

THE IMPACT OF PREVENTIVE MAINTENANCE PRACTICES ON MANUFACTURING PERFORMANCE: A PROPOSED MODEL FOR SMEs IN MALAYSIA

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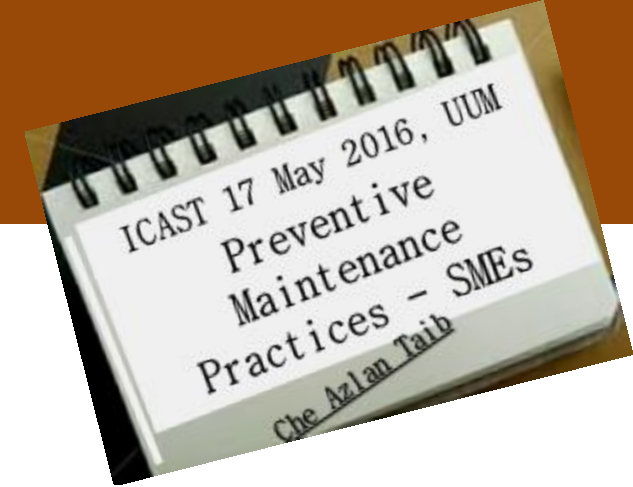
introduction

maintenance is ...

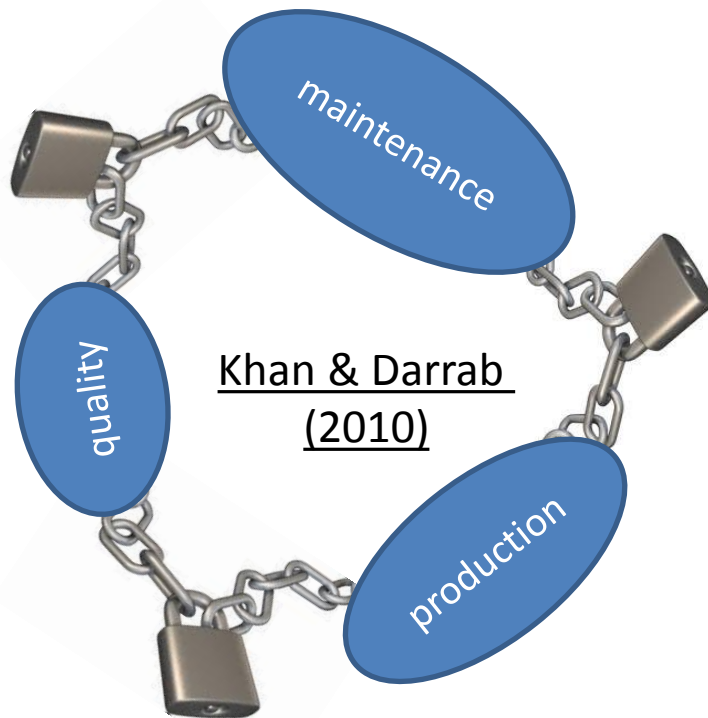
- is the overhaul of industrial machinery or equipment and facilities (Licker, 2003)
- including testing, measuring, adjusting, cleaning and parts replacement
- performed to prevent, keep, sustain and preserve faults from occurring.



introduction



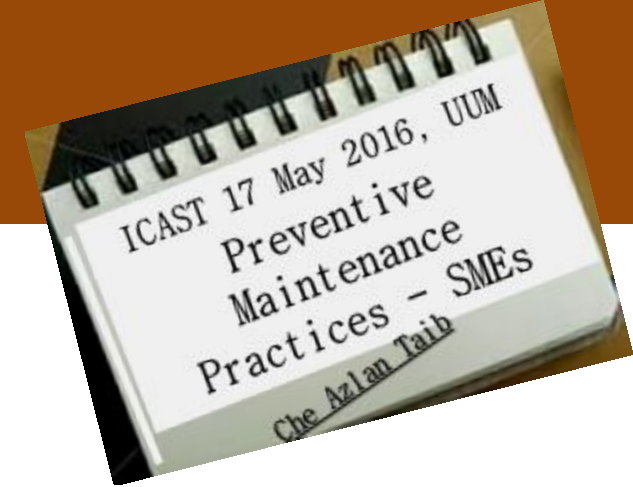
cont...



- PM and quality can be jointly optimized (Ben-Daya and Duffuaa, 1995).

