Research project: methodology

Communicating about your research methodology
Once you have identified the need for your research through the literature review and formulated research question/s, you will design and communicate about your research methods, i.e. How will you go about answering your research question?

Your methodology section is an essential component of the research project/plan: This section:
• connects to your literature review and your research questions
• connects to your results and your discussion sections
• shows the rigour of your research and that your choices are informed
• shows that we can trust the answers to your research questions, i.e. that your results are valid and reliable

Tips for writing:
➢ Be clear, concise and direct
➢ Stay on point, don’t stray
➢ Write in chronological order
➢ Write in an objective style (DO NOT USE ‘I’ or ‘we’)
➢ Use correct verb tenses
What do you include?

A **DESCRIPTION** of, and a **RATIONALE** for your:
- research approach
- data collection instruments
- data collection procedures or processes
- data analysis procedures

➢ Be clear, concise and straight to the point
➢ Present in a logical order
➢ Justify your choices

Your research approach
- A brief but broad description of your methodology
- Are you using a quantitative, qualitative or mixed methods approach?
- Why did you choose this approach?
- Your choice of approach should be linked back to your research questions or aims.
- Justify your choices

Examples:

*As this project aimed to ...... it was decided that the best method was to take a mixed methods approach. This involved the design and use of a quantitative survey instrument followed by focus group interviews.*

*Qualitative methods offer an effective way of examining ......*

Your data collection instruments
- How did you collect the information/data that you used to answer your research question? For example:

  ➢ Survey
  ➢ Observations
  ➢ Document analysis
  ➢ Interviews
  ➢ Literature review
  ➢ Experiment
  ➢ Data modelling
  ➢ Simulations
  ➢ Computer modelling
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- Explain the design and development
- Justify your choices by referring to the research methods literature
- Acknowledge other possibilities

**Describing your data collection procedures**

- Describe WHO, WHAT, WHEN, WHERE and WHY
- Explain step-by-step how you went about data collection
- Use tables or diagrams to help communicate procedures

*For example:*
- Who participated in the study?
- How did you choose the participants?
- How did you recruit the participants?
- When did you collect the data?
- Where did the data collection take place?
- What instruments or equipment was used?
- How did you record your observations or interviews?
- What samples did you collect? How?
- What measurements did you take? How?

*NOTE:* You may also need to describe your ethics approval procedures and considerations if your study involved human participants.

**Example:**

An extensive literature review was conducted to gather information on project characteristics and its classification, construction waste management, waste management plan and its benefits. Subsequently, a set of questions was formulated to gain insight and opinion on the selection of project characteristics and particular benefits of construction waste management and was sent to each of the personnel for their views. The objectives of the survey were:

- to identify the key benefits for implementing waste management in construction projects;
- to collect respondents' views on whether project characteristics have effects on the benefits; and
- to gather respondents' views and insights of other project characteristics that will affect the benefits.

Both close-ended and open-ended questions were adopted in the survey that was divided into two sections. Section A consisted of general questions to identify the profile of respondents and Section B aimed to find out the experts' views and opinions, which allowed experts to state their views on whether project characteristics affect the benefits of waste management as well as to suggest any other

<table>
<thead>
<tr>
<th>How data collection instrument was developed</th>
<th>Purpose/objectives of the data collection instrument</th>
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<tbody>
<tr>
<td>Design of data collection instrument</td>
<td>The survey</td>
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The survey
project characteristics. The survey questionnaire is included in Appendix 1 (see Figure A1).

About 300 questionnaires were sent out and 66 industry experts responded to the survey questions and they were mainly project managers, assistant project managers, contractors, quantity surveyors, clerk-of-work and site supervisors as shown in Table I. Waste management for construction projects may not be performed without the identified key personnel and their opinions would play a critical role to identify the perception of key players on benefits from waste management. Overall, there is a fairly good mixture of designation of respondents, which would provide a fine basis for analyzing their views on this study. Having different years of experience in the construction industry will have a relationship towards the reliability of the responses and about 67 per cent of the respondents have more than six years of experiences in the construction industry. For the purpose of this study, it was important to identify respondents’ level of familiarity with waste management as the respondents are supposed to provide their views on whether project characteristics will affect the benefit of waste management. Almost 91 per cent of the respondents were familiar and more familiar with waste management. This may indicate that opinions and suggestions from the respondents are of value and appropriate to be analyzed in context of waste management. The results from the survey were then collated to examine the validity of a hypothesis that characteristics of construction projects have impact on perception on benefits from waste management. The results will be provided and discussed in the following sections.

(Adapted from Hwang & Yeo 2011, pp. 398-399)

**Example: Justifying your choices**

According to Noam (2008), a questionnaire survey is suitable when a large amount of data needs to be collected to investigate respondents’ view and experiences on a particular phenomenon. Moreover, the time available for data collection was limited. Considering the time allocated for this research, this method was adopted for this research.

(Adapted from Yunis 2012, p. 73)

**Example: Describing the instrument design and development**

This study involved the analysis of data received from the 43-item MCAS, taken by maintenance personnel from 27 Navy and Marine Corps aviation units. The MCAS is a self-administered survey consisting of nine demographic and 43 maintenance-related items (see Appendix A). The demographic items are: 1) rank; 2) total years aviation maintenance experience; 3) work center; 4) primary shift; 5) current model aircraft; 6) status (active duty,
drilling reservist or active reservist); 7) parent command; and 8) unit’s location. The maintenance items are grouped into the six HRO components: process auditing, reward system, quality, risk management, command and control, and communication/functional relationships. The MCAS utilizes a five-point Likert scale to capture participant responses: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree (note: options of Not Applicable and Don’t Know are also available).

