Service life planning for electronics, mechanical and electrical components of a hotel building

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AGENDA

- INTRODUCTION
- PURPOSE
- OBJECTIVES
- LITERATURE REVIEW
- METHOD
- RESULT AND DISCUSSION
- CONCLUSION AND RECOMMENDATION

INTRODUCTION

- Service life is very important in most stages of development of building and infrastructure
- In the feasibility stage, service life is used for investment decision, the longer service life is the better but consequently spent more money on initial investment cost, since better also costs more.
- Both data of service life and service period for a component of a building or any building are very vital when it comes to the operational

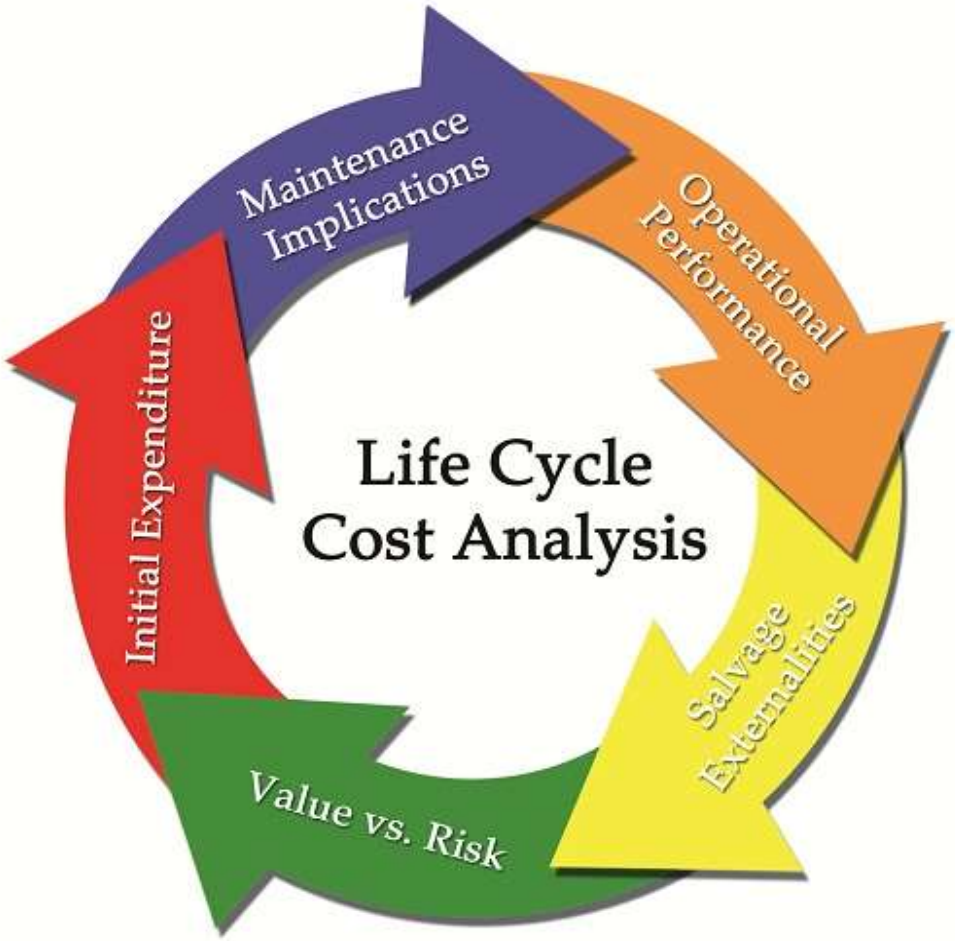
The purpose of the life cycle cost

- to manage the process repeated from the planning to the destruction or replacement of assets,
- to manage the lifecycle cost (long-term) of the short-term savings,
- to ensure the appropriate service consistently with the purpose of the designed building,
- to improve sustainability and lowers the risk of failure and maximize the potential and advantages of the provision of services, in order to minimize the associated costs throughout the life of the building itself.

The Objectives

1) collecting service life data electronic, mechanical and electrical (E & ME) components of the hotel building;

2) finding out the service maintenance interval (service period) of the E & ME components for the building.

