



Managing Work Requests to Improve Level of Building Maintenance Services

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ABSTRACT: Building and Facilities Maintenance Section is one of the sections in Infrastructure Facilities Department in PT.ABC that deals with the maintenance and operation of building facilities in non-PIT areas. PT. Sumber Karya Utama is the contractor appointed to carry out the building maintenance contracts. In contrast to the KPI of 90% for Work Request completion, the total incoming WR addressed to the section has a completion rate of 65% every month.

Delays in completing Work Request work are due to the fact that there has not been a structured work schedule made, the planner have difficulty making Work Order work plans is because the WR descriptions are random and the work locations are spread out. The Building Maintenance Section developed a Standard Operation Procedure (SOP) for writing Work Request to standardize writing descriptions to the main job, so the planner could assess, identify and making categorized of the type of work item into work group items easily.

To establish a work schedule, prioritize work group items using the SMART method. The data used are list of work items, work groups, alternatives, criteria, and weighting. The sequence of work schedules runs effectively by implementing a division into 5 work areas so that work schedules are made per work area.

By implementing work priority references and dividing the area into 5 work areas, WO work can be completed on time, more fairly distributed, efficiently completed, and acceptable to all parties involved, thereby improving the performance and quality of services provided to customers, as well as ensuring that building maintenance runs smoothly and continues to function properly.

KEYWORDS: Work Request, Work Item, Work Order, SOP, Work Group, SMART

1.INTRODUCTION

Section Building Facilities Maintenance of the Infrastructure Department is in charge of maintaining building facilities such as: offices, data centres, control rooms, warehouses, housing, camps, warehouses, clinics, places of worship, mosque, sports facilities, and other buildings facilities. Total of the buildings in area Swarga Bara: 219 buildings, with the longest location of building is 26 km distance.

The section monitors and manages the building maintenance works from all departments in PT.ABC and the contractors through building maintenance contract.

The contract of works includes:

- The value of the work contract
- The validity duration of the contract
- Technical requirements and job specifications that must be met
- Provisions for the adequacy of the number of workers and vehicle units for the mobilization of workers, materials and tools.
- Provisions for meeting material needs
- Provisions for safety needs
- Provisions for submitting progress claims and receiving payments.
- Key performance indicators

Each occupant of the facility building is informed and submits requests for repairs due to building damage by using Ellipse. The request information provided through the Infrastructure Helpdesk (INF WRSsupport). The average Work Request (WR) of building maintenance at area Swarga bara received by Building Maintenance Section per day is 8 WR, for a total of 200 WR/month.



The INF WRSupport created a Work Order (WO) base on the WR (Work Request) and submitted it to the building maintenance contractor (PT. Sumber Karya Utama) as work instructions. The example of List of Work Orders is as follow.

Table1. List of Work Orders

No.	WO No.	WR Date	Location	Description
1	BM056226	02-Jan-24	A-23	The floor of the barracks kitchen cupboard was broken
2	BM056227	02-Jan-24	A-08/6	Repaint & Repair Ceiling at Room
3	BM056228	02-Jan-24	A-09	Kitchen cupboard is crumbly
4	BM056230	02-Jan-24	A-27, A-32, J-24	Rayah & Prima water filter maintenance for the January 2024 period is 8 ea
5	BM056234	02-Jan-24	A-17	Front floor of toilet & living room is crumbly
6	BM056235	02-Jan-24	A-08	Toilet lower pipe RPR leaking
7	BM056236	02-Jan-24	A-05	The front corridor door is crumbly

(Source by: Author)

2. BUSINESS ISSUE

PT. ABC is a coal mining company located in the region Sangatta, East Kalimantan, Indonesia. It operates of the largest open-pit Mining in the world. PT.ABC is an Indonesian incorporated company that engages in coal mining and sales for both domestic and international customers from various industrial sectors.

PT.ABC has 13 divisions that carry out its business. CPHD (Coal Processing and Handling Division) is one of the divisions. And Infrastructure Department is a part of the CPHD. Building Maintenance Section is one of the sections in Infrastructure Department that deals with the maintenance and operation of building facilities in non-PIT areas.

The current situation is that, of the total incoming WR, WO completion has achieved 65% per month, whereas the KPI for WR completion is 90%. If the WO takes too long to start repairing, it will result in unfulfilled maintenance services. In office, users are uncomfortable at work, there are disruptions such as leaking roofs, broken doors, clogged toilets, which have an indirect impact on office staff productivity and safety, as well as taking care of things that are not directly related to job obligations. In workshop, it can disrupt workshop activities if there is leaking roof. For at home, residents can't rest comfortably, because of a leaky roof, stuck water, etc.

The issues:

1. There are complaints from users regarding WR which have been sent for a long time.
2. The WR sent by the user are randomized (depend to the location of work and type of work), making it difficult for the contractor's planner to create a works schedule.
3. There is no obvious reference in creating WO execution schedule.

So far, the work execution flow is that the WR that was sent to INF WR Support (Helpdesk) is directly made WO (work order) to the contractor, so the decision for which WR will be carried out by the contractor is determined by the contractor's planner and supervisor, unless there is an interruption from the Infrastructure Department's supervisor to prioritizing other WRs because they are more urgent, for example, related to production, operations, or safety. So, the WO is carried out randomly as determined by the planner and supervisor.