Therefore, while the global competition increases the level of quality as well as quantity, this competition led to devise strategies to meet the changing needs of the customers by maintaining a high level of quality standards with seeking to reach the advanced levels in the world market (Mohammed, Che Azlan, T and Nadarajan, 2016).

introduction



- SMEs plays a vital role in contributing to the economy and is considered as the backbone of economic growth in developing as well as developed nations like Malaysia.
- Most of the manufacturing sector comprises of the SMEs and it make up 95% of the total manufacturers in Malaysia

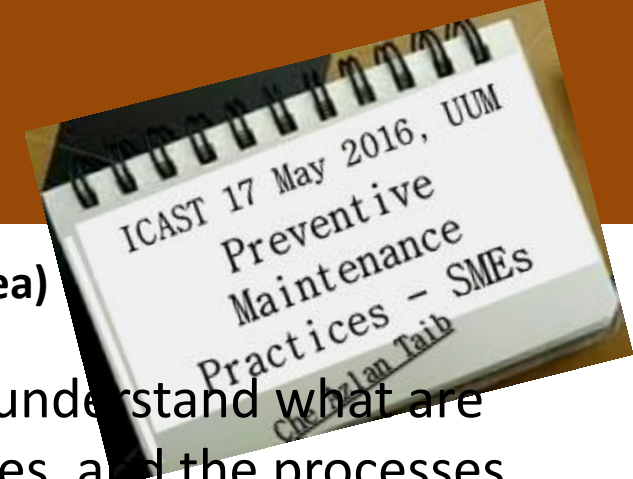
- According to Ahmed, Hassan and Taha (2004), Malaysia SMEs were more concern on quality defects rather than equipment or machinery losses.

Since began to increase competition in the market, SMEs need to search new strategies and effective ways in which can differentiate themselves, good return on investment, better competitive position and sustain in the market place, a proper PM is one of the strategies.

An effective PM model strongly effect the overall of maintenance management strategy and impact of the SMEs performance, as well the quality of products or services. Hence, this paper aims to generate the idea for investigation the potential relationship between PM practices and manufacturing performance moderated by organizational capability**##**

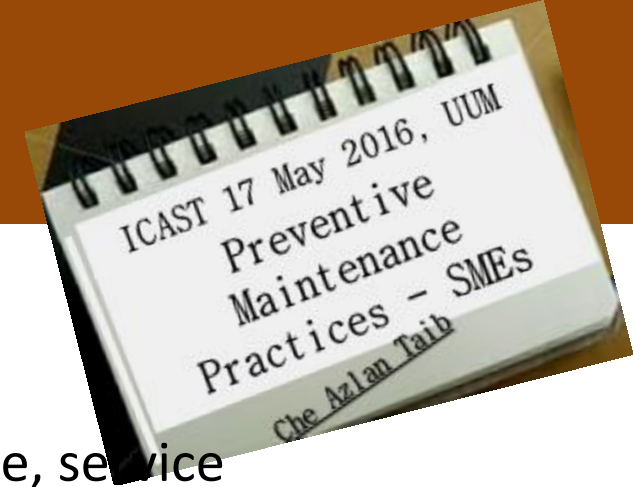
literature review

performance measurement (Perf-Mea)



- **Performance** -- an indicator that helps us to understand what are the current status about our products, services, and the processes that help us to take an necessary action and intelligent decisions on understand, manage, and improve in the organizations (**Nelson and Coopride, 1996; Bial, 2004**).
- **three types of performance measures:** (i) key results indicators (KRI), (ii) performance indicators (PIs), and key performance indicators (KPI) (Parmenter, 2007).
- According to Cua, Kckone and Schroeder (2001) and Pont et al., (2008) performance is a capable to measure both **financial and non-financial**
- Summers (2010) classified performance into four measures: **customer, financial, internal and learning and growth.**

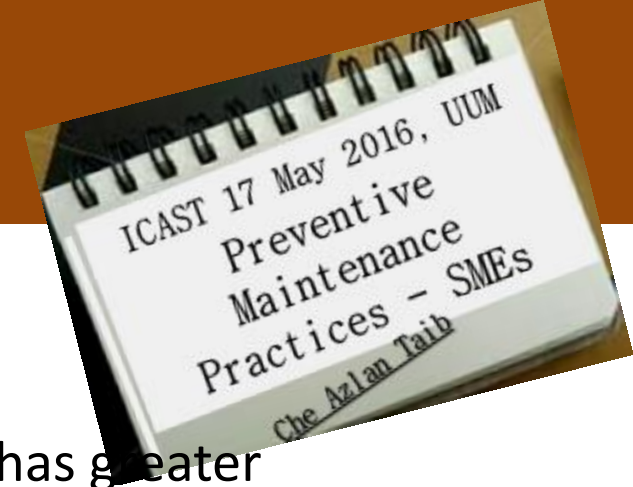
literature review



financial (Fin)

