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PRESENTER

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RESEARCH AREA: Asset Management

ESTABLISHING CRITICAL FACTORS CONTRIBUTING TO BUILDING DEFECTS AND ITS' RELATIONSHIP TO SCHOOL BUILDING CONDITION

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CONTENT

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BACKGROUND OF RESEARCH

Situation

- Defects in building and deterioration of buildings (Mydin, 2012; Ramly, 2004).

Complication

- Defects caused serious deterioration, danger and failure of the building (Khan, 2016; Hamzah, 2010)

Implication

- Increase in maintenance cost
- Shorten the building lifespan
- Depreciation of building
- Affected occupant / user safety and comfort
- Increase stress level, health impact and low productivity (Clare, 2015)

PROBLEM STATEMENTS

Is the building effectively managed and monitored?

1. The practice of asset management in Malaysia **was lacking on performance monitoring** (Yusof 2013; Isa, 2002).
2. The practice **adopted a reactive maintenance, ad hoc without systematic plan and schedule** (Che-Ani et al, 2015; Mohamed Abu Backer, and Wan Yusoff, 2014).
3. **Poor in managing** the assets will lead to **building defects** (Hong, 2008)
4. The building defects can **caused lower asset life, incur high maintenance cost, reducing the quality of services** (Baum, 2000)

SCHOOL BUILDINGS SCENARIO

School and educational was the largest infrastructure sectors and were built more than 45 years old and need for extra care.

Categories of Public Primary Schools	No. Of Schools	Student Enrolment
Primary School	7,772	2,685,403
Secondary School	2,408	2,188,525
Total	**10,180**	**4,873,920**

Source: EMIS Data as 31 July 2016 and APDM Data as 31 May 2016

School Condition?

- Exposed to building defects and physically affect the building (Mydin et. al 2014)
- The School building was audited and reported in poor condition (MySPATA report, 2011; Ali, 2013; Yong, 2015; IKRAM Report of Overall Trend Assessment & Analysis Report, 2011)
- School maintenance still practiced in an unsatisfactory level, which lead to the increment of the maintenance cost (Ali, 2013, Mahli, 2012)

RESEARCH OBJECTIVES

The research aim is to establish significant relationship between the factors contribute to defects and building condition

OBJECTIVES	DELIVERABLES
RO1 -To identify the factors contributing to the building defects	• **A List of factors** that affected building condition
RO2 - To investigate the condition of the school buildings through condition assessment	• **Compilation** building rating and **record** of defects findings
RO3 - To establish significant relationship between the factors contribute to defects and building condition	• **Group of significant variables** between the factors and building condition was identified

LITERATURE REVIEW

Types of Building Defects
- Government Malaysia, PWD
- Harris (2016)
- Jaspal (2012)
- Panchal (2015)
- Khan (2016)
- Wong and Hui (2005)

Possible Cause of Defect
- Government Malaysia, PWD
- A. Ramly, (2004)
- Whirlwind (2015)
- Kian (2001)
- Mansor (2012)
- Porteus (2011)

Factors Contributing building Defects
- Al Abu- Tair (2002)
- Ahluwalia (2008)
- Kian, P.S (2001)
- Ahzahar, N. (2011)
- Richardson,B.A (1991)
- Assaf et al (1996)
- Seeley (1987)
- Chew, M.Y.L (2004)

Building Condition
- D.R Uzarski (2008)
- Abbot et al (2007)
- Queensland Department of Public Work in Australia (1999)
- Construction Industry Council (CIC) (1996)
- Wordworth (2001)

Building Defects
- Abbott, G.R (2007)
- Hong (2008)

Possible Solution BCA
- Dfes (2003)
- NCES (2003b)
- Lounis et al (1998)
- Lee & Atkin (1997)
- ADOE (1997)
- Shahin (1992)
- Bailey et al (1989)
- Uzarski and Burley (1997)
- Ahluwalia (2008)

Building Deterioration
- Addleson, L. and Rice, C. (1991)

