Undertaking Research

Tips, terms, definitions and flow

A quick reference guide designed for Masters and PhD students undertaking research

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10th edition (June 2016)

Contents

This document has been prepared utilising the APA 6th referencing style (American Psychological Association, 2010).

Thesis Structure: Chapter Overview

Material for this section has been largely extracted from primary source: Baturo and Cottier (2010).

1 Introduction (Aims & Objectives)

- Defines the purpose and specific aims and objectives of the study.
- Delineate the research problem and outline the questions to be answered or the overarching objectives to be achieved
- Solving a research problem allows a better understand about something
- The knowledge gained from solving a research problem may be applied toward finding the solution to a practical problem
- It is normal that you make changes to your research problem later when you read scientific literature and speak to experts, your supervisor, etc.
- Working definition: A research problem is a question or matter involving doubt, uncertainty or difficulty that is proposed for solution. It concerns: 1. A question 2. Something which is not fully understood 3. Something that has been deliberately chosen as the subject of inquiry.

2 Literature review

- Major aim is to delineate various theoretical positions and from these to develop a conceptual framework for generation of hypotheses and setting up the research question[s]
- Implications from the literature provides the theoretical framework for your study
- The conceptual framework should reveal possible connections or associations between concepts or variables that can be expressed as specific research questions
- Provides the platform for making an explicit statement of the hypotheses, propositions or research questions and how they are derived from existing theory and literature
- Clearly identifies ***the gap in the literature that is being addressed by the research question[s]*** – and the likelihood of obtaining meaningful, relevant, and significant results.

3 Research Design

- Research design is adopted in order to achieve the aims and objectives stated the Literature Review
- State *design* (e.g., quantitative, qualitative) and *methodology* of your research (e.g., experimental, quasi-experimental, correlational, casual-comparative, survey, discourse, case study, analysis, action research)
- The basis for the choice of research method should be whether it will help answer the research question(s).
- The methods used must link explicitly to the research question[s] and must be suited to the nature of the question
- State participants in the study.
- State all the instruments [to be] used in the study and justification
- State procedure [to be] used and the timeline for completion of each stage of the study;
- How the data was [will be] analysed
- Ethical considerations of the research and its [potential] problems and limitations.

4 Results

- Generally just the results are presented, without interpretation, inference, or evaluation
- Some analysis of the results – maybe?
- Results to be inextricably linked to the design – describe what happened factually and un-emotively.
- Certain historical, case-study and anthropological investigations, factual and interpretive material may be interwoven rather than being presented as "findings".
- Can use headings that correspond to each main question of your hypothesis/objectives from the Literature Review and/or the theoretical framework – or (if applicable) results organised in terms of the stages of the study

5 Analysis

- Full discussion, interpretation and evaluation of the results with reference to the literature. Can also include theory building.
- For each objective, discuss the results with reference to the literature (find a place for as much of the literature as you can)
- Thus research outcomes are tied together in relation to the theory, review of the literature, and rationale.

6 Conclusions

- Present conclusions, limitations, and recommendations – so what is the theory? Where to from here? What are the practical implications?
- This is the "so what" of the findings – often the hypothesis/research question[s] restated as inferences with some degree of definitive commitment and generalisability
- Raise new and pertinent questions for future research.
- Include a discussion of any limitations of the research
- Provide final recommendations – practical suggestions for implementation of the findings/outcomes or for additional research

Data types and their Analysis

Extracted from various sources as derived from Creswell and Plano Clark (2011), Pandit and Yentis (2004), and Veal (2005)

cross sectional

typically a survey: observation of all of a population, or a representative subset, at one specific point in time

discrete data

Data that can't be broken down into smaller data values, e.g. a questionnaire with answer options of "Yes/No?"

empirical research

conducting quantitative or qualitative data analysis using direct and / or indirect observation or experience. Research design varies by field and by the question being investigated: many researchers combine qualitative and quantitative forms of analysis to better answer questions which cannot be studied in laboratory settings, particularly in the social sciences and in education.

interval data

Used on an order of scale basis that is equal to intervals between scores e.g. Olympic judging scores 6.0, 6.5, 7.0, 7.5. and typically used where the difference between two values is meaningful, e.g. the difference between a temperatures of 80°C and 70°C is the same difference as between 40°C and 50°C degrees.

