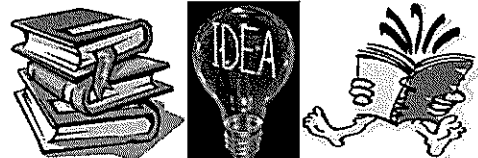
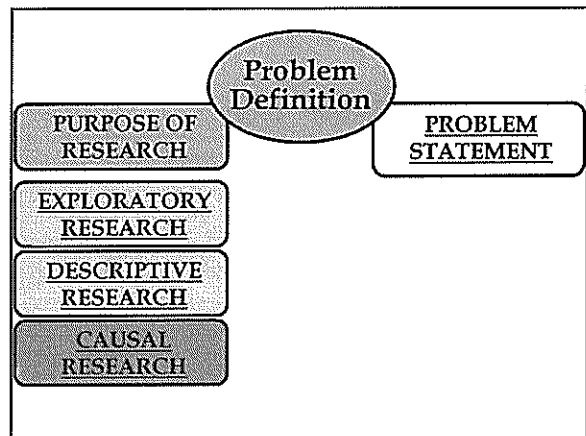
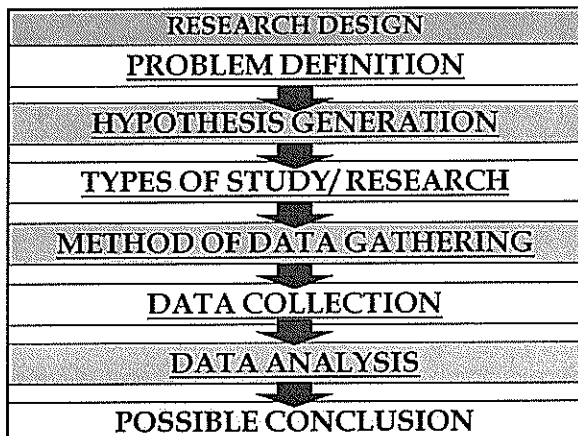
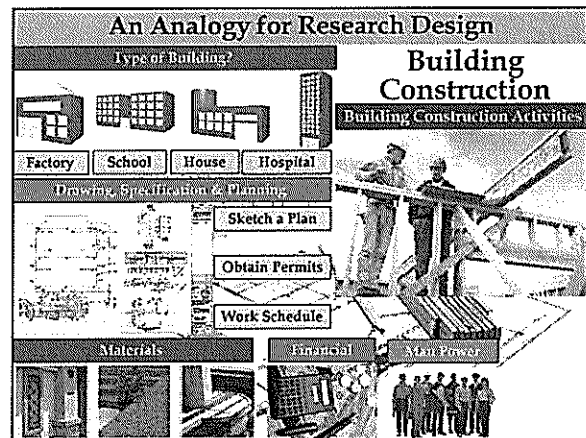
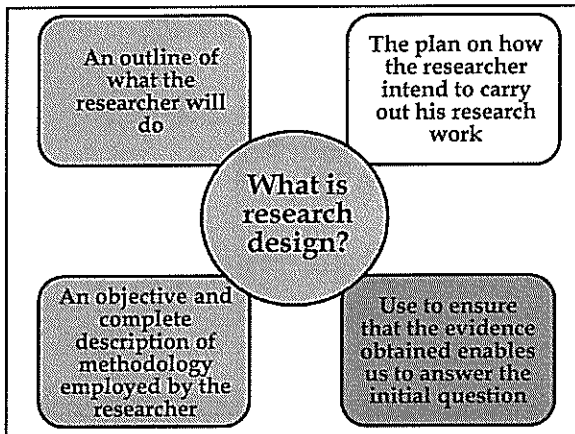
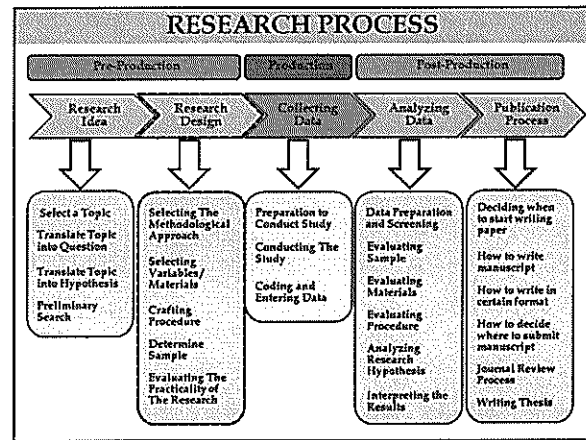


RESEARCH DESIGN



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EXPLORATORY RESEARCH

The objective is to gather preliminary information that will help define problems and suggest hypotheses.