- Kohtamaki et. al. (2015) claims that revenue, service offering, and profit play an important indicator to manufacturing companies to position themselves as industrial service providers
- Ganesan (2015) - the operation efficiency and continuous improvement will optimize the company's gross profit and minimize company's gross profit fluctuation.
- Quinn and Strategy (2013) - **properly developed strategy** will expand the efficient and flexibility of the organization and attract highly trained people which can revolutionize an industry.

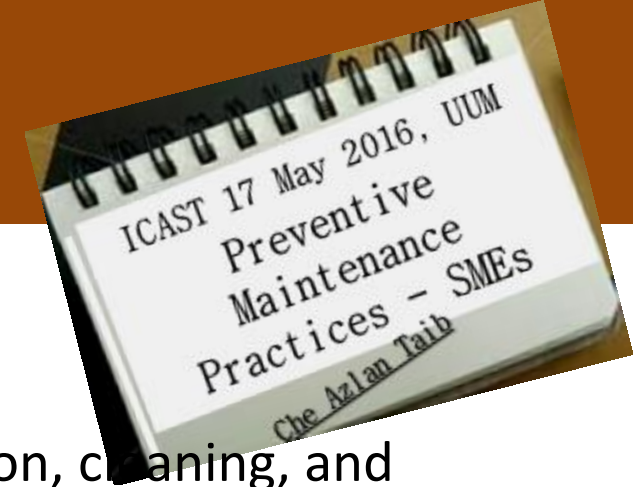
literature review



innovation_(inn)

- Laforet, (2013) - organizational innovation has greater impact on small firms because costs and benefits of government policies encourage innovation in small and medium-sized enterprises.
- frugal innovation provide better-designed products, in turn, have positive impact to lead the market potential and creating a virtuous cycle.
- Waeyenbergh & Pintelon, (2002) - high-speed technological innovation combined with severe competition, shortens the equipment life cycle and puts equipment under higher stress.
- Thus -- organization needs to **implement proper maintenances strategy.**

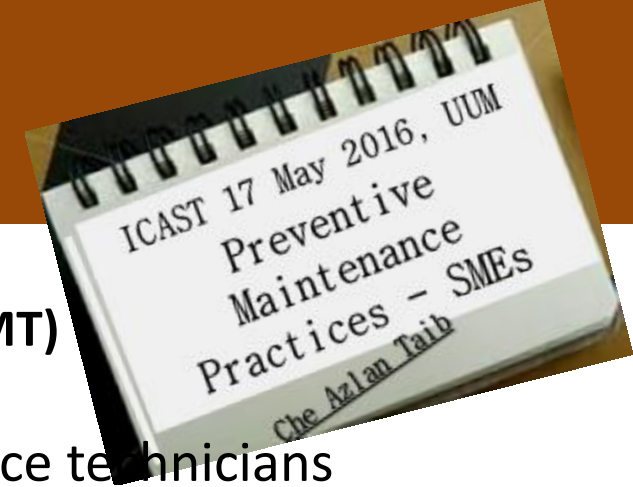
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Preventive maintenance_(PM)

- PM -- is a **regular** and **systematic** inspection, cleaning, and replacement of worn parts, materials, and systems.
- PM helps to prevent failure of parts, materials, and systems by ensuring that they are in good working order.
- The PM can be divided different subdivides such as **PM team** and **PM strategy**.

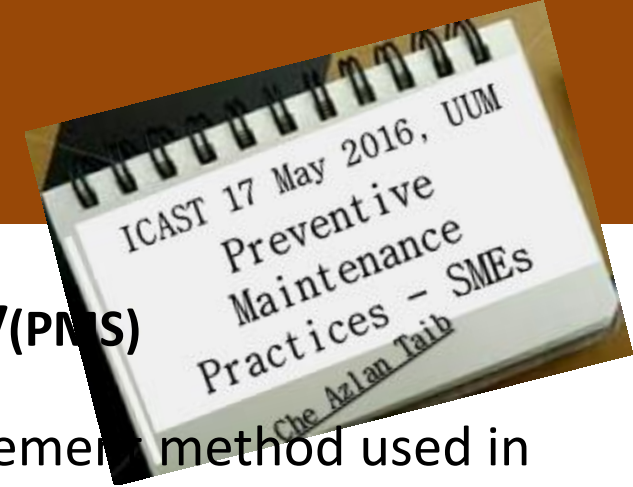
literature review



preventive maintenance team (PMT)

- The human factor represented by maintenance technicians and other related staff is the backbone of the maintenance system in any organization.
- Yam et al., (2000) - flexible, co-operative and a shared responsibility approach among production and maintenance personnel is required to promote operator ownership and free up maintenance personnel to perform more technically challenging maintenance works.