longitudinal analysis

a type of observational study used in correlational research that involves repeated observations of the same variables over long periods of time — often many decades. Often used in psychology to study developmental trends across the life span - or in sociology to study life events throughout lifetimes or generations. Unlike cross-sectional studies in which different individuals with same characteristics are compared, longitudinal studies track the same people, and therefore the differences observed in those people are less likely to be the result of cultural differences across generations. Therefore, longitudinal studies typically make observing changes more accurate: for example in medicine (used to uncover predictors of certain diseases), and in advertising (used to identify the changes that advertising has produced in the attitudes and behaviors of those within the target audience who have seen the advertising campaign).

nominal data

Nominal data is used to assign categories for identification purposes e.g. "Male = 1 Female = 2". The numbers have no value in themselves but identify the differences two different populations.

ordinal data

Data that can be ranked and put in place depending on the values that each subject has.

panel data (cross sectional and times series)

a statistical method, widely used in social science, epidemiology, and econometrics, which deals with two-dimensional panel data. The data are usually collected over time and over the same individuals and then a regression is run over these two dimensions. Multidimensional analysis is an econometric method in which data are collected over more than two dimensions (typically, time, individuals, and some third dimension)

primary data

Data collected by the researcher during the period of research

quantitative data

Data in a numerical form: often fails to explain reasons and causes.

qualitative data

Data in a non- numerical form: can include words or text, photographs, videos, sound and recordings. Often involves smaller sample sizes, and can be highly subjective.

ratio data

Based on an order scale with proportional equal units of measurement. Differences between data can be quantified and proportions can be specified (e.g. 21 years is three times as old as 7 years; or blood pressure measurements whereby if blood pressure increases by 10%, there is 10% more force being exerted.

secondary data

Data that has already been collected. Typically used for reference or combined with primary data in order top formulate an evidenced theory

time series

a sequence of data points, measured typically at successive time instants spaced at uniform time intervals. Time series ***forecasting*** is the use of a model (e.g. singular regression) to predict future values based on previously observed values. Periodic measurements are obtained prior to, during, and following the introduction of an intervention or treatment in order to reach conclusions about the effect of the intervention

Surveying and Population Sampling

Partially extracted from various sources including: De Veaux, Velleman, and Bock (2005), Utts and Heckard (2004), Weirs (2008), and SurveyMonkey (2015).

Sampling

We draw samples because it is usually not possible to work with an entire population. Because of this we seek out a **representative sample** that is of sufficient size that sees sufficient respondents in each category under observation. A parameter that is part of a model for a population is called a **population parameter** (see table below). Statistics that match statistics with population parameters estimates are known as **sample statistics**. Sampling design seeks to make sure that the statistics we compute from the sample reflect the corresponding parameters – a **representative sample**. These can be selected by:

1. **Random sampling** - occurs where respondents are chosen entirely by chance from the population at large
2. **Simple random sample** - every possible sample combination has an equal chance to be selected
3. **Stratified random sampling** - where populations are split up into homogenous groups – strata – before the sample is selected; then simple random sampling is used within each stratum before the results are combined
4. **Cluster sampling** - population is split into heterogeneous groups with one cluster selected
5. **Multistage samples** - sampling schemes that combine several methods
6. **Systematic samples** - sample drawn by selecting systematically, where there is no reason to believe that the order could be in any way associated with responses

Name	Statistic	Parameter
Mean		μ (mu)
Standard deviation	s	σ (sigma)
Correlation	r	ρ (rho)
Regression coefficient	b	β (beta)
Proportion	p̂	ρ (pee)
Population size		N
Sample size i.e. the response or number responding		n

Sample size

The number of completed responses your survey receives is your sample size n. It's called a sample because it only represents part of the group of people (or population) whose opinions or behaviour you are investigating.

There are three things you need to take into account in order to determine the optimum size of the sample size for your research project:

1. **Population Size:** The total number of people whose opinion or behaviour your sample will represent. For example, if you were surveying everyone in New Zealand the population size would be about four and a half million. If you were surveying all the players belonging to a local rugby club, the total population size could be as small as a few hundred.
2. **Margin of Error - % (ME)**: The extent of the interval on either side of p̂ sample proportion - i.e. the range (measured as a percentage) that your population's responses may deviate from your sample's. The percentage essentially describes how closely the answer your sample gave is to the "true value" in your population. The smaller the margin of error is, the closer you are to having the exact answer at a given confidence level. A smaller margin of error means that you must have a larger sample size given the same population. Generally denoted as: $estimate \pm ME$ it attempts to resolve the tension between certainty and precision.
3. **Confidence Level - %**: The confidence interval expresses the probability that your sample accurately reflects the attitudes of your population, within its margin of error. The industry standard is 95%, but could conceivably range from 80-99% but common standards used by researchers are typically 90%, 95%, and 99%.The higher your confidence level, the larger your sample size will need to be.