Type of research conducted for a problem that has not been clearly defined.

Helps determine the best research design, data collection method and selection of subjects

Often relies on secondary research such as reviewing available literature and/or data, or qualitative approaches.

Example: To comprehend the nature of a problem

EXPLORATORY RESEARCH

Biofuels (alcohols and biodiesel) applications as fuels for internal combustion engines
Astriah Kusnar Apawati

Abstract

The increasing industrialization and modernization of the world has led to a steep rise for the demand of petroleum-based fuels. Petroleum-based fuels are obtained from limited reserves. Those finite reserves are highly concentrated in certain regions of the world. Therefore, those countries not having these resources are facing energy foreign exchange crisis, mainly due to the import of crude petroleum. Hence, it is necessary to look for alternative fuels which can be produced from resources available locally within the country such as alcohol, biodiesel, vegetable oil etc. This paper reviews the production, characterization and current status of vegetable oil and biodiesel as well as the experimental research work carried out in various countries. This paper touches upon well-trodden greenhouse gas emissions, well-trodden efficiency, fuel versatility, infrastructure, availability, economics, engine performance and emissions, effect on wear, lubricating oil etc.

Biodiesel is also an attractive alternative fuel because it is a renewable bio-based resource and it is oxygenated, thereby providing the potential to reduce particulate emissions in compression-ignition engines. In this review, the properties and specifications of ethanol blended with diesel and gasoline fuel are also discussed. Special emphasis is placed on the factors critical to the potential commercial use of these blends. The effect of the fuel on engine performance and emissions (MI as well as compression ignition (CI) engines), and material compatibility is also considered.

Biodiesel is methyl or ethyl ester of fatty acid made from virgin or used vegetable oils (both edible and non-edible) and alcohol. The main resources for biodiesel production can be non-edible oils obtained from plant species such as *Lupinus albus* (Lupinus), *Pongamia pinnata* (Karanja), *Calophyllum inophyllum* (Nagchampa), *Helioscopes* (Ruhibar), Diesel oil can be blended in any proportion with mineral diesel to create a biodiesel blend or can be used in its pure form. Just like petroleum diesel, biodiesel operates in compression ignition (diesel) engine, and essentially require very little or no engine modifications because biodiesel has properties similar to mineral diesel. It can be stored just like mineral diesel and hence does not require separate infrastructure. The use of biodiesel in conventional diesel engines result in substantial reduction in emission of unburned hydrocarbons, carbon monoxide and particulate. This review focuses on performance and emission of biodiesel in CI engines, combustion analysis, wear performance on long-term engine usage, and economic feasibility.

DESCRIPTIVE RESEARCH

Example: To ascertain and describe the characteristics of variable in a situation...

The objective is to describe things.

Known as statistical research, describes data and characteristics about the phenomenon.

Descriptive research answers the questions who, what, where, when, "why" and how...

Although the data description is factual, accurate and systematic, the research cannot describe what caused a situation.

Descriptive research cannot be used to create a causal relationship, where one variable affects another.

Often the best approach, prior to writing descriptive research, is to conduct a survey investigation.

CAUSAL RESEARCH

Example: To explain the nature of certain relationship

The objective is to test hypotheses about cause-and-effect relationships. If the objective is to determine which variable might be causing a certain behaviour, i.e. whether there is a cause and effect relationship between variables, causal research must be undertaken.

CAUSAL RESEARCH

Flame structure of wall-impinging diesel fuel sprays injected by group-hole nozzles
Jian Gao^{a,*}, Seoksu Moon^a, Yuzin Zhang^b, Keiya Nishida^a, Yuhei Matsumoto^a