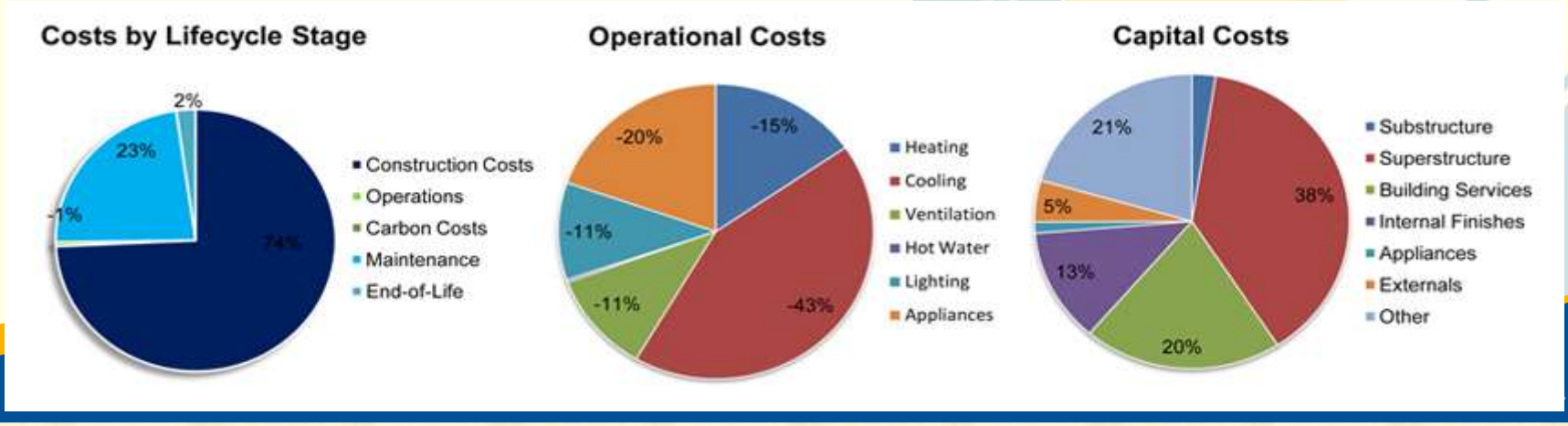


Literature Review

1. **Availability of data in the industry**
2. **Service life of building component**
    1. *Service Life Changes in Condition Over-Time*
    2. *Use of service life for LCA*
    3. *Service life prediction model*
    4. *Service life prediction using simulation technique*
    5. *Service life estimation using factor method*
    6. *Relationship between maintenance interval and performance*
    7. *Service life for Electronic Equipment*

The Method

- 1). preparation;
- 2). collection of data;
- 3). data Analysis;
- 4). discussion
- 5). conclusions and recommendations.



The Project

- The first hotel building is has floor area of 1390 m^2. Development of the hotel was self-managed by CV. Pilar Jaya started in with the construction duration planned at one year.

- The hotel building is situated business area in Yogyakarta and floor area of 22118.48 m^2. The building consists of 2 basements, 8 floors, served mainly for daily stay for visitor, and also provides room and facilities for meeting and conference with a limited numbers.

Data Collected from the Practitioners

- Initial Cost of the Hotel Building.
- Data related to Operation of the Building
- Service Life, and Service Period of Component of the Building.

Building Component	Periodical Service (years)												
	1	2	3	4	5	6	7	8	9	10	11	Mean	Mode
Air Condition													
Panel Unit		0,50	1,00	0,50	0,08	0,25	1	0,5	0,5	0,5	0,5	0,533	0.5
Chiller		0,50	1,00	0,50	0,08	0,25		0,5	1	0,5	1	0,592	0.5
Cooling Tower		0,50	1,00	0,50	0,08	0,25	0,25	0,5	0,5	0,5	0,5	0,458	0.5
Pump		0,50	1,00	0,50	0,08	0,25		1	0,5	1	0,5	0,592	0.5
Tank		0,50	1,00	0,50	0,08	0,25		0,5	1	0,5	1	0,592	0.5

Building Component	Periodical Service (years)												
	1	2	3	4	5	6	7	8	9	10	11	Mean	Mode
Fire Extinguisher													
Joekey Pump	1,00	1,00	2,00	0,25	0,25	1,00	0,5	1	1	0,5	0,5	0,818	1
Electric Pump	1,00	1,00	2,00	0,25	0,25	1,00	0,5	1	1	0,5	0,5	0,818	1
Diesel Pump	1,00	0,50	1,00	0,25	0,25		0,5	1	1	0,5	0,5	0,650	1
Indoor Hydrant Box	2,00	1,00	3,00	0,50	0,25	0,25	1	2	2	0,5	0,25	1,159	2
Outdoor Hydrant Box	2,00	1,00	3,00	0,50	0,25	0,25	1	2	2	0,5	0,25	1,159	2
Hydrant Pylor	2,00	1,00	4,00	0,50	0,25	0,50	1	2	2	0,5	0,25	1,272	2

Component of Building	Periode Service (month)	Service Life (year)	Brand
Transportation Equipment			
Elevator	2	21	Schindler
Air Condition and Supporting Accessories			
Panel Unit	6	8	SPLN
Chiller	6	8	Bosch
Cooling Tower	6	8	Shinwa
Pump	6	8	Mitsubishi

Component of Building	Periode Service (month)	Service Life (year)	Brand
Sound System			
Device	12	8	TOA
Cable	24	12	Supreme
Fire-Proof Cable	36	17	Pirelli
Tray Cable	36	17	Duta Listrik*
UPS	12	3	Vektor
PABX & Pesawat Telephone	12	12	Transtel

Service life for Material Components..