- Take care when making comparisons between groups in your sample because your sample size reduces and the margin of error increases. The sample size may need to be increased.

The formula for calculating sample size is as follows:

$$Sample\ Size = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

Where:

N = Population size
e = Margin of error
p = Population proportion
z = z-score (see table below)

Desired confidence level	z-score
80%	1.28
85%	1.44
90%	1.65
95%	1.96
99%	2.58

Response Rate / Nonresponse bias

Response rate is the % of responses received as a proportion of the total number of requests to undertake a survey. Surveys seldom succeed in getting responses from everyone; generally researchers aim for a clear majority response rate as a rule of thumb, with higher rates typically achieved where the respondents perceive that there is a tangible reward in participating, or where random surveying is undertaken that results in higher response rates. A low response rate often results in **nonresponse bias** – a serious but common potential source of bias - occurs when a large fraction of those sampled fail to respond, with the non-responders reaction subsequently remaining unknown. Thus the nonresponse bias can lead to systematically over or under estimating the truth about a population. Also, nonresponse bias can often be observed when basing a sample survey on a **self-selected sample** (also called a **volunteer sample**): it is usually so problematic that the results cannot be extended to anyone beyond the sample, since the survey depends entirely upon those upon those deciding to respond. It may be often demonstrated that in these instances, only those who have a strong opinion about the question are more likely to respond.

Hypothesis testing

Retain (support) hypothesis: the facts are consistent with the model, i.e. the results seem consistent with what we would expect from our natural sampling variability

Reject hypothesis: the facts are glaringly inconsistent with the hypothesis, i.e. the probability of seeing results like our data is really low.

Null Hypothesis H_0: normally the starting hypothesis. The probability that an observed statistic value (or an even more extreme value) could occur if the null model were true is called the **P-value**. If the P-value is small enough, the null hypothesis is rejected. However, the null hypothesis is the ordinary state of affairs, so it's the alternative to the null hypothesis that we consider unusual and for which we must marshal evidence. Nonetheless the conclusion in a hypothesis test is always a statement about the null hypothesis: the conclusion must state either that we reject or that we fail to reject the null hypothesis. It is expressed as $H_0: parammeter = hypthesized\ value$, for example, for a proportion that deviates from 50% then $H_0: p = 0.50$

Alternative hypothesis H_A or H_1: Contains the values of the parameter we accept if we reject the null. On the basis of the previous example, expressed as $H_A: p \neq 0.50$

Statistical significance

Occurs when an observed difference is too large for us to believe that it is likely to have occurred naturally. It resolves whether observed differences are as large as would be obtained by randomisation alone, or whether they larger (in which case they could be statistically significant). Such observations are often represented by boxplots.

When the P-value is small it tells us our data are rare given the null hypothesis. A "rare event" can be defined arbitrarily by setting a threshold for our P-value. If our P-value falls below that point we'll reject the null hypothesis. We call such results statistically significant, with the threshold called an **alpha level**. The alpha level is also called the **significance level**. When we reject the null hypothesis, we say that the test is "significant at that level". For example, we might say we reject the null hypothesis at the 5% level of significance, but the alpha level must be selected before you look at the data otherwise you could be accused of cheating by tuning your alpha level to suit the data.

It is good practice to report the magnitude of the difference between the observed statistic value and the null hypothesis value (in the data units) along with the P-value on which we base statistical significance[1].

ANOVA

Acronym for *Analysis of Variance*. Often used in observational data analysis, especially when an experiment would be impossible or unethical. Measured by a sampling distribution model of the ratio between $\mathbf{MS_T}$ (treatment mean square) and $\mathbf{MS_E}$ (error mean square) – the ***F*-distribution**, with the ratio between them being the ***F*-statistic**. By comparing this statistic with the appropriate *F*-distribution we obtain a P-value. The test is significant if the *F*-ratio is big enough – in practice big *F*-statistic values go with small P-values. The entire analysis is called **ANOVA**, and is typically expressed as the F-statistic, MS_T/MS_E, has $k - 1$ and $N - k$ degrees of freedom, where k is groups, and N is all the cases.

Control treatments

A control treatment is used as another level of a factor in order to compare the treatment results to a situation where nothing happens. The baseline measurement (without treatment) is called the **control** treatment, and the group of subjects to whom it is applied is called a **control group**. A 'fake" or null known to have no effect, but looks just like the treatments being tested, is called a **placebo** (overcomes the tendency of human subjects - often 20% or more of experimental subjects - to show a response even when administered a placebo).