ABSTRACT

This paper describes an investigation of the flame structure of wall-impinging diesel sprays injected by group-hole nozzles in a constant-volume combustion vessel at experimental conditions typical of a diesel engine. The particular emphasis was on the effect of the included angle between two orifices (0–15 deg. in current study) on the flame structure and combustion characteristics under various simulated engine load conditions. The laser absorption scattering (LAS) technique was applied to analyze the spray and mixture properties. Direct flame imaging and OH chemiluminescence imaging were utilized to quantify the ignition delay, flame geometrical parameters, and OH chemiluminescence intensity. The images show that the asymmetric flame structure emerges in wall-impinging group-hole nozzle sprays as larger included angle and higher engine load conditions are applied, which is consistent with the spray shape observed by LAS. Compared to the base nozzle, group-hole nozzles with large included angles yield higher overall OH chemiluminescence intensity, wider flame area, and greater proportion of high OH intensity, implying the better fuel-air mixing and improved combustion characteristics. The advantages of group-hole nozzle are more pronounced under high load conditions. Based on the results, the feasibility of group-hole nozzle for practical direct injection diesel engines is also discussed. It is concluded that the asymmetric flame structure of a group-hole nozzle spray is favorable to reduce soot formation over wide engine loads. However, the hole configuration of the group-hole nozzle should be carefully considered so as to achieve proper air utilization in the combustion chamber. Stoichiometric diesel combustion is another promising application of group-hole nozzle.

PROBLEM STATEMENT

Identification of what would be studied


Clarity and Precision

Conveyance of the study's importance, benefits and justification

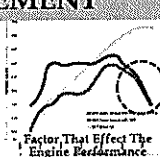
Identification of an research question & variables

Articulation of the study's boundaries or parameter

Identification of key concept




Engine Performance Reduction




Factor That Effect The Engine Performance

Get Information


Reading Literatures Conference/Seminars Library/Internet Get Advice from Experts




Abstract



Engine Deposit



Soot Emissions



Star

- Different aspect of study
- Different method/approach
- Different apparatus

New/Different Ideas: Originality

PROBLEM STATEMENT

Identification of what would be studied

Clarity and Precision

Conveyance of the study's importance, benefits and justification

Identification of an research question & variables

Articulation of the study's boundaries or parameter

Identification of key concept

Evaporation and Fuel Vapor Distribution in a Diesel Spray Impinging on a Hot Wall
*Kenji Anagaki and Masataka Anai

INTRODUCTION
Many researchers have investigated new technologies to reduce the particulate and NOx emissions from the diesel engine. There are many engine improvement methods to reduce these emissions without any performance reduction, combustion improvement was accompanied by the suitable method among these reduction methods [1-4]. Then, the analysis of fuel atomization, fuel evaporation and combustion in a DI diesel engine had been investigated as the main research target of engine researchers. By the effect of spray regulation, combustion mechanism in a DI diesel engine was analyzed and the relation between the diesel combustion and mixture formation mechanism such as PM and NO have been then clarified using some advanced diagnostic systems based on the laser measurement technique.

Especially, laser induced fluorescence method was a powerful tool for the measurement of some combustion products (OH, NO) further the spray and fuel vapor distribution were measured by the laser induced exciplex fluorescence method. This method was very useful for the understanding of spray evaporation behavior in the engine. There are lots of works about the respective process of diesel spray [5-9]. In this report, the fuel vapor distribution of a diesel spray impinging on a hot wall was measured using the laser induced fluorescence method. Effect of ambient gas and wall temperature on evaporation process was investigated.

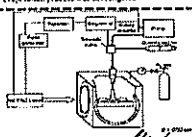


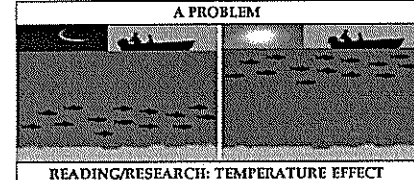
Fig. 1 Experimental apparatus

HYPOTHESIS GENERATION

HYPOTHESIS: A SUGGESTED EXPLANATION OF A PHENOMENON

↓

A PROBLEM



↓

READING/RESEARCH: TEMPERATURE EFFECT

↓

HYPOTHESIS: MORE FISH NEAR THE SEA WATER SURFACE DURING DAY TIME COMPARE TO NIGHT TIME DUE TO TEMPERATURE DIFFERENCE FACTOR.