3. DATA COLLECTION

Data collection includes data collection methods and data analysis method.

3.1. Data Collection Methods

In carrying out its business, PT.ABC uses the Ellipse system to bridge all of the interests of each department in terms of carrying out operational activities in each individual unit, so that information is gathered from data that can be accounted for, because accurate data is provided by each department. Related activities will make analysis and decision-making easier, particularly in



operational areas. Infrastructure Facilities Department uses Ellipse to manage incoming WRs, monitor their progress, and carry out the work invoicing process.

The WR reception arrangements are carried out by the admin (INF WRSupport), the user / building custodian sends the WR by filling in the Ellipse with the following data: description of repair request, work priority (P1, P2 & P3), location and raised date. The WR, after checking the work request, then creates a WO and sends it to the contractor who handles the work (according to the scope of the work contract).

From the input data, a list of WOs can be obtained for a certain period. The primary data is a list of Work Request received in the Building Facilities Maintenance section via an ellipse from January 1 to 31, 2024. Based on the research subject, one month's data is adequate to capture general trends or patterns, primarily patterns of numerous types of repair work in building maintenance. A single month could represent long-term patterns.

Data collection methods included focus group discussions, observation, and company data collection; the summary table is as follows:

Table 2. Data Collection Methods

Stages	Data	Data Collection Methods
Develop SOP Writing Work Request	Standard SOP form Tutorial WR Filling in Ellipse	Focus Group Discussion
Work Items Analysis	List WO: January 2024	Download WO data from Ellipse. Observation to WR /WO
Work Groups Analysis	List WO: January 2024	Focus Group Discussion
Work Groups Priority	List of Work Groups, Criteria and Weight Criteria	Focus Group Discussion
Schedule of Works	List of Work Groups (date, area) Reference to previous work	Map of working area Observation to contractor

(Source by: Author)

The focus group discussions are a valuable platform for sharing and discussing the determining factors in work priorities, allowing experts and building custodian to provide their insights and perspectives. The experts and building custodian consist of planner, supervisor, site manager from PT. Sumber Karya Utama (SKU) along with the supervisor, engineering section head from Building Facilities Maintenance (BFM)Section and also involve several experts building custodian.

3.2 Data Analysis Methods

Data analysis methods applying various methods to effectively handle and optimize the workflow associated with handling work request, the summary table is as follows:

Table 3. Data Analysis Methods

	Data Analysis Method
SOP Writing Work Request	Developing SOP Writing Work Request
Work Items Analysis	Identifying the work request description into a simple description
Work Groups Analysis	Classifying the items of work request into several work groups
Work Groups Priority	Using SMART method
Schedule of Works	Developing Gantt Chart

(Source: by Author)



4. ANALYSIS

4.1 Developing SOP

The SOP Writing WR is prepared by the Engineer and reviewed by the Building Maintenance Facilities team through a focus group discussion. This SOP only applies to writing Work Requests addressed to Building Facilities Maintenance which will be made by the WO to the contractor PT. Sumber Karya Utama as the executing contractor. Implementation of the SOP needs to be informed to users or building custodians of all departments for changes to writing Work Requests.