Replication

Repeating of an entire experiment with the controlled sources of variation at different levels. Considered to be an essential step in science.

hedonic modelling and pricing

In real estate this is a technique that decomposes characteristics (typically of buildings) into separate components and estimates relationships with pricing or demand. This is typically achieved by a hedonic regression equation which can form the basis for developing a pricing index for property value.

[1] Statistical significance may not carry any practical importance or impact. For large samples, even small, unimportant (insignificant) deviations from the null hypothesis can be statistically significant. On the other hand, if the sample is not large enough, financially or scientifically "significant" differences may not be statistically significant.

Theory Building from Case Studies

Extracted from Kathleen M. Eisenhardt (1989) and Kathleen M. Eisenhardt and Graebner (2007)

Case Study – Theory Building: Overview & Approach

- An alternative method that takes advantage of rich empirical data. Case studies are typically rich, empirical descriptions of particular instances of a phenomenon that are typically based on a variety of data sources.
- Scholars have used case studies to develop theory about topics as diverse as group process, internal organization and strategy
- Papers that build theory from cases are often regarded as the "most interesting" research and are among the most highly cited pieces in management journals
- Building theory from case studies is a research strategy that involves using one or more cases to create theoretical constructs, propositions and/or midrange theory from case-based, empirical evidence.
- The central notion is to use cases as the basis from which to develop theory inductively. The theory is emergent in the sense that it is situated in and developed by recognizing patterns of relationships among constructs within and across cases and their underlying logical arguments.
- Central to building theory from case studies is replication logic. That is, each case serves as a distinct experiment that stands on its own as an analytic unit. Like a series of related laboratory experiments, multiple cases are discrete experiments that serve as replications, contrasts, and extensions to the emerging theory
- Although sometimes seen as "subjective," well-done theory building from cases is surprisingly "objective," because its close adherence to the data keeps researchers "honest." The data provide the discipline that mathematics does in formal analytic modeling.
- Its emphasis on developing constructs, measures, and testable theoretical propositions makes inductive case research consistent with the emphasis on testable theory within mainstream deductive research.
- Inductive and deductive logics are mirrors of one another, with inductive theory building from cases producing new theory from data and deductive theory testing completing the cycle by using data to test theory. Moreover, since it is a theory-building approach that is deeply embedded in rich empirical data, building theory from cases is likely to produce theory that is accurate, interesting, and testable. Thus, it is a natural complement to mainstream deductive research.

Process of Building Theory from Case Study Research

A roadmap for building theories from case study research.

Step	Activity	Reason
Getting Started	Definition of research question	Focuses efforts
	Possibly a priori constructs	Provides better grounding of construct measures
Selecting Cases	Neither theory nor hypotheses	Retains theoretical flexibility
	Specified population	Constrains extraneous variation and sharpens external validity
	Theoretical, not random, sampling	Focuses efforts on theoretically useful cases-i.e., those that replicate or extend theory by filling conceptual categories
Crafting Instruments and Protocols	Multiple data collection methods	Strengthens grounding of theory by triangulation of evidence
	Qualitative and quantitative data combined	Synergistic view of evidence
	Multiple investigators	Fosters divergent perspectives and strengthens grounding
Entering the Field	Overlap data collection and analysis, including field notes	Speeds analyses and reveals helpful adjustments to data collection
	Flexible and opportunistic data collection methods	Allows investigators to take advantage of emergent themes and unique case features
Analysing Data	Within-case analysis	Gains familiarity with data and preliminary theory generation
	Cross-case pattern search using divergent techniques	Forces investigators to look beyond initial impressions and see evidence thru multiple lenses
Shaping Hypotheses	Iterative tabulation of evidence for each construct	Sharpens construct definition, validity, and measurability
	Replication, not sampling, logic across cases	Confirms, extends, and sharpens theory
	Search evidence for "why" behind relationships	Builds Internal validity
Enfolding Literature	Comparison with conflicting literature	Builds internal validity, raises theoretical level, and sharpens construct definitions
	Comparison with similar literature	Sharpens generalizability, improves construct definition, and raises theoretical level
Reaching Closure	Theoretical saturation when possible	Ends process when marginal Improvement becomes small

