THE UNIVERSITY OF MELBOURNE
FACULTY OF BUSINESS & ECONOMICS

Helpsheet

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RESEARCH ESSENTIALS

Use this sheet to help you:

- Learn 10 essential principles for research in all scientific and social science disciplines

5 minute self test

Look at the names of the 10 research essentials described in this Helpsheet. What do they mean to you? How might they be essential for effective research?

1. Purposiveness	6. Replicability
2 .Rigour	7. Precision and confidence
3. Clarification of variables	8. Objectivity
4. Hypotheses formation	9. Generalisability
5. Testability	10. Parsimony

If any of these are not clear to you, read on.

Some, or all of the material in this helpsheet, appear in: Martin Davies (2011), *Study Skills for International Postgraduate Students*. Basingstoke, UK.: Palgrave, MacMillan. ISBN: 140 399 580 X.

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Introduction

What characterises rigorous, effective research? Literature on this topic can appear overwhelming in its scope and complexity. The purpose of this Helpsheet is not to provide a comprehensive overview of a vast array of approaches to research and their theoretical underpinnings. That would be impossible in such a text as this. Rather, it is to present ten principles to guide research in the scientific and social science disciplines; principles that are simple to understand and essential to consider.

1. Purposiveness

All research must have an aim; that is, it should be problem-based, unified and directed, not pointless and random.

A testable hypothesis is normally needed in scientific writing to determine the exact purpose of study. This also narrows the project to a manageable size, and is essential in order to complete the project in a limited time.

Consider the following topics:
a. The environment and the US economy
b. The problem of pollution and its impact on the US economy
c. The problem of ocean spills and their economic impact on the US economy
d. The problem of oil spills and their economic impact on the US economy
e. The 1989 Alaskan Oil Spill and its impact on the US economy
f. Consequences of the 1989 Alaskan Oil Spill on share prices in the Alaskan economy from 1989 to 2002

It should be clear that Topic f is narrower and has a clearer purpose than Topics a – e. The first thing that you should do is establish a research question that is meaningful, narrow and clear.

(See Sekaran for examples of clear business research questions, pp. 43-44).

2. Rigour

The research project should have sound methodological design. It should be scientific and logical, that is, conclusions must follow from accepted premises that are defended and tested in the course of the research. One can't base conclusions on a few interviews with company employees, for example.

In the above example, Topic f lends itself to a rigorous approach only if a number of features of the Alaskan economy are considered and tested under a range of different conditions, and if consequences are measured using a number of independent economic models.

Consider carefully:
- Phrasing of research question (see 4: Hypothesis formation, below)
- Phrasing of survey questions
- Sample size (how many are needed)?
- Cause and effect (which is which)?
- Choice of relevant variables

Rigour is also ensured by an appropriately wide search and discussion of the literature in the area. This not only helps in making the study rigorous as it can help avoid problems in these areas that others might have made, but it also ensures that the study is unique.

3. Clarification of variables

Being clear about your variables is critical. You must distinguish between your:
- *Dependent variables*: the things you are looking at
- *Independent variables*: the things that influence the dependent variable(s)
- *Moderating variables*: the things that modify relationships between the DVs and IVs
- *Intervening variables*: the things that may turn up after the moderating variables have had their effects, but do not change that relationship

For example, in the previous case given:
- Alaskan share prices are the dependent variables
- The 1989 Alaskan oil spill is the independent variable
- The general influences on Alaskan share prices (e.g., the state of the world economy, trade with other countries, etc) are moderating variables
- Other factors which may normally have an impact on share prices (consumer sentiment, terrorism, etc.), but need not change the relationship between the DV and the IV might be intervening variables

4. Hypotheses formation

A clear hypothesis, even if not explicitly stated in the dissertation, will ensure that your dissertation has a focus or purpose and direction. It also ensures that you answer a research question of some kind, rather than ramble from one topic to another. Hypotheses are the connecting membranes that hold the research together.

The hypotheses can be in several formats:

Conditional statements (if ... then):
If employees are healthier, they will take sick leave less frequently.

Non-conditional statements:
Employees who are healthier will take sick leave less frequently.

It is less clear what constitutes evidence for or against this latter proposition than in the conditional form. The conditional form requires you to actually do something to demonstrate the point. It is not just an unsupported assertion.

Directional statements:
The greater the stress experienced in the job, the lower the job satisfaction of employees.

Again, like conditionals, statements that incorporate direction directions: "more than" "less than", "negative", "positive" etc., force you to do something to demonstrate the point you are making. They beg justification.

