# Unit One: Introduction to Research

# Unit Information

## Unit Overview

This unit begins by describing what we understand by the term 'research'. Research is considered as a process and the key stages that provide a basic plan for conducting research are identified. Discussions then move on to the role of research in both the natural and social sciences. These discussions explore how data, information, knowledge, decision-making, and the research–client relationship relate to research. Having provided this grounding, the unit then focuses on the theoretical considerations involved in the first stage of the research process: formulating the research problem and research questions, hypotheses or objectives. Tips on writing research questions and developing hypotheses are provided.

## Unit Aims

The overall aim of this unit is to explain what we mean by 'research', consider the role of research and explore the theoretical considerations at the start of the research process. The specific aims are:

- To define what we mean by 'research' and describe the stages and concepts behind the research process.

- To explore how data, information, knowledge, and decision-making relate to the role of research.

- To explain how research ideas are formulated into researchable problems.

- To provide guidance on formulating and writing research questions or hypotheses and research objectives.

## Unit Learning Outcomes

By the end of the unit, students should be able to:

- explain what is meant by the term 'research' and describe the stages of the research process

- describe how data, information, knowledge, decision-making, and the research–client relationship relate to research

- formulate research problems from research ideas

- formulate and write research questions or hypotheses and research objectives

## KEY READING

**Section 4**

❖ O'Leary Z (2005) From real problems to researchable questions. In: *Researching Real-World Problems*. Sage Publications, London, pp. 23–38.

This reading offers some more advice on identifying a research problem and suggests a process for developing the research question. In particular it illustrates the importance of examining our own assumptions when developing a research question.

## FURTHER READINGS

Bryman A (2012) *Social Research Methods*, 4th edn. Oxford University Press, Oxford.

This is a core text and you might like to familiarise yourself with it. There will be specific references to it throughout the units.

Davies S (1994) Information, knowledge and power. *Institute of Development Studies Bulletin* **25**(2) 1–13.

Available from: http://www.ids.ac.uk/index.cfm?objectid=1310D52A-0CCE-87C8-B4906CF09DFBF4F9

# REFERENCES

Andrew CO, Hildebrand PE (1982) *Planning and Conducting Applied Agricultural Research.* Westview Press Inc.

Bryman A (2008) *Social Research Methods,* 3rd edn*.* Oxford University Press, Oxford.

Dixon BR, Bouma GD, Atkinson GBJ (1987) *A Handbook of Social Science Research*. Oxford University Press, Oxford.

Dorward AR, Chirwa E, Boughton D, Kelly V (2007) *Evaluation of the 2006/7 Agricultural Input Supply Programme, Malawi: Interim Report*. Imperial College London.

Frankfort-Nachmias C, Nachmias D (1996) *Research Methods in the Social Sciences*. Edward Arnold.

Nutley S, Walter I, Davies HTO (2003) From knowing to doing: a framework for understanding the evidence-into-practice agenda. *Evaluation* **9**(2) 125–148.

Punch KF (1998) *Introduction to Social Research: Qualitative and Quantitative Approaches*. Sage Publications, London.

## WEBLINKS AND PORTALS

| | |
|---|---|
| **ODI**<br>**Overseas Development Institute** | Research programme on Research and Policy in Development (RAPID). Understanding the role of knowledge in policy and practice.<br><br>http://www.odi.org.uk/publications/220-bridging-research-policy-rapid-approach |
| **Reading University Statistical Services Centre** | Provides links to learning resources.<br><br>http://www.rdg.ac.uk/ssc/publications/publications.html |
| **Royal Statistical Society** | Statistics glossary.<br><br>http://www.stats.gla.ac.uk/steps/glossary/alphabet.html |
| **The Web Center for Social Research Methods** | http://www.socialresearchmethods.net/ |

## MULTIMEDIA

ODI (undated) *Talking Heads: Civil Society Partnerships Programme Video Interviews.* Interviews with Carlos Aramburu (Video 8. Duration 2.24 minutes) and Susan Mbaya (Video 11. Duration 1.51 minutes). Research and Policy in Development (RAPID), Overseas Development Institute (ODI), London.

Available from:
http://www.odi.org.uk/Rapid/Tools/talking_heads/Interview_list_CSPP.html

These short film clips are available in the e-study guide by kind permission of ODI and the interviewees.

# 1.0  WHAT IS RESEARCH?

## Section Overview

This section discusses what we mean by 'research' and how we distinguish it from other forms of enquiry. The idea of research as a process is presented and we consider how research may be evaluated.

## Section Learning Outcomes

By the end of this section, students should be able to:

- define what is meant by the term research

- draw a simple diagram of the research process

- identify and define the key stages of the generalised research process

## 1.1  Research defined

We can define research as an activity of systematic enquiry that seeks answers to a problem.

### Research in our everyday lives

We all encounter research in our daily lives. The results of research on many topics are presented to us in the form of newspaper articles, books, reports, and television programmes. For example, crime level figures are presented to us by television news reports and some topics, such as diet and health, are very popular with magazines as well as television programmes. Thus, through various media we have become accustomed to seeing, reading and hearing about research and although we may not be aware of it, we are used to making our own judgements about research findings. If we take the example of diet and health, many of us have taken into consideration information that has been presented on 'healthy eating' and have made our own choices about diet within the context of our own lives. We assess the information with which we are presented, form an opinion as to the validity and relevance of the research, and come to our own conclusions based on considerations such as:

- what we understand is the question or problem to be answered

- how the findings are presented

- why the research was conducted

- what we know about who conducted the research

- what other people think about the information

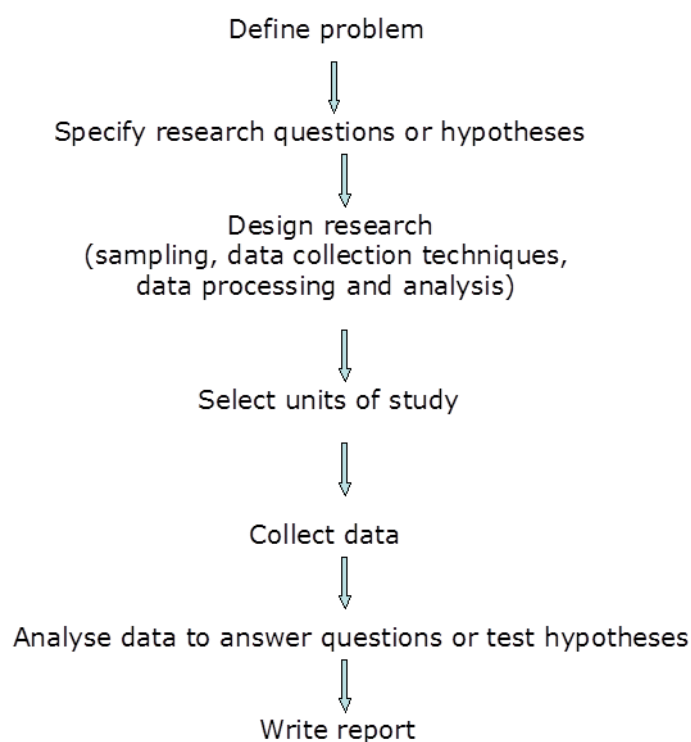- how the research findings relate to us

We may choose to ignore the information, we may decide we don't understand what the findings mean, we may disagree, or we may agree with the findings and either adjust our eating habits or decide that the costs of adjustment are too high relative to the benefits. For some, because of their life circumstances, such as those suffering

from a food shortage, the information may be of little immediate value. In other words, you may not be aware of it, but you already have some understanding of the research process, the role of research, research concepts, and research evaluation.

## 1.2   Research as a process

Research can be seen as a series of linked activities moving from a beginning to an end. Research usually begins with the identification of a problem followed by formulation of research questions or objectives. Proceeding from this the researcher determines how best to answer these questions and so decides what information to collect, how it will be collected, and how it will be analysed in order to answer the research question.

**1.2.1 Research process — linear representation**

Define problem

Specify research questions or hypotheses

Design research
(sampling, data collection techniques,
data processing and analysis)

Select units of study

Collect data

Analyse data to answer questions or test hypotheses

Write report

Source: unit author

An animated version of this diagram is available on your e-study guide

Described in this way the research process is given the impression of linearity, yet research investigation is often an iterative process whereby the process of conducting the research will give rise to new ideas which, in turn, feed back into the data collection and analysis stage. Decisions made early in the research process are often revisited in the light of new insights or practical problems encountered along the way.

