



# TARCH

TEACHING AND LEARNING TECHNIQUE FOR ACADEMIC RESEARCH

**MODULE VOLUME 1**

## Keeping your research organised

SYAHIRAH YAHYA | RAZ ZARINDA MOHD RASHID | DR. NOORUL JANNAH ZAINUDDIN



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# TEACHING AND LEARNING TECHNIQUE FOR ACADEMIC RESEARCH (TARCh) - MODULE VOLUME 1

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# PREFACE

**TEACHING AND LEARNING TECHNIQUE FOR ACADEMIC RESEARCH (TARCh) - MODULE VOLUME 1** is a text written by the instructors of DMK40142 (*Project 1 - Proposal and Research Methodology*), DMT40162 (*Seminar*), DMK50203 (*Project 2 - Implementation and Evaluation*) and DMT50194 (*Project*) courses in Department of Chemical and Food Technology, Politeknik Tun Syed Nasir Syed Ismail. The content of the module consists of a step-by-step guidance to brainstorm research project starting from:-

- **CHAPTER 1: BRAINSTORMING IDEA & INTRODUCTION**
- **CHAPTER 2: LITERATURE REVIEW**
- **CHAPTER 3: METHODOLOGY**
- **CHAPTER 4: PROPOSAL WRITING**

The book highlights the concept of student-centric approach and contributes to pedagogical advancement in research education discourse. This book aims to assist new students who are just beginning to learn and start in research field. This book focuses on Semester 4 of Diploma and Semester 2 of Technical and Foundation in Engineering Technology.

The complete techniques starting from TEACHING AND LEARNING TECHNIQUE FOR ACADEMIC RESEARCH (TARCh) - MODULE VOLUME 1, followed by TEACHING AND LEARNING TECHNIQUE FOR ACADEMIC RESEARCH (TARCh) - MODULE VOLUME 2, complement with TEACHING AND LEARNING TECHNIQUE FOR ACADEMIC RESEARCH (TARCh) - PROGRESSION FORM, providing the use of teaching aids and measurement to assess the impact of the content on both educators and students.

We welcome comments and suggestions from all parties, particularly fellow academics, to enhance future editions of the book. Your input is valuable for improving future editions of the book and greatly appreciated.

**Authors,**

**SYAHIRAH YAHYA**  
**RAZ ZARINDA MOHD RASHID**  
**DR. NOORUL JANNAH ZAINUDDIN**



# ACKNOWLEDGEMENT

We would like to thank the Head of Department, Department of Chemical and Food Technology, Politeknik Tun Syed Nasir Syed Ismail, Ts. Sazaliana binti Sopian for her encouragement and support.

Series of guidance have been given on a regular basis in educating students on their research. According from there, a guiding skill in directing students in brainstorming the research idea and research writing technique is felt necessary and thus initiated through the usage of **TEACHING AND LEARNING TECHNIQUE FOR ACADEMIC RESEARCH (TARCh)-MODULE VOLUME 1**. This innovation in teaching and learning aid gains a good review from the lecturers and students. It has also proven in improving students understanding on research through their assessment scores. Special thanks mainly to the Head of Department for the permission of this module application, as well as lecturers and students for the cooperation. Each effort and special attention is very much appreciated.

Our team in publishing this book and proofreader, Madam Rohaya binti Mohamed Bahari and Adleena Adha binti Abdul Mua'ain. Thank you for the guidance in publishing this book.

Last but not least, we would like to thank our families for their unlimited support for our work and studies.

## **AUTHORS,**

**Syahirah Yahya**

**Raz Zarinda binti Mohd Rashid**

**Dr. Noorul Jannah binti Zainuddin**



# **USER GUIDELINE TARCh MODULE VOL. 1**

**1****MODULE 1****2****INSTRUCTIONAL/ TEACHING SESSION  
CONDUCTED BY LECTURER FOR CHAPTER 1****3****STUDENT CENTRIC ACTIVITY USING  
PROGRESSION FORM 1****4****REVIEW SESSION LED BY LECTURER  
DISCUSSING THE PROGRESSION FORM 1  
IN CLASS****5****SELF-EDITING THE  
PROGRESSION FORM 1****6****DISCUSSION PROGRESSION FORM 1 WITH  
SUPERVISOR**  
\*RETURN TO PREVIOUS STEP FOR IMPROVEMENT**7****INSTRUCTIONAL/ TEACHING SESSION  
CONDUCTED BY LECTURER FOR CHAPTER 2****8****STUDENT CENTRIC ACTIVITY USING  
PROGRESSION FORM 2**



# USER GUIDELINE TARCh MODULE VOL. 1

**9**

**REVIEW SESSION LED BY LECTURER  
DISCUSSING THE PROGRESSION FORM 2  
IN CLASS**

**10**

**SELF-EDITING THE  
PROGRESSION FORM 2**

**11**

**DISCUSSION PROGRESSION FORM 2 WITH  
SUPERVISOR**  
\*RETURN TO PREVIOUS STEP FOR IMPROVEMENT

**12**

**INSTRUCTIONAL/ TEACHING SESSION  
CONDUCTED BY LECTURER FOR CHAPTER 3**

**13**

**STUDENT CENTRIC ACTIVITY USING  
PROGRESSION FORM 3**

**14**

**REVIEW SESSION LED BY LECTURER  
DISCUSSING THE PROGRESSION FORM 3  
IN CLASS**

**15**

**SELF-EDITING THE  
PROGRESSION FORM 3**

**16**

**DISCUSSION PROGRESSION FORM 3 WITH  
SUPERVISOR**  
\*RETURN TO PREVIOUS STEP FOR IMPROVEMENT



# **USER GUIDELINE TARCh MODULE VOL. 1**

**17**

**INSTRUCTIONAL/ TEACHING SESSION  
CONDUCTED BY LECTURER FOR CHAPTER 4**

**18**

**PROPOSAL DEFENCE  
PRESENTATION SLIDE REVIEWED BY  
SUPERVISOR USING PROGRESSION FORM 4.1**

**19**

**STUDENT CENTRIC ACTIVITY ON  
PROPOSAL WRITING**

**20**

**PROPOSAL REVIEWED BY SUPERVISOR  
USING PROGRESSION FORM 4.2**

**21**

**MODULE 2**



# USER GUIDELINE TARCh MODULE VOL. 2

**21**

MODULE 2

**22**

(Objective 1)  
STUDENT CENTRIC ACTIVITY USING  
PROGRESSION FORM 5

**23**

DISCUSSION PROGRESSION FORM 5 WITH  
SUPERVISOR

\*RETURN TO PREVIOUS STEP FOR IMPROVEMENT

**24**

(Objective 2)  
STUDENT CENTRIC ACTIVITY USING  
PROGRESSION FORM 5

**25**

DISCUSSION PROGRESSION FORM 5 WITH  
SUPERVISOR

\*RETURN TO PREVIOUS STEP FOR IMPROVEMENT

**26**

(Objective 3)  
STUDENT CENTRIC ACTIVITY USING  
PROGRESSION FORM 5

*\*If applicable*

**27**

DISCUSSION PROGRESSION FORM 5 WITH  
SUPERVISOR

\*RETURN TO PREVIOUS STEP FOR IMPROVEMENT

**28**

STUDENT CENTRIC ACTIVITY USING  
PROGRESSION FORM 6



# USER GUIDELINE TARCh MODULE VOL. 2

**29**

**DISCUSSION PROGRESSION FORM 6 WITH  
SUPERVISOR**

\*RETURN TO PREVIOUS STEP FOR IMPROVEMENT

**30**

**FULL REPORT WRITING**

**FINISH**



# USER TIMELINE

Plan your research timeline according to the student learning time (SLT) in your course information.

Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
PF 1 Brainstorming	TARCh – Module Volume 1 (CHAPTER 1)																												
	Brainstorming idea																												
	Problem statement																												
	Objective																												
	Scope of Study																												
	Title																												
DISCUSSION PF 1 WITH SUPERVISOR																													
PF 2 Literature Review	TARCh – Module Volume 1 (CHAPTER 2)																												
	Point Out Keyword																												
	Research Question																												
	Scholar Finding and Reference																												
	Create Related Subtopic																												
	Rearrangement of LR content																												
DISCUSSION PF 2 WITH SUPERVISOR																													
PF 3 Methodology	TARCh – Module Volume 1 (CHAPTER 3)																												
	Research Framework																												
	List of Methods																												
	Procedure for Each Method																												
	Chemical and Apparatus Listing by Method Category																												
	Accumulation of Chemical Cost Estimation																												
DISCUSSION PF 3 WITH SUPERVISOR																													
PF 4 Compilation of Research	TARCh – Module Volume 1 (CHAPTER 4)																												
	Presentation (PF 4.1)																												
	Writing Proposal (PF 4.2)																												

 Pedagogical Method
  Student-Centric Approach
  Supervision





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# CHAPTER 1

# INTRODUCTION

RESEARCH DEFINITION  
IDEA BRAINSTORMING  
RESEARCH PROCESS  
RESEARCH TITLE  
PROBLEM STATEMENT  
RESEARCH OBJECTIVES  
RESEARCH QUESTION  
SIGNIFICANCE OF THE STUDY  
SCOPE OF THE STUDY





# INTRODUCTION

## RESEARCH DEFINITION

“Research is a systematic approach to obtaining and confirming new and reliable knowledge”

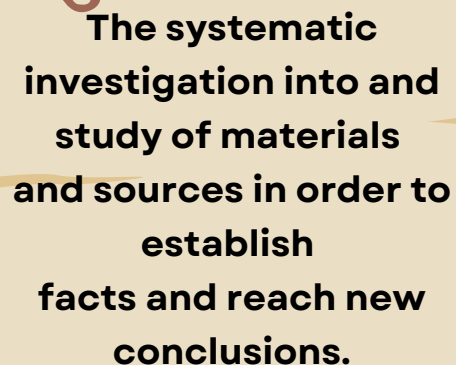
- Systematic and orderly (following a series of steps)
- Purpose is new knowledge, which must be reliable

**Searching for explanation of events, phenomena, relationships and causes .**

**What, how and why things occur?  
Are there interactions?**

**A process is ...**

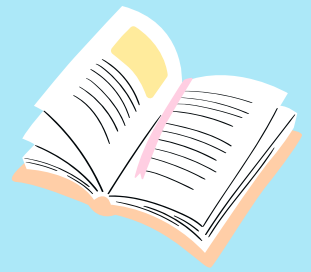
- **planned and managed –so the information generated is credible**
- **creative**
- **circular – always leads to more questions**



**The systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions.**

# INTRODUCTION

## IDEA BRAINSTORMING



Brainstorming is an effective way for you to generate ideas for your research paper. There are several brainstorming strategies you can use to help you during any point of the research process.

### SEVERAL WAYS TO BRAINSTORM

**Lists or bullets**

**Mind-mapping**

**Free writing**

**Star-bursting**

**SWOT Analysis**

**Word Association**

### Brainstorming Rules

#### Focus on quantity

The greater the number of ideas generated, the greater the chance of producing a radical and effective solution



#### No criticism

Instead of immediately stating what might be wrong with an idea, the participants focus on extending or adding to it



#### Unusual ideas are welcome

They open new ways of thinking and provide better solutions than regular ideas.



#### Combine and improve ideas

This approach leads to better and more complete ideas than merely generating new ideas alone

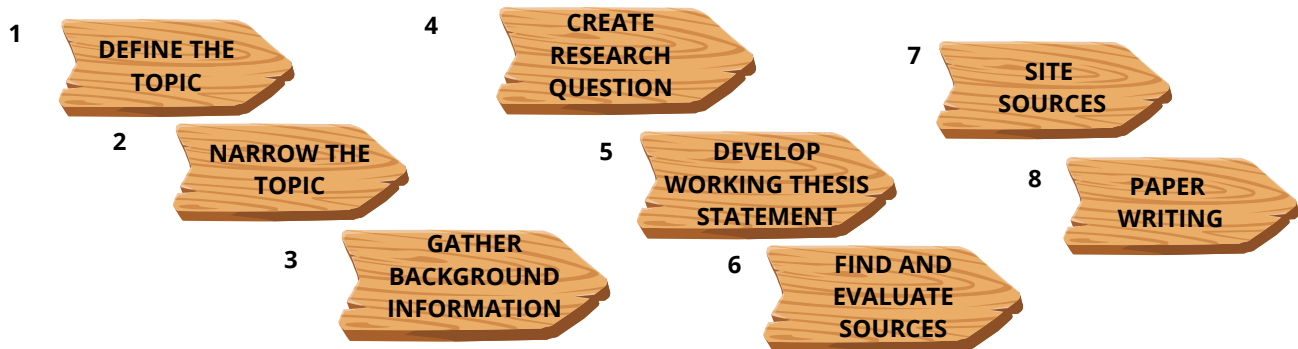






# INTRODUCTION

## RESEARCH PROCESS



Step 1	The process is initiated with a question or problem
Step 2	Goals and objectives are formulated to deal with the question or problem
Step 3	The research design is developed to achieve the objectives
Step 4	Results are generated by conducting the research
Step 5	Interpretation and analysis of the results

1) Problem Definition

6) Analysis and Reporting

2) Approach Formulation

**MARKET RESEARCH PROCESS**

Always consult with your supervisor along the journey

3) Research Design Selection

5) Data Processing

4) Data Collection



# INTRODUCTION

## RESEARCH TITLE:

Make sure the most important words appear in the beginning of the title.

Do not use ambiguous or confusing words.

Do include key words.

Be sure to indicate accurately the subject and scope of the study.

Avoid using abbreviations.

## HOW TO CONSTRUCT A WINNING RESEARCH TITLE?

### EXAMPLE OF RESEARCH TITLE



OBJECTIVE

METHOD

SIGNIFICANCE

OBJECTIVE

METHOD

DEVELOPMENT OF FILTRATION SYSTEM WITH PASTEURISATION PHASE FOR DUAL PRODUCTION OF BEVERAGE AND PASTE FROM GEMUNGGAL LEAVES AS NUTRIENT SUPPLEMENT

SIGNIFICANCE

OBJECTIVE

PERFORMANCE OF DIFFERENT BINDERS (STARCH, CARRAGEENAN AND ISP) ON QUALITY OF VEGAN MEATBALL

METHOD

SIGNIFICANCE

OBJECTIVE

THE REFINING OF MASSAGE OIL FROM WASTE COOKING OIL USING ACTIVATED CARBON FOR MASSAGE OIL PRODUCTION

METHOD

SIGNIFICANCE





# INTRODUCTION

## PROBLEM STATEMENT:

A statement that discusses what the problem is, why it is a problem in the first place, what to propose to get it fixed

### HOW TO WRITE A PROBLEM STATEMENT

①

Identify the problem

②

Put the problem into context

③

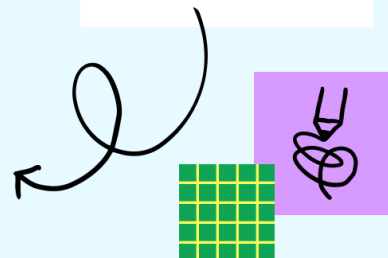
Find the root cause

④

Describe your ideal outcome

⑤

Propose a solution and outline its benefits



- Must identify problems that are possible to solved when you do your research.
- After the research is finished, you hope that it can solve the problems that you stated here.
- Write about each problem, reference and how it can be solved in each paragraph.
- Problem statement should be specific, manageable, and is written with the intent to stimulate reader interest .