(Adapted from Hernandez 2001, p. 20)

Example: Acknowledge other possibilities

- Describe briefly
- Explain why they were not considered feasible

The primary focus of this project is to ... While alternative methodologies have been used in the past to ... these are not considered appropriate for this study. These alternatives will be discussed in a later section, specifically in relation to why they are not considered feasible.

Example: describing the research site

A watershed on the Texas A&M University campus in College Station, Texas, is used to demonstrate HFR calculations for a realistic watershed and its use for storm-water management. Watershed D on the West Campus contributes to tributaries of White Creek, which is in the headwaters of the Brazos River (Figure 4). Tributary D cuts through the West Campus area, draining 3.2 square kilometers through a natural open channel of 2.0 km in length (Figure 5). Soils in this area are clays and sandy clays with sand lens and are classified as Group D hydric soils, and the CN is 77 (City of Bryan/College Station 2008; Thompson 2005). The upper subwatershed of the watershed is densely occupied by commercial and university facilities, and the lower subwatershed is covered sparsely by urban land use. Because of increased development, erosion and stream bed degradation occurred in Tributary D (Figure 5). Gabions have been placed to alleviate increased velocities, and a detention pond has been recommended for further mitigation of increased storm-water runoff volumes (Thompson 2005).

(Giacomoni et al. 2012, p. 102)

Example: describing tests/experiments

3.2 Experimental Methodology
3.2.1 Small-scale Tests

Small-scale tests were performed at the University of Maryland College Park. Both horizontal and vertical tests were performed. The horizontal tests were similar to FMVSS 302 as stipulated in the NHTSA Laboratory Test Procedure for FMVSS 302 (FMVSS 2013). Both insulation types, FR Material and Current Material, were cut into 102 mm by 356 mm strips and laid on two thin rods, to support the fabric, in a burn test cabinet. Ignition was caused by a methane Bunsen burner with a flame height of approximately 38 mm placed under the sample (edge of the burner top was 19 mm from the sample). The FMVSS-302
standard requires that the material burn at a rate of no more than 102 mm per minute or stop
burning before 60 second, so the results of this study were gauged on these requirements.

The vertical test was performed with samples cut from each insulation of the same size as the
horizontal test. The burn test cabinet was placed in the vertical position and the samples
secured one at a time in the cabinet. Once again, the methane burner with a flame of 38 mm
was placed under the sample with the burner top 19 mm from the sample for ignition. The
same requirements to be met during the horizontal FMVSS 302 test could not be used in the
vertical test because of the rapid nature of vertical flame spread; a subjective approach was
used to compare horizontal flame spread to vertical flame spread and illustrate why FMVSS 302
does not correlate to vertical orientations.

(Patronik 2008, p. 30)

Describing data analysis procedures

• How did you analyse the data? Statistical analysis? Thematic analysis?
• What software or instruments did you use to analyse the data? Why?

Example 1:
The data from the semi-structured interview was organised and transcribed before the data
was keyed into analysis software for qualitative data. The software used for this research is
QSR NVivo version 9. Bazeley and Richards (2000) highlighted that NVivo is able to
categorise data from interview session into nodes that can be explored, organised or
changed to answer the research questions. This software allowed the researcher to browse
all the data coded at a node, to review the data, to return to the context, or to rethink the
idea in interpreting the results. In this way the coding was more systematic and easy to
access.

(Adapted from Yunus 2012)

Example 2:
The data for the quantitative approach was analysed using statistical tools. Descriptive and
inferential statistics were used to analyse the data collected from the questionnaires. As
mentioned in Section 3.1, PASW Statistics 18 were used to analyse the quantitative data.
This software is a comprehensive system for analysing data and it is able to assist data
interpretation more easily (Allen & Bennett, 2010). Tabulated reports, charts, and plots of
distributions and trends were generated to show the significance and similarity among the
data evaluated.

(Adapted from Yunus 2012)
A note about grammar

<table>
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<tr>
<th>Verb tense</th>
<th>Purpose/function</th>
</tr>
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| Simple present tense| Used when talking about an idea, theory or procedure that is constant  
                        | - Radiographic techniques are the main non-invasive method used to determine ...                |
| Simple past tense   | To describe actions or events in the past that are completed                                      |
|                     | - In a previous study, Smith (2005) implemented ...                                                 |
| Present perfect tense| To describe actions or events in the past that are connected to the present                        |
|                     | - To date various methods have been developed and introduced to measure X.                       |
| Passive voice       | To give a more objective, authoritative tone to your writing                                        |
|                     | Focus on the action, rather than the person doing the action, e.g.:                                |
|                     | - Data selection was based on input parameters.                                                   |
|                     | - Data selection will be based on input parameters.                                               |

Additional resources:
For resources on referencing (including UniSA Harvard and APA referencing styles) and academic integrity, go to [UniSA’s referencing website](http://www.unisa.edu.au).

References


Patronik, EA 2008, *An analysis of vehicle fires and potential methods to reduce their severity through more stringent material standards*, ProQuest, UMI Dissertations Publishing.


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