### 1.2.2 Cyclical or iterative research process



Define problem
↓
Specify research questions or hypotheses
↓
Design research
(sampling, data collection techniques,
data processing and analysis)
↓
Select units of study
↓
Collect data
↓
Analyse data to answer questions
or test hypotheses
↓
5
Write report
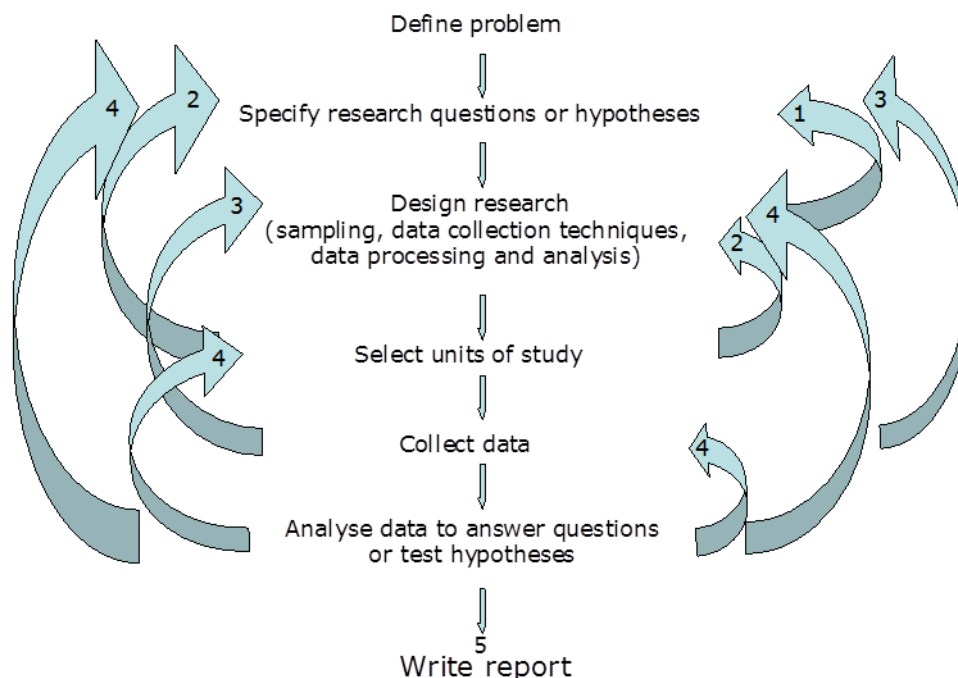
(1) Through the process of designing your research, consideration of both practical and conceptual issues may force you to reconsider your original research question.

(2) Difficulties with access to research sites or participants may cause you to reconsider your questions or your methods.

(3) Issues arising during data collection may suggest that additional data are required or reveal problems with the original research question.

(4) Problems or new questions arising from analysis of data collected so far may result in a need to collect more data, sample elsewhere or employ a different technique.

(5) Finally you progress to the report writing stage.

Source: unit author

An animated version of this diagram is available on your e-study guide

Regardless of the route taken subsequently, research should start with the problem and the research questions. If the intention of research is to answer your questions, it follows that choice of method should develop from your question: choose the method that can best provide the information you need to answer your research question given the resources available to you. This is one reason why it is very important to be clear as to what you are asking.

As you can see there are numerous choices to be made within the research process. Planning your research involves the consideration of four overlapping themes.

• The conceptual approach – the philosophical underpinnings of research

• Research design – how data collection is organised

• Data collection techniques – how data are collected

- Sampling – from whom data are collected

These aspects of research planning can be represented as forming different layers of a research 'onion'.

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### 1.2.3 The 'onion' diagram of research choices
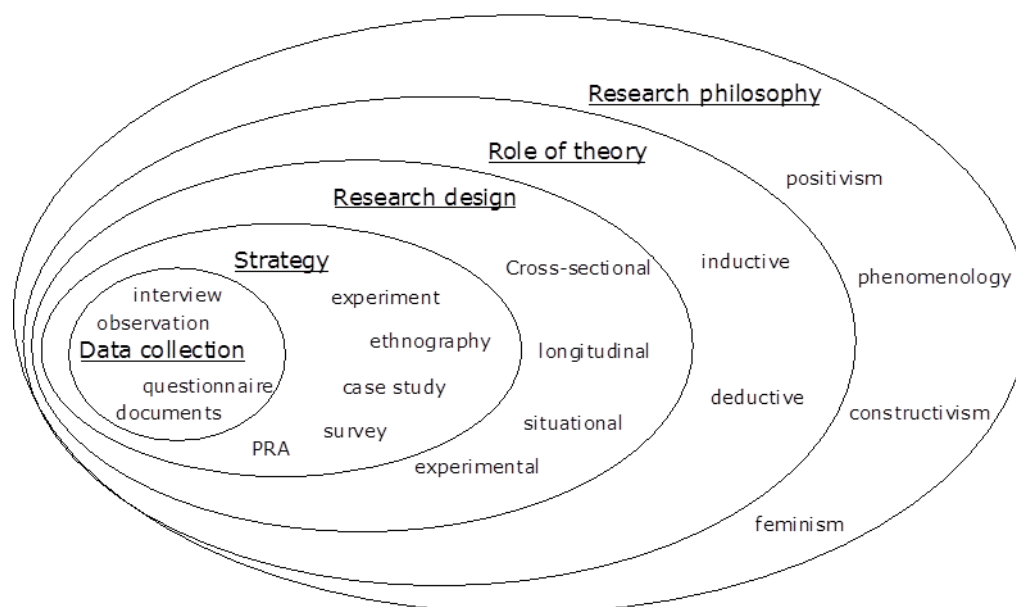


Source: unit author

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Each layer of the onion presents a different set of choices regarding research philosophy, research approach, method and so on. All research involves choices at all these levels, though these choices are not always made explicit. Choices further into the centre of the onion are often, but not always, contingent on those made further out.

> ✎ Compare the two different representations of research presented above (the 'research onion' and the animated diagrams of the research process). Note down the particular insights given by each diagram.

**Other considerations**

Choices in research planning must also take into account the following:

- the types of information outputs required – who needs the information and for what purposes

- research resources – time, funds, facilities, staff, and access

- ethical considerations – for example, within the research plan is it possible to obtain informed consent from all participants, does the plan involve any risks to the safety of the researcher, can the researchers assure the confidentiality of all information given?

## Clarifying terminology

You will notice when reading about research that different authors use an assortment of terminology to describe the stages of the research process. This can make reading around the subject somewhat confusing and unclear.

You will commonly encounter the following terms, some of which may seem somewhat interchangeable.

- 'Research topic' often used interchangeably or to mean the same thing as others' use of the terms 'research problem' and 'research situation'.

- 'Research strategy' often used interchangeably or to mean the same thing as others' use of the term 'research approach'.

- 'Method' can refer to a broad strategy of data collection or a specific tool for collecting data. For example 'survey' or 'ethnography' are sometimes defined as methods, as are 'interview' and 'observation'. For this reason we will limit the use of the word method.

The various ways in which approaches and designs are classified by authors are not always distinct, but overlap and can be used in different combinations. Consistent use of terminology is also complicated by overlap between some concepts or components of the research process (for example, according to our definitions below 'experiment' is both a research design and a research strategy). This reflects both the differing use of the same terminology and the fact that designs may be combined. This module will apply terminology according to the following definitions.

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**1.2.4 Research process terminology, module definitions**

**Plan**

General plan of how research questions will be answered, this includes the approach and design.

**Research approach**

This is the theoretical or conceptual basis for the research. For example: positivist, interpretivist, realist etc.

**Research design**

How data collection is organised in order to answer the research question. Basic design types are: (1) Situation, 'snap-shot' or Baseline (sometimes called case-study); (2) Cross-sectional comparison; (3) Longitudinal; (4) Longitudinal comparison; (5) Experiment.

**Research strategy**

Refers to a methodological practice or tradition: For example: experiment, survey research, or case studies.

**Data collection techniques**

How data are collected: questionnaire; interview; observation; documentary analysis.

Source: unit author

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## 1.3  Generalised summary of the research process

Whatever approach or strategy is followed, the research process can usually be summarised as follows:

- **Identify and formulate the research topic or problem**

  Select, narrow and formulate the topic or problem to be studied and conduct preliminary literature search.

- **Literature search and review**

  Read around the subject to help clarify your research topic, questions, and methods. Critically review literature to compare your research with what has already been done, and to give context. This stage interacts with other stages.

- **Research objectives, questions, and hypotheses**

  Define clear questions and/or hypotheses.

- **Research approach, design, and strategy**

  Select a research approach and design that will make it possible to answer research questions and plan the overall research strategy.

  Identify the data you want to record and from whom/where you are going to collect it (sampling).

- **Data collection**

- **Data analysis**

  The data collected are prepared in such a way that they describe and highlight what was found in the research. Analytical tools are used to describe the data and measure or explore relationships between the subjects or items of interest.

- **Generalisation and write-up**

  The researcher relates the evidence collected to the research question(s), draws conclusions about the question(s) or hypotheses, and acknowledges limitations of the research.

## 1.4  What makes research scientific?

We place special emphasis on the process of research because it is the rigour with which this is carried out (the scientific method) that distinguishes scientific research from other forms of enquiry, and scientific knowledge from other kinds of knowledge.

Scientific method is one means by which knowledge is created; however, it is not the only way we know or understand our world. Three other modes of knowing in human societies can be identified (Frankfort-Nachmias and Nachmias 1996).

- **Authoritarian** – individuals serve as sources of knowledge by virtue of their social or political position. These individuals may be religious or political leaders, kings or 'experts' such as respected scientists.