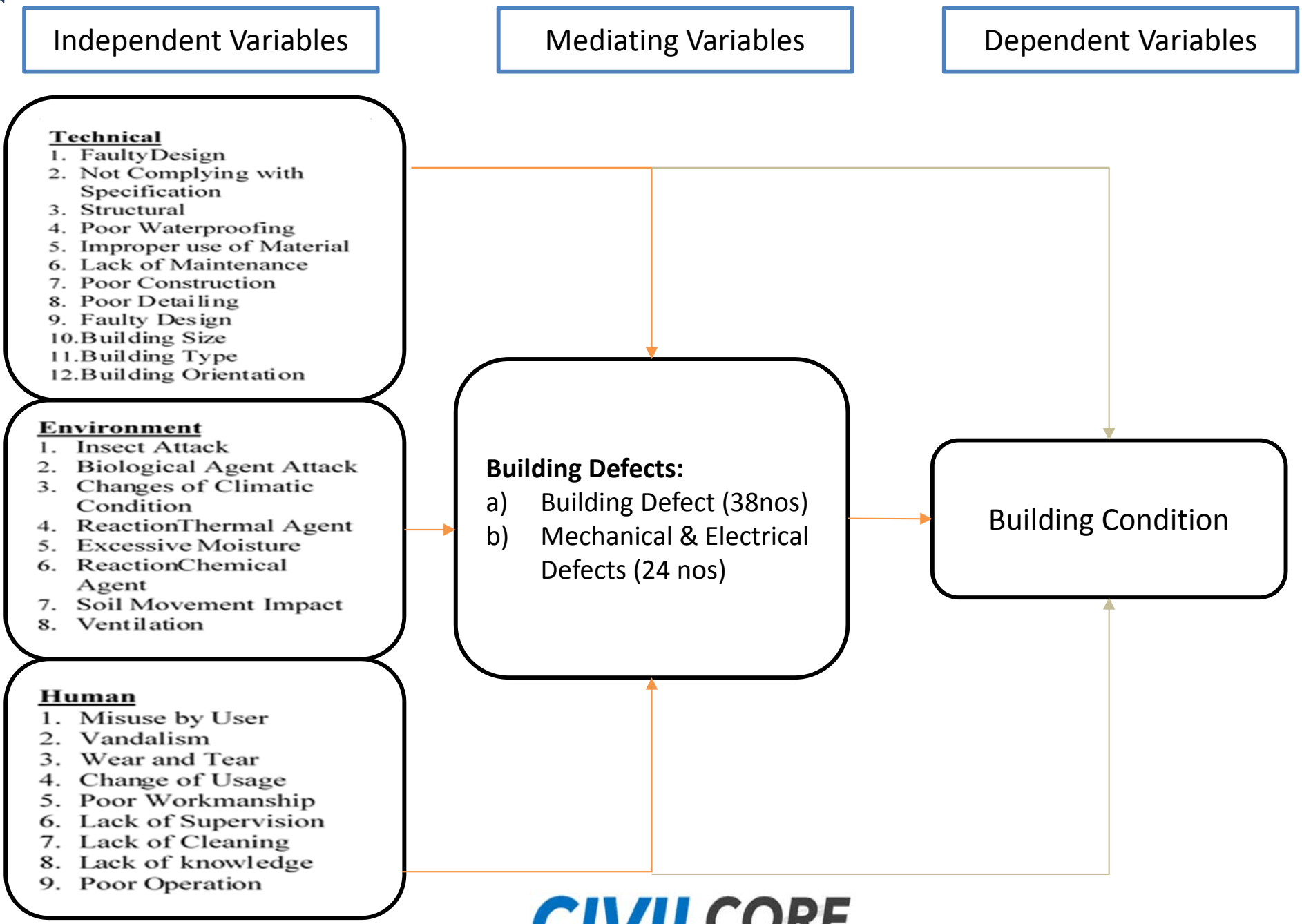
Possible Solution Prediction Model
- Geisser, Seymour (1993)
- Ediringhe (2012)
- Lounis, Z (1998), Biondini (2005)
- Abu Tair (2002)

Safety Impact
- Affected occupant / user safety

Customer Service Impact
- Affected occupant / user comfort / satisfaction
- Increment of maintenance cost

Property Impact
- Shorten the lifespan of the building
- Increment of repairing/ renovation / upgrading costs
- Government image

THEORETICAL FRAMEWORK



RESEARCH METHODOLOGY

RESEARCH PHASES

Research Problem & Design → **Review and Scoping** → **Data Collection** → **Data Analysis** → **Conclusion and Recommendation**





RESEARCH ACTIVITIES

- Initial review, research problems & needs,
- Research proposal, research
- Program & methodology

- RO1, RO2, RO3, RO4
- Literature review, Articles, journals, books, previous research report

303 numbers **Public school building** in Malaysia

1. Quantitative:- Archived documentation (BCA, BCMAS reports) (Structured assessment with the Likert Scale)
2. Qualitative:-Semi-structure interviews

- Quantitative:-BCARS (Building Condition Assessment Rating System) – Structured Rating with the range of grade
- SPSS: Statistical Analysis :- Descriptive, Content, Reliability, Correlation and Logistic Regression Analysis
- Qualitative:-Semi-structure interviews (verify, validate the result, and additional statement from respondents)

- Tie-up objectives, come out with prediction model of Building

RESULT FINDING O1

From the total of 29 numbers factor analysed, only **21 number of factors** were identified and used in the study.