# INTRODUCTION

## RESEARCH OBJECTIVES:

**Research objectives describe what we expect to achieve by a project.**

Writing your research objectives clearly helps to

1	Define the focus of your study	2	Clearly identify variables to be measured	3	Indicate the various steps to be involved	4	Establish the limits of the study
---	--------------------------------	---	-------------------------------------------	---	-------------------------------------------	---	-----------------------------------

### Specific

Be exact and specific when expressing a research objective (Doody & Bailey, 2016; Doran, 1981)

### Measurable

Can the objectives be quantified, measured, tracked, progress indicated or determined in some way? (Alves, 2018; Bowman et al., 2015)

### Achievable

Do you have the skills and resource? (Alves, 2019)  
Who will carry out the research? (Doran, 1981)

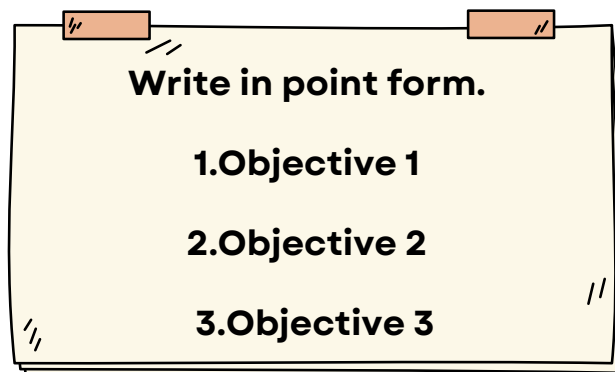
### Realistic

Be realistic about what you can achieve given the resources available (Doody & Bailey, 2016; Doran, 1981)

### Timeframe

How much time is required to achieve the goals and answer the research question? (Alves, 2018; Doody & Bailey, 2016)





## How to write research objectives?

To

Action Verb

WHAT?  
(Things to be achieved)

## Examples of Action Verb



To identify	To develop
To establish	To compare
To describe	To analyze
To determine	To collect
To estimate	To prove

## Sample of Research Objectives

To

- 1) To determine the best extraction method amongst three proposed methods
- 2) To determine the optimum extraction conditions, under which the good recovery of antioxidants from olive leaf can be obtained
- 3) To investigate the effect of storage conditions on the stability of steamed gluten-free muffin



# INTRODUCTION

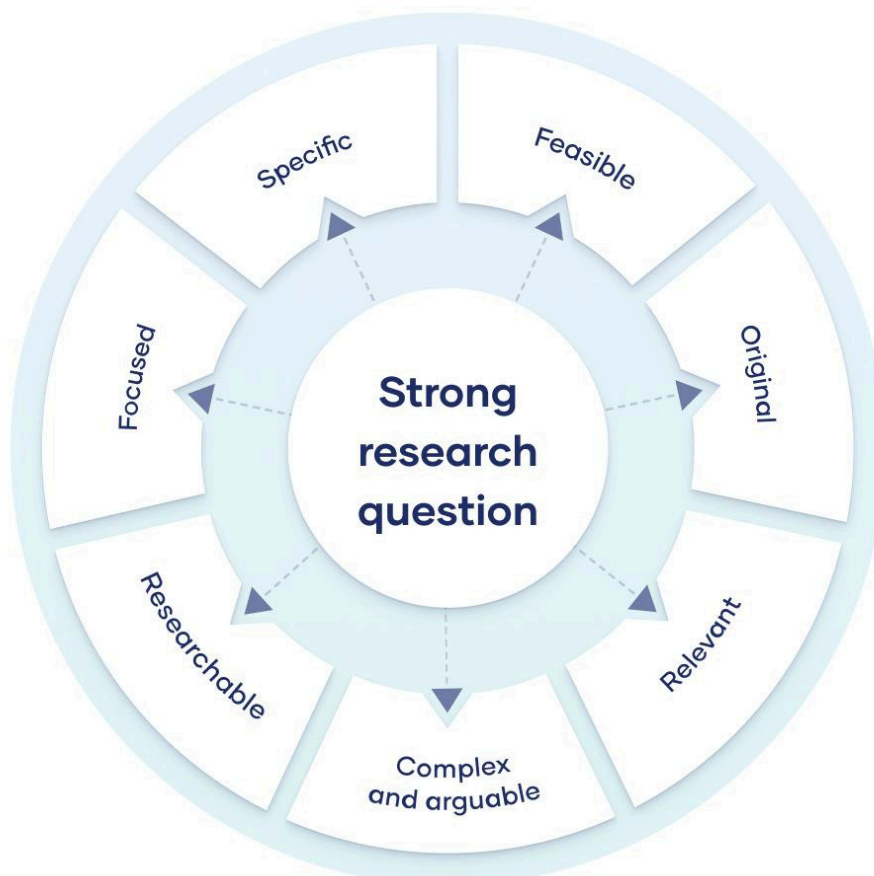
## RESEARCH QUESTION:

A research question is a question that a research project sets out to answer.

Good research questions seek to improve the knowledge on an important topic, and are usually narrow and specific.

It should be clear and focused, while synthesizing multiple sources to present your unique argument.

A research question is the question around the center of your research.





## Research Question Sample

BROAD TOPIC	RESTRICTED TOPIC	NARROWED TOPIC	RESEARCH QUESTION
Pollution	Acid rain	Acid rain in the United States	What can the United States do to prevent acid rain?
Fishing	Commercial fishing	Fishing regulations and New England	What impact do fishing regulations have on commercial fishing in New England?
Censorship	Internet	Internet and China	How will China's effort to censor the Internet affect its citizens?
Nutrition	Diets	Vegetarianism	What nutritional benefits are there to vegetarianism?

## Unfocused VS Focused Research Question Sample

The following table gives guidance on the difference between unclear and unfocused research questions and those that are appropriately clear and focused, lending themselves to in-depth research.



Unclear, unfocused and unarguable research questions	Clear, focused, narrow research questions lending themselves to in-depth research
What was the impact of Ho Chi Minh's allegiance to Lenin?	To what extent was nationalism the guiding factor in Ho Chi Minh's adoption of Leninism in 1920?
What is the history of Chinese theatre?	How does the legacy of Mei Lan Fang contribute to modern Jingju?
How important is chlorophyll to plant life?	What is the effect of different concentrations of kinetin on leaves aging and the biosynthesis of chlorophyll?
How can the US government's spending policy be reformed?	To what extent did the rising COE prices affect the demand for new and used cars by the consumer population and hence affect the revenue generated by the Singaporean economy for the period 2012-16?



# INTRODUCTION

## SIGNIFICANCE OF THE STUDY:

It refers to the contributions to and the impact of the study on a research field

“The significance/importance of your research to the world/community/environment”

What do you hope from this research after you finish this research?  
Solve the problem that you stated in problem statement.



Your Study



Research Field



Business Opportunities



Society



**Broadening Significance**



# INTRODUCTION

## SIGNIFICANCE OF THE STUDY:



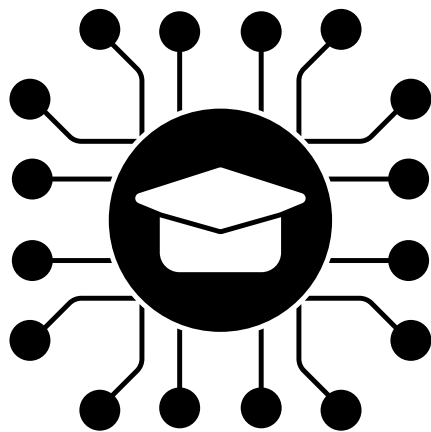
**What is the benefit of your research to**



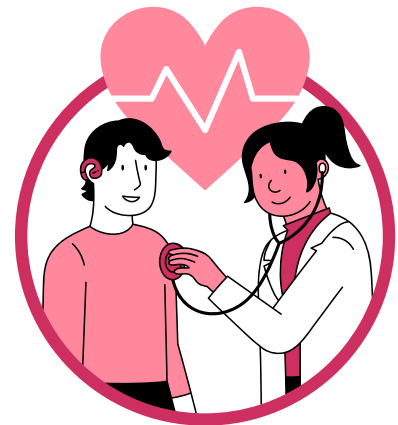
Community



Environment



Academic point of view



Health



Economy



# INTRODUCTION

## SIGNIFICANCE OF THE STUDY:



Sync your significant of study with your problem statements.



### QUICK TIPS

EXAMPLE

	Problem Statement	Significant of study
1	high demand of palm oil to produce soap, biodiesel and others.	can provide low cost raw material for palm oil derivatives.
2	Expensive bleaching earth agent.	Can contribute to economic growth
3	Abundance of waste cooking oil	Can avoid pollution in the environment and clogged drain issue

You are recommended to use this technique if you do not have any idea to write your content.

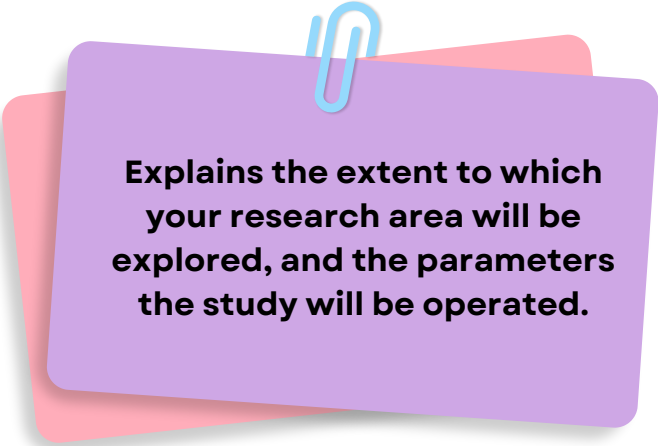







# INTRODUCTION

## SCOPE OF THE STUDY:



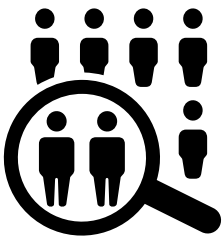
**Explains the extent to which your research area will be explored, and the parameters the study will be operated.**

**To define your scope of research, consider the following:**



**1**  
**Budget constraints or any specifics of grant funding**

**2**  
**Proposed timeline and duration**



**3**  
**Population of study**  
**Sample size, and the research methodology**

**4**  
**Any inclusion and exclusion criteria**



# INTRODUCTION

## SCOPE OF STUDY:



Limit your scope of study according to your objectives.



### QUICK TIPS

EXAMPLE

	Objectives	Scope of study
1	To refine waste cooking oil using bleaching earth agent.	Sources of waste cooking oil, type of bleaching earth agent, refining method.
2	To analyse the refined waste cooking oil.	Type of analysis, range of specification limit.
3	To compare the physical properties of waste cooking oil with standard specification	Type of standard specification, purpose of refining.

You are recommended to use this technique if you do not have any idea to write your content.

Do your best

LET'S DO THIS



LET'S TRY  
PROGRESSION FORM 1





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# CHAPTER 2

# LITERATURE

# REVIEW

LITERATURE REVIEW WRITING PROCESS  
HOW TO WRITE A LITERATURE REVIEW  
TIPS TO GET SCHOLAR FINDING  
EXAMPLE OF LITERATURE REVIEW  
TIPS TO CREATE KEYWORDS  
CREATING SUBTOPIC AND MAKE GENERAL READING  
TIPS TO MAKE GENERAL READING  
EXAMPLE OF LITERATURE REVIEW WRITING  
CITATION AND REFERENCES



# CHAPTER 2

## Literature Review

### INTRODUCTION:

A literature review is a survey of scholarly sources on a specific topic. It provides an overview of **current knowledge**, allowing you to **identify relevant theories, methods, and gaps** in the existing research.

In writing the literature review, the purpose is to convey to the reader what that the **ideas have been acknowledges and established** on a topic, and what are their **strengths and weaknesses**.

The literature review must be defined by a guiding concept:

**REMINDER**

**Before starting a literature review, it is essential to have a clear understanding of your research focus. Confirming your title, problem statement, and objectives helps to ensure that your literature review is focused and aligned with your research goals.**

**Research Title**  
Main keyword

**Research Problem**  
Specific issue or gap in existing knowledge

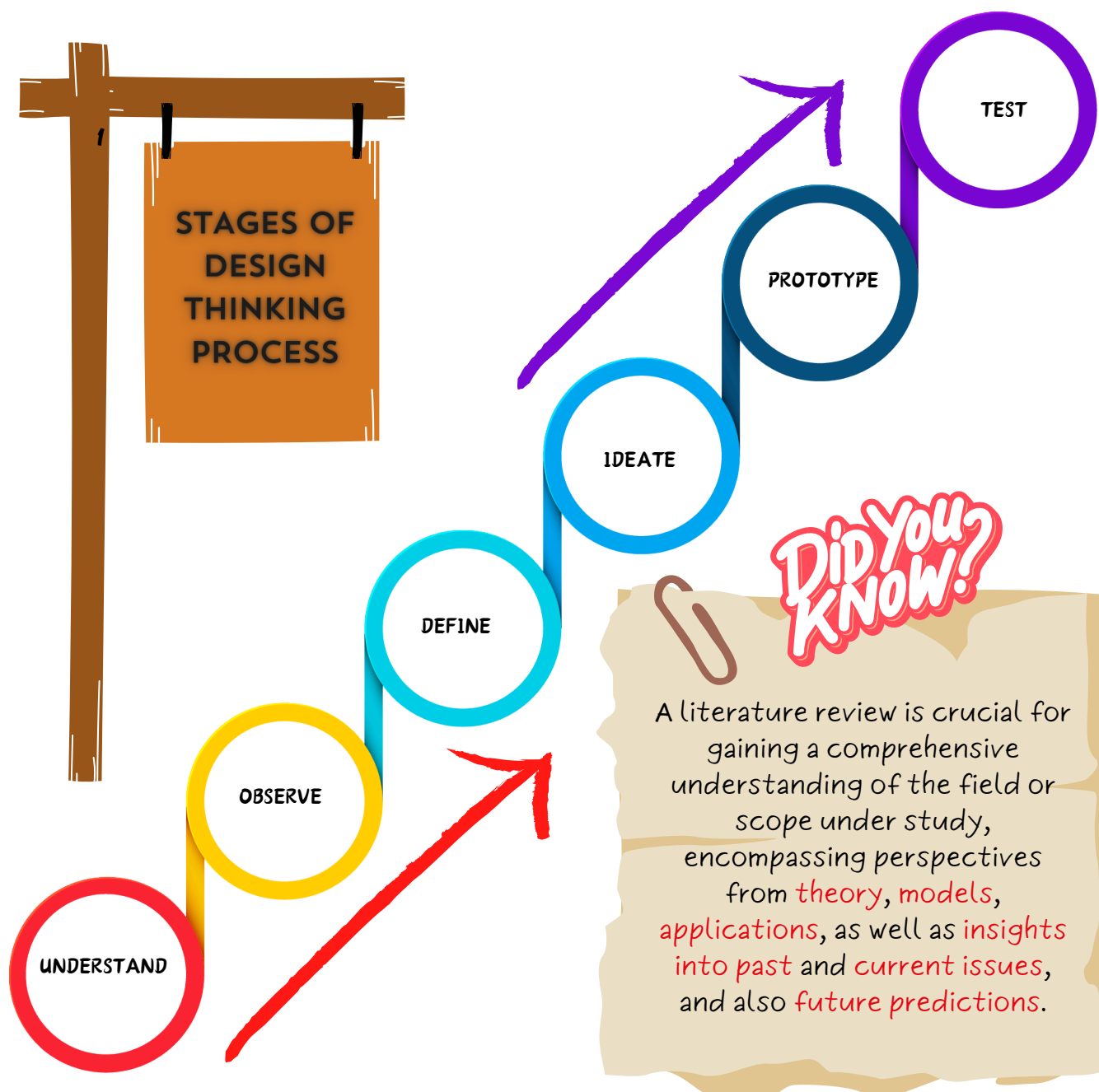
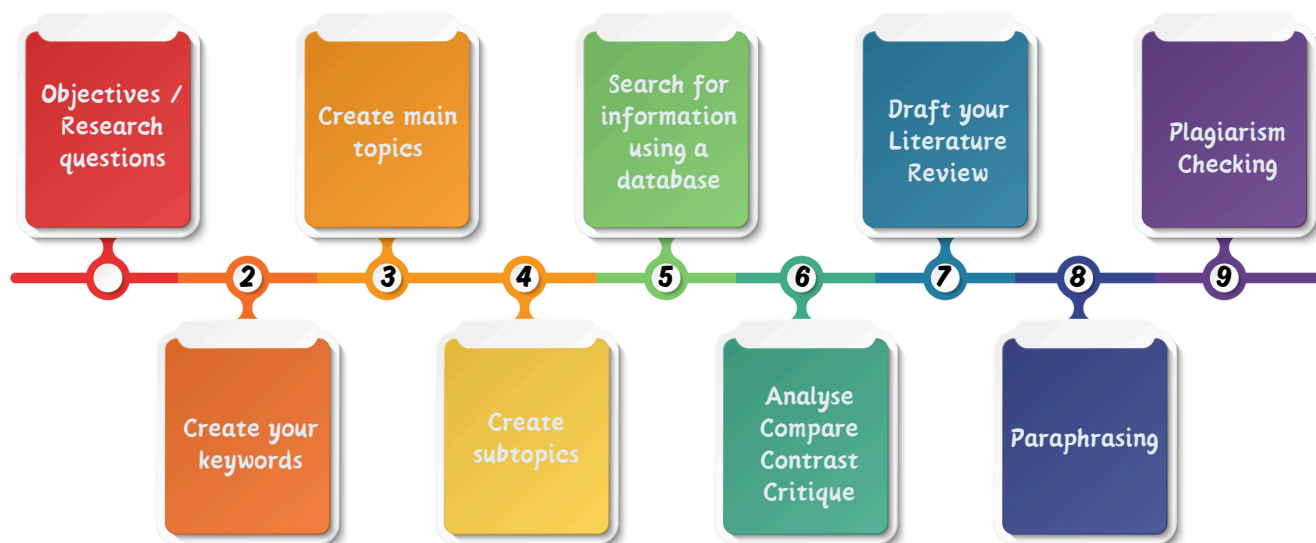
**Research Objective**  
Describe what your research is trying to achieve

**Expected Results**  
An ideal result that is possible to achieve.



A good literature review does not just summarize sources, it **analyzes, synthesizes, and critically evaluates** to give a clear picture of the state of knowledge on the subject.