Non-directional statements
There is a difference between the work ethic values of Australian and Asian employees.

These postulate a relationship between variables, but offer no indication of direction. These also beg clarification and expansion. They may be used in an area where there has not yet been any demonstration of a significant relationship between variables, or when studies indicate contradictory findings and where the direction of the relationship is unclear. The direction of the relationship may be the subject of further research work.

Directional and non-directional statements usually require different statistical tests of significance.

The null hypotheses
There is no relationship between stress experienced on the job and the job satisfaction of employees.

These express a definite relationship between variables under consideration: they state that the correlation between two variables is equal to zero. This means that there is no significant relationship between the two variables, only perhaps fluctuating differences that are insignificant.

All the hypotheses' formulations can then be deduced from the data used in the study. If any of the data conflicts with the hypothesis, the data is said to be falsified. This is called the *negative case analysis method*. A single falsification of the hypothesis requires that it be revised.

5. Testability

The project aim must be testable. It is no good having a clear purpose if it isn't testable.

The hypothesis: that oil spills have an impact on where consumers go shopping is hardly testable (even though it may be true)! How would one test this claim? How would one know that the independent variable was the only factor influencing their choices?

For testability, you might consider using a combination of data sources such as:
- Statistics
- Surveys
- Literature
- Interviews

Never use one measurement alone as individually the tests may be misleading. A way of increasing the likelihood that you have precise data is to use convergent validity as a test. (i.e. use a number of tests of the same data and see if the results of those tests can be correlated). This is called *triangulation*. (See: Yin, p. 93.)

6. Replicability

Your research must be able to be repeated by others. This requires:

a. that the experimental / case aims and procedures are sound

b. that the report is written in clear and comprehensible manner so others can follow it (to this end, a Methodology or Methods section needs to be included)

A project which both stands alone as a sound piece of research and can also be repeated by others in other situations is obviously better than one which can't be repeated.

7. Precision and confidence

"The more precision and confidence we aim for in our research, the more scientific the investigation, and the more useful the results" (Sekaran, p. 12).

This simply means that the results must be as close as possible (precise) to the actual state of affairs that you are studying and that others can rely on those results to a high degree.

These requirements are obviously not static; that's why research needs to be done constantly to improve our knowledge and experimental accuracy in a changing world. For example, the exact reason why people buy trouser braces is somewhat different now to the reasons people bought them three centuries ago (then they were needed to hold trousers up, now they are usually just a fashion statement).

You may use statistics (e.g., alpha levels) as a measure of significance (confidence) but the precision of your data prior to submitting it to statistical analysis must be constantly reassessed.

8. Objectivity

Conclusions should not be based on subjective or emotional values but rather the facts resulting from the data analysis.

There is no point in doing a serious experiment or case study if the conclusions you make are not based on data, but your pre-judged opinion of what should have happened (This is circular and self-justifying).

What happens if you do not support your hypothesis as expected? Providing you have adequately set up experimental conditions and used a number of data sources, and/or interpreted the data correctly, the project is not a failure.

From the point of view of good research design, it is as important to find out, for example, that aerobic activities do not increase cognitive speed in older adults as to find out that they do. Other researchers can then forget this variable and look at something else. A salutary lesson about research is this: "The [researcher] is a mere private in an army pursuing truth" (Perry, pp. 7-8).

9. Generalisability

The more that a given research project can be generalised to other situations, the better.

> 'If a researcher's findings that participation in decision making enhances organisational commitment, is found to be true in a variety of managerial, industrial and service organisations and not merely in the one organisation studied by the researcher, then the generalisability of the findings to other organisational settings is widened' (Sekaran, p. 13).

There is a tension here, of course, with other aims. The aim to complete a project that is both generalisable and also manageably narrow in focus is a tall order. The aim of generalisability is a regulative ideal rather than one that is essential. If your research project is generalisable as well as narrowly focussed, well and good.

10. Parsimony

Economy of explanation is preferred in research work that you are undertaking. Aim to uncover a small but meaningful result in your work, not something vast and complex. Making a small, simple but significant point forcefully (using a number of independent tests) is better than trying to do too much and over-extending yourself.

In research, don't be miles wide but inches deep!

References

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Sekaran, U, (1992). *Research Methods for Business*, NY, USA: Wiley and Sons

Yin, R, (1994) *Case Study Research: Design and Methods*, Applied Social Research Methods Series Vol 5: Sage