

How to find a strong research idea?

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Topics

- Introduction
- How to identify a research area?
- How to select a research topic?
- How to recognize a research gap?
- What are the research questions?

Introduction

- How do we choose a strong research topic?
 - Research Area
 - Research Topic
 - Research Gap
 - Research Questions



Research Area: Institute Requirements

- Use institute research strategy as a guide
 - Choose from a research area
 - What should you do if you suggest a non listed area
- Be aware of the institute regulations to complete your research/degree
 - Research funds
 - Time limit
 - Thesis specifications
 - Publishing of paper(s)

Research Area: Structural Checklist

- Feasibility of research area
 - List the required instrumentations
 - E.g., lab equipment, IT equipment or experimental material
 - Estimate the financial boundaries
 - E.g., equipment, experimental material, data set, cloud service, publication fees, etc...
 - Determine the research time limit
 - Choose a realistic research problem
 - Define the scope of research problem
 - Create a research plan
 - Match required research skills against yours
 - Identify the skills' gap & put a plan to overcome those gaps

Research Area: Structural Checklist

- Relevance of research area
 - Collect the latest trends & future growth
 - Does it have significant scientific impact?
 - Will it be of value after finishing or it will be out of date?
 - Is it expected to grow for at least 3-5 years?
 - What is its likelihood of cross-disciplinary impacts?

Research Area: Structural Checklist

- Required skills of research area
 - Knowledge skills
 - What you need to learn that is already known?
 - Intellectual skills
 - What no one in the field has answered yet?
 - Practical skills
 - What are resources or tools and their access?
 - Transferable skills
 - What are general research competencies you lack such as writing, data visualization, project management, version control, ...etc.

Research Topic

- Defines the research problem & consequently defines the researcher's task
- Selection process
 - Conduct a brainstorm session with your peers, experts in research community
 - Identify the most three interesting research problems
 - Start a literature review
 - Compare among previous work in terms of objectives, scope and limitations, data used, features, techniques, results, recommendations and future work
 - Identify the research gaps
 - Determine the needed resource
 - Iterate over previous steps till you end up with the best topic

Research Topic: Structural Checklist

- Search for the topic and find if it is
- Gap-driven
 - Clear discrepancy, uninvestigated issues or unanswered questions in existing literature
 - Legacy researches that need to be addressed
- Feasible
- Classified
 - You can name the research type (applied/ theoretical/ experimental/ combination)
- Scoped
 - Not so broad that it's unfinishable, nor so narrow that it's trivial

Research Topic: Structural Checklist

- Novel enough
 - Advances knowledge but builds on a recognizable foundation
 - Adds new contribution to research area
- Aligned with publisher priorities
 - Matches recent special issues or journal scopes
- Searchable
 - Keywords and synonyms defined
- Documented
 - Keep a research log to benefit from

Research Topic: Mindset Checklist

- Be realistic
- Be flexible
- Be rational
- Be enthusiastic
- Be up-to-date
- Be creative with solid foundation

Research Gap: Types

- Is a research problem need to be addressed and its type is
 - Knowledge Gap
 - What is unknown or lacks sufficient evidence?
 - Evidence Gap
 - Contradictory findings among researches
 - Empirical Gap
 - Lack of prior research
 - Methodological Gap
 - The need for a different approach
 - Contextual/Population Gap
 - A topic has been studied, but not in a specific context, geographical location, or population
 - Theoretical/Conceptual Gap
 - Existing theories fail or inconsistent to explain a phenomenon

Research Gap: Resources

- Systematic Literature Review
 - Lists what is known, unknown, and where the weak spots are
- Future Research section in papers
 - States what it can be done in better way
 - Specifies what new research problems are raised
- Conflict results or opinions among different researches
 - Discover what are the reasons for such conflicts?
- Existence of new concepts, ideas, demands or technology
- Existence of new methods to improve accuracy, speed, and reliability

Research Gap: Verification

- Is it a relevant research problem?
- Identify research questions to be answered.
- Is it specific?
 - What are you going to address?
 - E.g. newly related variable(s), method, or contradictory finding
- Is it researchable?
 - Can you achieve the research objectives with available resources
- Is it sophisticated enough but not oversimplified?
 - Is it a genuine & has significant use for new knowledge

Research Questions: Types

- Existence questions
 - Studies the occurrence of a phenomena
- Descriptive questions
 - Describe characteristics of a population
- Classification questions
 - Look for unique characteristics of a population
- Relational questions
 - Find the association/correlation among/between variables
- Causal questions
 - Studies the effect of a variable on other one(s)

Research Questions: Structural Checklist

- Formulate the research questions
- Formulate the research core objectives
- Revise research questions
- Revise research objectives
- Iteratively refine research questions using new updated research

Research Questions: FINER Criteria

- Is a framework to assess and to refine research questions
- Increases the likelihood of a successful meaningful study
- Can discover potential faults early enough
- Stands for
 - Feasible
 - Interesting
 - Questions are of interest to researcher and research community
 - Novel
 - Ethical
 - Follows the ethics of research
 - Relevant

FINER
Feasible
Interest
Novel
Ethical
Relevant

Research Questions: FINERMAPS Criteria

- Expansion of FINER framework to provide a comprehensive checklist
- Manageable
 - Refers to the scope and complexity of research questions
 - Questions fit within the boundaries of a single focused study
- Appropriate
 - Ensures a perfect alignment among research questions, methodology & academic contracts
- Potential Value & Publishable
 - Estimate the research value & likelihood of publishing it
- Systematic
 - Reinforces the research process to be logical, transparent and replicable

FINERMAPS
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Potential Value & Publishable
Systematic

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Question???