## LITERATURE REVIEW WRITING PROCESS





## How to Write Literature Review using CCAC Technique

### Compare

Making comparison between researchers to get the similarities in previous study.

Example:

- Azman Rosli (2017), Rahman Razali (2015), and Lee Aik (2014) agreed that external factors are the main reason rural teenagers become addicted to drugs.

**Three researchers agreed with the same opinion about rural teenagers**

### Contrast

Compare the differences among different researchers.

Example:

- Azman and Rosli (2015) found that there is significant correlation between total learning time with student score achievement in the subject of Mathematics. However, Ahmad and Kamal (2017) found that there is no correlation between contact time with students scoring. This may be caused by other factors as well the background effect of urban and rural students.

**Two researchers have different opinion about the students' achievement.**

**Give the possible reason to the contradiction.**

### Analyze

Divide the issue into several groups, evaluate the pros and cons of an issue.

Example

- Based on the studies that have been discussed earlier, there are two types of challenges faced by the poor in urban area the context of learning achievement. The first challenge is an internal challenge that is attitude themselves (Razali & Ahmad 2018), and the second challenge is the external challenge that is the factor of environment (Azman Rosli 2019; Mohamad Ali 2016 & Karim et al. 2014).

**Making conclusion/ summary of several information.**

## How to Write Literature Review

### Criticize

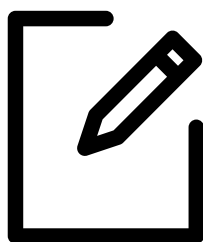
Giving review, giving criticism and comments.

Example:

- Razali and Lokman (2012) study only focused on students in urban areas in studying the relationship between student motivation and achievement. Meanwhile, Ravi and Azlan (2016) only looked at the dimensions of learning methods to the subject achievement. Previous studies have not discussed students' interest as an aspect of achieving excellence.

Support with your concern.

State the limitations from previous studies.



## CREATE YOUR CONTENT



FIND YOUR ARTICLES HERE:

- [www.scholar.google.com](http://www.scholar.google.com)
- [www.mycite.com](http://www.mycite.com)
- [www.scopus.com](http://www.scopus.com)
- <https://mjl.clarivate.com/>
- [www.ptsl.digital.ukm.my](http://www.ptsl.digital.ukm.my)
- <http://psasir.upm.edu.my/>
- <https://www.sciencedirect.com/>
- <https://ieeexplore.ieee.org/Xplore/home.jsp>
- <https://doaj.org/>
- <https://pubmed.ncbi.nlm.nih.gov/>
- <https://eric.ed.gov/>



CHECK YOUR GRAMMAR HERE:



QuillBot

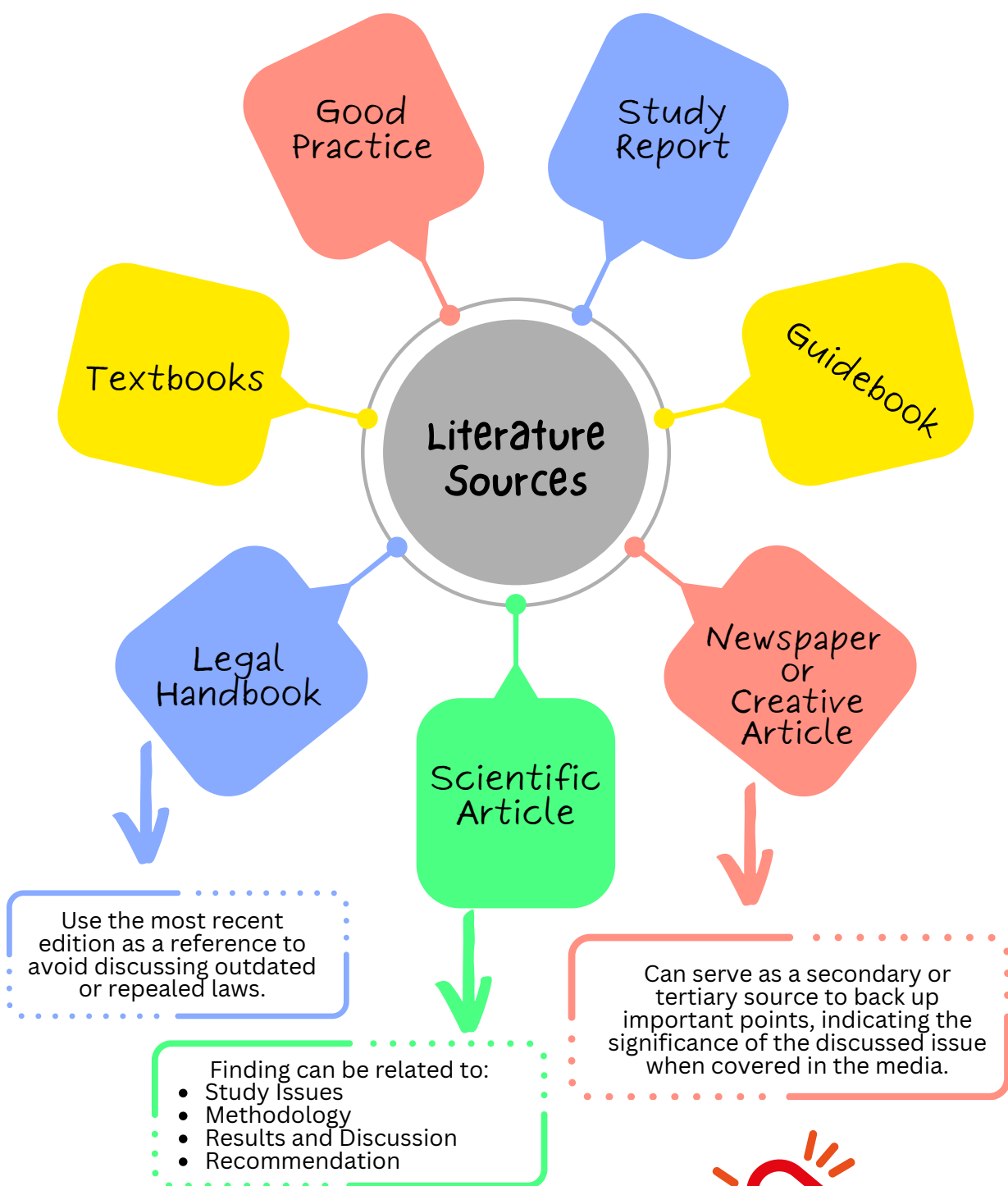


ChatGPT



grammarly

## Tips to Get Scholar Finding



### REMINDER

Utilize sources from the **past five years** to ensure the relevance of the topic for discussion. If the timeframe exceeds 10 years, the subject may have evolved or been successfully resolved.



### PLEASE AVOID!

- Speech
- Facebook posting or comments
- Data stated in newspaper

**DATA IS NOT PROVEN !**



## EXAMPLE OF LITERATURE REVIEW

### STEPS TO CREATE A LITERATURE REVIEW

1. Based on the title, research problem, research objectives, and expected results, generate relevant keywords with assistance from ChatGPT.
2. Utilize these keywords to formulate research questions.
3. Gather information and solutions for each keyword and research question from scholarly sources. You can copy and paste the information.
4. Organize the findings into the most frequently reviewed areas (sub-topics).
5. Develop the most relevant subtopics for the literature review.
6. Analyze, compare, contrast, synthesize, and critique the gathered information.
7. Finally, reorganize the information using your own words.



### EXAMPLE

Title:

**The production of dandruff shampoo from organic waste.**

Problem statement:

1. The prevention of dandruff using chemical shampoo.
2. Abundance of organic waste

Objectives:

1. To pre-treat the organic waste to remove hazardous material.
2. To produce dandruff shampoo using blending method.
3. To compare the characterization of dandruff shampoo with commercialized shampoo in the market.

*Tips to get  
scholar  
finding*



## Tips to Create Keywords using ChatGPT

Create keywords using research title, problem statements and objectives.

Use a specific prompt

SY

You

Suggest keywords for this information:

Title:

The production of dandruff shampoo for organic waste

Problem statement:

The prevention of dandruff using chemical shampoo.

Abundance of organic waste

Objectives:

To pretreat the organic waste to remove hazardous material.

To produce dandruff shampoo using blending method.

To compare the characterization of dandruff shampoo with commercialized shampoo in the market.



HELPFUL  
TIPS

“

The literature review is considered complete once all inquiries or acquisitions within the literature have been addressed.

”



## ChatGPT

Certainly! Here are some suggested keywords based on the information provided:

### 1. Title:

- Dandruff shampoo
- Organic waste
- Production
- Recycling
- Sustainable
- Green chemistry
- Waste utilization
- Environmental impact
- Eco-friendly shampoo
- Bio-based ingredients

### 2. Problem statement:

- Chemical shampoo
- Dandruff prevention
- Organic waste management
- Sustainability
- Environmental impact
- Waste abundance
- Hazardous materials
- Scalp health
- Hair care
- Pollution reduction

### 3. Objectives:

- Organic waste pretreatment
- Hazardous material removal
- Blending method
- Dandruff shampoo characterization
- Comparative analysis
- Market comparison
- Sustainable shampoo production
- Eco-friendly formulation
- Commercialized shampoo evaluation
- Scalp health assessment



You can combine the suggested keywords into ONE specific subtopic.

**DID YOU KNOW?**

You are not required to discuss all of the suggested keywords by ChatGPT. There might be keywords that is out of your scope of study. ChatGPT is used to help you choose the relevant topic to your research.

Discuss with your supervisor to choose the most relevant keywords to be discussed.





## Creating subtopic and make general reading

# 5

### SUBTOPICS TECHNIQUE

- Main product
- Research problem or research gaps
- Methodology
- Active ingredients/component
- Variables related to research

Make general reading

Search from 'Google'.  
Search specific journal  
sources that can be  
downloaded freely

Specify timeframe

The screenshot shows a Google search for "Dandruff shampoo AND journal.pdf". The search bar is at the top with the Google logo on the left and search, voice, and image icons on the right. Below the search bar are tabs for "All", "Images", "Shopping", "Books", "Videos", and "More". The search results are listed below the tabs. The first result is from ResearchGate, titled "(PDF) Development and Evaluation of Natural Anti- ...", with a date of "11 Oct 2023" and a circled "PDF" link. The second result is from the International Journal of Pharmaceutical Research and Applications, titled "A Review on Formulation and Evaluation of Herbal Anti ...", with a circled "PDF" link. The third result is from ResearchGate, titled "Polyherbal Anti-dandruff Shampoo: Basic concept, benefits ...", with a circled "PDF" link. Red arrows point from the text boxes above to the search bar and the "Tools" button.

Google

Dandruff shampoo AND journal.pdf

× | 🔊 📷 🔍

🔍 All 🖼 Images 🛒 Shopping 📖 Books 📺 Videos ⋮ More Tools

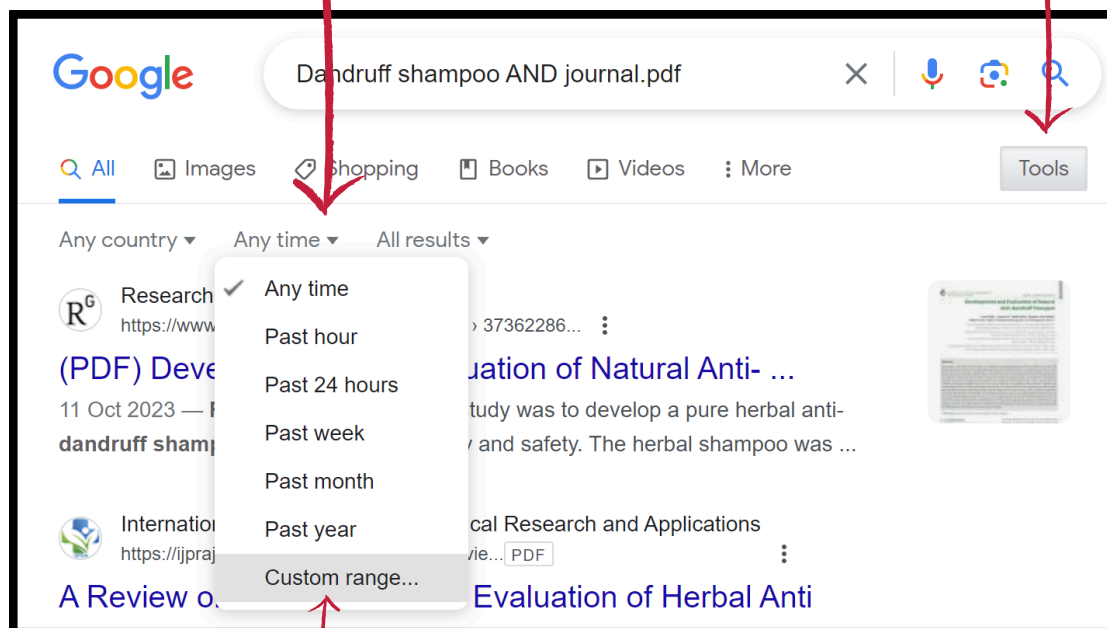
ResearchGate  
https://www.researchgate.net › publication › 37362286...  
(PDF) Development and Evaluation of Natural Anti- ...  
11 Oct 2023 PDF The purpose of the study was to develop a pure herbal anti-dandruff shampoo and assess its efficacy and safety. The herbal shampoo was ...

International Journal of Pharmaceutical Research and Applications  
https://ijprajournal.com › issue\_dcp › A Review... PDF  
A Review on Formulation and Evaluation of Herbal Anti ...  
... Journal Page 1306 dandruff is imbalance in PH. Ginger balances the. PH of the ... Review on herbs used in anti- dandruff shampoo and its evaluation parameters.  
12 pages

ResearchGate  
https://www.researchgate.net › publication › 32915233...  
Polyherbal Anti-dandruff Shampoo: Basic concept, benefits ...  
Request PDF Polyherbal Anti-dandruff Shampoo: Basic concept, benefits, and challenges |  
The objective of this review article is to provide information ...