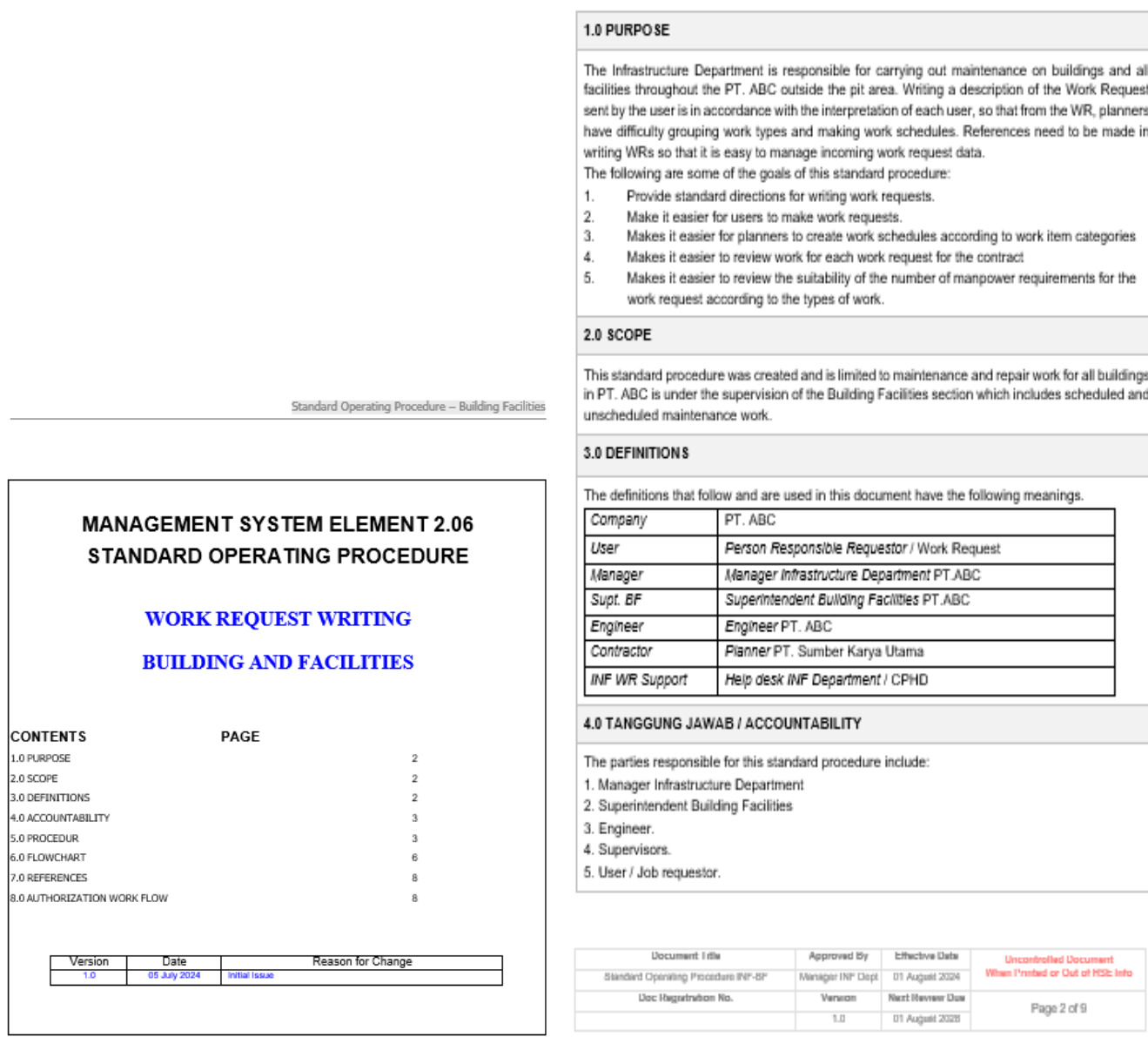


Figure 1. SOP Writing WR
(Source: by Author)

4.2 Work Item Analysis

Based on data from the existing WO list, to identify work items author take the WO samples that raised from 1 – 10 January 2024. The description of each WO is analyzed to identify work items.



Table 4. Work Items Analysis

No.	Work Request		Location	Description	Work Item
	WO No.	WR Date			
1	BM056226	02-Jan-24	A-23	The floor of the barracks kitchen cupboard was broken	repair the floor
2	BM056227	02-Jan-24	A-08/6	Repaint & repair ceiling at Room	repaint and repair the wall
3	BM056228	02-Jan-24	A-09	Kitchen cupboard is crumbly	repair the kitchen cupboard
4	BM056230	02-Jan-24	A-27, A-32, J-24	Rayah & Prima water filter maintenance for the January 2024 period is 8 ea.	replacing water filter
5	BM056234	02-Jan-24	A-17	Front floor of toilet & living room is crumbly	repair the wooden floor
6	BM056235	02-Jan-24	A-08	Toilet lower pipe repair leaking	repair toilet's plumbing pipe
7	BM056236	02-Jan-24	A-05	The front corridor door is crumbly	repair the door
8	BM056237	02-Jan-24	A-13	The front floor of the toilet is breaking	repair the toilet's floor
9	BM056239	02-Jan-24	A-16	Repaint the barracks corridor, the paint is faded (wall, ceiling)	repaint the wall
10	BM056242	02-Jan-24	Andromeda	Construction of meeting room walls for DDF-HEM Dept	additional walls

(Source: by Author)

From the table we can see the work item description become simple only describe the main items of work.

4.3 Work Groups Analysis

Work groups are formed from the list of work items to group tasks that have the same sort of work, such as being part of the same building, doing the same work activity, the same position in the building, or being carried out by the same worker.

Table 5. Work Group Analysis

No.	Work Request		Location	Description	Work Item	Work Group Item
	WO No.	WR Date				
1	BM056226	02-Jan-24	A-23	The floor of the barracks kitchen cupboard was broken	repair the floor	repair the floor/wall/ceiling
2	BM056227	02-Jan-24	A-08/6	Repaint & Repair Ceiling at Room	repaint and repair the wall	repaint the wall/ceiling
3	BM056228	02-Jan-24	A-09	Kitchen cupboard is crumbly	repair the kitchen cupboard	furniture works
4	BM056230	02-Jan-24	A-27, A-32, J-24	Rayah & Prima water filter maintenance for the January 2024 period are 8 ea.	replacing water filter	plumbing and sanitary works
5	BM056234	02-Jan-24	A-17	Front floor of toilet & living room is crumbly	repair the wooden floor	repair the floor/wall/ceiling
6	BM056235	02-Jan-24	A-08	Toilet lower pipe, repair the leaking	repair toilet's plumbing pipe	plumbing and sanitary works
7	BM056236	02-Jan-24	A-05	The front corridor door is crumbly	repair the door	repair the door/window
8	BM056237	02-Jan-24	A-13	The front floor of the toilet is breaking	repair the toilet's floor	repair the floor/wall/ceiling
9	BM056239	02-Jan-24	A-16	Repaint the barracks corridor, the paint is faded (wall, ceiling)	repaint the wall	repaint the wall/ceiling
10	BM056242	02-Jan-24	Andromeda	Construction of meeting room walls for DDF-HEM Dept.	additional walls	renovation/ relay out

(Source: by Author)

Workgroup grouping uses descriptive analysis for request types by categorizing and analysing the types of requests received to understand the nature of the work and identify common patterns or trends. After analyse and setting up the work items in the list into work groups, there were nine work groups. The summary table is as follows.