Ranking of Factors Contribute to Building Defects According to Mean

NO	FACTOR	MEAN	STD DEVIATION
1	Lack of Supervision	4.5809	0.88357
2	Lack of Maintenance	4.5710	0.70058
3	Vandalism	3.8680	1.20008
4	Improper use of Material	3.4422	1.16619
5	Poor Workmanship	3.3696	0.71581
6	Wear & Tear	3.2013	1.03674
7	Poor Construction	3.1914	1.25538
8	Excessive Moisture	3.0462	1.21894
9	Poor Waterproofing	2.7228	1.09317
10	Change of Climatic Condition	2.7162	1.08474
11	Misuse by User	2.6799	1.60578
12	Reaction of Biological Agent	2.5941	1.11817
13	Insect Attack	2.3861	1.14953
14	Soil Movement Impact	2.0594	1.70878
15	Lack of Cleaning	1.9175	1.18340
16	Reaction Chemical Agent	1.7492	1.11126
17	Faulty Design	1.6271	1.15210
18	Change of Usage	1.6139	1.03550
19	Reaction of Thermal Agent	1.4587	0.93715
20	Structural	1.4587	0.94770
21	Not Complying with Specification	1.4455	0.93294

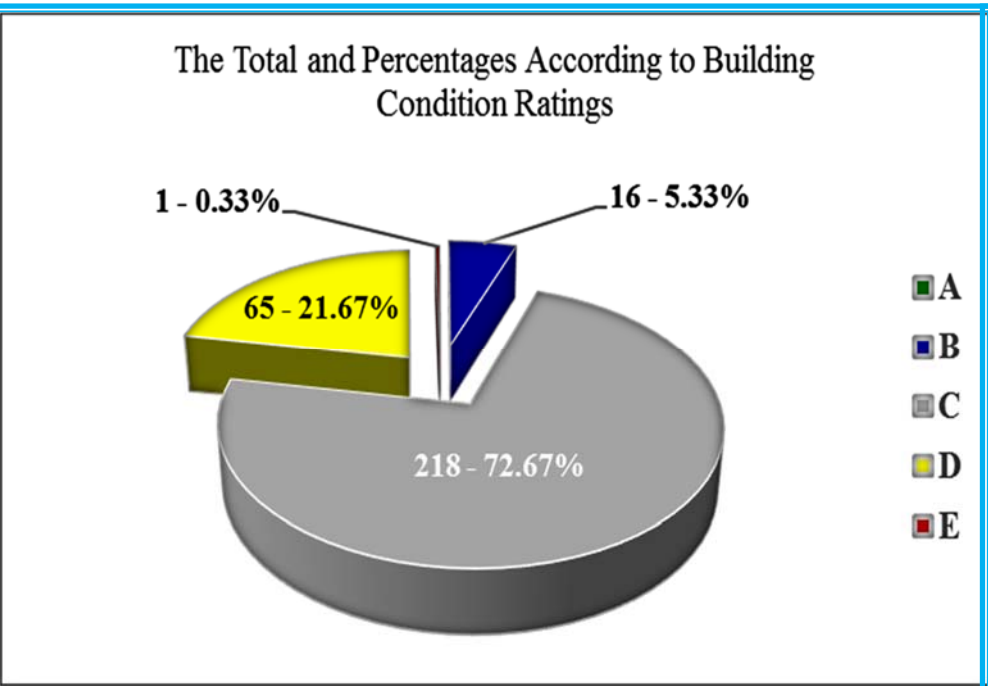
Data was run for reliability analysis for internal consistency measure.