- **Mystical** – knowledge is sought from the supernatural world.

- **Rationalistic** – within the school of rationalism knowledge can be derived from the rules of logic and without reference to the empirical world.

In contrast to the modes listed above, scientific knowledge about the world is based upon **empirical** observation. Observation is used to develop theory to help us to describe, understand, and predict how our world works. The procedures by which observations are gathered, evaluated, and used to produce new knowledge are termed **methodology.**

Research **methodologies** are the rules and procedures by which knowledge is generated and shared. They allow research and therefore knowledge claims to be evaluated. The following criteria are commonly used to evaluate scientific research (Bryman 2008).

- **Reliability -** Is the research study repeatable? – that is: are the measures used reliable and consistent. If I go back and repeat the measurements in the same conditions will I get the same results?

- **Replication** - This refers to the idea that the procedures (methodology) employed in the study are reported in sufficient detail that a second researcher could repeat the study.

- **Validity** – This concerns the integrity of conclusions that are generated through a research study. There are a number of issues raised here including (1) does the measure employed accurately reflect the concept under investigation; (2) is the causal relationship robust – can we be sure that X is the **cause** of Y? (3) Can we be confident that we can extrapolate our findings beyond the research context?

In certain instances and particularly where a research study is not seeking to extrapolate statistical findings beyond the research context, the criteria of **trustworthiness** has been suggested as a means to ensure the integrity of conclusions.

All the criteria above are judged by perceived rigour in method; that is confidence that the researcher has followed accepted procedures to ensure to the fullest that the conclusions reached are robust. To achieve confidence in the results of a study demands 'disciplined inquiry' such that the data, arguments, and reasoning are able to withstand examination by other members of the scientific community (Punch 1998).

## Section 1 Self-Assessment Questions

# Question 1

Explain why research is considered to be an iterative process.

# Question 2

Arrange the following activities into their expected sequence in the general research process (ignoring the need for iterative changes).

   (a) Analyse data

   (b) Collect data

   (c) Define topic

   (d) Formulate questions

   (e) Search literature

   (f) Select design and methods

   (g) Select units of study

   (h) Write report

# Question 3

What are the criteria by which scientific research (and therefore, the knowledge that is generated through it) are commonly evaluated?

## 2.0  RESEARCH FOR POLICY AND DECISION-MAKING

## Section Overview

In the previous section we briefly considered the characteristics that are deemed to make research scientific; in this section we will consider what makes research useful.

## Section Learning Outcome

By the end of this section, students should be able to:

- discuss the impact of information from research on decision-making by considering 'who needs information', the users of information (clients) and the quality of information

## 2.1  Why research? The role of information

Research begins when we want to know something. Research is concerned with increasing our **understanding**. Research provides us with the **information** and **knowledge** needed for **problem solving** and **making decisions**.

Research is sometimes divided into **pure** (or basic) and **applied** research in order to make a distinction between research that is carried out to further our knowledge and that which seeks to apply pre-existing knowledge to real world problems. Our focus here is applied research for decision-making for public policy. In this context the purpose of research is 'problem solving'.

### Research for problem solving

Problem solving can be broken down into a number of separate components, each of which requires information and analysis:

- identification of problems
- diagnosis of causes
- identification of potential solutions
- decision for action
- monitoring and evaluation of action and outcomes

Information for policy-making will therefore serve one or more of the following functions.

- **Description** – to provide baseline data or simply a picture of how things are.
- **Explanation (analytical)** – to understand why things are the way they are, what factors explain the way things are.
- **Prediction –** to predict how systems will change under alternative scenarios (modelling).
- **Prescription and planning (decision-making**) – prescription and planning relating to changes in existing systems.

- **Monitoring and evaluation** – monitoring and evaluation of the effects of changes during and after they have been made. Investigations may be made to compare results in practice with predictions, or to monitor the effects of a policy, management technique or treatment.

Examples of research serving the functions listed above:

| Function | Natural science | Social science |
|---|---|---|
| **Description** | Ecological survey of an estuarine habitat | Baseline survey of small businesses in a province |
| **Explanation** | Field experiment in grassland community manipulating grazing pressure | Study comparing two communities with differing teenage pregnancy rates |
| **Prediction** | Study investigating the response of fish populations to increased nitrates in river water | Study investigating the effects of increased taxation on household savings |
| **Monitoring and evaluation** | Periodic surveys of soil quality adjacent to manufacturing plant | Survey of school attendance following introduction of free school meals |

> ✍ Many problems are multi-disciplinary and require investigation of both natural and social processes (for example, in health or agricultural research). Write down for each function above an example of multi-disciplinary research.

## Information, knowledge, and power

Behind the list of problem-solving activities or research functions is a set of very important social and political questions about who is involved and who is in control at each stage.

- Who identifies problems?
- Who diagnoses causes?
- Who identifies potential solutions?
- Who decides on action?
- Who monitors and evaluates action and outcomes?

These questions emphasise the central role of decision-makers in decision-making. This may seem rather obvious, but it is important to recognise that different people have different objectives, different information, different views of the world, different access to resources and power. Research for policy is therefore far from being a neutral, objective process.

Current observations, knowledge, and policy concerns therefore tend to influence both the selection of topics to be researched and the way that they are researched. How may this relationship between policy and research limit the benefits of research for policy-makers? How may this relationship between policy and research pose problems for researchers?

Research can limit policy change or stimulate it. Thus if current policy sets the agenda for research, then research that conforms to the broad objectives and assumptions of current policy and uses easily available data may not ask enough questions to challenge the fundamental approach of policy. It may then promote more effective design and implementation of an ineffective or inappropriate policy, without questioning the policy or looking for alternatives. This is an important danger that researchers must be aware of. We sometimes need to question basic assumptions, and break out of the 'box' of current thinking. Political currents and pressures, the demands of clients willing to fund research, 'fashions' in development thinking, an emphasis on technology or modernisation, our own experience, and the availability of data and information can all, consciously or unconsciously, strongly affect our choice of problems to research and the questions we address in our research. This is a danger that all researchers have consciously to guard against.

## The research–client relationship

Research clients usually have a say in the topic of research and in the definition of research objectives. These objectives will normally be related to overcoming problems that the clients define as important.

If certain categories of stakeholders (in particular the socially disadvantaged) are not considered as research clients, their particular interests and problems (as they define them) are unlikely to be investigated. This will then affect the focus of the research, how it is conducted and the research findings. The cycle of learning and doing, research and action, may thus exclude particular groups of people and their interests. This may occur even when individual research studies are conducted using apparently sound and objective research methodologies.

There are methods that explicitly recognise this relationship between research, information, and development, these are participatory research methods. They attempt to involve different stakeholders (and, particularly, more vulnerable groups) in the definition of research problems and objectives and in the interpretation of research findings. The process of different stakeholders reaching agreement about information on problems and their solutions makes participatory research an implicit part of a participatory development process.

Clients (often the research funders) are key drivers in determining the focus, methods, and findings of research. Consequently, research may not necessarily focus on issues that researchers may consider most important, but rather what the client is willing to fund. Research findings should be considered in the light of the client–researcher relationship. Clients and researchers may have a vested interest in the

outcome of the research and results may be presented to prove a point. For example, a client may commission an experiment to show that the insecticide they manufacture is more effective than one manufactured by another company. The results may show that their insecticide is indeed more effective than that of their competitor under the specific test conditions. However, are the results repeatable and do the insecticides perform in the same manner under different test conditions?

The results should be critically assessed bearing in mind the focus and presentation.

This discussion shows that applied research topics and methods are closely related to the philosophy, objectives, and approaches of researchers and their clients.

## 2.2   Research and decision-making

### 2.2.1 Research, information, and decision-making
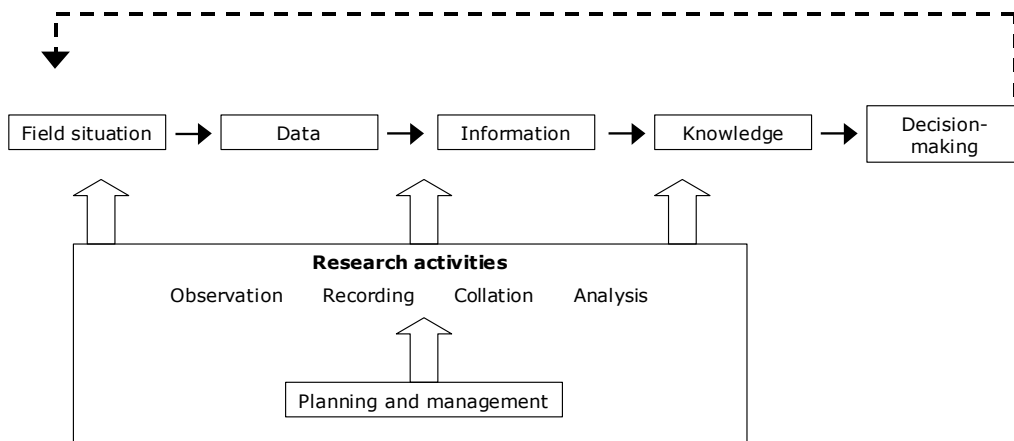


Source: Dorward personal communication

Figure 2.2.1 represents the transformation of data into knowledge for decision-making. In this context, data refer to raw, unanalysed material; information is analysed data; knowledge the subsequent absorption, assimilation, and understanding of that information. This diagram draws attention to the steps that link the situation being studied to acquisition of data; data to information; information to knowledge; and knowledge to decision-making.