Table 6. Work Group

No.	Work Group Item
1	Repair the floor/wall/ceiling
2	Repaint the wall/ ceiling
3	Repair the door/ window
4	Plumbing and sanitary works
5	Renovation/ relay out
6	Furniture works and accessories
7	Supply material
8	Repair roof/ gutter/ rain water pipe
9	Company event

(Source: by Author)

4.4 Work Groups Priority

The author uses the SMART approach to identify work group item priorities. To apply SMART analysis, determining criteria is required, which are gained through research findings and team discussions. Any criteria included are based on the potential risks analyse that will be impacted if a work order is not completed immediately. The SMART method is used in decision-making techniques, is based on the idea that each alternative is composed of many criteria, each of which has a weight that indicates its relative importance to other criteria.

The following are the results of the criteria from the potential risk analyse that defined in the focus group discussion:

Table 7. Criteria

No	Criteria (C)
1	Function of damaged parts in the building (C1)
2	Security (C2)
3	Safety, potential risk of injury, property damage, fire (C3)
4	Increasing level of damage (C4)
5	Company image and maintenance relationships with stakeholders(C5)
6	Production (C6)
7	Comfortable conditions (C7)

(Source: by Author)

The SMART method was completed in the following steps:

1. Determining Alternative

The first stage in making a decision using the SMART method are first to determine alternatives. Determining these alternatives are based on the incoming WR data so that work items (main items) are obtained and formulated into group items. These nine group items cover all work items in building maintenance. The alternatives that will be compared using work group items can be seen in the following table.

Table 8. Alternative

No.	Alternative
1	Repair the floor/wall/ceiling
2	Repaint the wall/ ceiling
3	Repair the door/ window
4	Plumbing and sanitary works
5	Renovation/ relay out
6	Furniture works and accessories



7	Supply critical material
8	Repair roof/ gutter/ rain water pipe
9	Company event

(Source: by Author)

2.Value weighting of criteria, which is used as system default values and is based on the greatest weight to the smallest weight within the interval 0-100. Determining the amount of weighting of criteria items based on the amount of the direct and indirect losses that will be spent in the event that an incident occurred that relates to the work not being completed, with results as follows:

Table 9. Weight of Criteria

No	Criteria (C)	Weight (Wj)
1	Function of damaged parts in the building (C1)	10
2	Security (C2)	10
3	Safety, potential risk of injury, property damage, fire (C3)	30
4	Increasing level of damage (C4)	10
5	Company image and maintenance relationships with stakeholders(C5)	15
6	Production (C6)	20
7	Comfortable conditions (C7)	5
	Sum:	100

(Source: by Author)

3.Weight value predetermined criteria of the largest of the highest to the lowest is not important which will be normalized by dividing the weight of criteria weights (wj) with a total weight value ($\sum w_j$). The normalization weighting criteria are described in the table below.

Table 10. Weight of the Normalization Criteria

No	Criteria (C)	Weight (Wj)	Normalization $\frac{(w_i)}{\sum w_i}$
1	Function of damaged parts in the building (C1)	10	10/100 = 0,1
2	Security (C2)	10	10/100 = 0,1
3	Safety, potential risk of injury, property damage, fire (C3)	30	30/100 = 0,3
4	Increasing level of damage (C4)	10	10/100 = 0,1
5	Company image and maintenance relationships with stakeholders(C5)	15	15/100 = 0,15
6	Production (C6)	20	20/100 = 0,2
7	Comfortable conditions (C7)	5	5/100 = 0,05

(Source: by Author)

The next step in completing the SMART technique is to specify the parameter values. The parameter values will be categorized as follows.



Table 11. Parameter Value

Category	Parameter Value
Very high	4
High	3
Mid	2
Low	1

(Source: by Author)

The above table can be explained in terms of the classification criteria utilized. Organizing the criteria given in the table below.