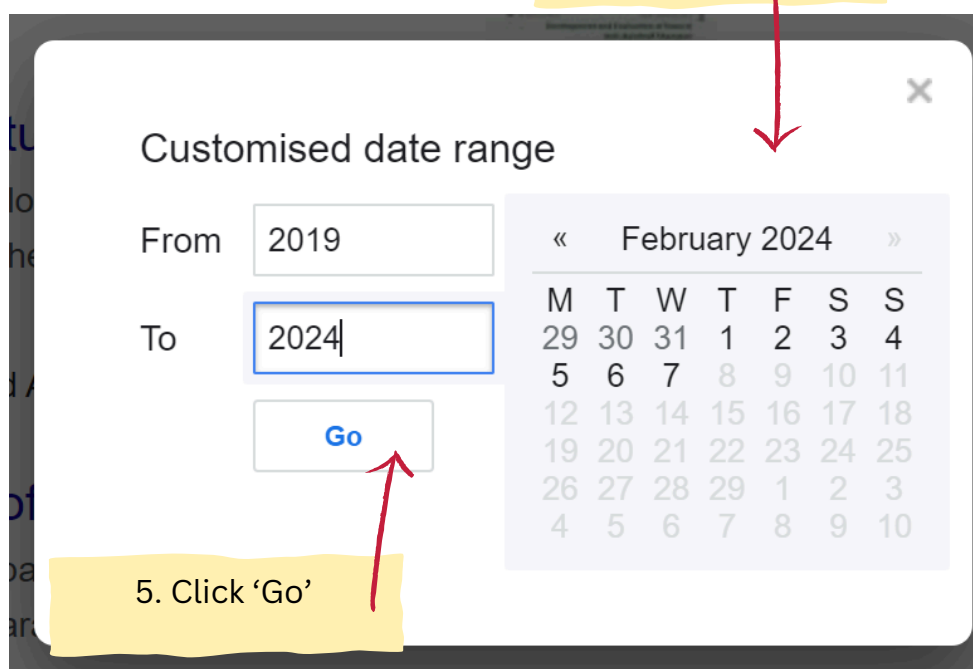
2. Click 'Any time'

1. Click 'tools'



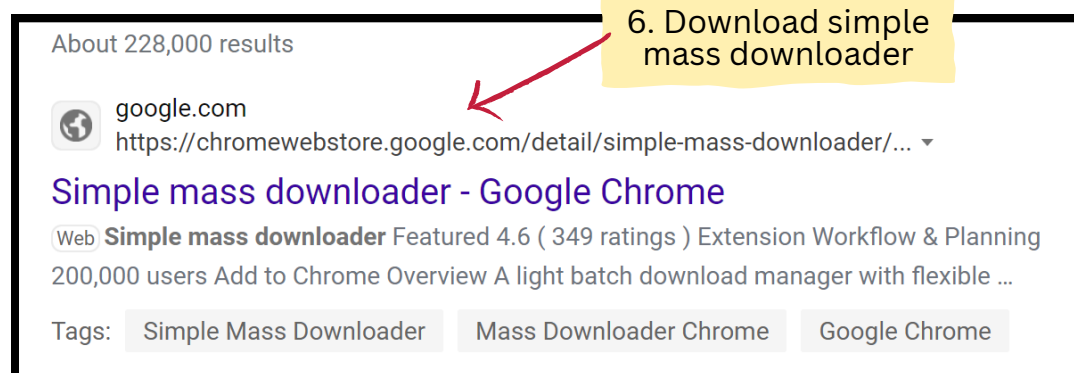
3. Click 'Custom range'

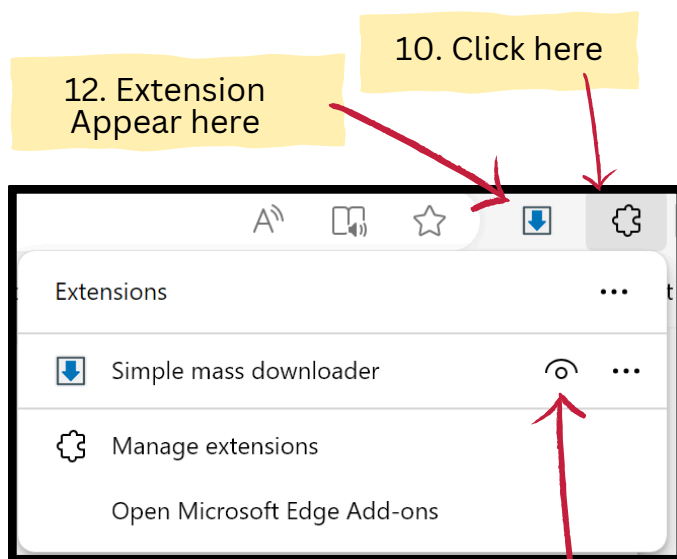
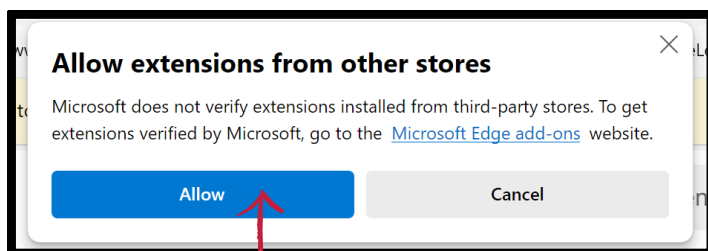
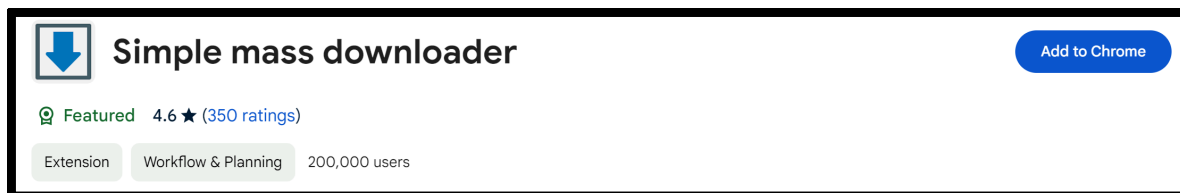
4. Insert date range



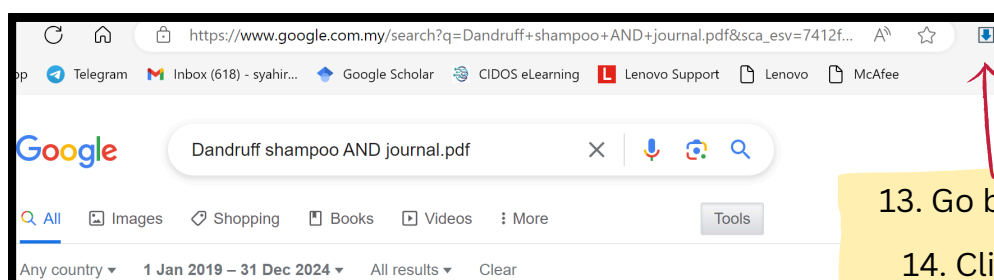
5. Click 'Go'

6. Download simple mass downloader



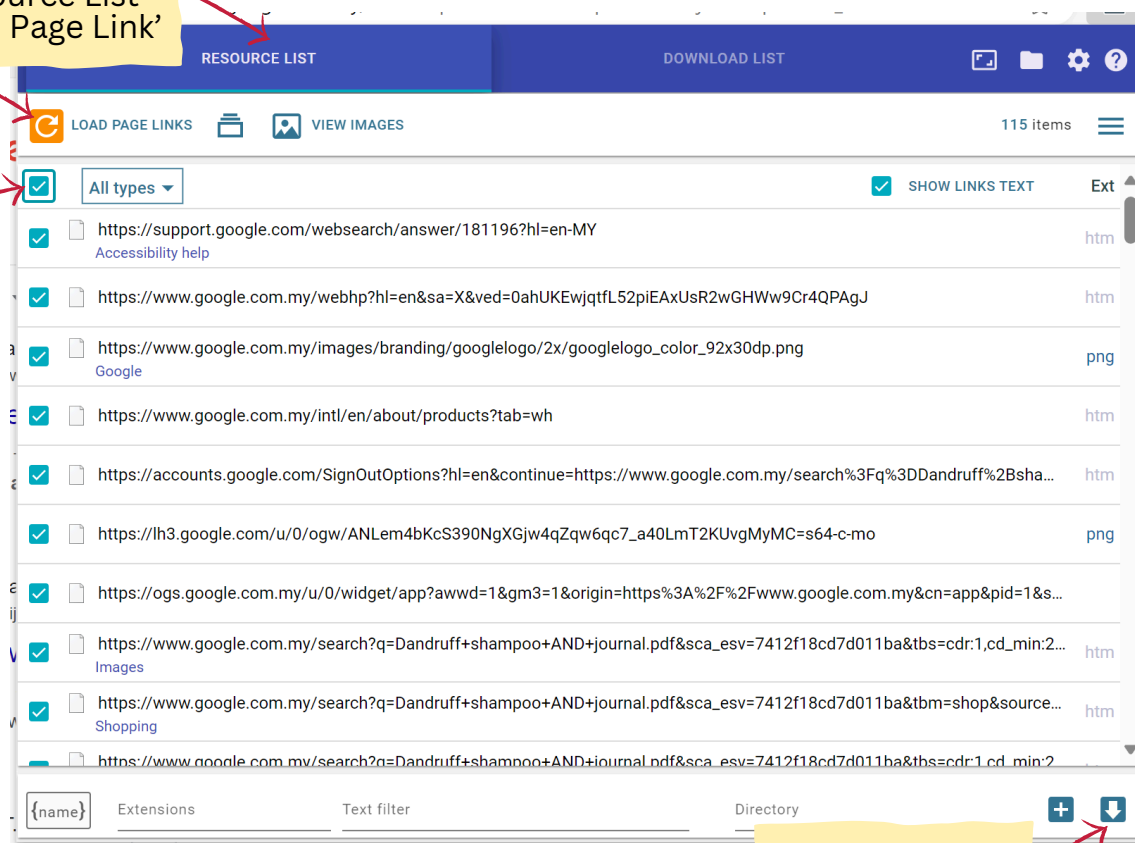


8. Click 'Allow'  
9. Click 'Add Extension'



13. Go back to 'Google' search engine  
14. Click mass downloder extension

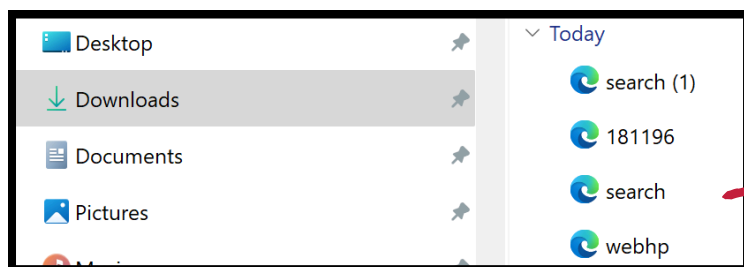
13. Click 'Resource List'  
14. Click 'Load Page Link'



15. Select specific link

16. Click here to download





Make grouping of your files into a specific folder

Dandruff Shampoo



Your journal or articles are all **FREE!**  
Start your general reading **NOW!**



You may also get help from ChatGPT to suggest the related article for you to study.



QUICK TIPS

SY

You

suggest me an article that discussion about this information:

Working women who wear headscarves are required to cover their heads for 8-10 hours daily to adhere to modesty standards, leading to oily hair that stays damp. Conversely, non-veiled women are exposed to pollution and dirt. These two factors are the main contribution to a lower incidence of dandruff on their heads.



ChatGPT

You might be interested in an article titled "The Impact of Headscarves on Hair Health: A Comparative Study of Dandruff Incidence in Working Women" that discusses the effects of wearing headscarves on dandruff incidence compared to non-veiled women exposed to pollution and dirt.

Using problem statement

Then, search the article in Google Scholar.

Google Scholar THE IMPACT OF HAIRSCARF ON HAIR HEALTH : A COMPARATIVE STUDY

Articles About 46 results (0.11 sec) My profile

Any time  
Since 2024  
Since 2023  
Since 2020  
Custom range...

Sort by relevance  
Sort by date

Any type  
Review articles  
☐ include patents  
☒ include citations  
☐ Create alert

Did you mean: THE IMPACT OF **HAIR SCARF** ON HAIR HEALTH : A COMPARATIVE STUDY OF DANDRUFF INCIDENCE

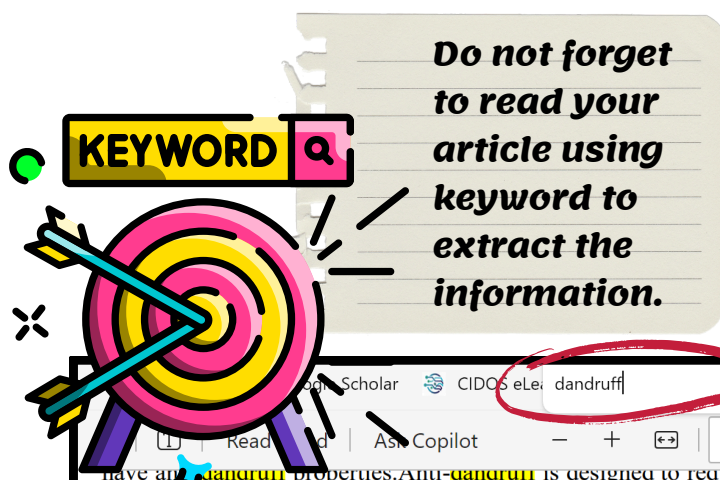
The frequency of head lice, **health** practices and its associated factors in primary schools in Khorramshahr, Iran  
[PDF] [brieflands.com](#)  
H Kassiri, A Gatifi - **Health Scope**, 2016 - [brieflands.com](#)  
... home, presence or absence of **dandruff** in the head, birth rank, ... as sharing **hair** items such as comb, brush, **headscarf** and hat. ... In the current **study**, the **prevalence** of pupils infested with ...  
☆ Save Cite Cited by 10 Related articles All 6 versions

Evaluation of Scalp Hydration and pH Values in Hijab-Wearing and Non-Hijab-Wearing Women  
[PDF] [tandfonline.com](#)  
RMN Hidayah, MRH Widjaya, H Gunawan... - ... of Women's **Health**, 2023 - Taylor & Francis  
... problems eg, itch, **dandruff**, and **hair loss**, which might be related to ... This was a cross-sectional **comparative** analytical **study** ... , some women wear a **headscarf** to cover the scalp and neck ...  
☆ Save Cite Related articles All 6 versions

The Epidemiology of Hairstyle related african **hair** disorders, in and Urban Township in South Africa  
[PDF] [uct.ac.za](#)

Choose the most related article to your study

FREE to download



Extract the information in a table

have any **dandruff** properties. Anti-**dandruff** is designed to reduce **dandruff**. Although the cause of **dandruff** is not fully understood, treatment involves the use of several "active ingredients" that act as either antibacterial agents or mitotic inhibitors. Shampoo is probably the most commonly used hair care product today. Since it is based on synthetic detergent, it is relatively insensitive to the hardness of water. A good shampoo should produce enough foam almost immediately, regardless of the type of water used or the type of dirt or grease removed from the hair. Foaming is not inherited by the detergency, but psychologically people always prefer highly irritating products. **Dandruff** is clearly caused by a fungus called *Malassezia stricta* and *M. globosa*. Formerly known as, *Malassezia*, *Pitosporum*, is a yeast that causes skin and scalp infections. **Dandruff** is a common condition caused by *Pitosporum* Yeast, which affects the condition of the scalp. **Dandruff** cannot be completely removed and can only be effectively treated and regulated. **Dandruff** affects 5% of the population, which occurs primarily after puberty in 2030 And **dandruff** affects men more than women. **dandruff** is a common scalp condition that affects almost half

I. Search your keyword in Google Scholar

Google Scholar search results for 'shampoo'. The search bar shows 'shampoo' and the results show 'About 16,400 results (0.06 sec)'. The first article is 'Hair care cosmetics: From traditional shampoo to solid clay and herbal shampoo, a review' by J Gubitosa, V Rizzi, P Fini, P Cosma - Cosmetics, 2019 - mdpi.com. The article snippet mentions 'shampoo [12]. Among them, in this review, the attention has been focused on solid shampoo and herbal shampoo... known in literature [12] and the novelty introduced by a clay shampoo. ...'. There are links to 'Save', 'Cite', 'Cited by 83', 'Related articles', and 'All 9 versions'.

2. Set 5 years range

3. Use the right keyword to search

4. Organize the information in a table.

Copy and paste the information from article.

Extract the important information related to your scope.