Clearly there is scope for error, influence or bias, and delay at each of these steps.

### Information for decision-making, what can go wrong?

**Bias:** data and information may reflect one aspect of a situation but not others. Bias may arise by accident or deliberate manipulation of the data or information. Bias may arise from faulty problem specification, research design, sampling, data collection, analysis, interpretation, and presentation – that is at any stage of the research process. It can be very difficult to detect and prevent as we all have inadequate understandings which bias our research. Recognising, and as far as possible reducing, bias is a critical research skill and a major explicit and implicit focus of this module.

**Recording and editing:** recording, transcription, and editing errors may be introduced at the observational stage, during recording, collating, and analysis.

**Selection:** data and information selected may not be relevant to the decision for which the information is required. Information for one decision-maker may be data to another – depending upon the decisions they are concerned with.

**Time:** if each step takes too much time, then the whole process may not deliver information to the relevant decision-makers in time to be used in decision-making.

**Analysis and interpretation:** particular problems may arise in analysis and interpretation, such as the use of an inappropriate analysis technique leading to invalid interpretation.

This summary allows us to identify some of the qualities required of information if it is to be useful in decision-making.

### What are the qualities of 'good' or useful information?

The definition of 'good' information varies between different users of information. Therefore it may be helpful to consider who might be the users of information generated by research?

- **planners** have clear information requirements as they seek to identify and solve problems as outlined above

- **implementers** of projects need to monitor what they are achieving and the impacts of their activities, in order to adjust their activities

- **policy-makers**, like planners, must be informed about problems, their causes, and means of overcoming them

- **donors** seek to take actions to support other stakeholders and at the same time pursue their own, sometimes contradictory, objectives

- **service agencies** (such as extension and research organisations, and input and output marketing companies, for example) need to make decisions about how to invest and what activities to engage in

- **academics** can be major users of information

Information should generally be

- **comprehensive** (in its coverage of issues important for a particular decision)

- **consistent** with previous studies (as regards methods or coverage) and internally consistent as regards facts and conclusions

- **clearly presented** and easy to comprehend without excessive detail

- **relevant** to the problem under consideration

- **reliable and accurate**

- **representative** of the situation as a whole, not biased or one-sided in its coverage

- **timely**, with regard to the timing of decisions

- **generalised** and **applied only to situations** similar to those from which it was obtained

- **directed and delivered** to the relevant decision-makers

- **cost-effective**, providing information as cheaply as possible at costs in proportion to the potential benefits gained from improved decision-making

There are often conflicts between, for example, cost-effectiveness and timeliness on the one hand, and comprehensiveness and reliability on the other. Considerable skill is required in research design and management; there is usually a trade-off between these parameters.

## How knowledge is used in decision-making

The utilisation of research for decision-making is mediated by social and political factors. Research findings do not always feed directly into decision-making for policy and practice. However, research may influence the policy process and the actions of practitioners even if not used directly.

Four main types of research utilisation have been identified (Nutley *et al* 2003).

(1) Instrumental use – research feeds directly into decision-making

(2) Conceptual use – research changes practitioners' understanding providing new ways of thinking

(3) Mobilisation of support – research as an instrument of persuasion

(4) Wider influence – research findings may come into use through networks of practitioners and researchers and alter policy paradigms or belief communities

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**?** Achieving evidence-based policy

Achieving policy impact through research is far from guaranteed. Watch the ODI 'Talking Heads' video clips (see multimedia listing) of interviews with Carlos Aramburu and Susan Mbaya on how to influence policy through research evidence.

Make a list of the main points made.

*Answer*

*The need for researchers to understand what the policy process is and how policy is made.*

*The need to form partnerships with policy-makers in the research process.*

*The importance of presenting information clearly in a form accessible to policy-makers.*

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✍ A policy change will often require a change in information needs on the part of policy-makers. For one of the policy changes listed below, identify the likely information needs and availability first under the existing policy, and then under the new policy. What sorts of information problems are likely to be encountered in designing and implementing the new policy?

– A nation's **biodiversity action plan** that moves from an emphasis on protected areas to the maintenance or encouragement of biodiversity on privately held lands.

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– An **agricultural development policy shift** from an emphasis on the production of cash crops for export and of cheap food for urban populations to an emphasis on developing broad-based rural livelihoods to reduce rural poverty.

– **Privatisation and market liberalisation policies** that dismantle the existing monopolistic parastatal marketing companies and encourage private sector companies and community-based organisations to take over their functions.

– A change in municipal **waste management policy** from a regular free collection of all waste to the introduction of charges for the collection of non-recyclable household waste in urban areas.

## Section 2 Self-Assessment Questions

# Question 4

Research that provides information to policy-makers can be categorised according to function – can you match the example of a research study to the type of information it provides? Note that there can be more than one function for a study.

**Study**

(a) An experiment that manipulates flooding depth to investigate the impact on natural vegetation

(b) A modelling study to describe the impact of increased fuel taxation on the aviation industry

(c) A household expenditure survey

(d) A survey to establish the incidence of diarrhoea in infants following a sanitation campaign

**Function**

(1) Descriptive

(2) Explanatory

(3) Predictive

(4) Monitoring and evaluation

# Question 5

True or false?

(a) Bias refers to deliberate manipulation of the data or information to serve researchers' interests.

(b) In designing research there is often a trade-off between cost-effectiveness and timeliness, and comprehensiveness and reliability.

(c) Research is useful only if it feeds directly into decision-making.

## 3.0  FROM RESEARCH IDEA TO RESEARCHABLE PROBLEM

### Section Overview

In this section we consider where ideas for research come from and the techniques we can use to generate questions from general ideas.

### Section Learning Outcome

By the end of this section, students should be able to:

*   formulate a research topic or problem

## 3.1   Where do research ideas come from?

Ideas for research problems or topics can arise from a range of sources such as personal or professional experience, a theory, the media, or other research studies.

### Personal or professional experience

Everyday personal or professional experience may lead us to identify a problem for which we would like a solution. Alternatively, we may encounter a question or questions that we would like to try and answer.

For example, on a personal level, you may prefer the taste of organically produced vegetables and thus wonder if people in general prefer the taste of organically produced vegetables to those produced non-organically. The research topic is a study into taste preferences and the question 'do people in general prefer the taste of organically produced vegetables to those produced non-organically?' Alternatively, for example, as a professional nature reserve warden you may want to encourage the establishment and spread of a particular plant species because you know it is a food source for a rare butterfly.  The research problem may be, 'how do I encourage the spread of the plant species of interest?'

### Theory

Theories are ideas about how things relate to each other. Theories may be general, commonly held beliefs (such as, domestic cats are the cause of a decline in bird numbers in UK gardens) or more technical ideas (for example, that global warming is causing a change to the timing of the seasonal responses of the flowering cherry tree in the UK).

There are many ways of expressing theories, some are very formal, others are informal. Here are some examples:

*   Keynes' statement that ... 'men are disposed as a rule and on average, to increase their consumption as their income increases, but not as much as the increase in their income ...' is a theory.

*   The idea that distance learners have different needs than on-campus students is a theory.

- A hunch that crossing two particular strains of maize will produce a more drought-tolerant variety is a theory.

- The assumption that every species has a fundamental niche, is a theory.

Theories may be useful in suggesting interesting questions and generally guiding fieldwork, but should not restrict us from exploring alternative explanations. **The end result of the research process is knowledge.**

### Literature and the media

There are many sources of literature, such as books, journal articles, and newspapers. When searching and reading literature it is possible to encounter gaps in information and knowledge, and problems for which there is currently no solution. These may provide a good basis for research. We are also flooded with information presented by the media, such as television, which again might give rise to research ideas.

## 3.2   Formulating the research problem

Once the general topic or problem has been identified, this should then be stated as a clear **research problem**, that is, taken from just a statement about a problematic situation to a clearly defined researchable problem that identifies the issues you are trying to address.

It is not always easy to formulate the research problem simply and clearly. In some areas of scientific research the investigator might spend years exploring, thinking, and researching before they are clear about what research questions they are seeking to answer. Many topics may prove too wide-ranging to provide a researchable problem. Choosing to study, for instance a social issue such as child poverty, does not in itself provide a researchable problem. The problem is too wide-ranging for one researcher to address. Time and resources would make this unfeasible and the results from such a study would consequently lack depth and focus.

### Statement of research problem

An adequate statement of the research problem is one of the most important parts of the research. Different researchers are likely to generate a variety of researchable problems from the same situation since there are many research issues that can arise out of a general problem situation. Your research will be able to pursue only one in depth.

For a problem statement to be effective in the planning of applied research it should have the following characteristics (Andrew and Hildebrand 1982).