Simplified Research Thesis Development Flowchart

Research Topic (a subject on which to conduct an investigation)	• The research topic has many potential research problems and involves lateral thinking • Will be further developed as a research question • Successful research topics are typically narrowly focused and carefully defined, but are important parts of a broad-ranging, complex problem • Unearthed by initial exploration and overview; then brainstorming, sharing and discussion.
Research Problem (question[s] that you have to solve by researching)	• A creative process • Research problem provides context for the study and reveals what the researcher is trying to answer. • A problem statement articulates the problem to be addressed and indicates the need for a study, but… • The problem should be expressible as a question. • Its solution should make an original contribution to the literature in your field
Literature Review (current knowledge)	• Provides theoretical framework for the study • The conceptual framework developed from the literature review is based on the problem • *Conducted on an on-going basis* to ensure research builds on work already completed in the field of study
Literature Gap (what is not known)	• Confirms (or refines) the research topic and research problem
Research Question[s] (question[s] that you have to answer by researching)	• Involves logical thinking • Usually no more than 3 or 4 questions.
Research Hypotheses (translates a quantitative research question into a precise prediction of expected outcomes)	• Specific predictions regarding answers to the research question • Tested empirically • Qualitative studies do not begin with a hypothesis • Worded in the present tense • *Research hypothesis* - statements of expected relationships between variables • *Null hypothesis* H_0 - no relationship between the independent and dependent variables. (Alternate hypothesis H_1)
Research Aims & Objectives (what is, and how it will be, accomplished	• Aims: broad statements of desired outcomes, or the general intentions of the research; emphasize *what* is to be accomplished (not *how* it is to be accomplished) • Objectives: The steps being undertaken in order to answer the research questions (specific list of tasks needed to accomplish the goals of the project); emphasises how aims are to be accomplished
Research Design (achieves aims and objectives)	• Quantitative, or qualitative, or both quantitative and qualitative analysis (e.g. explanatory sequential design)
Research Methodology (basis: whether it helps answer research question)	• For example - experimental, quasi-experimental, correlational, casual-comparative, survey, discourse, case study, analysis, action research

Writing a Scholarly Article for a Refereed Journal

Extracted from primary source: Brand and Huiskes (2001)

The two critical principles: logical flow and brevity

Logical flow occurs by observing the following elements of paragraph construction:

1. Each paragraph discusses only one major topic.
2. The first sentence of each paragraph introduces the topic, and the remaining statements merely expand and/or modify the first.
3. The critical elements of the topic appear in that first sentence.
4. Either the final sentence in the paragraph connects the logic from that paragraph to the next, or the topic sentence of the new paragraph relates back to the previous; that is, paragraphs are connected by ‘‘transitional’’ statements.

Brevity arises by:

1. Concisely stating ideas once;
2. Minimizing repetition (with a few exceptions to be noted below); and
3. Proper grammar.

Complexity = Simple Structure

Most concise scientific (archival) journals utilize a traditional form: **Introduction, Methods, Results, Discussion.** This format is neither always essential, nor always the best. However, one should have clear justification for discarding it in favour of another. Complexity of material is rarely, if ever, adequate justification. In fact, complex material is best presented with simple structure. Sub-headings can be distracting, and often a poor substitute for clear writing.

Captions

All data (figures and tables) should provide some key argument for or against the prediction, question, or hypothesis, and that argument should be succinctly stated in one or two sentences. The reader should immediately grasp the significance of the data to the questions posed. If an author cannot convince a reader of critical points in say, 10 sets of data, then the data are likely to be inefficiently conveyed, or less important data included, or the questions vaguely formulated.

Section	Word Count	Detail
Introduction	500 or less	Briefly notes what we know (or do not know) about the issue, and poses appropriate questions or hypotheses or approaches. It focuses upon the rationale (motivation) for the study.
Methods	500 - 1,500	This section provides the experimental design (hypothesis-based paper) and details of the approach. Ideally, provide enough detail so that an independent investigator could repeat the work; however, practicality dictates that the fundamentals of published methods be briefly noted. However, all critical details must be provided, with less critical (but new) details best provided in an appendix. Complete description of all statistical methods If any) provided at the end, with choice of level of statistical significance requiring justification
Results	500	Contains only that information bearing on the questions raised. Begin each paragraph in Results with a clear statement of a key result (parenthetically referring to all data figures or tables) within the framework of the prediction, question, or hypothesis posed in the Introduction. List results in approximate order of importance. Quantitative studies should justify the selected level of significance based upon the particular problem, rather than merely stating or implying a ‘‘standard’’ p value.
Discussion	1,000	The discussion should reflect rather more of a synthesis than a reiteration of results – in fact no new results should be discussed. Begin with a concise restatement of the rationale for the question or hypothesis stated at the end of the Introduction. Then, briefly explore the major assumptions and/or limitations of the approach or methods. The reader should be convinced that the limitations do not seriously jeopardize the conclusions within an explicitly stated range of conditions. Next, compare and/or contrast data with observations or data in the literature Finally, synthesize the results of the current paper and observations or data in the literature into a coherent whole, and within the framework of the prediction, question, hypothesis, or objective posed in the Introduction. ‘Synthesis’’ means that all known observations correspond to the framework (failure of an established ‘‘fact’’ to correspond falsifies the hypothesis).
Abstract	300 or less	Do this last. Begin with the issues or questions posed, and then describe the method in a few brief statements. Express answers to the question (or statement of support for or refutation of a prediction or hypothesis) in one or two concise statements.