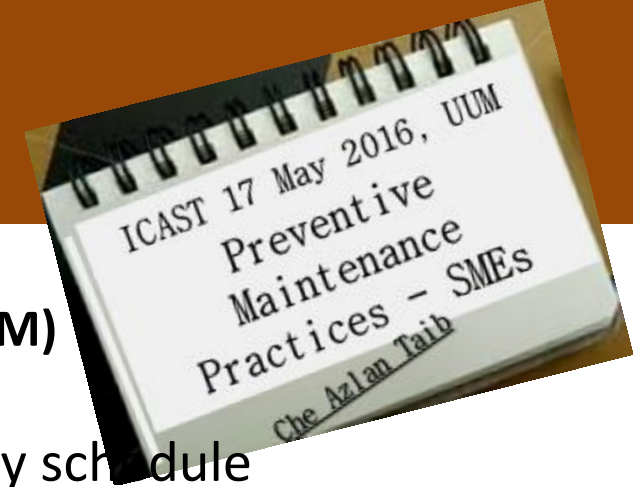
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preventive maintenance strategy(PMS)

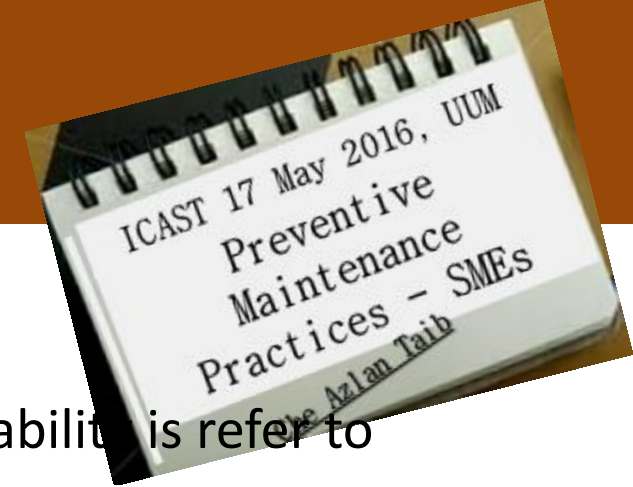
- Fredriksson and Larsson (2012) - the management method used in order to achieve the maintenance objectives.
- Rastegari and Salonen(2013) - the strategy reflects the organizations conception of its intended long – term goal and the approach to achieve it.
- Swanson (2011)- there are three maintenance strategies – proactive, reactive and aggressive
- Meng & Yusof (2012) - identified five strategies -- top management leadership, planned maintenance management, focus improvement, autonomous maintenance and education and training;
- **Abdallah (2013)** - four important elements - people's training, involvement, preventive maintenance, and maintenance teams.

literature review



planned maintenance strategy^(PI-M)

- Planned maintenance process is measured by schedule compliance i.e. the percentage of work orders completed during the scheduled period before the late finish or required by date.
- The aims - is to **allow equipment operators and maintenance engineers to analyze the cause of equipment failures and develop a planned maintenance system to repair or modify** the equipment to improve maintainability and planned maintenance typically involves the work conducted by skilled maintenance engineers (Baglee and Knowles, 2010).