(1) The problem reflects felt needs

(2) The problem is non-hypothetical, ie it must be based on factual evidence

(3) It should suggest meaningful and testable hypotheses – to avoid answers that are of little or no use to the alleviation of the problem

(4) The problems should be relevant and manageable

Formulating the research problem allows you to make clear, both to yourself and the reader, what the purpose of your research is. Subsequent elaboration of method should be oriented to providing information to address that problem. The problem statement is therefore a very important device for keeping you on track with your research. It is also one means by which your research will be evaluated – does the research address the problem as stated.

## 3.3   So how do we get from the research problem to researchable questions?

Arriving at specific research objectives, questions or hypotheses from an idea or problem is a highly personalised activity – there are different ways of doing it and we all do it differently. Below is one suggestion based around the idea of 'brainstorming'. The results of this process can be displayed in the form of a 'spider diagram' or mental map of ideas and themes related to your research idea. The resulting conceptual map can serve both as a starting point and as a conceptual framework for your investigation.

### Conceptual frameworks

A common tactic here is to 'unpack' your idea or problem thus generating a range of possibilities before narrowing down on one or two themes. Following the suggestions of Punch (1998) steps could be:

(1) write down the all the **concepts** involved, and **all** the sub-questions you can think of pertaining to the issue. Reading around your research idea will help to generate questions and information and to identify themes and potential information sources

(2) subdivide your questions where possible; split wide general questions into smaller ones

(3) begin to order questions and develop focus: group questions together under common themes, separate general and specific questions

(4) start to trim by selecting those questions that you wish to deal with, consider the resources that will be available to you

(5) collate these thoughts within a loose conceptual framework – this shows how questions and themes are related and may help guide your thinking at a later stage.

This process of thinking wide and then focusing and delimiting your questions, should result in a handful of research questions that you wish to investigate. These may still need further modification to render them answerable; they may need to be operationalised.

Note: there are no right or wrong answers in such an exercise; the purpose is to get you thinking about as many facets of your research idea as possible. It should also cause you to question some of the concepts you might previously have accepted as given.

## Example 1

The example below is taken from a suggested student report on the theme of contract farming in peri-urban Lusaka. The student is aware that the government is seeking to promote contract farming as a development activity and would like to do some research on the issue. The questions, groupings, and linkages suggested here are not meant to be exhaustive, I am sure you will be able to think of more – this is presented to give an idea of process. An animated version of these diagrams is available on your e-study guide.

**Step 1.** Write down all the questions, themes, and concepts you can think of
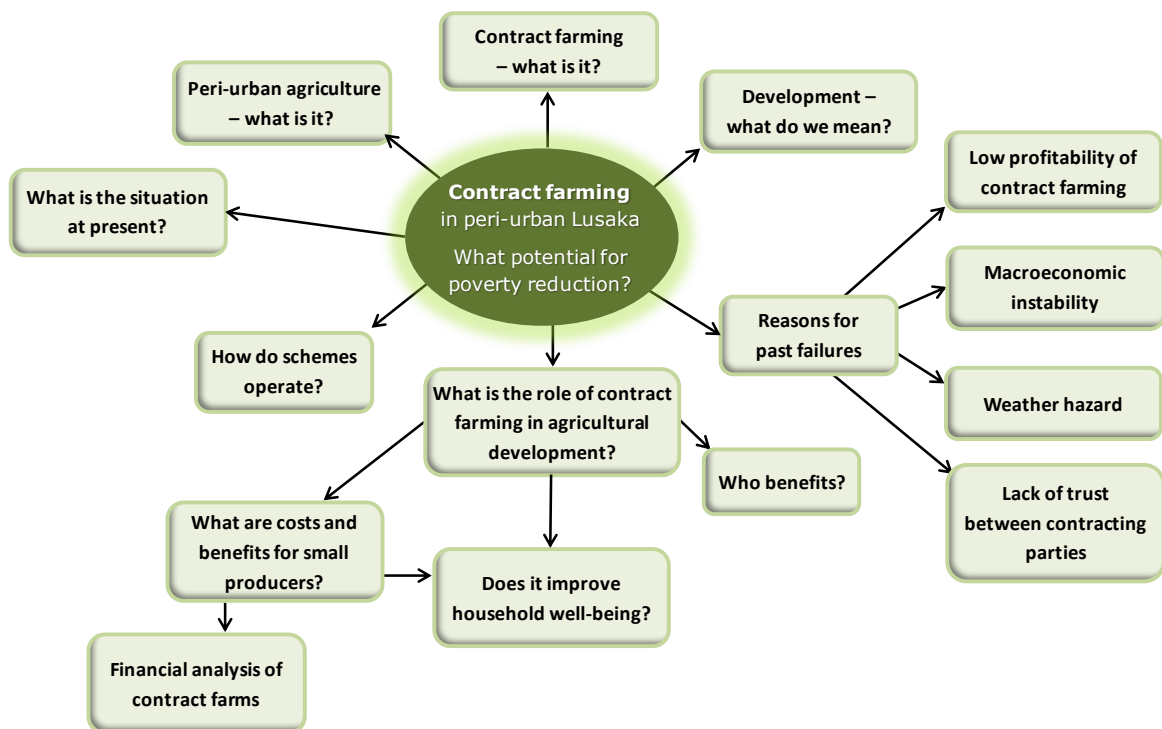
**Step 2**. Subdivide questions – try and make general questions into specific ones
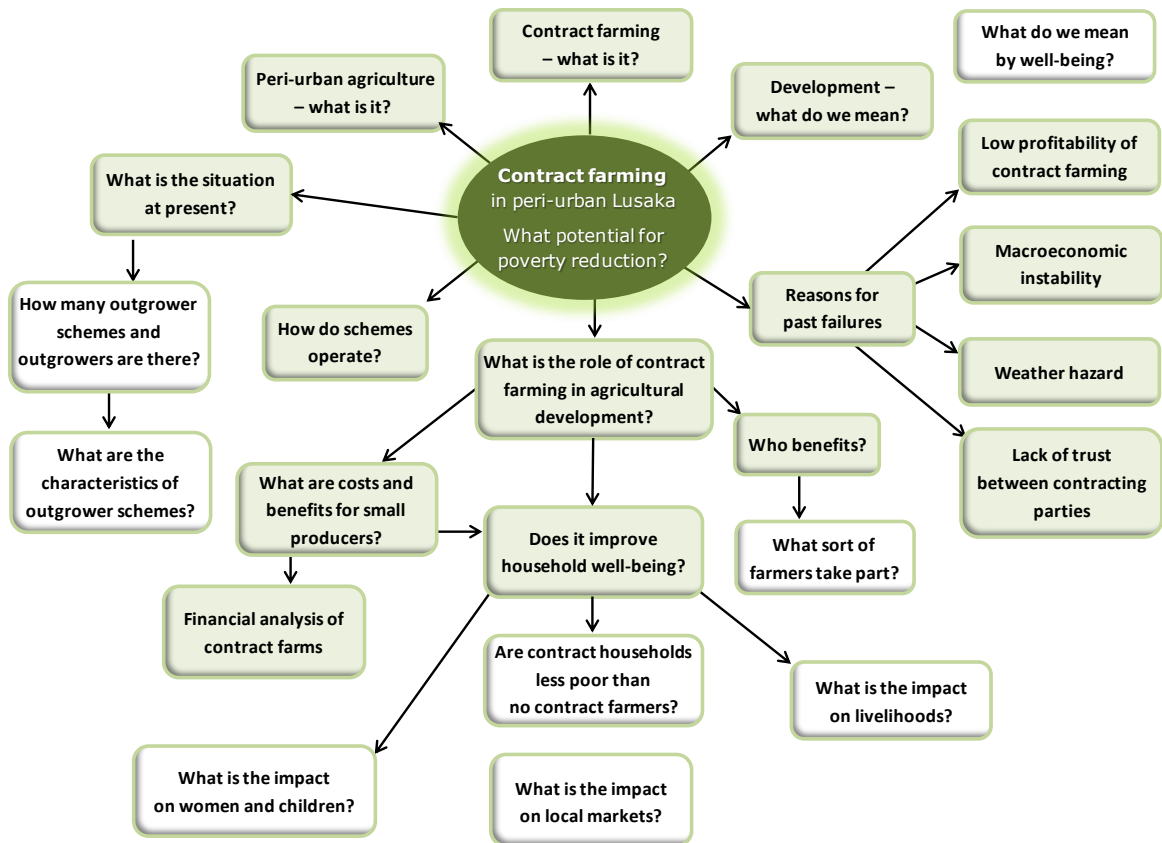