Table 12. Value of Sub Criteria

No	Criteria (C)	Risk	Value
1	The function of damage parts in the building (C1)	Very high	4
		High	3
		Mid	2
		Low	1
2	Security (C2)	Very high	4
		High	3
		Mid	2
		Low	1
3	Safety, potential risk of injury, property damage, fire (C3)	Very high	4
		High	3
		Mid	2
		Low	1
4	Increasing level of damage (C4)	Very high	4
		High	3
		Mid	2
		Low	1
5	Company image/ maintenance relationships with stakeholders(C5)	Very high	4
		High	3
		Mid	2
		Low	1
6	Production (C6)	Very high	4
		High	3
		Mid	2
		Low	1
7	Comfortable conditions (C7)	Very high	4
		High	3
		Mid	2
		Low	1

(Source: by Author)



The above table describes the classification criteria and value. The table can be used to assign a value to each of the criteria of alternate use. Determining the value per alternative is based on the level of influence on each criterion. The values of these criteria resulting from Focus Group Discussion are described in the following table

Table 13. Value of Sub Criteria for Alternatives

No.	Alternative	Criteria (C)						
		the function of damage parts in the building (C1)	security (C2)	safety, potential risk of injury, property damage, fire (C3)	increasing level of damage (C4)	company image/ maintenance relationships with stakeholders(C5)	production (C6)	comfortable conditions (C7)
1	Repair the floor/wall/ceiling	3	1	3	3	1	2	3
2	Repaint the wall/ ceiling	2	1	1	3	1	1	2
3	Repair the door/ window	4	3	2	2	1	2	3
4	Plumbing and sanitair works	4	1	2	3	1	2	4
5	Renovation/ relayout	1	1	1	1	1	2	3
6	Furniture works and accessories	2	1	1	1	1	1	3
7	Supply material	4	1	3	3	1	3	1
8	Repair roof/gutter/rain water pipe	4	1	3	4	1	3	3
9	Company event	3	1	1	1	4	1	3

(Source: by Author)

The above table describes the rating criteria of each alternative then the value will be converted to seek his utility value. Determining the value of the utility to convert the value of the criteria to - one of the criteria to - I using the equation:

$$u_i(a_i) = \frac{c_{out} - c_{min}}{c_{max} - c_{min}}$$

Then the result of the calculation is:

1. If the value criteria (c_{out})= 4, then $u_i(a_i) = \frac{4-1}{4-1} = 1$
2. If the value criteria (c_{out})= 3, then $u_i(a_i) = \frac{3-1}{4-1} = 0,667$
3. If the value criteria (c_{out})= 2, then $u_i(a_i) = \frac{2-1}{4-1} = 0,333$
4. If the value criteria (c_{out})= 1, then $u_i(a_i) = \frac{1-1}{4-1} = 0$

The final value of each alternative is calculated by multiplying the utility value criteria with the normalized weight value using the formula,

$$u(a_i) = \sum_{j=1}^m w_j u_j(a_i)$$

The calculated final amount will be changed based on many factors. The description is as follows:



Table 14. Final Score

No	Alternative	Criteria (C)	Value	Value Utilities	Weght of Normaliza	$w_i / \sum w_i$	Score $\sum w_i v_i$
1	Repair the floor/wall/ceiling	C1	3	0,67	0,1	0,07	0,43
		C2	1	0	0,1	-	
		C3	3	0,67	0,3	0,20	
		C4	3	0,67	0,1	0,07	
		C5	1	0	0,15	-	
		C6	2	0,33	0,2	0,07	
		C7	3	0,67	0,05	0,03	
2	Repaint the wall/ ceiling	C1	2	0,33	0,1	0,03	0,12
		C2	1	0	0,1	-	
		C3	1	0	0,3	-	
		C4	3	0,67	0,1	0,07	
		C5	1	0	0,15	-	
		C6	1	0	0,2	-	
		C7	2	0,33	0,05	0,02	
3	Repair the door/ window	C1	4	1	0,1	0,10	0,40
		C2	3	0,67	0,1	0,07	
		C3	2	0,33	0,3	0,10	
		C4	2	0,33	0,1	0,03	
		C5	1	0	0,15	-	
		C6	2	0,33	0,2	0,07	
		C7	3	0,67	0,05	0,03	
4	Plumbing and sanitair works	C1	4	1	0,1	0,10	0,48
		C2	1	0	0,1	-	
		C3	3	0,67	0,3	0,20	
		C4	3	0,67	0,1	0,07	
		C5	1	0	0,15	-	
		C6	2	0,33	0,2	0,07	
		C7	4	1	0,05	0,05	
5	Renovation/ relayout	C1	1	0	0,1	-	0,10
		C2	1	0	0,1	-	
		C3	1	0	0,3	-	
		C4	1	0	0,1	-	
		C5	1	0	0,15	-	
		C6	2	0,33	0,2	0,07	
		C7	3	0,67	0,05	0,03	
6	Furniture works and accessories	C1	2	0,33	0,1	0,03	0,07
		C2	1	0	0,1	-	
		C3	1	0	0,3	-	
		C4	1	0	0,1	-	
		C5	1	0	0,15	-	
		C6	1	0	0,2	-	
		C7	3	0,67	0,05	0,03	



7	Supply critical material	C1	4	1	0,1	0,10	0,50
		C2	1	0	0,1	-	
		C3	3	0,67	0,3	0,20	
		C4	3	0,67	0,1	0,07	
		C5	1	0	0,15	-	
		C6	3	0,67	0,2	0,13	
		C7	1	0	0,05	-	
8	Repair roof /gutter/rain water pipe	C1	4	1	0,1	0,10	0,57
		C2	1	0	0,1	-	
		C3	3	0,67	0,3	0,20	
		C4	4	1	0,1	0,10	
		C5	1	0	0,15	-	
		C6	3	0,67	0,2	0,13	
		C7	3	0,67	0,05	0,03	
9	Company event	C1	3	0,67	0,1	0,07	0,25
		C2	1	0	0,1	-	
		C3	1	0	0,3	-	
		C4	1	0	0,1	-	
		C5	4	1	0,15	0,15	
		C6	1	0	0,2	-	
		C7	3	0,67	0,05	0,03	