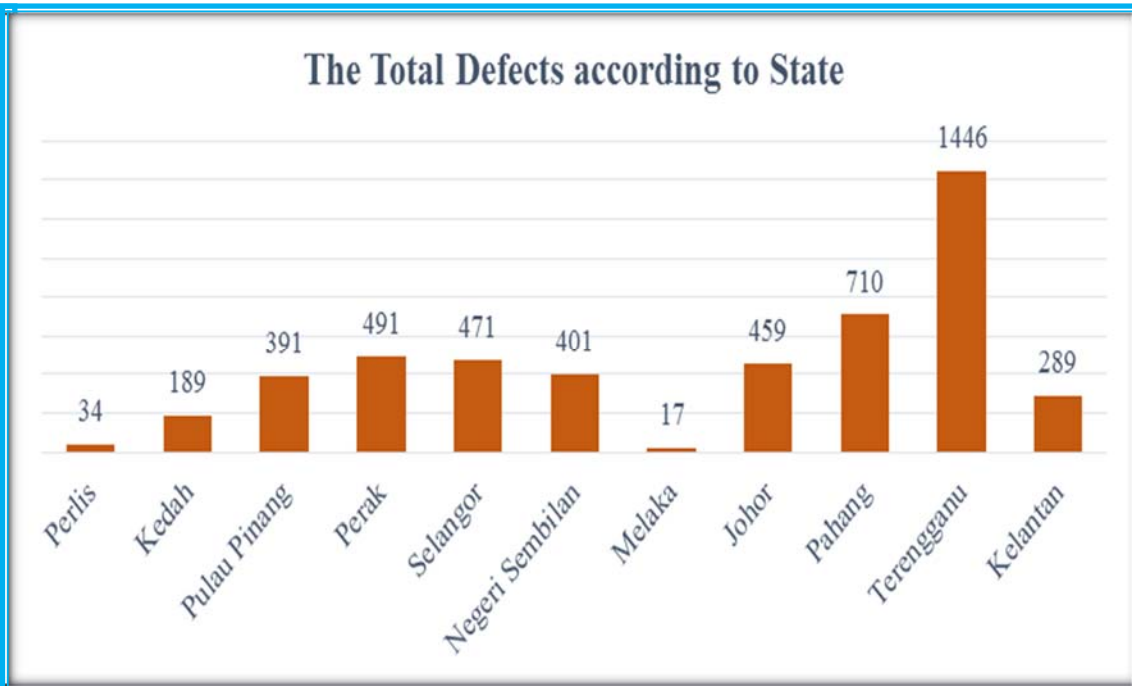
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.713	0.712	21

Mohsen, (2011), most of acceptance value for alpha ranging from 0.70 to 0.95

RESULT FINDING O2

No	State	Condition Rating				
		A	B	C	D	E
		Very good	Good	Average	Poor	Very Poor
		1 - 5	6 -10	11 - 15	16 - 20	21 - 25
1	Perlis	0	0	1	2	1
2	Kedah	0	2	7	7	0
3	Pulau Pinang	0	2	18	10	0
4	Perak	0	3	21	8	0
5	Selangor	0	1	20	9	0
6	Negeri Sembilan	0	0	14	7	0
7	Melaka	0	0	2	0	0
8	Johor	0	1	17	9	0
9	Pahang	0	0	33	8	0
10	Terengganu	0	3	64	4	0
11	Kelantan	0	4	21	1	0
	Total	**0**	**16**	**221**	**65**	**1**





RESULT FINDING O3

The correlation test using Spearman rank correlation coefficient used in the study

Ranking of Relationship between Factors Contribute To Building Defect and Building Condition

No	Factors Contribute to Building Defects	Building Condition Rate
1	**Lack of Maintenance**	**.311****
2	**Vandalism**	**.273****
3	**Poor Waterproofing**	**.253****
4	**Lack of Supervision**	**.181****
5	**Lack of Cleaning**	**.158****
6	**Misuse by User**	**.147***
7	Improper Use of Material	.106
8	Insect Attack	.066
9	Faulty Design	.052

6 factors contribute a significant relationship with significant value **p<0.05**

Talib, (2014), Syamilah (2005) Ahzahar et al. (2011), Suffian (2013) Othman, (2015), Chong and Low (2006), Mydin, 2014, Ali (2011)

Relationship Towards Building Condition

The Correlation result in the study.

1	2	3
Variables has strong significant relationship	**Variables has a least significant relationship**	**Variables which have zero variance**
Lack of Maintenance	Improper use of Material	Poor Detailing
Vandalism	Soil Movement Impact	Faulty Drawing
Poor Waterproofing	Excessive Moisture	Building Size
Lack of Supervision	Change of Usage	Building Types
Lack of Cleaning	Poor Construction	Building Orientation
Misuse by User	Specification	Lack of Knowledge
	Reaction of Thermal Agent	Poor Ventilation
	Poor Workmanship	Poor Operation
	Wear and Tear	
	Structural	
	Faulty Design	
	Reaction of Chemical Agent	
	Change Climatic Condition	
	Insect Attack	
	Reaction Biological Agent	

DISCUSSION & CONCLUSION

1. Many of school in Malaysia are aging, and to sustain their condition has become a great challenge. From the study, the criticality the factors contribute to building defects and building condition were analysed from 21 factors to confirm the significant relationship factors toward building condition.

2. The results also shows that the 6 factors have a strong significant relationship toward building condition and significantly can affect the condition of the buildings. It is also found that 15 variables have a least significant relationship toward building condition. Meanwhile 8 factors have zero variance which not included in the analysis.

3. The factors which has strong relationship significantly is the main reason defects to occur in the building and they need to be taken into consideration or to give priority to solve the defects issues.

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THANK YOU

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