32144 Technology Research Preparation

Research Methods
Commonly used in Industry and Applied Research
Semester 1, 2024.
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Lecturer Dr John Rose.

What is Research? (Reminder from Week 1).

- Creative and systematic work undertaken to increase our knowledge (OECD 2015).
- Collection, organization, and analysis of information to increase our understanding.
- **Research is about the creation of knowledge, for yourself, organisation or culture.**

In General, How Do We Do Research?

Given a problem or an issue, a "research question" is framed that when answered in the affirmative will address the issue.

A research problem:

- Focussed on a single well defined problem.
- Researchable (**by you**).
- Feasible to answer within a timeframe and practical constraints.
- Specific enough to answer thoroughly.
- Complex enough to require developing and validating the answer.
- The potential answer is open to debate rather than accepted facts.
- Relevant to **your** field of IT expertise

Research design vs research method

- **Research design** is a **plan** to answer your research question.
- **Research method** is a **strategy** used to implement that plan.

Good research design ensures

data you obtain through executing your strategy

will help you effectively answer your research question.

Context of Your Research – The Research Proposal – Industry Focus

The approved research proposal defines what you can do. If something is not in the proposal then you can't do it.

Industry likes proposals that:

- Build on and/or improve existing (well proven) processes, techniques and product quality.

- Be aware that "New" implies "risk". "Risk" means longer approvals and lower funding priority.

- Gradual incremental steps with clearly stated cost/benefit goals (lower risk).
  Start with pilot project (tightly scoped and focussed) – aim for 3 months from "go meeting".
  Use to validate research in eyes of business decision makers (simplifies implementation).

- Maximise rewards, minimise costs with quick returns. Remember, involving staff costs money.
  Accurate (as best you can) time line with reasonable decision points (usually monthly).

Developing Research Proposal

You must involve stakeholders as soon as possible, get their ideas, include them and acknowledge them - gets their buy-in, ownership and sponsorship. Remember this is just the start!

Research Considerations in Industry

There are some unique constraints for research when dealing with Organisations. In my own experience I was effectively placed on staff for duration of the project:

- **Cost:** Interviewing an employee (manager, director, line worker) costs the organisation directly in salary (and overheads). It is an opportunity cost that may result in production delays. In developing your proposal you must work with stakeholders and gain "informal" approval.

- **Time:** Employees are subject to KPI's (Key Performance Indicators) which they must meet. Your interview or work preparing your data could risk an employee not meeting a KPI. You must have senior level approval, so employees are directed/encouraged to participate in the research.

- **Clients:** Service Organisations will have confidentially agreements with their clients. You must discuss with management what, if any, constraints will be placed on your research. You may be asked (and I was) to sign a non-disclosure agreement. This will impact you if you hope to publish your research. I submitted all my articles for approval to senior management before publication. I also acknowledged and gave credit to the organisation's role in my research.

- **Competitive Advantage:** Organisations are sensitive about knowledge associated with their real or perceived competitive advantage. This goes beyond a normal "non-disclosure agreement" and involves a high degree of trust usually only accorded to senior/line managers. **Negotiation skills required!** (You may need a sponsor).

Qualitative research

Qualitative research characterized by the collection and analysis of textual data:

- surveys,
- interviews,
- focus groups,
- conversational analysis,
- observation,
- ethnographies,

and by its emphasis on the context within which the study occurs.

Research questions:

- **What** is occurring?
- **Why** does something occur?
- **How** does one phenomenon affect another?

Answering these questions generally requires rich, contextual descriptions of the data.

In qualitative research, the value of data decreases with time.

Quantitative research

Quantitative Research aims to:

- **Classify** features,
- **Count** them and
- **Construct** statistical models in an attempt to explain what is observed.