**Step 3.** Make links – we can group some of our questions under themes and make links across the diagram (groupings here are shown by different coloured text-boxes)
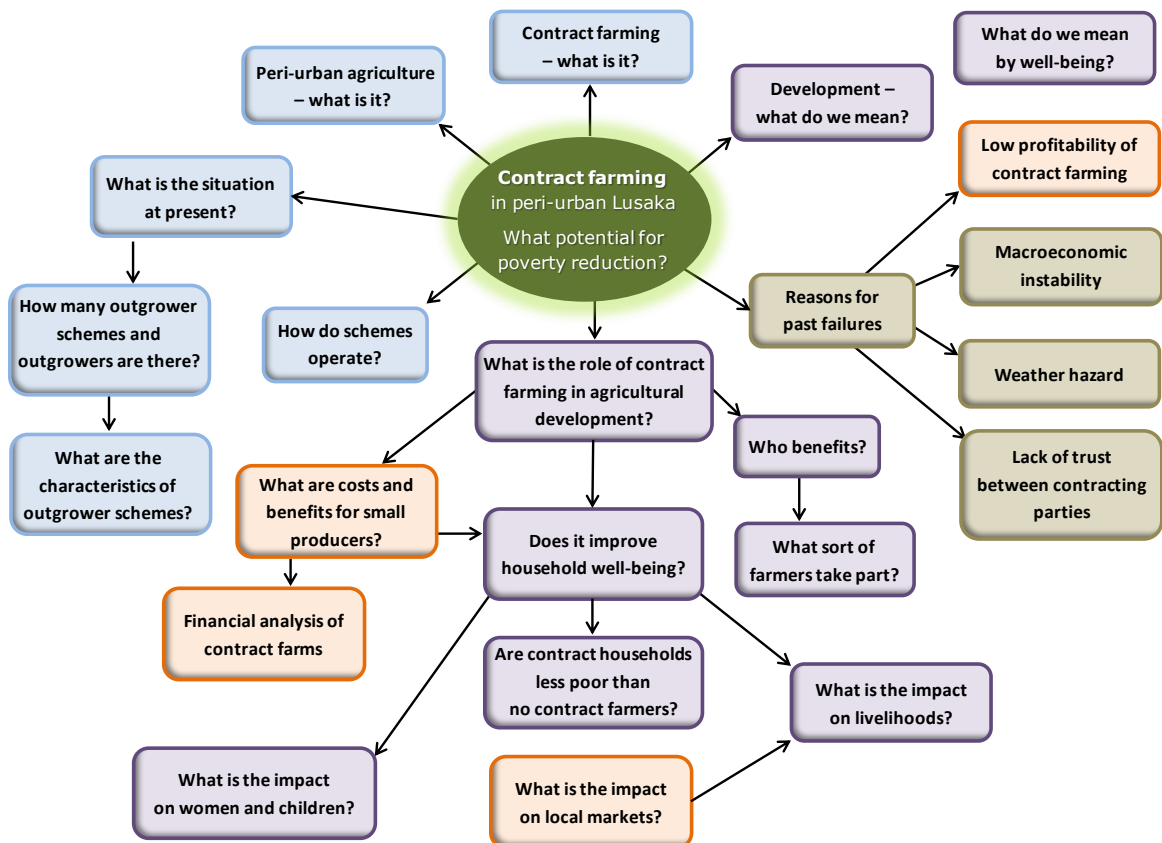
**Step 4.** Identify the questions that you think you would like to deal with. This student has identified certain areas he would like to focus his investigation on:

- What is the present situation and how do contract schemes in Lusaka operate?

- Does participation in contract schemes benefit participating households?

He also is curious about the idea that lack of trust has proved a particular problem for schemes in the past and would like to explore this further.
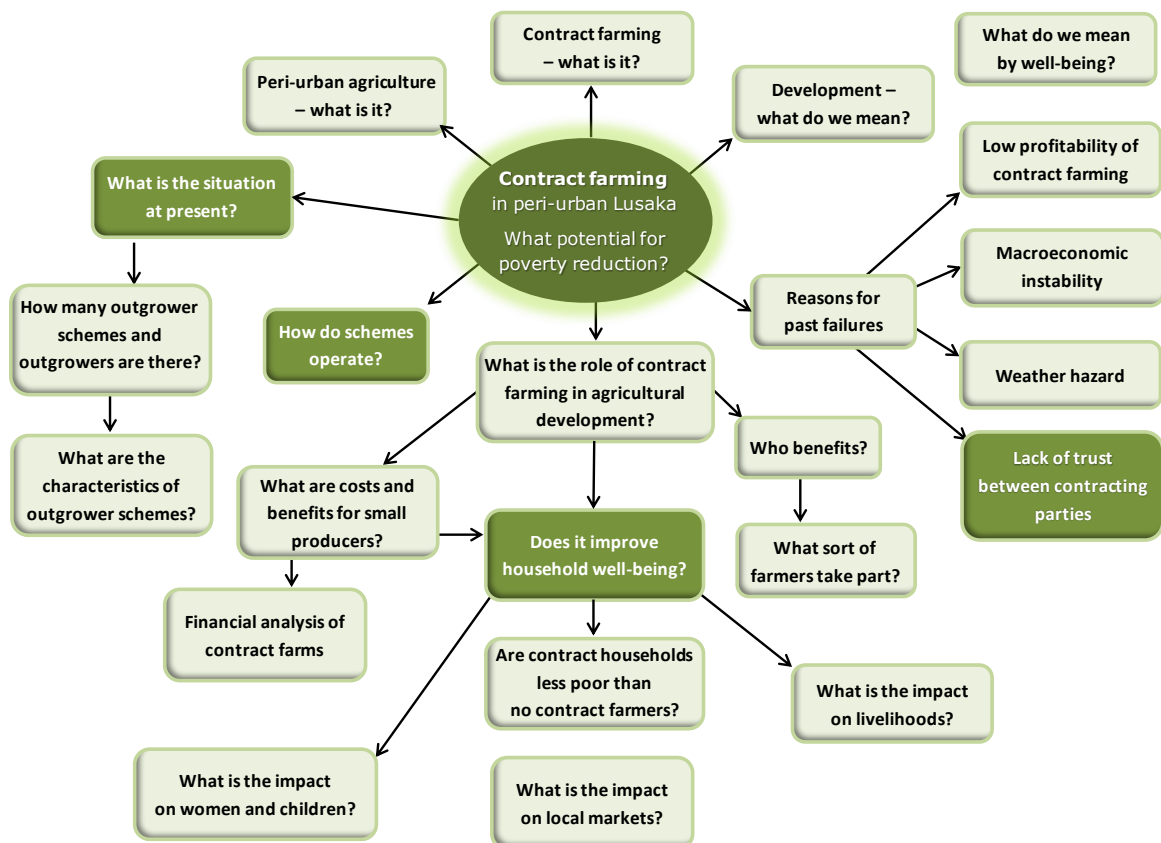
## Example 2

The example below is developed for a study into the effect of fertilisers subsidies in Malawi, in this case the research is contracted by the government and a major donor with explicit terms of reference. The conceptual framework is developed to organise the research so that the terms of reference are addressed; to describe the main elements and processes in the system; to identify main variables and identify expertise required (Dorward *et al* 2007). An animated version of this diagram is available on your e-study guide.
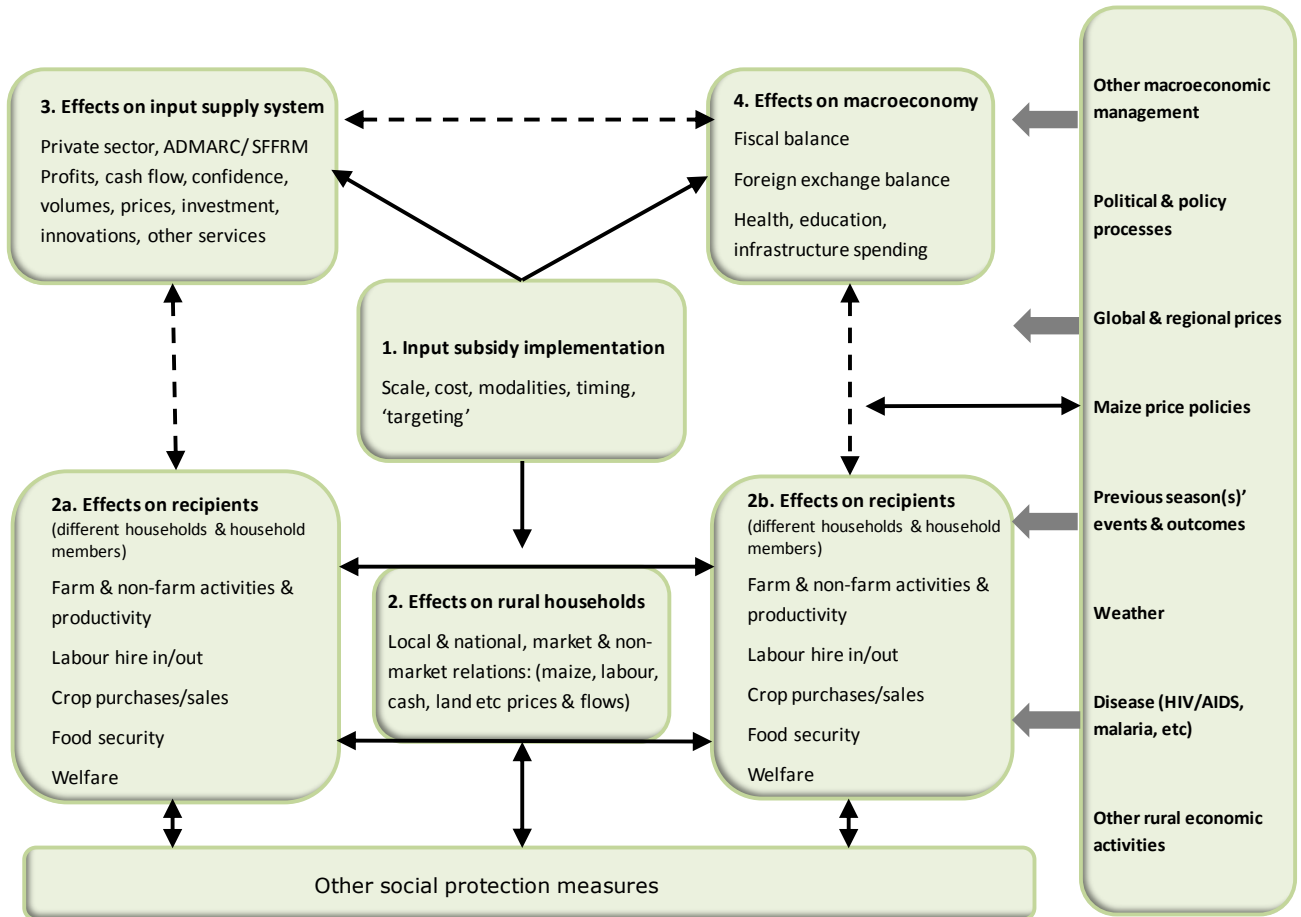