(Source: by Author)

From the results of these calculations, an alternative ranking order is created based on the highest to lowest scores, as follows:

Table 15. Priority of Alternative (Work Group Item)

No	Alternative	Score	Priority
1	Repair roof /gutter/rain water pipe	0,57	1
2	Supply critical material	0,50	2
3	Plumbing and sanitary works	0,48	3
4	Repair the floor/wall/ceiling	0,43	4
5	Repair the door/ window	0,40	5
6	Company event	0,25	6
7	Repaint the wall/ ceiling	0,12	7
8	Renovation / relay out	0,12	8
9	Furniture works and accessories	0,07	9

(Source: by Author)

After determining the work group item priority, it can then be applied to the current WO list, as seen in the following



Table 16. List WO with Scale of Priority.

No.	Work Request		Location	Description	Work Item	Work Group Item	Scale of Priority	Manpower Skill
	WO No.	WR Date						
1	BM056226	02-Jan-24	A-23	The floor of the barracks kitchen cupboard was broken	repair the floor	Repair the floor/ wall/ ceiling	4	Carpenter
2	BM056227	02-Jan-24	A-08/6	Repaint & Repair Ceiling at Room	repaint and repair the wall	Repaint the wall/ ceiling	7	Painter
3	BM056228	02-Jan-24	A-09	Kitchen cupboard is crumbly	repair the kitchen cupboard	Furniture works and accessories	9	Carpenter
4	BM056230	02-Jan-24	A-27,A-32,J-24	Rayah & Prima water filter maintenance for the January 2024 period is 8 ea.	replacing water filter	Plumbing and sanitary works	3	Plumber
5	BM056234	02-Jan-24	A-17	Front floor of toilet & living room is crumbly	repair the wooden floor	Repair the floor/ wall/ ceiling	4	Carpenter
6	BM056235	02-Jan-24	A-08	Toilet lower pipe RPR leaking	repair toilet's plumbing pipe	Plumbing and sanitary works	3	Plumber
7	BM056236	02-Jan-24	A-05	The front corridor door is crumbly	repair the door	Repair the door/ window	5	Carpenter
8	BM056237	02-Jan-24	A-13	The front floor of the toilet is broke	repair the toilet's floor	Repair the floor/ wall/ ceiling	4	Carpenter
9	BM056239	02-Jan-24	A-16	Repaint the barracks corridor, the paint is faded (wall, ceiling)	repaint the wall	Repaint the wall/ ceiling	7	Painter
10	BM056242	02-Jan-24	Andromeda	Construction of meeting room walls for DDF-HEM Dept	additional walls	Renovation/ relay out	8	Carpenter
11	BM056244	03-Jan-24	D-13	Supply 30 pieces of chalk board, 30 pieces of 5x10x400 chalk, 1 1/2" nails 1 kg, 2" nails 1 kg for D13 shelf needs	supply material	Supply critical material	2	Carpenter
12	BM056245	03-Jan-24	Simulator Murung	Addition of Classrooms to the OTC M18 area	additional room	Renovation/ relay out	8	Carpenter
13	BM056243	02-Jan-24	M-6	Repair/replace the 5500 lt reservoir which is cracked/leaking next to the M6 prayer room	repair the water tank	Plumbing and sanitary works	3	Plumber
14	BM056251	03-Jan-24	Andromeda	Making shelves at the DDF warehouse section	make shelves	Furniture works and accessories	9	Carpenter
15	BM056253	03-Jan-24	Jupiter PNS	Work for Pit Cottage J-14: 1. Painting interior walls, 2. Replacing door locks and window hinges	additional walls	Renovation/ relay out	8	Carpenter

(Source: by Author)

4.5 Schedule of Works

The condition of building locations extends within a lot non-PIT areas; if WO work is only based on WO priorities, it will be ineffective because there are locations that are far away and require longer travel times, so the work area must be divided with different teams of workers to optimize WO completion in those areas. Each area of work will be completed by a team of workers in proportion to the amount of work orders.

The position of nearby building areas in the region determines the division of work areas, as follows:



Table 17. Division of Building Site Areas

No.	Area	Building Code	Office Area	Radius (Km) from Contractor Office
1	Area 1	A1- A33, J1-J23, S10-S22	Junior Camp, Senior Camp, ISOS, ESD Office	2 Km
2	Area 2	M1- M8	Mine Site, MSD & SIC Office	3 Km
3	Area 3	M9 - M27	Murung, Coal Mining, Pit Surya, Pit Bintang	11 Km
4	Area 4	C1-C6, D1- D17, PNS	CPP, Tango.Delta, Pit J Pinang South	4 Km
5	Area 5	H, MS, AB and AN	Prima Office (MS, DB), Hatari, AB Phase 2. Andromeda	26 Km

(Source: by Author)