Mutual Expectations Agreement

The aims of the MEA at Lincoln University are to encourage communication between the thesis student and their supervisor/s and second, and to record their agreed mutual expectations. The agreement should be completed within three months of the assignment of the supervision team. Students, especially those new to Lincoln, are advised to raise any matters they are uncertain about before the MEA is signed.

The MEA contains some or all of the following elements:

1. **Research topic and proposal** (submitted within 6 months of registration for PhD's). Any major changes in the research project or supervisors, require the agreement of the student, Supervisor, Associate Supervisor/s (and others as appropriate) and the Postgraduate Committee Chair.
2. **Regular Meetings** - times as mutually agreed (frequency and duration). Notes from these meetings will be written and circulated by the student., Also, access to the supervisor(s) outside scheduled meeting times
3. Expectations of the **student's attendance at Department/Faculty seminars**
4. **Advice and Support**
    - **timeline** for provision of comment to the student
    - Any need to obtain statistical or other advice from **specialist advisers**
    - Student initiation (if required) re **advice and assistance on English writing** and copy editing from specialist advisers, or regarding Library services
5. IP and Publications – compliance with Lincoln University **Intellectual Property** Guidelines.
6. **Publication plan** including planned joint publications with members of the supervision team (submitted as part of the thesis proposal.) - British Sociological Association Author Guidelines (adopted as policy by the University in 2005) to apply.
7. **Tasks, milestones and timelines**, responsibilities relating to preparation and writing of **conference papers, PPT, journal articles, book chapters** etc to be determined at the regular meetings and require mutual agreement

Also: refer to *Flow Chart of Key Components of the PhD (Masters / Dissertation / Honours) Process at Lincoln University*.

Human Ethics

Information in this section has been largely extracted from *Human Ethics Committee Application Form Guidebook*, Lincoln University (2014).

If your research project involves human participants, then more than likely you will need to submit an application to the Lincoln University Human Ethics Committee (HEC) for formal Ethical Approval. The application should be completed in conjunction with, and after reference to, the HEC Application Form Guidebook. Committee deliberations require up to six weeks to reach a decision; more often than not it will be considerably less time than that.

It is Lincoln University policy that ALL non-exempt research projects that involve human participants and that are carried out by Lincoln staff or students must receive approval from the Lincoln University Human Ethics Committee before commencement.

Note that the application process is a "value-added" and "risk management" process, and for this reason it is recommended that all research involving any form of human participation be submitted to the HEC for evaluation and comment.

Principles Which Govern Sound Ethical Research

There are four primary principles:

1. Informed consent
2. Respect for rights of privacy and confidentiality
3. Limitation of deception
4. Minimisation of risk

With regard to Informed Consent:

- Participation in a project must be voluntary;
- Informed written consent must normally be obtained in advance from participants or, in the case of children, their legal representatives;
- Information provided to gain the consent of participants must be adequate and appropriate.
- Any departures from the foregoing must be justified in terms of the necessity to the scientific aims of the project or research method or with regard to cultural factors that may apply

Human Ethics - Supplementary Information Requirements

There are five documents based on 'templates' designed by the HEC that you may need to include with your application. These need to be customised to your project. They are:

1. Questionnaire template and final questionnaire
2. Telephone introduction script and list of questions
3. Research Information Sheet
4. The Consent Form
5. Research Involving a Third Party organisation.