↓

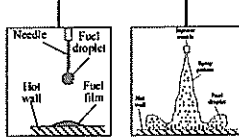
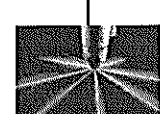
DESIGN THE EXPERIMENT

↓

TEST THE HYPOTHESIS


TYPE OF RESEARCH

Basic/Fundamental	Exploratory	Applied Research	Development	Design
<ul style="list-style-type: none"> Advanced science knowledge No specific application More on understanding rather than application Theory 	<ul style="list-style-type: none"> Similar with "basic" but with an objective 	<ul style="list-style-type: none"> Toward to practical application Application of basic knowledge New concept 	<ul style="list-style-type: none"> Product development Process development 	<ul style="list-style-type: none"> Cost performance improvement Modification and testing existing product

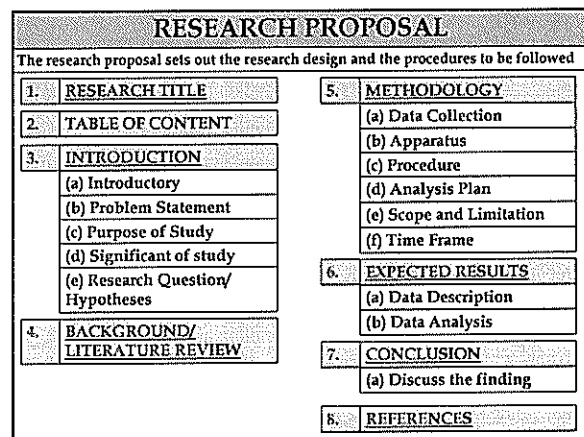
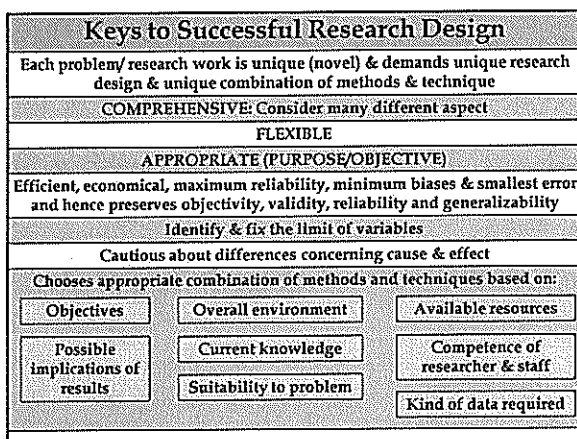
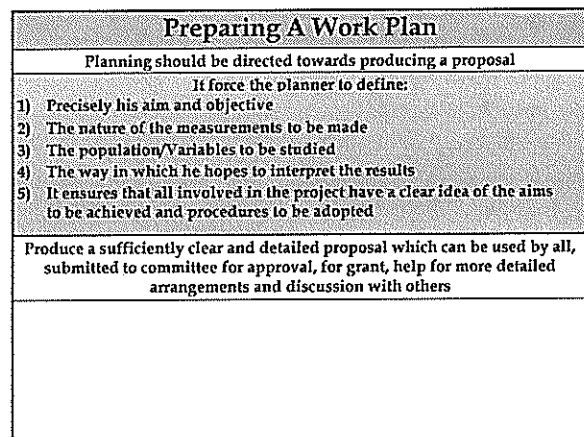
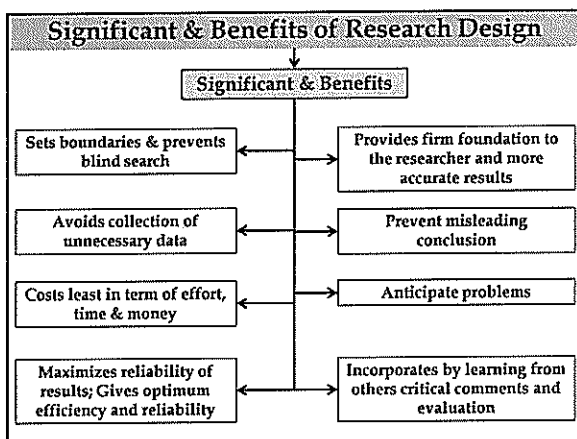
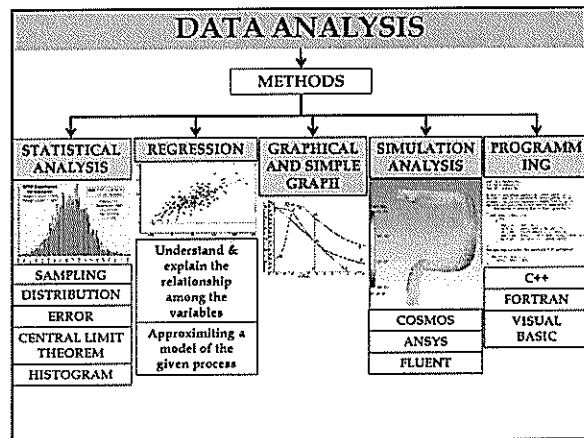
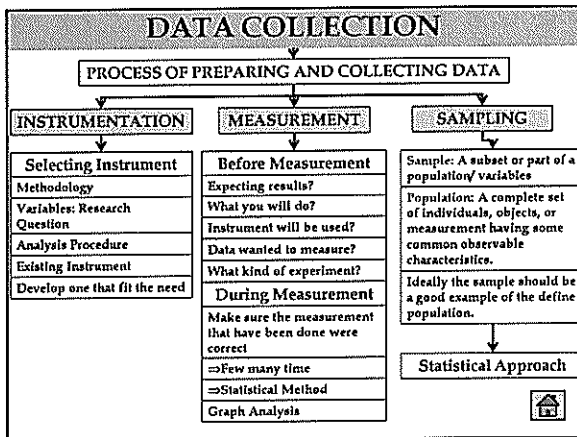
DATA GATHERING METHODS