Scope: Suitable pH for shampoo

Title	References	Finding	Important information
Shampoo, conditioner and hair washing	George, N. M., & Potlupati, A. (2022). Shampoo, conditioner and hair washing. International Journal of Research, 8(1), 185.	The scalp pH is 5.5 and the hair shaft pH is 3.67. The pH at which a protein or particle does not migrate (moment of charge neutrality) in an electric field is the isoelectric point (3.67 pH). The pH of which a protein or particle has an equivalent number of total positive and negative charges is called the isoelectric point (pH-5.6). A protein that is in a pH region below its isoelectric point will be positively charged, and vice versa. Any product applied on hair that has pH higher than 3.67 may increase the negative electrical net charge of the hair fibre surface and, therefore, increase the friction between the fibres increasing the damage to the A-layer and the epicuticle of the hair fibre.  Rinsing hair with water (pH-7), increases negativity, creates frizz. Water penetrates the scales that open, hydrating the strand and breaking the hydrogen bonds of the keratin molecule. Keratin is a spiral molecule that keeps itself in that shape due to chemical bonds. To tackle the effects of shampoo with a high pH, it is necessary to choose a shampoo with a pH lower than 5.5 by using a 'pH balancing' shampoo with the addition of an acidic substance such as glycolic acid, adding cationic ingredients to shampoo or by using a conditioner after shampoo. A conditioner of low-pH neutralizes electric charge, reduce the frizz effect and close cuticular cells. A high pH shampoo, will have a positive effect in oily and thin hair, as it can add volume to the hair post shampoo because of the increase in static electricity. However, a pH higher than 5.5 may cause irritation of the scalp.	Scalp pH= 5.5 Hair shaft pH = 3.67 (protein does not migrate) Protein has balance positive & negative charge = 5.6 pH > 5.5 = increase the negative electrical net charge of the hair fibre surface > create frizz > hair damage > cause irritation of the scalp  Water = pH7 Conditioner = lower pH, neutralize electric charge, reduce frizz, close cuticular cell
Sugar Surfactant-Based Shampoos	Nunes, A., Marques, P., Marto, J., Ascenso, A., Gonçalves, L., Fitas, M., ... & Ribeiro, H. M. (2020). Sugar Surfactant-Based Shampoos. Journal of Surfactants and Detergents, 23(4), 809-819.	The pH control of the formulations is quite important, as it should respect the physiologic mild acid pH of both scalp and skin (Trüeb, 2007). The optimal hair pH range is 5.5–6.5, which allows the sealing of the hair cuticles, making it smooth and shiny. At higher pH, the hair cuticles might open due to the negative electrical charge of the hair fibers' surface, which increases the friction between them. Thus, alkaline pH may lead to cuticle damage and fiber breakage, as well as to a frizzed hair (Gavazzoni Dias et al., 2014). The pH values of the formulations developed in this study varied between 5.01 and 9.70. The formulation with the highest pH was the one containing coco-glucoside (formulation 2), while the formulations containing SLES (formulations 1, 4 and 6) had the lowest pH values. These values were in accordance with the pH of each ingredient. For example, coco-glucoside has a pH between 11.5 and 12.5 causing an increase in the net pH of the formulation, in contrast with sulfates for which pH varies between 5.5 and 8.0 (Cornwell, 2018). In order to achieve a suitable pH for topical application, lactic acid (90%) was added to formulation 2, and an acidic pH of 6.78 ± 0.3 was obtained.	pH 5.5-6.5 = optimum, the sealing of the hair cuticles, making it smooth and shiny sodium laureth sulfate (SLES) = pH 5.5 – 8.0 lactic acid used to acidify the formulation
Formulation and evaluation of Pomegranate based herbal shampoo	Malpani, T., Jeithliya, M., Pal, N., & Puri, P. (2020). Formulation and evaluation of Pomegranate based herbal shampoo. Journal of Pharmacognosy and Phytochemistry, 9(4), 1439-1444.	Determination of pH: A 10% v/v shampoo solution was constituted in distilled water and the pH of the solution was measured by using a calibrated pH meter [15].  The pH of formulated shampoo was 6, falling within the ideal pH range for shampoo which is between 5 and 7.8. The formulated shampoo is acid balanced which is near to the skin pH. The pH of shampoo is important for improving and enhancing the qualities of hair, minimizing irritation to the eyes and stabilizing the ecological balance of the scalp. Mild acidity prevents swelling and promotes tightening of the scales, thereby inducing shine.  The pH of the shampoo was 6 which can retain the acidic mantle of scalp. We have used lemon juice for preservation and therefore have avoided the risk posed by chemical preservatives.	Method: A 10% v/v shampoo solution was constituted in distilled water and the pH of the solution was measured by using a calibrated pH meter.  Mild acidity = minimize irritation to eyes, prevent swelling, promote tightening of the scales, inducing shining  Lemon juice = preservation



### 5. Reorganize the information in paragraph

Summary:

Subtopic: Suitable pH for shampoo

#### Introduction

pH adjustment in shampoo is very important as the ideal pH range for shampoo which is between 5 and 7.8, which is near to the skin pH (Malpani et. al., 2020).

#### Body

pH 5.5 is an isoionic point, where protein or particle has an equivalent number of total positive and negative charges (George & Potlapati, 2022). According to Nunes et. al. (2020), alkaline pH will increase the negative electrical net charge of the hair fibre surface, which may damage hair due to frizz, cuticle damage and fibre breakage, as well as may cause irritation of the scalp. Therefore, maintaining pH of shampoo at  $\pm 5.5$  is important. The ideal pH can help to seal of the hair cuticles, making it smooth and shiny, minimize irritation to eyes, prevent swelling, promote and tightening of the scales (Nunes et. al., 2020; Malpani et. al., 2020).

Previous study has stated that sodium laureth sulfate (SLES) resulted the pH range between 5.5 – 8.0. The alkaline result can be adjusted using 90% lactic acid (Nunes et. al., 2020). However, in order to ensure the stability of the product, Malpani et. al. (2020) used lemon juice as preservatives. Lemon juice not only can act as preservative, but also can acidify the formulation. The pH can be done by using calibrated pH meter to obtained the accurate result.

However, if consumer uses the alkaline shampoo, they may recover the pH using acidic conditioner with lower pH to neutralize electric charge, reduce frizz and close cuticular cell (George & Potlapati, 2022).

#### Conclusion

In conclusion, researcher should formulate the shampoo producing acidic medium to ensure the health of hair, skin and to avoid scalp.



1. Introduction
2. Scholar Finding 1 (Compare / Contrast / Analyze)
3. Scholar Finding 2 (Compare / Contrast / Analyze)
4. Scholar Finding 3 (Compare / Contrast / Analyze)
5. Critique
6. Recommendation/Conclusion

You are recommended to use this **6 POINTS TECHNIQUE** if you do not have any idea to write your content.



## Example of Literature Review Writing

### EXAMPLE

**Subtopic:** Makanan kucing

#### Introduction

Terdapat pelbagai jenis makanan kucing yang dihasilkan di Malaysia dari sumber yang sihat.

#### Scholar Finding 1 (Analyze)

Berdasarkan kajian yang lepas, terdapat dua jenis bahan asas untuk membuat makanan kucing. Pertama, diperbuat dari ikan mentah (Musa, 2019; Zakwan, M., 2020). Kedua, diperbuat dari ayam mentah (Ali, 2024).

#### Scholar Finding 2 (Compare)

Musa (2019) dan Zakwan, M (2020) mendapati makanan kucing yang berasaskan ikan boleh meningkatkan selera makan kucing.

#### Scholar Finding 3 (Compare)

Begitu juga dengan makanan kucing yang diperbuat dari bahan asas ayam (Ali, 2024).

#### Scholar Finding 4 (Compare & Contrast)

Zafarin, M. dan Zaki. D (2022) juga pernah membuat kajian yang sama ke atas kucing betina dan kucing jantan. Keputusan menunjukkan bahawa berat kucing betina yang diberikan makanan berasaskan ikan meningkat sebanyak 500 g sebulan. Walau bagaimanapun, jenis makanan tersebut tidak berkesan ke atas kucing jantan. Keputusan sedemikian mungkin berpunca daripada bahan tambahan yang terdapat di dalam penyediaan makanan tersebut kurang sesuai terhadap kucing jantan.

#### Critique

Berdasarkan hasil kajian yang lepas, hanya kajian makanan kucing yang diperbuat daripada bahan asas ayam dan ikan mentah sahaja telah dikaji. Belum pernah ada kajian yang melibatkan kepada perbandingan kualiti makanan kucing yang diperbuat dari bahan asas mentah dan bahan asas yang telah di asak terhadap tahap kesihatan kucing.

#### Recommendation/Conclusion

Sehubungan dengan itu, adalah disarankan agar kajian makanan kucing dapat diteruskan dengan mengambil kira jenis makanan kucing, kaedah penyediaan dan kesan makanan terhadap kesihatan dan kualiti bulu kucing.

## Citation and References

According to Cambridge dictionary, **citation** is a document that praises someone publicly for something the person has done.

Citation is a way of informing readers about the sources or origins of summarized ideas from other individuals. It provides readers with the information needed to find the source again through related references. Citation that located in a text of writing is known as **in-text citation**.

A **reference** is a source of information used to support or verify a statement, claim or fact.

# Important

Don't forget to put the citation of your sources.

### HOW TO WRITE CITATION

#### End of sentence:

- The challenge of student achievement is due to the factor of environment (Azman, 2019).
- There is no correlation between contact time with students scoring (Azman, 2019b).

REMEMBER!

Alphabet **b** is used to write the same author from different sources.

#### In front of sentence:

- According to Azman (2019), the challenge of student achievement is due to the factor of environment.
- Azman (2019) has stated the challenge of student achievement is due to the factor of environment.

#### If TWO (2) authors:

- There is no correlation between contact time with students scoring (Azman and Faris, 2019).
- According to Azman and Faris (2019), the challenge of student achievement is due to the factor of environment.
- Azman and Faris (2019) has stated the challenge of student achievement is due to the factor of environment.

#### If MORE THAN TWO (2) authors:

- There is no correlation between contact time with students scoring (Azman et. al., 2019).
- According to Azman et. al. (2019), the challenge of student achievement is due to the factor of environment.
- Azman et. al. (2019) has stated the challenge of student achievement is due to the factor of environment.

## HOW TO WRITE REFERENCE (APA style)

### Reference

#### Website

M. Salbi, N. (2018). The rule of APA reference style. Retrieved from <http://www.scribbr.com/category/apa-style/>.

#### Proceeding

Nasir, N. A. and Osman, M. A. (2021). The Effectiveness of Combuch as Bio-degradable Straw. *Festival Agromakanan dan Bioteknologi (FAMB) 2020, Johor, Malaysia, 20-23 Jun 2020*. m/s 400-402.

#### Magazine

Rahim, S. N. H. (2019). Bad Effect of Waste Cooking Oil. *Majalah Didik*, 145(20), 58-59, 16<sup>th</sup> May 2019.

#### Journal

Razak, R. Z. (2020). Cause of Bad Writing Paraphrasing. *Malaysian Journal of Research*, 20(2): 242-259.

#### Journal

Razak, R. Z. *et. al.* (2020). Cause of Bad Writing Paraphrasing. *Malaysian Journal of Research*, 20(2): 242-259.

#### Newspaper

Razli, M. H. *et. al.* (2023). Global Warning of Climate Change. *Berita Harian*, p. 10. 26<sup>th</sup> May 2023.

#### Book

Yahya, S. (2024). Importance of Research (2<sup>nd</sup> ed.). Malaysia: PTS Media Group.

#### Book Chapter

Zainuddin, N. J. (2023). Literature Review. *How to Write Research Report* (pp. 20-25). North Ryde, Australia: Century.

**DONT  
FORGET**

Apply these formatting  
guidelines to the APA  
reference page:

- Double spacing (within and between references)
- Hanging indent of ½ inch
- Legible font (e.g. Times New Roman 12 or Arial 11)

**TAKE IT  
EASY**

**MENDELEY**

**EN**

**EndNote™**



Google Scholar

viscosity of massage oil

Articles

About 6,330 results (0.08 sec)

Any time

Since 2024

Since 2023

Since 2020

Custom range...

Sort by relevance

Sort by date

Any type

Review articles

Characterization of aromatherapy **massage oils** prepared from virgin coconut oil and some essential oils

S Songkro, A Sirikatitham, S Sungkarak... - ... of the American Oil ..., 2010 - Wiley Online Library

... 1 C), the **viscosities** of **massage oil** formulations containing lemon oil at 3 and 5... **viscosities** of **massage oils** containing 3 and 5% w/w eucalyptus oil did not change whereas the **viscosity** ...

☆ Save **Cite** Cited by 35 Related articles All 13 versions



JUST TRY

What is the citation for this reference?

Cite

MLA Songkro, Sarunyoo, et al. "Characterization of aromatherapy massage oils prepared from virgin coconut oil and some essential oils." *Journal of the American Oil Chemists' Society* 87.1 (2010): 93-107.

APA Songkro, S., Sirikatitham, A., Sungkarak, S., Buaking, K., Wungsintaweekul, J., Maneenuan, D., & Oungbho, K. (2010). Characterization of aromatherapy massage oils prepared from virgin coconut oil and some essential oils. *Journal of the American Oil Chemists' Society*, 87(1), 93-107.

Chicago Songkro, Sarunyoo, Anusak Sirikatitham, Supreedee Sungkarak, Khemmarat Buaking, Juraithip Wungsintaweekul.

HELPFUL TIPS

Use Scribbr APA Citation Generator to generate your reference

Scribbr APA Citation Generator

Accurate APA citations, verified by experts, trusted by millions.

Citation style APA 7th edition

Cite a webpage, book, article, and more

Search by title, URL, DOI, ISBN or keywords

Cite

Cite with Edge NEW Cite manually

Do your best

LET'S DO THIS



LET'S TRY  
PROGRESSION FORM 2





# CHAPTER 3

# RESEARCH METHODOLOGY

RESEARCH METHODOLOGY  
RESEARCH DESIGN  
KEY ELEMENTS OF RESEARCH DESIGN  
EXAMPLE OF RESEARCH DESIGN  
QUALITATIVE VS QUANTITATIVE RESEARCH  
METHODOLOGY  
RESEARCH FRAMEWORK  
MATERIALS AND EQUIPMENTS  
EXPERIMENTAL DETAILS  
STATISTICAL ANALYSIS



# CHAPTER 3

## RESEARCH METHODOLOGY:

**Describes the techniques and procedures used to identify and analyze information regarding a specific research topic**

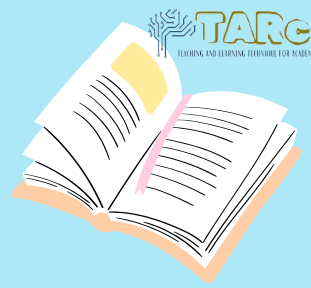
**Methods of conducting research are about the exact and precise ways of how we collect data in conducting a particular research.**

**Methodologies of research are about how researchers should best collect data in respect of a particular investigation/research.**

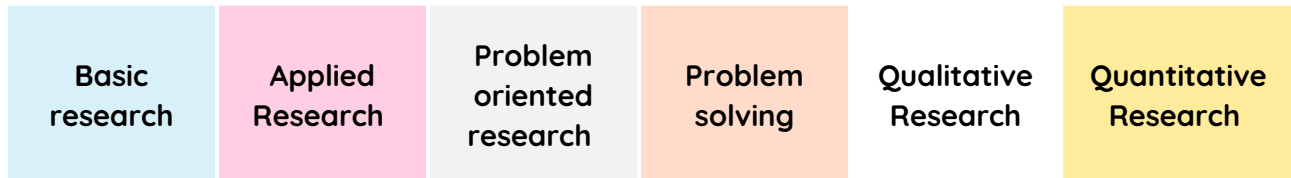


# RESEARCH METHODOLOGY

## RESEARCH DESIGN:



### Types of research methodology



## What is research design?

The overall plan or structure that guides the process of conducting research. It is a critical component of the research process and serves as a blueprint for how a study will be carried out, including the methods and techniques that will be used to collect and analyze data. A well-designed research study is essential for ensuring that the research objectives are met and that the results are valid and reliable.

### Characteristics of Research Design



Neutrality



Reliability



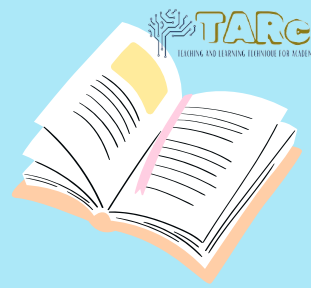
Validity



Generalization



# RESEARCH METHODOLOGY



## KEY ELEMENTS OF RESEARCH DESIGN:

**Research Objectives**



**Research Questions  
or Hypotheses**



**Data Collection Methods**

**Sampling**



**Data Collection Instruments**



**Data Analysis**

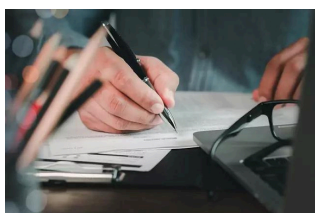
**Time Frame**



**Ethical Considerations**

**Resources**

**Data Presentation and  
Reporting**





# RESEARCH METHODOLOGY

## KEY ELEMENTS OF RESEARCH DESIGN:

Research Objectives	Clearly define the goals and objectives of the research study. What is the research trying to achieve or investigate?
Research Questions	Formulating specific research questions or hypotheses that address the objectives of the study. These questions guide the research process.
Data Collection Methods	Determining how data will be collected, whether through surveys, experiments, observations, interviews, archival research, or a combination of these methods.
Sampling	Deciding on the target population and selecting a sample that represents that population.
Data Collection Instruments	Developing or selecting the tools and instruments needed to collect data, such as questionnaires, surveys, or experimental equipment.
Data Analysis	Defining the statistical or analytical techniques that will be used to analyze the collected data.
Time Frame	Establishing a timeline for the research project, including when data will be collected, analyzed, and reported.
Ethical Considerations	Addressing ethical issues, including obtaining informed consent from participants, ensuring the privacy and confidentiality of data, and adhering to ethical guidelines.
Resources	Identifying the resources needed for the <u>research</u> , including funding, personnel, equipment, and access to data sources.
Data Presentation and Reporting	Planning how the research findings will be presented and reported, whether through written reports, presentations, or other formats.

## EXAMPLE OF RESEARCH DESIGN

### Research Design Examples



## QUALITATIVE VS QUANTITATIVE RESEARCH

Qualitative Research	Quantitative Research
Qualitative Research is primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions, and motivations.	Quantitative Research is used to quantify the problem by way of generating numerical data or data that can be transformed into usable statistics.
It provides insights into the problem or helps to develop ideas or hypotheses for potential quantitative research.	It is used to quantify attitudes, opinions, behaviors, and other defined variables - and generalize results from a larger sample
Qualitative Research is also used to uncover trends in thought and opinions, and dive deeper into the problem. Qualitative data collection methods vary using unstructured or semi-structured techniques.	Quantitative Research uses measurable data to formulate facts and uncover patterns in research.
Some common methods include focus groups (group discussions), individual interviews, and participation/observations.	Quantitative data collection methods are much more structured than Qualitative data collection methods
The sample size is typically small, and respondents are selected to fulfill a given quota.	Quantitative data collection methods include various forms of surveys - online surveys, paper surveys, mobile surveys and kiosk surveys, face- to-face interviews, telephone interviews, longitudinal studies, website interceptors, online polls, and systematic observations.