From these two examples you can see that conceptual frameworks can play a useful role in formulating and managing research projects.

> ✍ Select a problem that is of interest to you and see if you can repeat the process described above to arrive at some research questions.

## Section 3 Self-Assessment Questions

# Question 6

Fill in the missing word.

A _____ is an idea about how things relate to each other.

# Question 7

True or false?

(a) A conceptual framework shows how questions and themes are related.

(b) Brainstorming is a process of focusing down on the questions that interest you most.

# 4.0 FORMULATING RESEARCH QUESTIONS, HYPOTHESES, AND OBJECTIVES

## Section Overview

In this section we continue to explore the issue of turning ideas into questions by taking a look at how to refine questions and generate hypotheses

## Section Learning Outcomes

By the end of this section, students should be able to:

- develop and write research questions

- formulate and write research hypotheses

- formulate and write research objectives

## 4.1 Research questions

If you have gone through the 'brainstorming' process described above you will probably have a number of questions which are close to your requirements as research questions – they appeal to your interests and are likely to be answerable within your time and resource constraints. Phrase your questions so that they are simple and clear.

It is usually best to pose only one or two questions. Do not pose more than three questions as this generally leads to a much larger research project. Start questions with terms like, how, who, what, why, and when. Questions should be specific, not vague.

### Example research questions

- When is the best time of year to translocate a meadow grassland from its original site in Surrey, south-east England to a new site?

- How does applying fertiliser affect the yield of a wheat crop grown on the North Downs in Kent?

- What are the implications of de-regulating a hitherto controlled market for a staple food commodity on producers and consumers in a named region of a country?

- Why do residents of a named village object to the siting of wind turbines 2 km from their homes?

The questions above represent wide differences in scope and complexity and hence will make very different demands on research resources. Some of these questions might later need to be modified to fit resources (abilities, time, finance, equipment) while still addressing research problem.

## 4.2   Research hypotheses

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**4.2.1 What is a hypothesis?**

A hypothesis is a tentative answer to a research problem that is advanced so that it can be tested.

Source: unit author

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**When do I use a hypothesis?**

It is appropriate to use a hypothesis when you are testing a theory. Your immediate answer to this may be 'I'm not testing a theory'; however, remember that our definition of theory is very broad – 'an idea about how things relate to each other'. If you have an expectation of how your research question will be answered (the outcome) then it is fair to say you have a theory in mind. If you ask of your research question 'What is the expected outcome?' and have an answer, you can ask why? What is my thinking behind this prediction? This is essentially the theory that you will be testing.

If you are not able to predict the answer to your question then your approach is not one of theory testing and you should not proceed with developing hypotheses to test. Your research questions remain as such. This will be the case if your research is descriptive or exploratory in nature.

**?**   Which of the example research questions stated in 4.1 above do you think could be restated as hypotheses?

*Answer*

*When is the best time of year to translocate a meadow grassland from its original site in Surrey, south-east England to a new site? Yes, there is a narrow question to be addressed to which a tentative answer could be suggested. This research question is suitable for testing as a hypothesis.*

*How does applying fertiliser affect the yield of a wheat crop grown on the North Downs in Kent? Yes, again the question is amenable to testing.*

*What are the implications of de-regulating a hitherto controlled market for a staple food commodity on producers and consumers in a named region of a country? This appears to be a more exploratory research question. However, if we have knowledge of some likely outcomes, these could be stated as hypotheses and tested.*

*Why do residents of a named village object to the siting of wind turbines 2 km from their homes? This is a 'why' question which appears exploratory in nature– we do not know at the outset the nature of residents objections.*

**Developing a hypothesis from a research question**

Our definition of a hypothesis stresses that it can be tested. To meet this criterion the hypothesis must be operationalised – that is the concepts employed in the hypothesis must be **measurable.**

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Developing hypotheses requires that you identify one character, variable or descriptor of a sampling unit that causes, affects, or has an influence on, another character, variable or descriptor of the same or other sampling units. The character, variable or descriptor that affects other variables or sampling units is called the **independent variable**. The character, variable or descriptor which is affected by the independent variable is called the **dependent variable** or **response variable**.

Note that although for the purposes of research methodology some variables may be called 'dependent' when investigating their relationship with other 'independent' variables, this does not imply the existence of a causal (as compared with associative) relationship unless strict rules of research design are followed. This issue is discussed in more detail later in the module.

### 4.2.2 Good hypotheses

There are two criteria for good hypotheses. One, hypotheses are statements about relationships between variables. Two, hypotheses carry clear implications for testing the stated relationships. These criteria mean, then, that hypothesis statements contain two or more variables that are measurable or potentially measurable and that they specify how the variables are related.

Source: Dixon *et al* (1987) p. 40.

**Diagramming hypotheses**

Diagramming hypotheses is a useful technique to help clarify your thinking.

Usually a hypothesis takes the form 'X causes Y' or 'X is related to Y'.

X ——————————▶ Y

X ◀——————————▶ Y
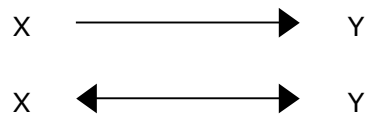
For example, the first hypothesis stated above could be represented by a diagram as follows

| Financial resources | + ve ——————▶ | Adoption of new technologies |
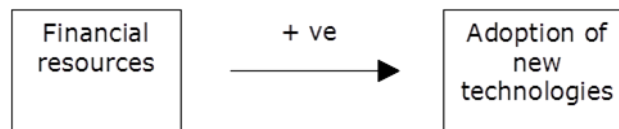
The two variables, or concepts are in boxes that are linked by an arrow going from one concept to the other. The arrow indicates that one variable (financial resources) does something to the other variable (adoption of new technology).

The plus sign indicates that the relationship is seen as positive, that is more of the one will lead to more of the other. Not all concepts have a positive relationship.

Once you get used to forming hypotheses and making diagrams then you can explore new patterns involving more than two concepts. For example:
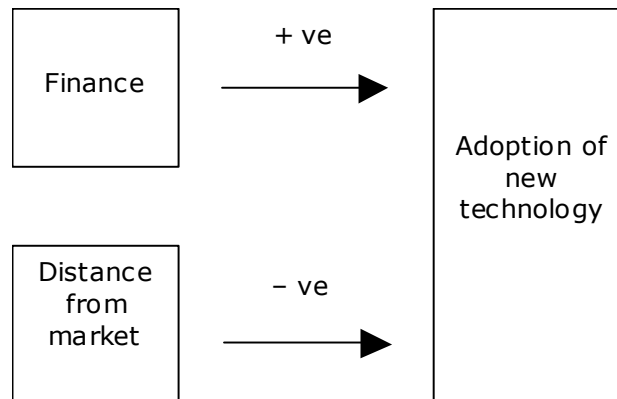


In this case two concepts, finance and distance from market, are related as independent concepts to the dependent concept, adoption of technology. One of the independent concepts is positively related and the other negatively related to the dependent concept.

There are endless possibilities. Most research projects deal only with one small area of the diagram. But it is often useful to make a diagram of more than you plan to study in order to show where your research fits into the larger frame of things and to help you to identify factors which may have to be taken into account (these could be integrated into your conceptual map).

## Research without hypotheses

In **exploratory** research our base knowledge of a subject may be so low that we cannot formulate meaningful hypotheses. Nonetheless, exploratory research should be guided by a clear sense of purpose. Instead of hypotheses, the design for the exploratory study should **state its purpose**, or **research objectives** as well as criteria by which the exploration will be judged successful.