Quantitative			Qualitative
SURVEY	OBSERVATION	EXPERIMENTATION	INTERVIEW



Quantitative VS Qualitative	
General Frame Work	
Seek to confirm hypothesis about phenomena	Seek to explore phenomena
Instruments use more rigid style	Instruments use more flexible
Use highly structured methods: Questionnaires, surveys, structured observation	Use semi-structured methods: Interviews, focus group, participant observation
Analytical Objectives	
To quantify variation	To describe variation
To predict causal relationship	To describe and explain relationship
To describe characteristics of a population	To describe individual experiences
Question Format	
Closed Ended	Open-Ended
Data Format	
Numerical	Textual
Flexibility in Study Design	
Stable from beginning to end	Some aspect of the study are flexible
EXPERIMENTAL	

Quantitative VS Qualitative																					
How do you rate ...	<table border="1" style="width: 100%;"> <tr> <th>SATISFACTION</th> <th>DISSATISFACTION</th> </tr> <tr> <td>1 2 3 4 5</td> <td>1 2 3 4 5</td> </tr> <tr> <td>16. The lecture room overall</td> <td>0 0 0 0 0</td> </tr> <tr> <td>17. The teaching and learning equipment, e.g. projection screen, blackboard</td> <td>0 0 0 0 0</td> </tr> <tr> <td>18. The level of assistance</td> <td>0 0 0 0 0</td> </tr> <tr> <td>19. The lighting</td> <td>0 0 0 0 0</td> </tr> <tr> <td>20. The layout</td> <td>0 0 0 0 0</td> </tr> <tr> <td>21. The decoration</td> <td>0 0 0 0 0</td> </tr> <tr> <td>22. The furnishings</td> <td>0 0 0 0 0</td> </tr> <tr> <td>23. Cleanliness</td> <td>0 0 0 0 0</td> </tr> </table>	SATISFACTION	DISSATISFACTION	1 2 3 4 5	1 2 3 4 5	16. The lecture room overall	0 0 0 0 0	17. The teaching and learning equipment, e.g. projection screen, blackboard	0 0 0 0 0	18. The level of assistance	0 0 0 0 0	19. The lighting	0 0 0 0 0	20. The layout	0 0 0 0 0	21. The decoration	0 0 0 0 0	22. The furnishings	0 0 0 0 0	23. Cleanliness	0 0 0 0 0
SATISFACTION	DISSATISFACTION																				
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21. The decoration	0 0 0 0 0																				
22. The furnishings	0 0 0 0 0																				
23. Cleanliness	0 0 0 0 0																				
Researcher: _____	Date: _____																				
Location: _____	Time Begin: _____																				
Weather: Sunny <input type="checkbox"/> Overcast <input type="checkbox"/> Rain <input type="checkbox"/> Windy <input type="checkbox"/>																					
Temperature: _____																					
# of people in group observed: _____	# of females: _____																				
# of males: _____	appear appropriate: _____																				
Time to complete one slip only: _____ minutes	# of times responses shared: _____																				
# of males who smoked: _____	# of females who smoked: _____																				
Items to observe and note:																					
1. Describe where in the school and the working in taking place																					
2. Did you observe any student? Why? Describe any interventions from others to stop the smoking? If you describe																					
3. How are the smoking groups formed? Use group? Several groups? All male? All female? Mixed?																					
4. Are there any behaviors from individuals to encourage cessation or others to smoke?																					
5. Is factory owners, causes from participant (only with address of concern)																					
6. Are there any in the group not smoking?																					
7. Describe how the workers look when they're working																					
8. Note any other information relevant to the study.																					



