from literate families.

- Notice that the research is not done to reduce cheating or help people who cheat or any other "applied" aspect, but to increase the understanding of cheating behaviour.

APPLIED RESEARCH

- Applied research is mainly related with **solving practical problems** rather than focusing on knowledge expansion.
- It is mainly used to find solutions to problems which occur on a daily basis and develop new innovative technologies.
- The main aim of applied research is to provide better technologies for humans to enhance their standard of living.
- Example: Investigating which treatment approach is the most effective for treating cancer patients / Researching which strategies work best to motivate workers.

QUANTITATIVE RESEARCH

- Quantitative research is generally related with the positivist concept.
- It usually involves collecting and converting data into numerical form so that statistical calculations can be made and conclusions drawn.
- Objectivity is very vital in quantitative research.
- Therefore, researchers try to avoid their own presence, behavior or attitude affecting the results (e.g., by changing the circumstances being studied or causing participants to behave differently).
- They also examine their methods and results for any possible bias.
- The aim of quantitative research is to develop mathematical models, theories related to phenomenon. Quantitative research is mainly used in social sciences.

QUALITATIVE RESEARCH

- Qualitative research is the approach usually related with the social constructivist concept which emphasises the socially constructed nature of reality.
- It is about recording, analysing and attempting to reveal the in debt meaning and significance of human behaviour and experience, including conflicting beliefs, behaviours and emotions.
- The qualitative method tries to answer why and how of decision-making rather than what and when.
- The approach to data collection and analysis is logical but allows for greater flexibility than in quantitative research.
- Data is collected in textual form on the basis of observation and communication with the participants, e.g., through participant observation, in-depth interviews and focus groups.
- It is not converted into numerical form and is not statistically analysed.

DESCRIPTIVE RESEARCH

- Descriptive research is used to describe characteristics of an observable fact being studied.
- Descriptive studies are structured in such a way that it cannot be changed frequently, so it can be said that they are rigid in nature.
- They cannot identify cause and effect relationship between variables.
- Descriptive research answers questions such as who, when, where, what and how.
- This type of research describes what exists and may help to reveal new facts and meaning.
- The purpose of descriptive research is to observe, describe and document

EXPLORATORY RESEARCH

- Exploratory research is carried out for a problem that has not been clearly defined.
- The main aim of this research is to gather initial information which helps to define problems and recommend hypothesis.
- Exploratory research helps to settle on the best research design, data collection method and selection of subjects.
- Exploratory research often relies on secondary research such as reviewing available literature, or qualitative approaches such as informal discussions with consumers, employees, management or competitors, and more formal approaches through in-depth interviews, focus groups, projective methods, case studies or pilot studies.
- Exploratory research can mainly be conducted when researchers lack clear idea of the problem.
- The results of exploratory research are not generally useful for decision-making, but they can provide major insight into a given situation.

HISTORICAL RESEARCH

- It is defined as the type of research that examines past events or combinations of events to arrive at an account of what has happened in the past.
- Historical research is carried out to discover the unknown; answer questions, recognise the relationship that the past has to the present; record and assess activities of individuals, agencies, or institutions; and assist in understanding the culture in which we live.
- Historical research can exhibit patterns that occurred in the past and over time which can facilitate us to see where we came from and what kinds of solutions we have used in the past.
- We usually will notice that what we do today is expressly rooted in the past. Historical research involves the process of collecting and reading the research material collected, and writing the document from the data collected.

EXPERIMENTAL RESEARCH

- It is commonly used in sciences such as sociology and psychology, physics, chemistry, biology, medicine, etc.
- It is a collection of research designs which use manipulation and controlled testing to understand fundamental processes.
- Usually, one or more variables are manipulated to establish their effect on a dependent variable.
- Experimental Research is mainly used when: there is time priority in a causal relationship (cause precedes effect) or there is uniformity in a causal relationship (a cause will always lead to the same effect) or the magnitude of the correlation is great.
- Experimental research is important to society as it helps us to improve our daily lives.

VARIOUS STAGES OF A RESEARCH

A universal set of chronological components of research is the following:

- Selection of a research topic
- Definition of a research problem
- Literature review
- Evaluation of current status of the topic chosen
- Formulation of hypotheses / Research design
- Actual investigation
- Data analysis
- Interpretation of result
- Report

LIMITATIONS OF RESEARCH

1. Bias by Researcher: Bias is a major issue in the success of any research work. Bias takes place at many levels like personal bias by researcher, biased questionnaire, biased respondent or improper sampling.

2. Defective Data Collection: When a researcher is not loyal towards his work, he may use faulty methods of data collection leading to faulty conclusions.

3. Existence of Subjectivity: Subjectivity occurs when researcher is inclined by likes and dislikes, beliefs, faith, etc. These factors may have a negative impact on the worth of research and cause damage thereby increasing subjectivity of the research work.