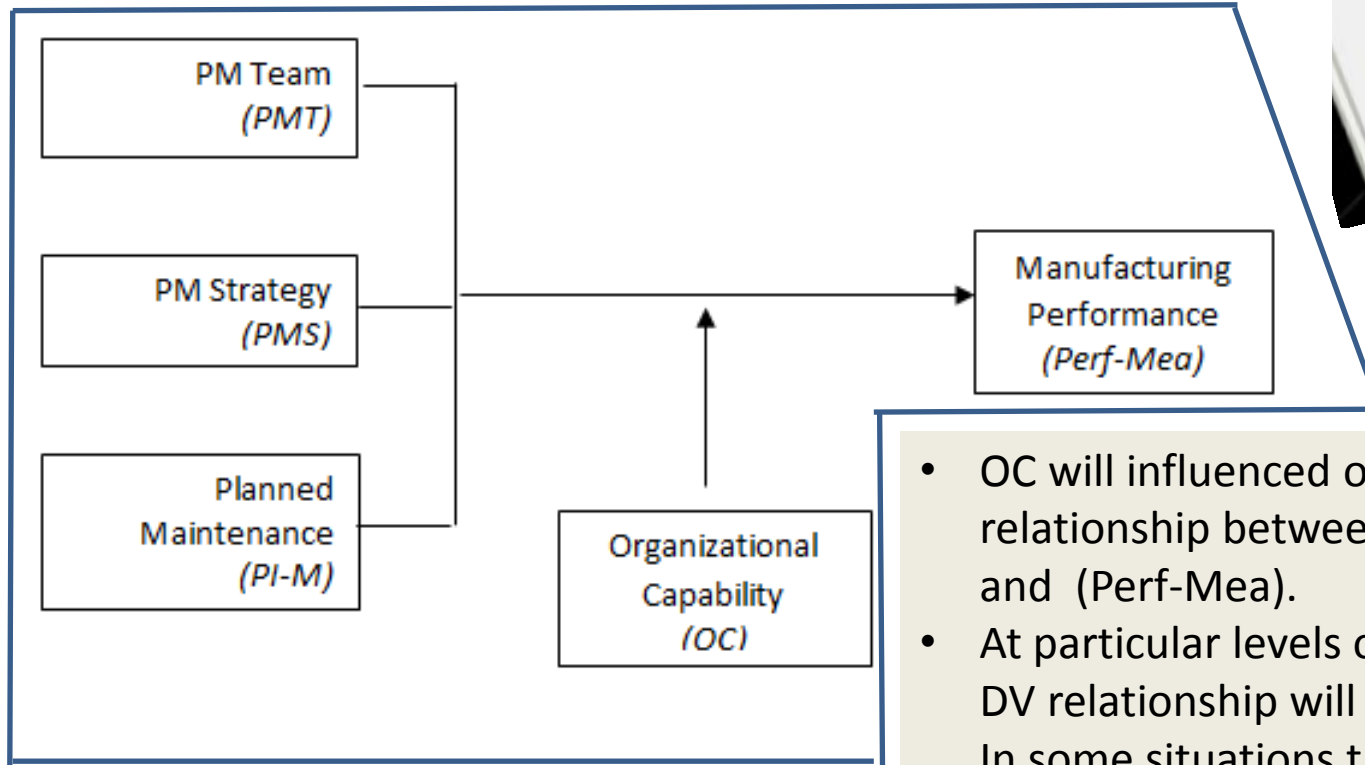
organizational capability(oc)

- Wade and Hulland (2004) - organizational capability is refer to value creation.
- Teece et al., (1997) stated that capabilities can be considered as business processes to shape the resources that assist to the accomplishment of certain jobs or activities in a organization.
- When organizations tend to develop its capabilities by using new information it will give positive impact on organization performance to be more flexible (Chen et al., 2013).
- Organization capability (OC) - plays as a moderator variable. OC will alter the relationship between the independent variable (IV) and the dependent variable (DV).

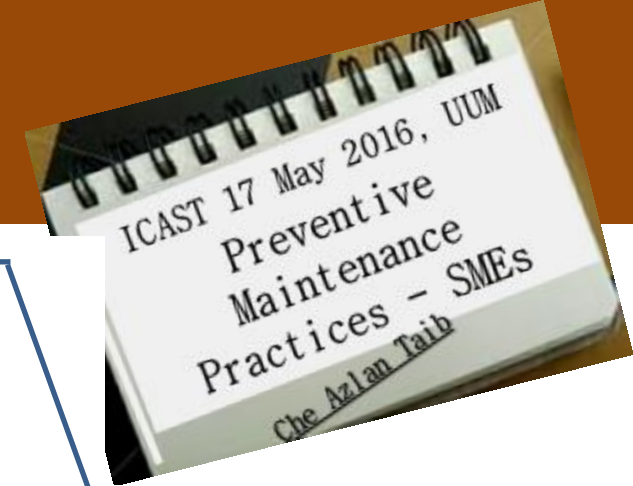
proposes framework

- PM implementation in the manufacturing environment is important (Ahmed et al., 2005; Tsarouhas, 2007; Ahuja, & Khamba, 2007; Salaheldin & Eid, 2007; Patra, Tripathy, & Choudhary, 2005; Pramod, Devadasan, Muthu, Jagathyraj, & Moorthy, 2006).
- PM is about utilising organisation's internal resource effectively in maintenance activities.
- PM team very important to ensure that manufacturing performance can be achieved.
- PM strategy is a group of activities conducted that relates to maximizing equipment effectiveness; continuous improvement actions taken to improve quality ("kaizen"), increasing safety and reducing costs; actions to raise the morale of the team that is implementing PM (Eti et al., 2004).