Attributes:

- ❑ Researcher knows clearly in advance what he/she is looking for
- ❑ Recommended during latter phases of research projects
- ❑ All aspects of the study are carefully designed before data is collected
- ❑ Researcher uses tools, such as questionnaires or equipment, to collect numerical data
- ❑ Data is in the form of numbers and statistics
- ❑ Quantitative data is more efficient, able to test hypotheses, **but may miss contextual detail**
- ❑ Researcher tends to remain objectively separated from the subject matter

Mixed-Methods Research

General Characteristics:

- Combines both quantitative and qualitative methods.
- Data can be collected simultaneously or sequentially; depending upon design.
- Allows researchers to expand an understanding from one method to another or converge or confirm findings.
- Researcher draws on breadth of generalization offered by quantitative research with depth of detailed understanding offered by qualitative research.
- Design may or may not be driven by a theoretical perspective.

Two data collection methods; one is embedded (i.e., nested) within the other:

- **Priority** is given to primary data collection approach with less emphasis placed on the nested approach.
- **Data** are mixed during the analysis phase.
- **Primarily purpose:** is for gaining a broader perspective than could be gained from using only the predominant data collection method.
- **Secondary purpose:** is use of embedded method to address different research questions or garner information from different groups or levels within an organization.
- **Strengths**: able to collect two types of data simultaneously; can collect both quantitative and qualitative data allowing for perspectives from each; provides advantages of both methods.
- **Weaknesses:** data needs to be transformed to allow integration during analysis, this may lead to issues in resolving discrepancies that occur between different data types; there is little literature in this area; results may be biased by differing priorities assigned to research design results.

Things to Include in Your Research Section

Decisions:

What decisions have you made?

Actions:

What actions do you plan to take in the research study?

Rationale:

Why do you want to take those decisions and actions?

Implications:

What are the potential implications of your decisions and actions?

Implementation Process:

How do you plan to implement the decisions?

Structuring Your Research Methods Design

Designing & Structuring your Research Method

- Introduction
  - Problem, Purpose, Rationale, & Section Overview
- Research Method
  - Qualitative, Quantitative, or Mixed
  - Participants / Corpus (collection of written texts)
  - Data Collection Strategy & Procedure
    - Quality Assurance
    - Instrumentation
    - Data Processing
  - Assumptions & Limitations
- Research Design
  - Management Issues
  - Timeline (Gantt Chart) (highly recommended)
- Summary

Limitations

- Limitations are ***weaknesses*** related to ***decisions*** made in a research study
- They are ***difficult to contain***
  - Consequences associated with choices made in a study related to, for example:
    - Sampling technique
    - Data collection strategy (i.e. interviews, focus groups, ...)
    - Instrument used
    - Population chosen (in terms of accessibility)
    - Time and resources
- How would you be addressing expected challenges?

Source: Simon, M. K. (2011). Dissertation and scholarly research:
Recipes for success (2011 Ed.). Seattle, WA, Dissertation Success, LLC.
http://dissertationrecipes.com/wp-content/uploads/2011/04/AssumptionslimitationsdelimitationsX.pdf

RESEARCH METHODS

ASSUMPTIONS

- Assumptions **can not be** totally **controlled**
- They **need to exist** for your study to be **valid/ essential/credible**
  - Truthfulness/honesty of participants' response
  - Representativeness of sample
  - Homogeneity of participants characteristics
- **Having knowledge of your assumptions**
- Justifying their existence

Source: Simon, M. K. (2011). Dissertation and scholarly research: Recipes for success (2011 Ed.). Seattle, WA, Dissertation Success, LLC. http://dissertationrecipes.com/wp-content/uploads/2011/04/AssumptionslimitationsdelimitationsX.pdf

RESEARCH METHODS

Delimitations - Scope of the RESEARCH

Features that can be controlled to determine parameters or scope

Subject to Stakeholder Agreement, researchers have control over the following characteristics of the research:

- Research problem
- Research purpose
- Research question(s)
- Methodology
- Variables
- Population

IMPLEMENTATION OF RESEARCH METHOD

Implementation issues, including

- Risks
- Benefits
- Information Privacy & Security

Management of implementation issues

- Ethics:
  Approvals & assurances
- Participant protocols:
  Participant control over narrative / information
  Management of consent / completion of consent forms
  Confidentiality of participant information
- Data security:
  Protection of participant information
  Anonymity of participant responses

Example of a (Very Optimistic) PhD TIMELINE