Component of Building	Period of Service (month)	Service Life (year)	Brand of Component or Material
Transportation Equipments			
Elevator	4	19	Schindler
Air Conditioning Works			
Unit Panel	7	9	SPLN
Unit Chiller	5	9	Bosch
Unit Cooling Tower	5	9	Shinwa
Unit Pump	9	9	Mitsubishi
Unit Tank	9	9	Tda 1200
Unit Chemical	5	9	Tda 1200
Unit AHU	5	9	Mitsubishi
Unit FCU	5	9	Mitsubishi
Unit Fan	5	9	Nicotra
Accessories & Valve	5	9	Toyo
Ducting	5	9	Lokfom
Air Register	5	9	Toshiba
Cabel	5	9	Supreme
Cabel Tray	5	9	Duta Listrik
Pipe Chiller	5	9	Denji
Pipe Condenser	5	9	Denji
Pipe Drain PVC	5	9	Wavin
Pump Joekey	8	17	Grundfos
Pump Electric	8	17	Petterson
Pump Diesel	8	17	Petterson
Indoor Hydrant Box	14	17	Ozeki
Outdoor Hydrant Box	14	16	Ozeki
Pillar Hydrant	14	15	Ozeki
Gate Valve	9	14	Toyo
Safety Valve	13	15	Toyo
Automatic Air Vent	11	15	Tozen
Flow Meter	9	15	Gerand
Pipe Black Steel + fitting	11	18	Spindo
Sprinkler Head	8	14	Tyco
Branch Control Valve	8	16	Tyco
Main Control Valve	11	16	Tyco
Flexible Joint	20	15	Tozen
Component Panel	7	19	Phoenix

Tabel 2 *Period of Service,*

Yearly Cost Spent (in Million Rupiah)

Component of Building	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
Elevator																			330						
Air Conditioning									1835.8																
Fire Dstinquisher														7	29.3	19.4	504.3	28.2	10.3						
Instalation of electricity network		34.6	34.6		34.6	34.6		34.6	34.6	32.3	34.6	64.1		92.4	234.5	135.8	92.7	34.6		66.9	34.6		34.6	64.1	
Instalation Transformator																253.8									
Fire Alarm									61.9			37.1			3.1			61.8						37.1	
Sound Sistem				13.8				13.8	95.8			13.8			137.4	13.8		95.8		13.8				13.8	
Telephone & Data				4.8		1.54	7.3	4.8	2.8		23.4	5.4		252.9		5.7		3.44		4.82	7.3	23.5		5.45	
System CCTV							284.2	9.5					25.9	258.2		9.5					284.2			9.51	
System MATV				166.1	3.1		4.4	166.1		3.1		166.1	7.7		3.11	166.1				169.2	7.7			166.1	3.11
Architectural										521.3		47.9			19.1					521.3			491.1		
P. Clean Water													14.9			65.3									
P. Hot water										37.1	110							37.1		110					
Water Heater										30.7			105.9							30.7		39.5			
Pipe & Fitting										48.6					334.7	1.7				97.3					
Total Cost		34.6	34.6	184.8	37.7	36.1	299.3	228.9	2068.9	715.4	88.8	334.7	154.6	610.6	646.2	786.8	597.1	2097.1	340.3	934.8	364.7	63	525.8	296.2	3.11

Maintenance & Replacement Cost

- Electronics 53%
- Fire Fighting 14%
- Electricity 11%
- Architectural 11%
- Mechanical 6%
- Plumbing 5%