- OC will influenced or alter the value of relationship between PMT, PMS and PI-M and (Perf-Mea).
- At particular levels of the moderator the IV-DV relationship will be stronger or weaker. In some situations the direction of the relationship between the IV and the DV will change from positive to negative.



hypothesis testing



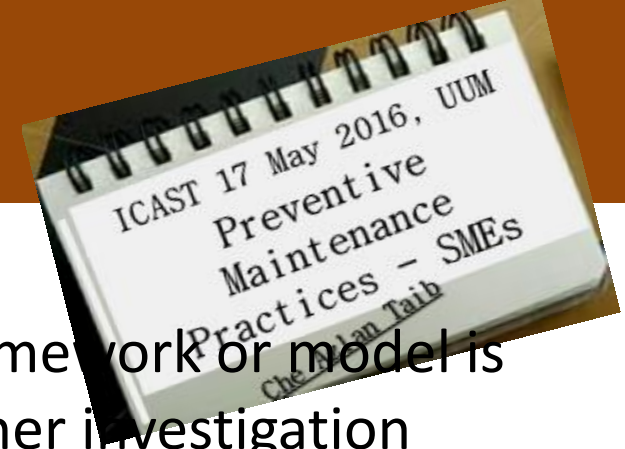
- Explain how the relationship among variables will be managed and how hypotheses developed and tested.
- Hypothesis tests, or tests for statistical significance, require a number of elements.
- Before going further, researchers advised to understand the proper terminologies such as:
 - Null – a claim is made/ a belief expressed.
 - Alternative – the null hypothesis is challenged.
 - Distribution data
 - Critical value (CV)- is the chosen limit of 'chance'. Researcher only guessing. Any 'success' are due to only to chance, and the null hypothesis is still holds, provided that the successes remain within the CV.
 - Confidence level (CI) – The CV determines the level of confidence which one can have in the result of a test. CI are expressed as percentages – commonly 95% and 99%.
 - Two-tailed or one-tailed test
 - Errors – Type I (alpha) or Type II (beta) . # researcher should concerned with Type I errors (Null hypothesis is true; Reject H_0).

hypothesis testing

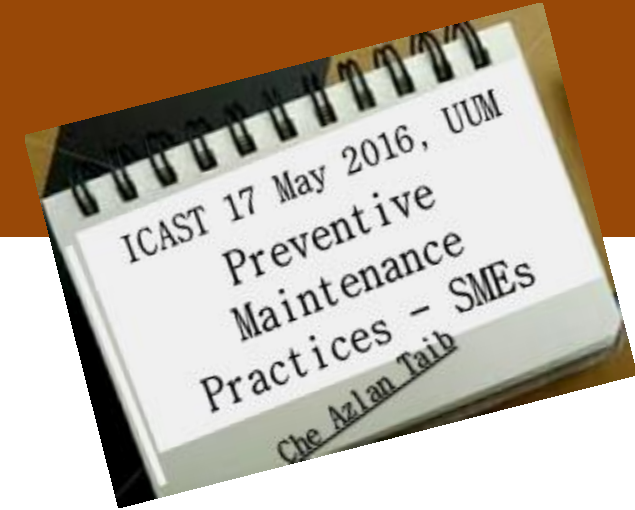


- The proposed framework assigned organizational capability as a moderator variable.
- In order to achieve the objectives of the study, according to Creswell (2009), there are mainly three approaches used as the process to collect data and information for the purpose of investigation certain issue; quantitative, qualitative, and mixed method.
- There is no right or wrong what approach researcher may choose.
- The important is related with the research paradigm.

conclusion



1. The question whether this proposed framework or model is valid and reliable to be answered if further investigation has been carried out.
2. The onus is then depending on twofold: first is the university or researchers who must come up with groundbreaking research, and second the SMEs who must work together to cooperate in the research.
3. Henceforth, the examinations of each hypotheses and the subsequent empirical investigations of this study are crucial to validate the proposed research framework.
4. It is expected that the study will be beneficial to local manufacturing players, policy makers and relevant practitioners.



Thank you

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