# RESEARCH METHODOLOGY

## METHODOLOGY:

The method used in this investigation is the scientific and experimental approach.

**Research framework**

**Material and equipment**

**Experimental Details**

**Statistical analysis method**

## RESEARCH FRAMEWORK

**A research framework clearly illustrates the structure of the research plan and helps the researcher formulate relevant research questions.**

**Usually presented in a flow chart**

**Starting from sample preparation, processing, analysis, data collection and interpretation**

# RESEARCH FRAMEWORK



Design your research framework according to your objectives.



QUICK TIPS

## EXAMPLE

### Objectives

1

To refine waste cooking oil using bleaching earth agent.

2

To analyse the refined waste cooking oil.

3

To compare the physical properties of waste cooking oil with standard specification

### Research framework

Refine waste cooking oil

Bleaching earth:

- Bentonite
- Montmorillonite

Refined waste cooking oil analysis

- Melting point
- Iodine Value
- Acid Value
- Color

Physical properties comparison

PORAM standard specification method

You are recommended to use this technique if you do not have any idea to write your content.



## MATERIALS AND EQUIPMENTS

**Explain how you gathered and selected material (such as publications or archival data) for inclusion in your analysis.**

**Source, details and quantity of the material?.**

**Location, model and types of equipment.**

**What criteria did you use to select material?**



## EXPERIMENTAL DETAILS

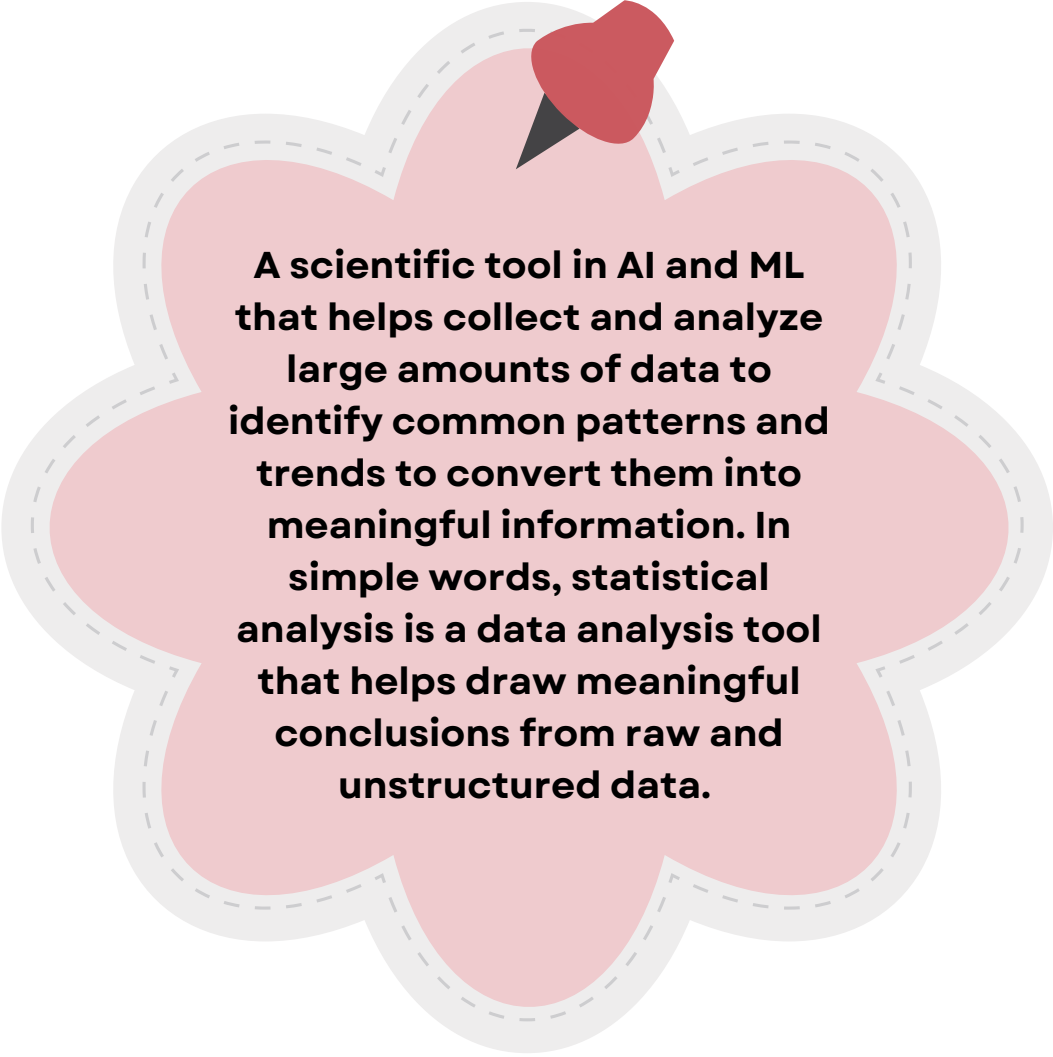
**Source of procedure  
(citation )**

**Step-by-step analysis with  
detailed parameters**

**Calculation involved**

**How was the data  
collected and tabulated?**

## STATISTICAL ANALYSIS



**A scientific tool in AI and ML that helps collect and analyze large amounts of data to identify common patterns and trends to convert them into meaningful information. In simple words, statistical analysis is a data analysis tool that helps draw meaningful conclusions from raw and unstructured data.**

## STATISTICAL ANALYSIS METHOD

<ul style="list-style-type: none"> <li>Standard Deviation</li> </ul>	<p>Analyzes the deviation of different data points from the mean of the entire data set. It determines how data of the data set is spread around the mean.</p>
<ul style="list-style-type: none"> <li>Regression</li> </ul>	<p>A statistical tool that helps determine the cause and effect relationship between the variables. It determines the relationship between a dependent and an independent variable. It is generally used to predict future trends and events.</p>
<ul style="list-style-type: none"> <li>Hypothesis Testing</li> </ul>	<p>To test the validity or trueness of a conclusion or argument against a data set. The hypothesis is an assumption made at the beginning of the research and can hold or be false based on the analysis results.</p>

## STATISTICAL ANALYSIS SOFTWARE

**Statistical analysis software products are specialized programs designed to allow users to perform complex statistical analysis. These products typically provide tools for the organization, interpretation, and presentation of selected data sets.**

## EXAMPLES OF STATISTICAL ANALYSIS SOFTWARE



**LET'S TRY  
PROGRESSION FORM 3**





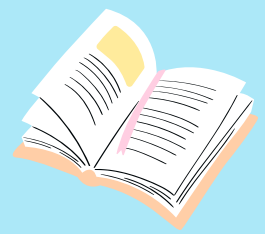
The page features abstract geometric shapes in teal and yellow. In the top right corner, there are several overlapping chevron-like shapes pointing downwards and to the right. In the bottom left corner, there are similar shapes, including a large teal triangle and a yellow chevron pointing upwards and to the right.

# CHAPTER 4

# PROPOSAL

# WRITING

ELEMENTS IN PROPOSAL  
TECHNICAL SETTING  
SAMPLE PROPOSAL  
FORMAT GUIDELINE



# CHAPTER 4

## Proposal Writing

### INTRODUCTION:

A **research proposal** is a structured, formal document that explains what you plan to research (your research topic), why it is worth researching (your justification), and how you plan to investigate it (your methodology).



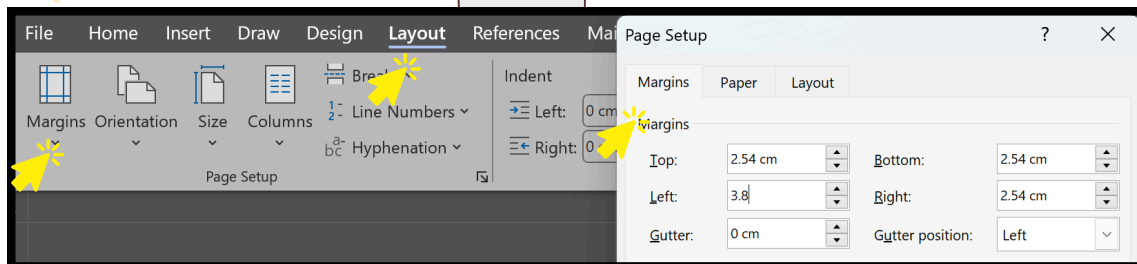
#### Element in proposal

- Cover
- Table of Content
- List of Table
- List of Figure
- List of Symbol
- List of Abbreviation
- Chapter 1 Introduction
- Chapter 2 Literature Review
- Chapter 3 Methodology
- Cost Estimation
- Gantt Chart
- References
- Appendixes

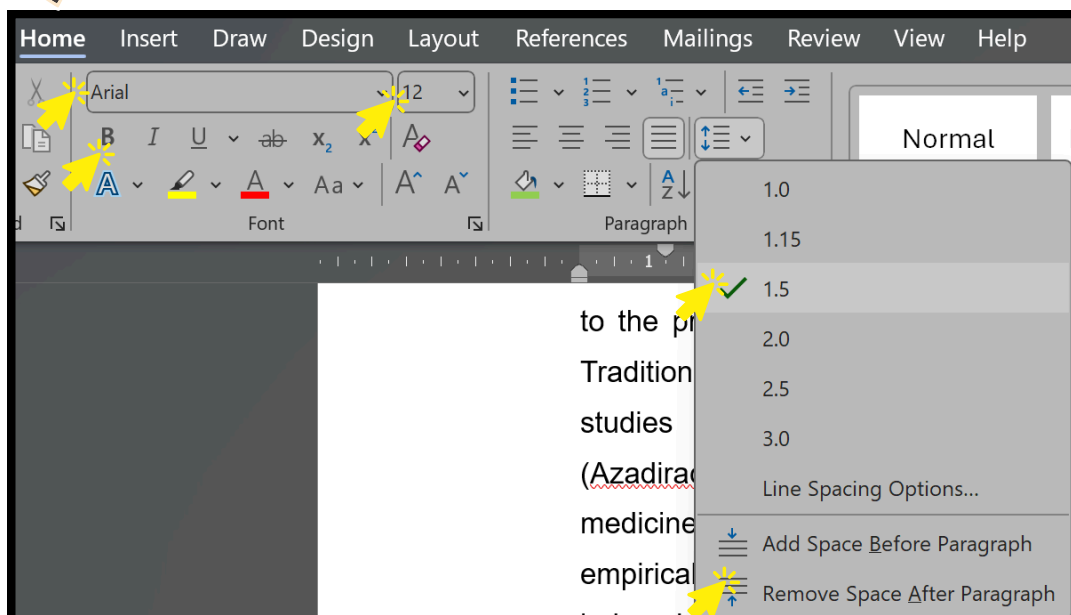
### TECHNICAL SETTING



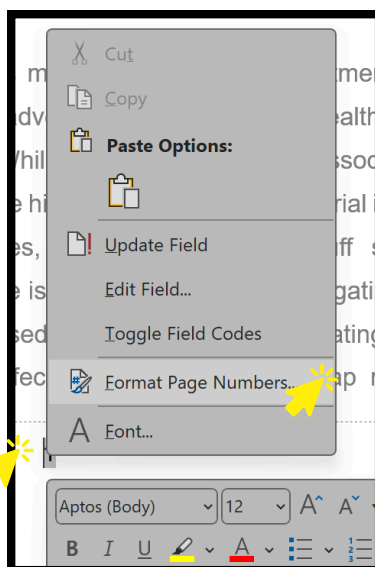
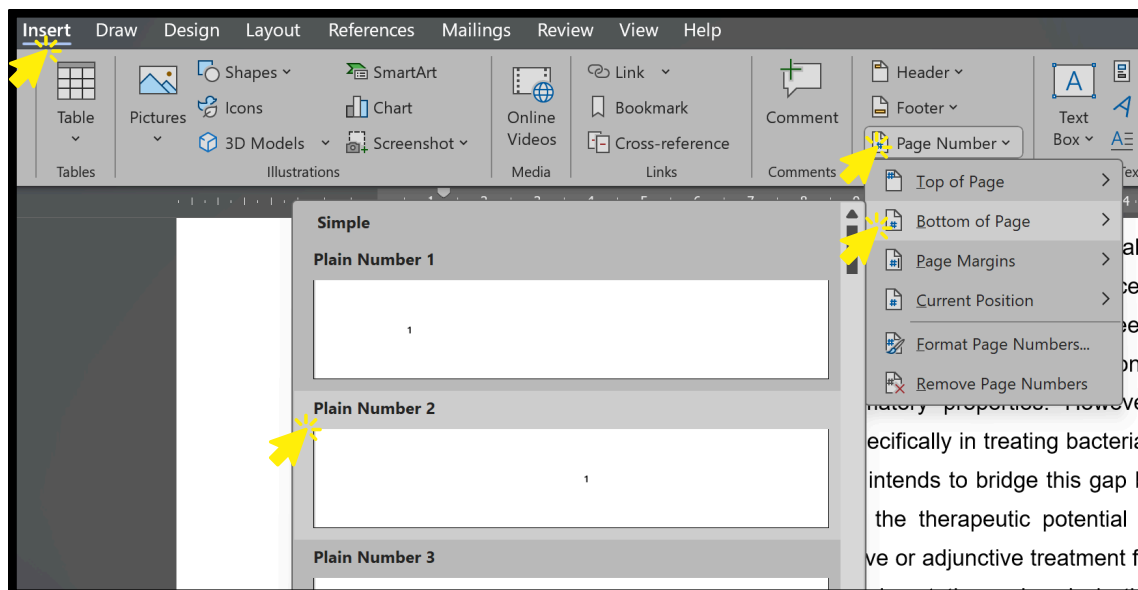
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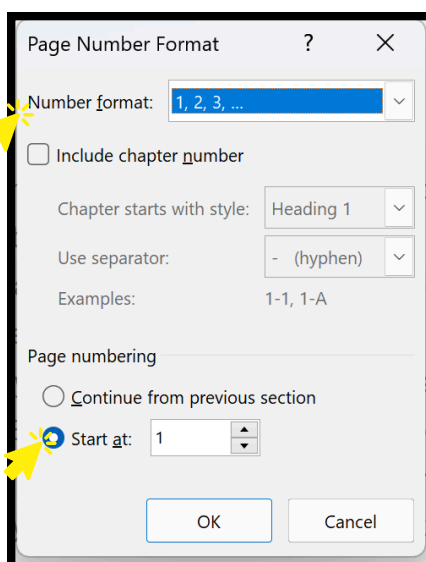
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2. Right click on page number

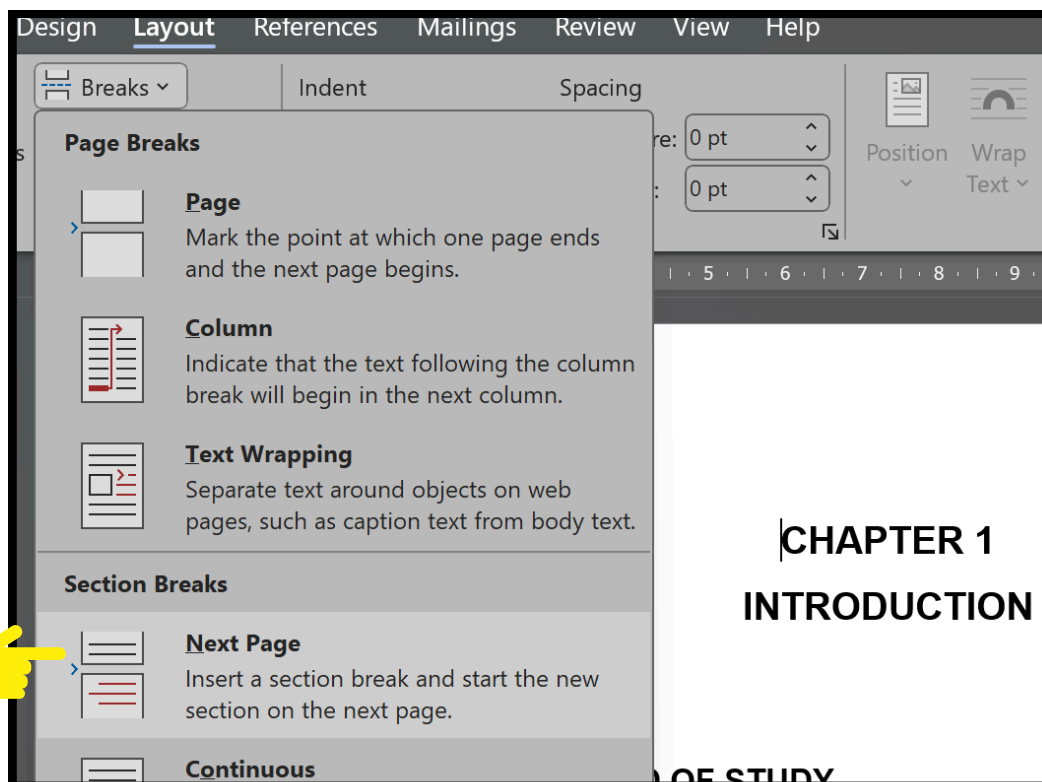
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for Chapter 1