4. Lengthy and Time-consuming: Research is a lengthy process and a time-consuming activity. Even though carried out in systematic manner, exploratory research may require more time.

5. Costly Process: Research is costly process as it requires services of experts. Cost is also involved in data collection.

Quick review

What is research?
State the objectives of research
Describe steps of research
What are the limitations of research?
Discuss the types of research:

Basic	**Applied**	**Qualitative**	**Quantitative**
Descriptive	**Exploratory**	**Historical**	**Experimental**

Choosing dissertation topic

Deciding on a topic for your thesis, dissertation or research project is the first step in making sure your research goes as smoothly as possible. When choosing a topic, it's important to consider:

- Your university's and department's requirements
- Your areas of knowledge and interest
- The scientific, social, or practical relevance
- The availability of data and sources
- The length and timeframe of your dissertation

Step 2: Choose a broad field of research

Start by thinking about your areas of interest within the subject you're studying. Examples of broad ideas include:

- Management
- Economic history
- Logistics
- Online marketing

It's a good idea to pick a field that you already have some familiarity with, so that you don't have to start your research completely from scratch. You don't have to be an expert on the topic, but if you've already read a few articles, that gives you a good starting point to find out more.

Step 3: Look for books and articles

Try skimming through a few recent issues of the top journals in your field, as well as looking at their most-cited articles. For inspiration, you can also search Google Scholar, subject-specific databases, and university library's resources.

If you've already read some articles in the field, check their reference lists to find more useful sources. As you read, note down any specific ideas that interest you and make a shortlist of possible topics.

Step 4: Find a niche

After doing some initial reading, it's time to start narrowing down your broad area. This can be a gradual process, and your topic should get more and more specific. For example, from the ideas above, you might narrow it down like this:

- Online marketing - Social media marketing - Social media engagement strategies

All of these topics are still broad enough that you'll find a huge amount of books and articles about them. Try to find a specific niche that not many people have researched yet (such as a neglected author or time period), a question that's still being debated, or a very current practical issue.

If there's already a lot of research and a strong consensus on your topic, it will be more difficult to justify the relevance of your work. But you should make sure there is enough literature on the topic to provide a strong basis for your own research.

At this stage, make sure you have a few backup ideas — there's still time to change your focus. If your topic doesn't make it through the next few steps, you can try a different one. Later, you will narrow your focus down even more in your problem statement and research questions.

Step 5: Consider the type of research

There are many different types of research, so at this stage, it's a good idea to start thinking about what kind of approach you'll take to your topic. Will you mainly focus on:

Collecting original data (e.g. experimental or field research)?

Analyzing existing data (e.g. national statistics, public records or archives)?

Comparing scholarly approaches (e.g. theories, methods or interpretations)?

Many dissertations will combine more than one of these.

You don't have to finalize your research design and methods yet, but the type of research will influence which aspects of the topic it's possible to address, so it's wise to consider this as you narrow down your ideas.

Keep in mind that collecting original data takes a great deal of time. If you don't have a lot of time to spend on your dissertation, it might be best to focus on analyzing existing data from primary and secondary sources.

Step 6: Determine the relevance

It's important that your topic is interesting to you, but you'll also have to make sure it's academically, socially or practically relevant.

Academic relevance means that the research can fill a gap in knowledge or contribute to a scholarly debate in your field.

Social relevance means that the research can advance our understanding of society and inform social change.

Practical relevance means that the research can be applied to solve concrete problems or improve real-life processes.

The easiest way to make sure your research is relevant is to choose a topic that is clearly connected to current issues or debates, either in society at large or in your academic discipline. The relevance must be clearly stated when you define your research problem.

Step 7: Make sure it's plausible

Before you make a final decision on your topic, consider again the length of your dissertation, the timeframe in which you have to complete it, and the practicalities of conducting the research.

Will you have enough time to read all the most important academic literature on this topic? If there's too much information to tackle, consider narrowing your focus even more.

Will you be able to find enough sources or gather enough data to fulfil the requirements of the dissertation? If you think you might struggle to find information, consider broadening or shifting your focus.

Do you have to go to a specific location to gather data on the topic? Make sure that you have enough funding and practical access.

Last but not least, will the topic hold your interest for the length of the research process? To stay motivated, it's important to choose something you're enthusiastic about.

Step 8: Get your topic approved

Submit a brief description of your topic to a supervisor. It's a good idea to discuss your ideas with your supervisor before you write a full research proposal / design.

Remember, if you discover that your topic is not as strong as you thought it was, it's usually acceptable to change your mind and switch focus early in the dissertation process. Just make sure you have enough time to start on a new topic, and always check with your supervisor or department.

Thank you for your attention!