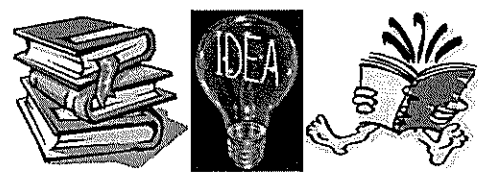
RESEARCH PROPOSAL	
1. RESEARCH TITLE	FISH FRIED RICE
3. INTRODUCTION	
(a) Introductory	Types of fried rice, The most delicious and affordable fried is chicken fried rice,...
(b) Problem Statement	Due to H5N1 disease, chicken stock decrease rapidly. Probably within 2 years the stock will be zero. Thus, new ingredient should be introduced to overcome the problem. FISH is a potential ingredient to replace chicken meat due to....
(c) Purpose of Study	To produce new fried rice by adding FISH instead of chicken meat.
(d) Significant of study	Substitute for Chicken Fried Rice
(e) Research Question/ Hypotheses	The FISH Fried Rice is more delicious and affordable than chicken Fried Rice. The Reason....

RESEARCH PROPOSAL	
1. RESEARCH TITLE	FISH FRIED RICE
4. BACKGROUND/ LITERATURE REVIEW	
According to Chef A, the taste of fried rice will be more delicious if adding chicken meat...	
Chef B mentioned in his study that due to H5N1, number of people like to eat chicken fried rice will reduce upto 80% this year. Thus, he used other type of meat in his fried rice. However, its taste not as good as chicken fried rice....	
5. METHODOLOGY	
⇒List of ingredient	
⇒Buy the ingredient	
⇒Prepare the raw material	
⇒Recipe book	
⇒Cook	
⇒Ask Customers to taste the fried rice	
⇒Scope: Fried rice with FISH & compare it taste with chicken fried rice	
⇒Time frame: Complete within 2 hours	

RESEARCH PROPOSAL	
1. RESEARCH TITLE	FISH FRIED RICE
6. RESULTS	
90% customer agreed that the FISH fried rice is more delicious than the chicken fried rice	
The price of the FISH fried rice is 20% less than the chicken Fried Rice	
7. CONCLUSION	
The FISH Fried rice is more delicious and affordable compare to the chicken fried rice...	
8. REFERENCES	
1) Chef A, "The Fundamental Study on Chicken Fried Rice", Food Journal, 2005 ; 3: 203-209.	
2) Chef B, "The effect of H5N1 on Chicken Fried Rice Market", Business Journal, 2005 ; 3: 203-209.	

ASSIGNMENT
Provide a research proposal's title and write an abstract for your proposal within 300 words (Max.). Select a journal paper that related to your proposal's title and make a photocopy of first 2 or 3 pages of the paper that include abstract and introduction. From the abstract and the introduction, identify the objectives, the problem statement and the methodology mentioned in the paper by underline the sentences.
This assignment will consist of:
1) First Page: Proposal's Title, Student's Name, Student's No. and Proposal's Abstract.
2) A copy of first 2 or 3 pages of related paper with underlined statements (objectives, problem statement and methodology)

ASSIGNMENT
Evaporation and Fuel Vapor Distribution in a Diesel Spray Impinging on a Hot Wall *Kenji Arakagi and Masataka Arai
Especially, laser induced fluorescence method was a powerful tool for the measurement of some combustion products [5-6]. Further the spray and fuel vapor distributions were measured by the laser induced exciplex fluorescence method. This method was very useful for the understanding of spray evaporation behavior in the engine. There are lots of works about the evaporation process of diesel spray [7-9]. In this report, the fuel vapor distribution of a diesel spray impinging on a hot wall was measured using the laser induced fluorescence method. Effect of ambient gas and wall temperatures on evaporation process was investigated.
OBJECTIVE

RESEARCH DESIGN

THANK YOU
<small>4 December 2011 Research Methodology 2010 (UTeM) 30</small>