The SOP for creating Work Requests includes area code input in addition to required recommendations. The method for dividing those areas is as follows:

Table. 18 List WO with Scale of Priority and Area

No.	Work Request		Location	AREA	Description	Work Item	Work Group Item	Scale of Priority	Manpower Skill
	WO No.	WR Date							
1	BM056226	02-Jan-24	A-23	AREA 1	The floor of the barracks kitchen cupboard was broken	repair the floor	Repair the floor/ wall/ ceiling	4	Carpenter
2	BM056227	02-Jan-24	A-08/6	AREA 1	Repaint & Repair Ceiling at Room	repaint and repair the wall	Repaint the wall/ ceiling	7	Painter
3	BM056228	02-Jan-24	A-09	AREA 1	Kitchen cupboard is crumbly	repair the kitchen cupboard	Furniture works and accessories	9	Carpenter
4	BM056230	02-Jan-24	A-27, A-32, J-24	AREA 1	Rayah & Prima water filter maintenance for the January 2024 period is 8 ea.	replacing water filter	Plumbing and sanitary works	3	Plumber
5	BM056234	02-Jan-24	A-17	AREA 1	Front floor of toilet & living room is crumbly	repair the wooden floor	Repair the floor/ wall/ ceiling	4	Carpenter
6	BM056235	02-Jan-24	A-08	AREA 1	Toilet lower pipe RPR leaking	repair toilet's plumbing pipe	Plumbing and sanitary works	3	Plumber
7	BM056236	02-Jan-24	A-05	AREA 1	The front corridor door is crumbly	repair the door	Repair the door/ window	5	Carpenter
8	BM056237	02-Jan-24	A-13	AREA 1	The front floor of the toilet is breaking	repair the toilet's floor	Repair the floor/ wall/ ceiling	4	Carpenter
9	BM056239	02-Jan-24	A-16	AREA 1	Repaint the barracks corridor, the paint is faded (wall, ceiling)	repaint the wall	Repaint the wall/ ceiling	7	Painter
10	BM056242	02-Jan-24	Andromeda	AREA 5	Construction of meeting room walls for DDF-HEM Dept	additional walls	Renovation/ relay out	8	Carpenter
11	BM056244	03-Jan-24	D-13	AREA 4	Supply 30 pieces of chalk board, 30 pieces of 5x10x400 chalk, 1 1/2" nails 1 kg, 2" nails 1 kg for D13	supply material	Supply critical material	2	Carpenter
12	BM056245	03-Jan-24	Simulator Murung	AREA 3	Addition of Classrooms to the OTC M18 area	additional room	Renovation/ relay out	8	Carpenter
13	BM056243	02-Jan-24	M-6	AREA 2	Repair/replace the 5500 ltr reservoir which is cracked/leaking next to the M6 prayer room	repair the water tank	Plumbing and sanitary works	3	Plumber
14	BM056251	03-Jan-24	Andromeda	AREA 5	Making shelves at the DDF warehouse section	make shelves	Furniture works and accessories	9	Carpenter
15	BM056253	03-Jan-24	Jupiter PNS	AREA 5	Work for Pit Cottage J-14: 1. Painting interior walls, 2. Replacing door locks and window hinges	additional walls	Renovation/ relay out	8	Carpenter

(Source: by Author)



To develop a WO schedule for work, it is made per area based on a priority scale. For example, by using data filters (AREA 1) and sort smallest to largest (column scale of priority), a list of WOs in area 1 can be compiled as follows:

Table 19. List WO with Scale of Priority Area 1

No.	Work Request		Location	AREA	Description	Work Item	Work Group Item	Scale of Priority	Manpower Skill
	WO No.	WR Date							
1	BM056230	02-Jan-24	A-27, A-32, J-24	AREA 1	Rayah & Prima water filter maintenance for the January 2024 period is 8 ea.	replacing water filter	Plumbing and sanitary works	3	Plumber
2	BM056235	02-Jan-24	A-08	AREA 1	Toilet lower pipe RPR leaking	repair toilet's plumbing pipe	Plumbing and sanitary works	3	Plumber
3	BM056226	02-Jan-24	A-23	AREA 1	The floor of the barracks kitchen cupboard was broken	repair the floor	Repair the floor/ wall/ ceiling	4	Carpenter
4	BM056234	02-Jan-24	A-17	AREA 1	Front floor of toilet & living room is crumbly	repair the wooden floor	Repair the floor/ wall/ ceiling	4	Carpenter
5	BM056237	02-Jan-24	A-13	AREA 1	The front floor of the toilet is breaking	repair the toilet's floor	Repair the floor/ wall/ ceiling	4	Carpenter
6	BM056236	02-Jan-24	A-05	AREA 1	The front corridor door is crumbly	repair the door	Repair the door/ window	5	Carpenter
7	BM056227	02-Jan-24	A-08/6	AREA 1	Repaint & Repair Ceiling at Room	repaint and repair the wall	Repaint the wall/ ceiling	7	Painter
8	BM056239	02-Jan-24	A-16	AREA 1	Repaint the barracks corridor, the paint is faded (wall, ceiling)	repaint the wall	Repaint the wall/ ceiling	7	Painter
9	BM056228	02-Jan-24	A-09	AREA 1	Kitchen cupboard is crumbly	repair the kitchen cupboard	Furniture works and accessories	9	Carpenter