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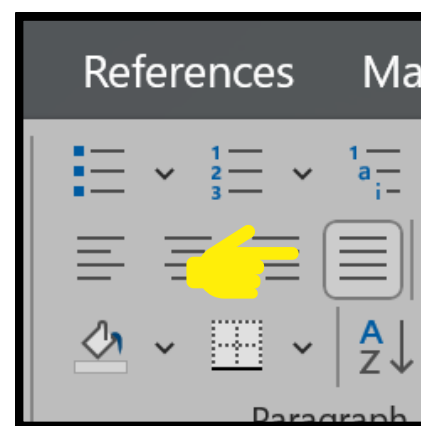
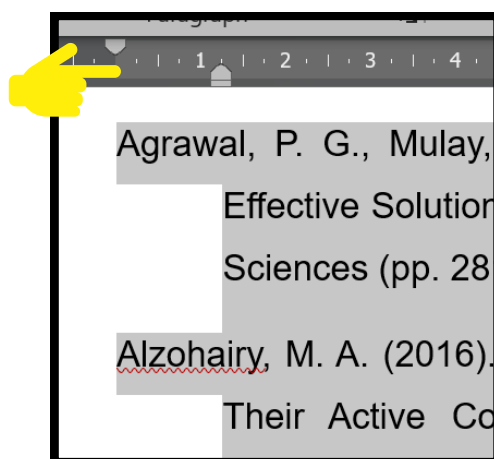
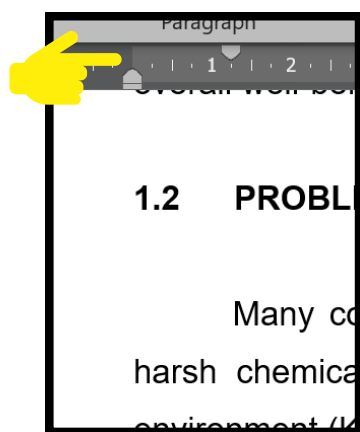
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## BREAK PAGE



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Breaks Indent Spacing

**Page Breaks**

- Page**  
Mark the point at which one page ends and the next page begins.
- Column**  
Indicate that the text following the column break will begin in the next column.
- Text Wrapping**  
Separate text around objects on web pages, such as caption text from body text.

**Section Breaks**

- Next Page**  
Insert a section break and start the new section on the next page.
- Continuous**  
Insert a section break and start the new section on the same page.
- Even Page**  
Insert a section break and start the new section on the next even-numbered page.
- Odd Page**  
Insert a section break and start the new section on the next odd-numbered page.

CHAPTER 2  
LITERATURE REVIEW

NEEM LEAF-BASED HERBAL SOLUTIONS FOR MATERIAL DANDRUFF INFECTIONS



## ALPHABETICAL ORDER

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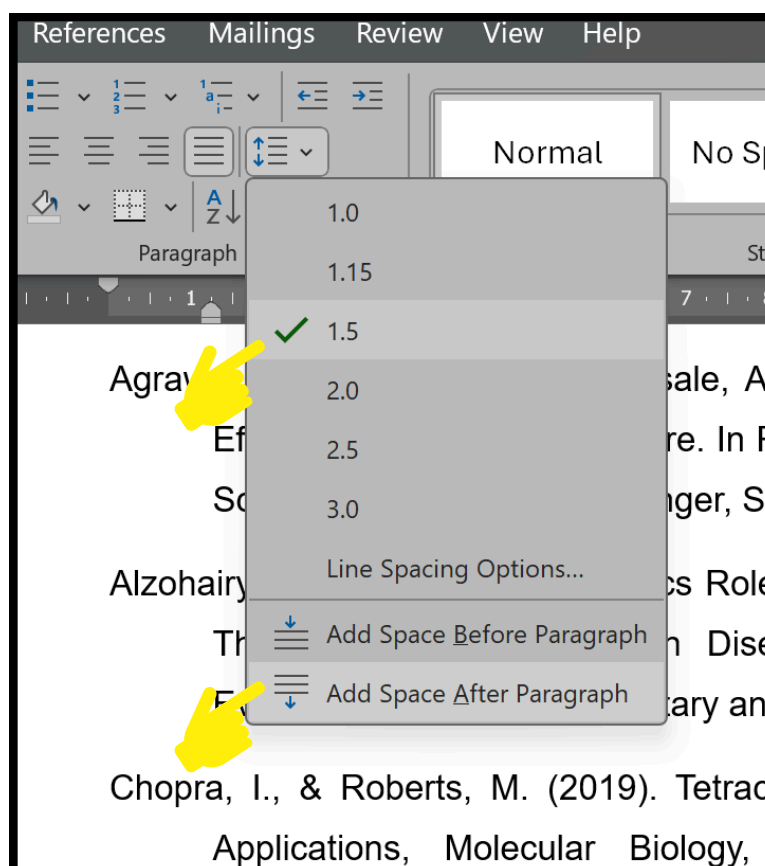
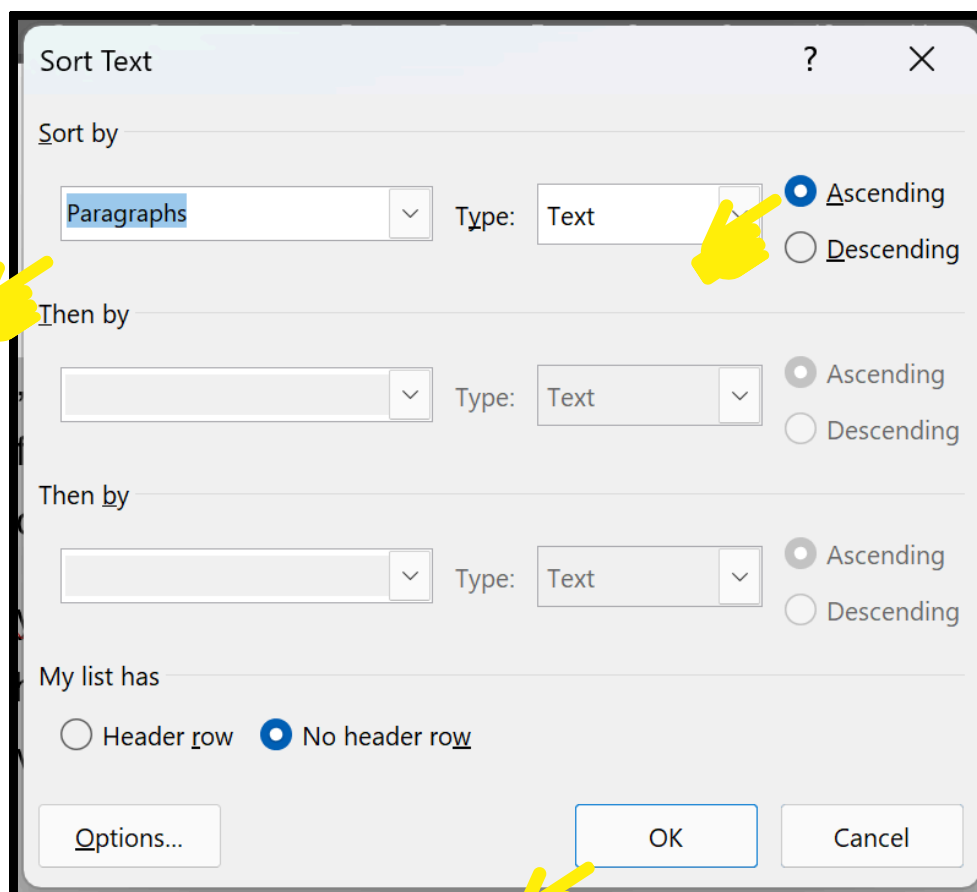
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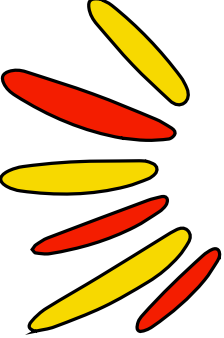
Agrawal, P. G., Mulay, S., & Bhosale, A. M. (2021). Herbal Shampoo: An Effective Solution for Hair Care. In Recent Advances in Pharmaceutical Sciences (pp. 281-291). Springer, Singapore.

Alzohairy, M. A. (2016). Therapeutics Role of *Azadirachta indica* (Neem) and Their Active Constituents in Diseases Prevention and Treatment.

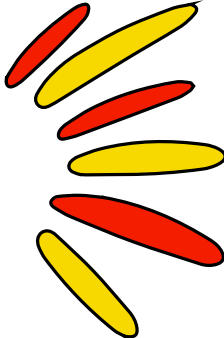
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# ***Sample of proposal***



◆—————◆  
**Disclaimer: This is an example of writing a proposal only. It is not  
directly related to any ongoing or prospective studies.**  
◆—————◆

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**THE IMPACT OF NEEM LEAF-BASED HERBAL  
SHAMPOO ON TREATING DANDRUFF CAUSED BY  
BACTERIAL INFECTIONS**

**ALI BIN ABU (33DMK17F1016)  
SITI BINTI BAKAR (33DMK17F1017)  
MARIA BINTI SIDEK (33DMK17F1018)**

**JABATAN TEKNOLOGI KIMIA DAN MAKANAN**



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**FEBRUARI 2024**



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## TABLE OF CONTENT



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### CHAPTER

### ITEM

### PAGES

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TIPS:  
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HIDE BORDER

TABLE OF CONTENT

i

LIST OF TABLE

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LIST OF FIGURE

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LIST OF SYMBOL

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LIST OF ABBREVIATION

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1

INTRODUCTION

1

1.1 Background of study

1

1.2 Problem statements

1

1.3 Objectives

2

1.4 Research Questions

3

1.5 Scope of study

3

1.6 Significant of study

4



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2

LITERATURE REVIEW

6

2.1 Efficacy Of Neem Leaf-Based Herbal Shampoo  
in Treating Bacterial Dandruff Infections

6

2.2 Safety Profile of Neem Leaf-Based Herbal  
Shampoo

6

2.3 Psychological And Social Impacts of Dandruff  
Treatment

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3

METHODOLOGY

3.1 Flowchart

9

3.2 Materials

9

3.3 Extraction of Neem Oil

10

3.4 Physical properties of Neem Herbal Shampoo

10

3.5 Effectiveness of Neem Herbal Shampoo

10

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GANTT CHART	13
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APPENDIXES	17

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## LIST OF TABLE



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2.1

Composition of antioxidant in different types of  
neem leaves

7

2.2

Type of bacteria exist in neem leave

9

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TIPS:  
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## LIST OF FIGURE

NUMBER OF FIGURE	TITLE	PAGES
2.1	Different type of neem leaves	7
2.2	Mechanism of neem compound against bacterial infection	9
3.1	Flowchart of methodology	19

## LIST OF SYMBOL

### SYMBOL

°C	Degree Celsius
cm	Centimeter

## **LIST OF ABBREVIATIONS**

NL	Neem Leave
PTSN	Politeknik Tun Syed Nasir Syed Ismail



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# CHAPTER 1 INTRODUCTION

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## 1.1 BACKGROUND OF STUDY

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The study aims to investigate the efficacy of a neem leaf-based herbal shampoo in alleviating dandruff triggered by bacterial infections. Dandruff, a common scalp condition characterized by flaking and itching, is often attributed to the presence of *Malassezia* yeast or bacterial colonization on the scalp. Traditional treatments for dandruff typically involve antifungal agents, but recent studies have highlighted the potential antibacterial properties of neem (*Azadirachta indica*) leaves. Neem has long been recognized in traditional medicine for its antimicrobial and anti-inflammatory properties. However, empirical evidence regarding its effectiveness specifically in treating bacterial-induced dandruff remains limited. This research intends to bridge this gap by conducting a comprehensive investigation into the therapeutic potential of neem leaf-based herbal shampoo as an alternative or adjunctive treatment for bacterial-induced dandruff. Through rigorous experimentation and analysis, this study seeks to contribute to the development of natural, sustainable, and effective solutions for managing dandruff, thereby enhancing scalp health and overall well-being.

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## 1.2 PROBLEM STATEMENTS



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Many commercial shampoos marketed for dandruff treatment contain harsh chemicals that may have adverse effects on scalp health and the environment (Kumar et al., 2020). While dandruff is commonly associated with fungal infections, recent studies have highlighted the role of bacterial infections, particularly *Staphylococcus* species, in exacerbating dandruff symptoms (Sarkar et al., 2018). However, there is a lack of research investigating natural alternatives, such as neem leaf-based herbal shampoos, in treating dandruff caused specifically by bacterial infections. This knowledge gap raises the

IN PARAGRAPH



question of whether neem leaf-based shampoos could offer an effective and safer alternative for individuals seeking relief from dandruff associated with bacterial infections.

Antibiotic resistance is a growing concern in the treatment of bacterial infections, including those contributing to dandruff (Chopra et al., 2019). The overuse of conventional antibiotics in shampoos may contribute to this problem by promoting the development of resistant bacterial strains (Kumar et al., 2019). Neem leaf extract has demonstrated antimicrobial properties against a wide range of bacteria, including *Staphylococcus aureus*, a common culprit in dandruff-associated bacterial infections (Alzohairy, 2016). However, the effectiveness of neem leaf-based herbal shampoos specifically in targeting bacterial dandruff infections remains underexplored. Investigating this potential could offer valuable insights into sustainable and alternative approaches to dandruff management that mitigate the risk of antibiotic resistance.

Dandruff not only affects scalp health but also has significant psychological and social impacts on individuals (Agrawal et al., 2021). Many existing treatments focus on symptom management rather than addressing the underlying causes, leading to temporary relief and potential recurrence (Thyssen et al., 2019). Neem leaf extract is known for its anti-inflammatory and antifungal properties, suggesting its potential efficacy in addressing both the symptoms and root causes of dandruff (Khoshdel et al., 2017). However, there is limited research evaluating the use of neem leaf-based herbal shampoos specifically for dandruff management, especially concerning bacterial infections. Exploring the impact of such shampoos on improving not only dandruff symptoms but also overall scalp health and quality of life could provide valuable insights into holistic approaches to dandruff treatment.

### 1.3 OBJECTIVES

The objectives for this study are as follows:

1. To pretreat the organic waste to remove hazardous material.
2. To produce dandruff shampoo using blending method.
3. To compare the characterization of dandruff shampoo with commercialized shampoo in the market.

  
IN NUMBERING

  
CAN SOLVE ALL  
PROBLEM  
STATEMENT

#### **1.4 RESEARCH QUESTIONS**



IN NUMBERING

The research questions for this study are as follows:

1. How does the neem leaf-based herbal shampoo's antibacterial properties affect the reduction of dandruff caused by bacterial infections compared to conventional anti-dandruff shampoos?
2. What are the specific bacterial species responsible for dandruff formation, and how does the neem leaf-based herbal shampoo target and inhibit their growth, thereby mitigating dandruff symptoms?
3. What is the comparative efficacy of neem leaf-based herbal shampoo in reducing dandruff caused by bacterial infections versus other natural remedies or pharmaceutical treatments available in the market?
4. How do the active compounds present in neem leaf extract interact with the scalp microbiome, particularly in cases of dandruff attributed to bacterial infections, and what role does this play in dandruff management?
5. What are the potential side effects or adverse reactions associated with the prolonged use of neem leaf-based herbal shampoo for treating dandruff caused by bacterial infections, and how do these compare to conventional anti-dandruff treatments?

#### **1.5 SCOPE OF STUDY**



IN PARAGRAPH

The scope of the study "The Impact of Neem Leaf-Based Herbal Shampoo on Treating Dandruff Caused by Bacterial Infections" encompasses several key aspects pertaining to the evaluation of neem leaf-based herbal shampoo as a potential remedy for dandruff induced by bacterial infections. Firstly, the research will delve into the efficacy of neem extract in inhibiting the growth of bacteria commonly associated with dandruff, such as *Malassezia* species. Secondly, it will investigate the effectiveness of neem-based shampoo in alleviating dandruff symptoms, including itching, flaking, and scalp irritation, attributed to bacterial colonization. Furthermore, the study will explore the safety profile of neem-derived formulations, ensuring they pose no adverse effects on the scalp or hair health. Additionally, the research aims to discern the



optimal formulation and concentration of neem extract required to exert therapeutic effects against bacterial-induced dandruff while considering factors like shelf-life stability and user acceptance. Lastly, the study will assess the potential of neem-based shampoo to serve as a natural, sustainable alternative to conventional anti-dandruff treatments, contributing to the broader domain of herbal remedies in dermatological care.