Life Cycle Cost Hotel Bhayangkara Over 25 Years

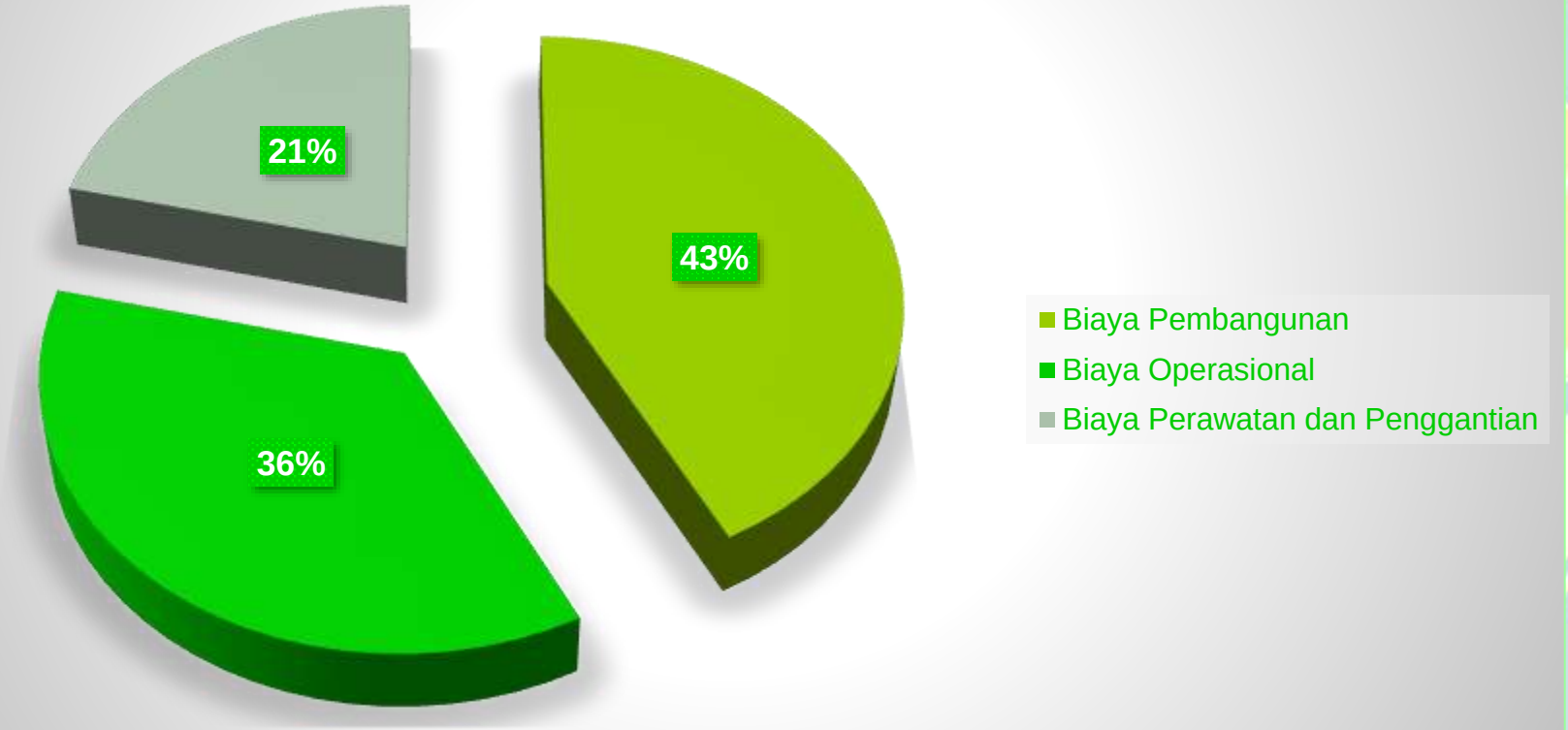


Table 7. Comparison LCC with other Studies.
Note: * Kaming & Mardiansyah, (2015), ** Maryanti (2017).

Project	Develepment Cost (%)	Operating Cost (%)	Maintenance & Replacement Cost (%)
Hostel*	46	26	28
Hotel GA**	47	27	26
Hotel B (this study)	42.4	36.3	21.3
Average	45.1	29.8	25.1

CONCLUSION

- The service life used in this study was been gathered from stakeholder involved in the suppliers, consultants, and academics, involved in the construction industry, as well as the maintenance officers from the other hotels maintenance and operation managers had some drawbacks in term of its quality and quantity. The service life obtained from this study can be used as a reference service life for future maintenance and replacement of the building components.

RECOMMENDATION

This study provides the following recommendation perhaps the similar information should be gathered for accurate based the empirical research methodology. As a material consideration and study and for further development, the authors provide suggestions that can help building owner, consultants, contractors to apply life cycle cost analysis as follows:

1. Study on service life for other buildings should be conducted regularly for the context in Indonesia.
2. Calculation of costs in this study by considering the future value but with the assumption of a fixed interest rate for 25 years. If the desired value in accordance with changes in prices and services annually can estimate the change in interest rates that occur each year.
3. Establish good relationships to people who understand about the service period, service life, and the cost of components of building materials so that the data obtained more accurate. The more accurate the data obtained then the results achieved can be more reliable.