(Source: by Author)

Based on the list above, the author prepares a Gantt Chart to create a work order (WO) execution schedule for area 1 as follows:

Table 20. Gantt Chart Schedule of Work Area 1

No	Work Request		Location	AREA	Description	Work Group Item	Scale of Priority	Manpower Skill	Est. Total Days	Schedule of Work												
	WO No.	WR Dte								day 1	day 2	day 3	day 4	day 5	day 6	day 7	day 8	day 9	day 10	day 11	day 12	
										Mon	Tue	Wed	Thurs	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	
1	BM056230	02-Jan-24	A-27,A-32,J-24	AREA 1	Rayah & Prima water filter maint. for the January 2024 period is 8 ea	Plumbing and sanitary works	3	Plumber	1													
2	BM056235	02-Jan-24	A-08	AREA 1	Toilet lower pipe RPR leaking	Plumbing and sanitary works	3	Plumber	1													
3	BM056226	02-Jan-24	A-23	AREA 1	The floor of the barracks kitchen cupboard was broken	Repair the floor/ wall/ ceiling	4	Carpenter	3													
4	BM056234	02-Jan-24	A-17	AREA 1	Front floor of toilet & livingroom is crumbly	Repair the floor/ wall/ ceiling	4	Carpenter	1													
5	BM056237	02-Jan-24	A-13	AREA 1	The front floor of the toilet is broke	Repair the floor/ wall/ ceiling	4	Carpenter	1													
6	BM056236	02-Jan-24	A-05	AREA 1	The front corridor door is crumbly	Repair the door/ window	5	Carpenter	1													
7	BM056227	02-Jan-24	A-08/6	AREA 1	Repaint & Repair Ceiling at Room	Repaint the wall/ ceiling	7	Painter	4													
8	BM056239	02-Jan-24	A-16	AREA 1	Repaint the barracks corridor, the paint is faded (wall, ceiling)	Repaint the wall/ ceiling	7	Painter	7													
9	BM056228	02-Jan-24	A-09	AREA 1	Kitchen cupboard is crumbly	Furniture works and access	9	Carpenter	1													

(Source: by Author)



5. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Based on the analysis to address the research questions in Chapter 1, how to increase the number of WO completion, how to arrange the WR created by the user so that it is easy to manage the work and determine the most effective strategies for prioritizing and triaging work requests in building maintenance execution, the author can conclude:

1. Delays in completing Work Request work are due to the fact that there has not been a structured work schedule made, so contractors work on Work Order based on material availability, existing manpower and complaints from users, not based on WO work planning which considers the type of work, number of WO per type of work, location and the level of urgency. One of the reasons Planners have difficulty making WO work plans is because the WR descriptions are random and the work locations are spread out.

2. What should you do to fix this problem?

a. The Building Maintenance Section developed a SOP for writing Work Request to standardize writing descriptions to the main job so that when the planner uploads the WO list in Excel data, it is simple to assess, identify the type of work, and decide priorities.

b. After the categories of work is classified into work groups with a priority order determined by the SMART method, they are applied to the whole list of WOs to be worked on, allowing the Planner to know the order in which the WOs will be worked on.

c. To optimize the completion of the WO, 5 areas of the building location were designated as work teams, each with a number of personnel based on the number of WO. Marking the location. When designing the WR, the user inputs the building location.

d. The planner develops a WO work schedule for each building location area based on the work sequence and projected completion time determined by field survey results.

e. The contractor implements the schedule, ensuring that adequate materials and people are available.

f. WO work is more fairly distributed, scheduled based on priorities, efficient for completion, and acceptable to all involved parties, all of which could improve the quality of service provided to customers.

5.2 Recommendation

By implementing work priority references, it is intended that WO work can be completed in accordance with priority the identification principles mutually agreed upon by INF and the building custodian, ensuring that building maintenance runs smoothly and building facilities continue to function properly.

Furthermore, INF and SKU contractors must learn how to manage challenges in the field in order to improve WO work and meet the intended targets. To implement the proposed change based on the analysis in Chapter 4, both tangible and intangible resources are required.

The tangible resources are as follows:

1. In each area, a lead team is provided, as the leading hand level, to make material purchase plans and manpower distribution arrangements.

2. Contractors can establish material requirements based on the work schedule and site surveys conducted by each work area supervisor.

3. Set up warehouses in each area so that materials can be stored close to the building location area.

The intangible resources are as follows:

1. Workgroup item data is used to examine the adequacy of the WO load and the quantity of personnel by the contractor.

2. Based on the data, to design the next building maintenance contract, consider the number of workers and their fields of expertise contracted for building maintenance work, as well as whether they comply with the WO's load composition.

3. WO work in accordance with one of the severity criteria, which if not fixed immediately, will minimize total maintenance expenses.

4. Prioritizing WO based on one of the safety criteria reduces the chance of loss due to incidents or accidents.

Recommendations and opportunities for the future include using this project improvement to develop building maintenance contracts based on work items and recapitulation of work volume from the prior contract period



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