Human Ethics – Information Required

The information required by the University includes, but is not limited to, the following:

- Project description (including background Information and project's significance)
- Whether your research is part of larger project
- Involvement of other investigators
- Whether approval by other ethical bodies is required (e.g., Health and Disability Ethics Committee, in the case of health or medical research).
- Aims and type of information and hypotheses to be tested
- Research Methodology and Design - intended procedures (the approach taken to obtaining information, how the data will be collected information processing and analysis – note: if the project involves the use of a questionnaire, a telephone survey, structured or semi-structured interviewing, then the questionnaire, survey or indicative list of questions must be provided. If a questionnaire is used, there is a standard template provided that can be used at the start of the questionnaire. If a telephone survey is being conducted, there is a standard introduction that the HEC asks to be used).
- Details of any research involving third party organisations
- Numbers and types of participants (age, gender, cohort details etc), participant selection and recruitment
- Information given to prospective participants (the usual requirement is that participants are fully informed about the research e.g. research information sheet outlining the project, its voluntary nature, and how long it is likely to take).
- Consent - wherever practical the HEC expects written consent to be obtained.
- Participant Anonymity and Confidentiality
- Project location
- Risks to participants - physical, emotional, cultural or moral – including any likely physical discomfort or incapacity
- Time required of participants
- Compensation and payments (includes inducements such as prizes, gifts and refreshments)
- Use of deception (e.g. deliberately telling participants something incorrect or misleading about the research either directly or by strong implication; or not telling participants relevant information.)
- Information about participants obtained from third parties
- Confidentiality, storage, retention and destruction of data and consent forms
- Availability of funding, including investigator's and Lincoln University's Financial Interests

Note particularly Section 6.10 LU HEC Policy and Procedures. This section of the Policy provides advice on issues related to voluntary participation, privacy, use of secondary data and use of third parties to obtain data, reducing the burden on participants, minimising deception, and ensuring the benefits of the research apply to future cohorts.

Flow Charts of Key Components of PhD, Masters and Honours at Lincoln University

FLOW CHART OF KEY COMPONENTS OF THE PhD PROCESS AT LINCOLN UNIVERSITY (Faculty of Agribusiness & Commerce)

Process	Initial Enquiry followed up and records kept	Assessment of application by Faculty	Agri-Comm Postgraduate Orientation compulsory attendance	Undertaking the research Timeframe from registration to submittal: aiming for 3 years (Maximum time = 5 years before extension required)					Research seminar normally conducted in the Faculty or Centre (or equivalent) but could be delivered at the annual PG Conference in the year of completion		Amendments (within 3 months) normally to the satisfaction of the supervisor
Compliance / constraints	Application requirements specified on the WEB	Approval by Faculty PG Committee	(Interim) Advisor/Supervisor appointed	Compulsory	Max. time allowed 9 months from registration - aim for less than 6 months	Compulsory	Compulsory	Around 2 months prior to submittal	Must comply with all University requirements	Reports to be completed within 2 months of receiving thesis	Occasionally also to the satisfaction of the NZ examiner, or other
CORE COMPONENT / MILESTONE	**Inquiry and application**	**Letter of offer**	**Registration for PhD**	**Mutual Expectations Agreement**	**Proposal and seminar**	**6-month progress report**	**12, 15 or 18-month progress meeting**	**External examiner nominations**	**Submittal and declaration**	**Examination and follow up**	**Submission of completed thesis and graduate clearance form**
Related comments, requirement	Sometimes students upgrade from Masters to PhD – approved by AAC after formal application	(valid 12 months) Includes registration details. IP, etc	Minimum Service Provision explained: Faculty Dean appoints on basis of approved criteria	If supervisors confirmed at beginning then complete immediately	Proposal defence (outcome: pass, OR fail with extension, OR fail with exclusion): approved by Faculty Dean or designate	June and December of each year	(optional 18 month)	1 x New Zealand external and 1 x international	2 copies, soft bound, to the Postgraduate Administrator	Independent chair collates reports and chairs exam (assuming required)	Budget allowing: 3 x copies hard bound (one to each supervisor and one for student) + 1 digital copy to the Library
	PhD eligibility essentially: PGCert. with a B+ average, subject to supervisor availability	Note to students: be familiar with House Rules on Web	Timeline begins	Max. enrolment is two courses (e.g. Research Methods) otherwise international fees apply	Confirms budget, ethics requirements, supervision	Criteria developed against which students can now be excluded for poor performance		Publish literature review asap, then progressively publish as appropriate		NZ Examiner conducts oral exam. Examiners joint report recommends outcome (award, revision, fail)	Digital library submission
LU web site or other reference	Apply on-line (can nominate contact person)	See Bernadette Mani for copies			Faculty Chair of PG Committee	Faculty Chair of PG Committee Chair, or B. Mani	Faculty Chair of PG Committee Chair, or B. Mani	Nomination form – B. Mani	B. Mani	B. Mani	B. Mani for Grad clearance form