For example, if we are trying to encourage farmers to make use of compost, we may first need to know the social structure or social norms of the farming community before we can begin making meaningful hypotheses about which individuals will influence the decision and the factors they consider when making their decision. We can state that our exploratory study would have the purpose of generating hypotheses about personal characteristics which correlate with the adoption/rejection of composting, the composition of the decision-making unit, and the factors which influence the decision either to adopt or reject. Success would be measured in terms of generating testable hypotheses.

**Interpretative** research, which seeks to develop knowledge through understanding meaning, does not usually proceed with hypotheses.

## 4.3   Research objective(s)

**What are the research objectives?**

In general, research objectives describe what we **expect to achieve** by a project.

Research objectives are usually expressed in **lay terms** and are directed as much to the client as to the researcher.  Research objectives may be linked with a hypothesis or used as a statement of purpose in a study that does not have a hypothesis.

Even if the nature of the research has not been clear to the layperson from the hypotheses, s/he should be able to understand the research from the objectives.

A statement of research objectives can serve to guide the activities of research. Consider the following examples.

- **Objective:** To describe what factors farmers take into account in making such decisions as whether to adopt a new technology or what crops to grow.

- **Objective:** To develop a budget for reducing pollution by a particular enterprise.

- **Objective:** To describe the habitat of the giant panda in China.

In the above examples the intent of the research is largely descriptive.

- In the case of the first example, the research will end the study by being able to specify factors which emerged in household decisions.

- In the second, the result will be the specification of a pollution reduction budget.

- In the third, creating a picture of the habitat of the giant panda in China.

These observations might prompt researchers to formulate hypotheses which could be tested in another piece of research. So long as the aim of the research is exploratory, ie to describe what is, rather than to test an explanation for what is, a research objective will provide an adequate guide to the research.

## 4.4   Examples of research statements

**From research problem to hypothesis, a natural science example**

```
┌─────────────────────────────────────────────┐
│                  Problem                      │
│                                               │
│   Will the time of year affect establishment  │
│   when translocating a grassland community    │
│              to a new site?                    │
└─────────────────────────────────────────────┘
                       │
                       ▼
┌─────────────────────────────────────────────┐
│                  Question                     │
│                                               │
│   When is the best time of year to translocate│
│   a meadow grassland from its original site in │
│       south-east England, to a new site?       │
└─────────────────────────────────────────────┘
                       │
                       ▼
┌─────────────────────────────────────────────┐
│              Research hypothesis              │
│                                               │
│   Translocation of meadow grassland in        │
│   south-east England is more successful if     │
│   carried out in the autumn, rather than the   │
│                   spring.                      │
└─────────────────────────────────────────────┘
                       │
                       ▼
┌─────────────────────────────────────────────┐
│                  Objective                    │
│                                               │
│   To determine whether spring or autumn is     │
│   the best time for translocation of meadow    │
│   grassland in south-east England              │
└─────────────────────────────────────────────┘
```

**From research problem to hypothesis, a social science example**

```
┌──────────────────────────────────────────┐
│                 Problem                    │
│  Most farmers in the province are not      │
│  adopting new technologies. Why?           │
└──────────────────────────────────────────┘
                     │
                     ▼
┌──────────────────────────────────────────┐
│                 Question                   │
│  Are farmers unable to adopt new           │
│  technologies because financial resources  │
│  are limited?                              │
└──────────────────────────────────────────┘
                     │
                     ▼
┌──────────────────────────────────────────┐
│             Research hypothesis            │
│  Farmers in the province are unable to     │
│  adopt new technologies because financial  │
│  resources are limited.                    │
└──────────────────────────────────────────┘
                     │
                     ▼
┌──────────────────────────────────────────┐
│                 Objective                  │
│  To describe how financial resources       │
│  influence farmers when deciding whether   │
│  to adopt a new technology.                │
└──────────────────────────────────────────┘
```

Note: although these two examples are set out as primarily natural and social science, respectively, note that this assumes certain prior research choices (as in the research onion). Thus in the first example 'best' appears to be judged from a technical perspective of most successful meadow growth (however that is defined) without reference to more 'social' questions about cost or the desirability of meadow establishment by particular times of year. In the second example it is assumed or already known that the new technologies are effective (and this has both natural/ technical and social science elements in terms of (a) physical/biological input/output relations and (b) financial and non-financial costs and benefits).

## Section 4 Self Assessment Questions

# Question 8

In a study, researchers attempted to test the hypothesis: smaller class size leads to higher student grades. Which of these statements is true?

   (a) Class size is the independent variable.

   (b) Class size is the dependent variable.

   (c) Grades are the independent variable.

   (d) Grades are the dependent variable.

# Question 9

Which of these is an objective?

   (a) Does fertiliser A increase wheat yield?

   (b) A study to determine the effect of fertiliser A on wheat yield in the UK.

   (c) To describe how a staple food subsidy influences farming practices in Bhutan.

   (d) Do staple food subsidies influence farming practices in Bhutan?

# Question 10

Which of these statements are true about hypotheses?

   (a) A hypothesis is an assertion which can be tested.

   (b) Hypotheses are appropriate in research where variables can be measured.

   (c) Hypotheses are necessary for rigorous research.

# UNIT SUMMARY

Research is described as a process that moves through a number of key stages, starting with identification of the research idea and problem and finishing with the generalisation or write-up. Discussions then moved on to the role of research and how data, information, knowledge, and decision-making relate to each other and research. Issues (or themes) relating to information, such as information validity and quality were raised. The influence that those who commission research have on methods, findings, and thus decision-making, was highlighted.

The second half of the unit focused on the theoretical aspects of the first three stages of the generalised research process. Guidance was provided on formulating researchable problems from the initial research idea, explaining why some problems are not researchable problems. The unit then concluded by explaining how to formulate and write research questions or hypotheses and research objectives.

## Key Points

To summarise, the key learning points from this unit are as follows.

- Research is systematic investigation to find answers to a problem.

- When we collect data we are collecting raw or analysed facts or figures. Information is data that has been analysed, that is often presented in a form specifically for a decision-making task. Knowledge is assimilated information, an appreciation and understanding of that information.

- Information that is generated from research is used for problem-solving and decision-making.

- Research clients have a major role in determining the focus, methods, and funding of research. Participatory methods are those that also attempt to involve stakeholders in the process.

- Research does not always have an impact on policy-making. There are many potential reasons for this, including the lack of political will; inappropriate research questions; or poor dissemination of results to policy-makers (for example, through information overload or poor presentation).

- There are three main sources from which we can identify research topics or research problems: personal experience, theory or literature.

- Research questions ask, how, who, what, why, and when, whilst a hypothesis is a tentative answer to a research problem that is advanced so that it can be tested.

- Research objectives describe what we aim to achieve by a project and may be linked to hypotheses or used for exploratory study without hypotheses.

## KEY TERMS AND CONCEPTS

| | |
|---|---|
| **authoritarian approach to knowledge** | knowledge is sought by referring to people who are considered qualified producers of knowledge |
| **data** | raw (unanalysed) material (facts and figures), at times collected by an information system, that can be used as a basis for inference or reckoning |
| **descriptive research** | research to provide baseline data or a description of how things are |
| **empirical** | based on observation or experiment |
| **evaluation** | assessing the importance or impact of data, information, a particular course of action or event |
| **explanatory research** | attempts to explain how and why phenomena operate as they do, what factors affect the system |
| **exploratory research** | attempts to describe the situation, provide baseline data, a picture of how things are |
| **hypothesis** | a tentative answer to a research problem that is advanced so that it can be tested |
| **information** | analysed data, often presented in a form that is specifically designed for a given decision-making task, and transmitted to/received by decision-makers |
| **knowledge** | absorption, assimilation, understanding, and appreciation of information |
| **measure** | to quantify the degree or extent of a thing |
| **monitoring** | collecting data on the changes and the effects of changes during and after they have occurred |
| **mystical approach to knowledge** | knowledge is obtained from supernatural authorities, eg gods, mediums, prophets |
| **objectives** | describe what we expect to achieve by a project |
| **observation** | a single item of data about a phenomenon that is recorded or measured |
| **parameter** | a measurable or quantifiable characteristic, feature or phenomenon |
| **rationalist approach to knowledge** | that all knowledge can be obtained by following rules and logic and that (a) the world can be understood by the human without observing phenomena and (b) knowledge exists in forms independent of human experience, a priori knowledge |
| **research approach** | this is the theoretical or conceptual basis for the research |

| | |
|---|---|
| **research design** | how data collection is organised in order to answer the research question |
| **research problem** | a statement about a problematic situation that identifies the issues you are trying to address |
| **research process** | the way we come to know what we know, it can be broken down into key iterative stages |
| **research strategy** | refers to a methodological practice or tradition. For example: experiment, survey research, or case studies |
| **scientific approach to knowledge** | knowledge may be proved by logic (reason) and experience (observation). Validity may be tested using empirical verification |
| **variable(s)** | an attribute of interest that differs between cases and is measurable |