## 1.6 SIGNIFICANT OF STUDY

Based on the provided problem statements in Section 1.2, here are three significant aspects of study for the research on "The Impact of Neem Leaf-Based Herbal Shampoo on Treating Dandruff Caused by Bacterial Infections".

Firstly, investigate the efficacy of neem leaf-based herbal shampoo in treating dandruff caused by bacterial infections compared to conventional shampoos containing harsh chemicals. This aspect of the study would focus on assessing the effectiveness of neem leaf extract in combating bacterial strains, particularly *Staphylococcus* species, while also evaluating its safety profile for scalp health and the environment.

Secondly, explore the potential of neem leaf-based herbal shampoo in mitigating antibiotic resistance in bacterial dandruff infections. This aspect would involve assessing whether the antimicrobial properties of neem leaf extract could provide an alternative to conventional antibiotics commonly used in dandruff shampoos, thereby reducing the risk of promoting antibiotic-resistant bacterial strains.

Lastly, investigate the psychological and social impacts of using neem leaf-based herbal shampoo for dandruff management. This aspect would focus on assessing not only the effectiveness of the shampoo in alleviating dandruff symptoms but also its impact on improving overall scalp health and quality of life. Understanding how the use of natural alternatives like neem leaf-based shampoos influences individuals' perceptions, self-esteem, and social interactions could provide insights into holistic approaches to dandruff treatment.

These three aspects collectively address the research gap outlined in the problem statement, offering a comprehensive examination of the potential

benefits and implications of using neem leaf-based herbal shampoo for treating dandruff caused by bacterial infections.

## 1.7 EXPECTED OUTCOME

Successful extraction of neem oil from neem seeds using the Soxhlet method, resulting in a pure and concentrated form of neem oil suitable for further formulation into herbal shampoo.

Comprehensive characterization of the physical properties of neem herbal shampoo, including pH 5.5-6.6, viscosity 33-35 cps, foaming capacity, stability last to 1-2 years, color, and good odor. This analysis will provide crucial information on the formulation's suitability for use as a shampoo product.

Evaluation of the effectiveness of neem herbal shampoo in treating dandruff caused by bacterial infections through a clinical trial. Anticipated outcomes include a reduction in dandruff severity scores, decreased bacterial colonization on the scalp, and improvement in overall scalp health among participants using the neem herbal shampoo compared to the control group.

These expected outcomes align with the specific objectives of the study and provide clear benchmarks for assessing the success and impact of each research objective.



SYNC WITH  
OBJECTIVES





## **CHAPTER 2**

### **LITERATURE REVIEW**

Break page

#### **2.1 EFFICACY OF NEEM LEAF-BASED HERBAL SHAMPOO IN TREATING BACTERIAL DANDRUFF INFECTIONS**



IN PARAGRAPH

Dandruff is a common scalp disorder affecting millions of individuals worldwide, with recent studies implicating bacterial infections, particularly *Staphylococcus* species, in exacerbating dandruff symptoms (Sarkar et al., 2018). Conventional shampoos marketed for dandruff treatment often contain harsh chemicals that may have adverse effects on scalp health and the environment (Kumar et al., 2020). In light of this, there has been growing interest in exploring natural alternatives such as neem leaf-based herbal shampoos for managing dandruff caused specifically by bacterial infections.

Research by Alzohairy (2016) highlights the antimicrobial properties of neem leaf extract against a wide range of bacteria, including *Staphylococcus aureus*, a common culprit in dandruff-associated bacterial infections. These properties make neem an attractive candidate for dandruff treatment, offering a potential alternative to conventional antibiotics commonly used in shampoos.

Moreover, a study by Chopra et al. (2019) emphasizes the importance of addressing antibiotic resistance in the treatment of bacterial infections, including those contributing to dandruff. The overuse of conventional antibiotics in shampoos may promote the development of resistant bacterial strains, posing a significant public health concern. Investigating the efficacy of neem leaf-based herbal shampoo in targeting bacterial dandruff infections could offer valuable insights into sustainable and alternative approaches to dandruff management that mitigate the risk of antibiotic resistance.

#### **2.2 SAFETY PROFILE OF NEEM LEAF-BASED HERBAL SHAMPOO**

While neem leaf extract demonstrates promising antimicrobial properties, it is essential to evaluate its safety profile for scalp health and the

environment. Kumar et al. (2019) discuss the potential adverse effects of harsh chemicals commonly found in commercial shampoos, emphasizing the need for safer alternatives. Neem leaf-based herbal shampoos offer a natural solution that may be gentler on the scalp and less harmful to the environment. Table 2.1 shows the composition of bacteria exist in neem oil.

**Table 2.1:** The composition of bacteria exists in neem oil.

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OF THE TABLE  
  
TIPS:  
USE TABLE  
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Type of Bacteria	Composition
Staphylococcus aureus	20%
Escherichia coli	10%
Pseudomonas aeruginosa	15%
Bacillus subtilis	30%
Salmonella sp.	10%
Enterobacter sp.	15%

Studies by Khoshdel et al. (2017) and Agrawal et al. (2021) highlight the anti-inflammatory and antifungal properties of neem leaf extract, suggesting its potential efficacy in addressing both the symptoms and underlying causes of dandruff. However, further research is needed to assess the long-term safety and potential side effects of neem leaf-based shampoos, particularly concerning their use for bacterial dandruff infections.

## 2.3 PSYCHOLOGICAL AND SOCIAL IMPACTS OF DANDRUFF TREATMENT

In addition to its physical symptoms, dandruff can have significant psychological and social impacts on individuals. Thyssen et al. (2019) note that many existing treatments focus on symptom management rather than addressing the underlying causes, leading to temporary relief and potential recurrence. This underscores the importance of holistic approaches to dandruff treatment that consider both the physical and emotional well-being of patients.

Exploring the impact of neem leaf-based herbal shampoo on improving not only dandruff symptoms but also overall scalp health and quality of life is crucial. Understanding how the use of natural alternatives like neem leaf-based

shampoos influences individuals' perceptions, self-esteem, and social interactions could provide valuable insights into holistic approaches to dandruff treatment (Agrawal et al., 2021).

In summary, the literature suggests that neem leaf-based herbal shampoo holds promise as a potential treatment for bacterial dandruff infections, offering antimicrobial properties with potentially fewer adverse effects compared to conventional shampoos. However, further research is needed to fully evaluate its efficacy, safety, and psychological impacts on individuals.

## CHAPTER 3 METHODOLOGY

### 3.1 FLOWCHART

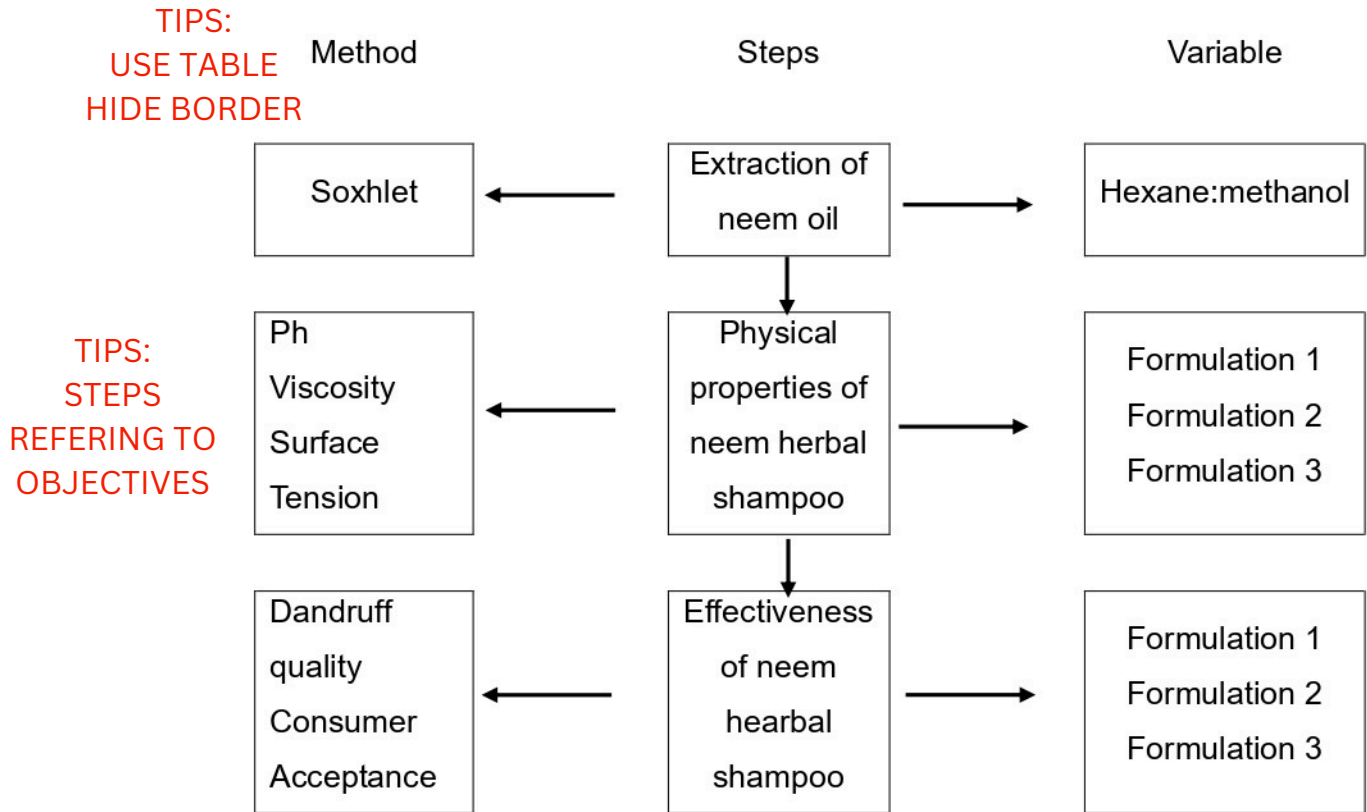


Figure 3.1: Flowchart of methodology

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### 3.2 MATERIALS

IN PARAGRAPH

For shampoo with hair care properties, various herbal parts will be choosen. All herbs will be taken in powder form often have the ability to enhance the quality of the scalp and shield the skin from harm. The powdered forms of Amla fruit, Neem leaf, Reetha fruit, Hibiscus flower, Ginger fruit, Bhringraj leaf, Shikakai fruit will be collected from natural origin. Last but not least, methanol (purity 99%) and hexane (purity 99%) will be purchased from Merck.

### **3.3 EXTRACTION OF NEEM OIL**

Neem oil will be extracted from neem seeds using a cold-press method. Neem seeds will be cleaned to remove any impurities and then crushed using a mechanical press to release the oil. The crushed seeds will be subjected to cold pressing using a hydraulic press to extract the oil. The extracted oil will be filtered to remove any remaining solids and stored in amber glass bottles to prevent degradation due to light exposure. This extraction process will be conducted in accordance with standard protocols (Singh et al., 2018).

### **3.4 PHYSICAL PROPERTIES OF NEEM HERBAL SHAMPOO**

The physical properties of the neem herbal shampoo will be evaluated using various parameters. These include pH measurement using a digital pH meter, viscosity determination using a viscometer, foaming capacity assessment by measuring the volume of foam generated upon agitation, and stability testing through visual observation for any changes in appearance or phase separation over time. Additionally, the color and odor of the shampoo will be assessed using standardized methods. All physical property evaluations will be conducted in triplicate and the mean values will be reported (Kumar et al., 2020).

### **3.5 EFFECTIVENESS OF NEEM HERBAL SHAMPOO**

The effectiveness of the neem herbal shampoo in treating dandruff caused by bacterial infections will be assessed through a clinical trial involving human participants. Individuals diagnosed with bacterial dandruff infections will be recruited and randomly assigned to either the neem herbal shampoo group or a control group using a randomized controlled trial design. Participants will be instructed to use the assigned shampoo according to the provided instructions for a specified duration. Dandruff severity will be evaluated using standardized scales such as the Severity of Dandruff Scale, and bacterial colonization on the scalp will be assessed through microbial swabbing and culture techniques. Statistical analysis will be performed to compare the



efficacy of the neem herbal shampoo with the control shampoo in reducing dandruff severity and bacterial colonization (Sarkar et al., 2018).

## COST ESTIMATION

Chemical	Quantity	Cost/Unit (RM)	Cost (RM)
Total cost (RM)			

Apparatus	Quantity	Cost/Unit (RM)	Cost (RM)
Total cost (RM)			

## GANTT CHART

WEEK / PROJECT ACTIVITIES	STATUS	W1	W2	W3*	W4	W5	W6	W7	W8	*MI D SEM	W9	W1 0	W1 1	W1 2*	W1 3	W1 4
PROJECT REGISTRATION	P															
	I															
CHEMICAL PREPARATION	P															
	I															
OBJECTIVE 1 : Extraction of neem oil																
SOXHLET	P															
	I															
PROGRESSION FORM 5.1	P															
	I															
OBJECTIVE 2 : Physical properties of neem herbal shampoo																
Formulation 1	P															
	I															
Formulation 2	P															
	I															
Formulation 3	P															
	I															
pH	P															
	I															
Viscosity	P															
	I															



ARIAL  
14PT  
BOLD  
UPPERCASE



## REFERENCES



1x ENTER

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ALPHABETICAL  
ORDER

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HANGING  
INDENT 1.25CM

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ADD SPACE  
AFTER  
PARAGRAPH

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ARIAL  
12PT  
1.5 SPACING

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## **APPENDIXES**

APPENDIX A	Sample interview questions
APPENDIX B	Sample questionnaire form for shampoo acceptance

LET'S DO  
THIS

Do  
your  
best



LET'S TRY  
PROGRESSION FORM 4





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**Syahirah Yahya**, is an enthusiastic educator and researcher at Politeknik Tun Syed Nasir Syed Ismail (PTSN) since 2020, previously served as a part-time tutor at Tamhidi Center, USIM in 2019. In addition to her teaching profile, her research has been published in various indexed journals, including the Renewable Energy, the Materials Today: Proceedings, the Asia Pacific Journal of Educators and Education, and the Malaysian Journal of Science, Health & Technology. Beginning in year 2019, she started her research career as the Editor of the Malaysian Journal of Science Health & Technology. Concurrently, she achieved second place in the 3-Minutes Thesis Competition at USIM, leading to participation in the Falling Walls Lab AIMST 2019 competition. Her notable research achievements include winning the Best Thesis Award in Hadiah Analisis 2019 in the Master Category, the Best Manuscript Award 2020 (USIM), the Best Master Student Award 2020 (USIM) in Best Thesis Category, the Best Extended Abstract in Multidisciplinary Innovation Competition (IMIC2021) and the Best Extended Abstract Awards in International Innovation Competition (INNOCOM) 2022. While at PTSN, she gained extensive experience teaching Project courses spanning over nine sessions of study term involving final year students. Leveraging her accumulated expertise and skills, she aspires that the development of TARCh will aid students in their academic journey with structured guidance to achieve positive educational outcomes.

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**Raz Zarinda**, an exceptional academic force, has been illuminating Politeknik Tun Syed Nasir Syed Ismail (PTSN) as a captivating lecturer since 2021. Her journey began in 2015 at Politeknik Pagoh as a part-time lecturer, marking the inception of her commitment to knowledge dissemination. With notable contributions to publications such as the National Technology Research in Engineering and the Design and Social Science Conference 2022 (nTrends'22), Zarinda has become a prominent scholar. Her brilliance extends to remarkable achievements at the Malaysian Polytechnic and Community College Sustainability Award (MPCCSustAWARD'23), where she secured both the Best Paper and Best Presenter accolades. As a dynamic leader, she moderates conferences like the International TVET Academic and Research Symposium (ITARS 2023), strengthening Scientific Writing Webinar and facilitates workshops on grant proposal writing. Zarinda's impact on student success is evident in guiding mentees to victory in competitions like IDEA'22 and securing awards in innovative projects. Internationally recognized as a jury member in competitions such as International Research and Innovative Technology Competition (i-RITEC'23), she continues to shape minds in her role as a lecturer and coordinator for the Seminar Course, collaborating on this TARCh innovative modules. Raz Zarinda stands as a beacon of scholarly excellence, enriching the academic landscape with her unwavering dedication and invaluable contributions in developing TARCh with her team.



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