FLOW CHART OF KEY COMPONENTS OF THE MASTERS PROCESS AT LINCOLN UNIVERSITY

Related comments, requirements	Ensure all enquiries are followed up and records kept	Faculty or equivalent assessment of application	Induction Faculty of A&C: compulsory attendance of Commerce Postgraduate Preparation Programme (CPPP)	Undertaking the research – from registration to submittal: normally 1 year (120 credits)					Research seminar, normally in the Faculty or Centre (or equivalent) but could be at the annual PG Conference in the year of completion	Normally to the satisfaction of the supervisor
	Application requirements specified on the WEB	Approval by PG sub committee	Advisor / Supervisor appointed	Compulsory	During papers year in Agribus Com and ESD; otherwise within 3 months of starting	Compulsory	Around 2 months prior to submittal	Must comply with all University requirements	Reports to be completed within 2 months of receiving thesis	Occasionally also to the satisfaction of the NZ examiner, or other
CORE COMPONENT	**Inquiry and application**	**Letter of offer**	**Registration for Masters**	**Mutual Expectations Agreement**	**Proposal and seminar**	**6-month progress report**	**External examiner nominations**	**Submittal and declaration**	**Examination and follow up**	**Submission of completed thesis and graduate clearance form**
Related comments, requirements	Sometimes students upgrade from PG Cert, Dip or Hons to Masters – approved by AAC after formal application	Includes registration details. IP, etc	Minimum Service Provision explained	If supervisors confirmed at beginning then complete immediately	Approved by Faculty Dean (or equivalent) or designate	June and December of each year	1 x New Zealand external (university) plus 1 x independent member of LU Academic staff	3 copies, soft bound, to the Graduate Administrator	Reports collated by Graduate Student Administrator; if clear to pass then approved by AAC; otherwise procedures in House Rules implemented	3 copies hard bound: 1 hard and 1 digital to the Library and 1 to the Faculty
	Masters eligibility normally: PGCert. with a B average, subject to supervisor availability	Note to students: be familiar with House Rules on Web	Timeline begins		Confirms budget, ethics requirements, supervision				Provision for oral exam if deemed	Digital library submission
LU web site or other reference					English language: students can employ style editors (LU has approved persons) which NZ Aid will pay for.					

FLOW CHART OF KEY COMPONENTS OF THE HONOURS PROCESS AT LINCOLN UNIVERSITY (or 40 credit Masters dissertation)

Related comments, requirements	Ensure all enquiries are followed up and records kept	Faculty assessment of application	Induction Faculty of A&C: compulsory attendance of Commerce Postgraduate Preparation Programme (CPPP)	Undertaking the research – from registration until 2 weeks after the final examination for full time students in the year of registration					Normally to the satisfaction of the supervisor
	Approval by PG sub committee	Approval by PG sub committee	Advisor/Supervisor appointed	Compulsory	Within 3 months of registration for full time students	Around 2 months prior to submittal	Must comply with all University requirements	Reports to be completed within 2 months of receiving thesis	Occasionally also to the satisfaction of the NZ examiner, or other
CORE COMPONENT	**Inquiry and application**	**Letter of offer**	**Registration for Honours**	**Mutual Expectations Agreement**	**Proposal**	**Examiner nominations**	**Submittal and declaration**	**Examination and follow up**	**Submission of completed dissertation and graduate clearance form**
Related comments, requirements	B+ or better average in 300 level courses – except BAgrSc Hons (B average in last 2 years of FT study). Can come from another University)	Includes registration details, IP, etc	Minimum Service Provision explained	If supervisors confirmed at beginning then complete immediately	Approved by Faculty Dean or designate	1 other LU examiner (i.e. marked internally)	2 copies, soft bound, to the Graduate Administrator	Faculty Dean or nominee collates draft reports and facilitates final examination process	3 copies, hard bound: 1 hard and 1 digital to the Library and 1 to the Faculty, if deemed of enduring quality
	One year “stand alone” program	Includes note to be familiar with the House Rules	Timeline begins		Confirms budget, ethics requirements, supervision				Digital library submission
LU web site or other reference									

Research is to see what everybody else has seen, and to think what nobody else has thought.

Albert Szent-Gyorgyi
1893-1986

Hungarian physiologist who won the Nobel Prize in Physiology or Medicine in 1937. He is credited with discovering vitamin C and the components and reactions of the citric acid cycle. He was also active in the Hungarian Resistance during World War II and entered Hungarian politics after the war.

Source: Nobel Media AB (2015)

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