

Maintenance Management for Public Infrastructure for Malaysian Local Authorities

Hamimah Adnan, Zafrul Fazry Mohd Fauzi

*Faculty of Architecture, Planning and Surveying, University Teknologi MARA Shah Alam, Selangor
MALAYSIA*

Email: hamimah863@gmail.com, ir.zafrul@gmail.com

Azizan Supardi, Ismail Rahmat

*Faculty of Architecture, Planning and Surveying, University Teknologi MARA Shah Alam, Selangor
MALAYSIA*

Abstract

Local authorities have responsibilities to ensure its public infrastructure facilities are performing well up and up to a level of public satisfaction. This paper studies the current implementation of the maintenance of infrastructure facilities at four local municipal council authorities in Malaysia. It was found major efforts should be focused on improving the maintenance performance of local authorities. The findings prove to be vital to providing a better comprehension to authorities and related parties as to why the infrastructure maintenance work in Malaysia needs to be given an emphasis in order to achieve an acceptable condition and satisfy the public. Commitment from the broader range of players within the Malaysian construction industry supply chain is vital.

Keywords

Maintenance, Maintenance Management, Local Authorities, Infrastructure

1. Introduction

Maintenance aspects need to be considered and taken into account as an integral part of a project. Over the years, use and the environment cause infrastructures to deteriorate. This occurs over a period of time even under the best circumstances. This, in turn, increases maintenance and rehabilitation costs (McNeil, Markow, Neumann, Ordway, Uzarski, 1992). Local authorities in Malaysia have responsibilities to ensure its public infrastructure facilities are performing well and up to a level of public satisfaction. However, this public satisfaction level cannot be achieved due to the lack of proper facilities management and a lack of awareness among the local authorities. Lack of maintenance culture in Malaysian facilities also leads to poor maintenance activities being carried out (Badawi, 2007). What is needed is a constructive approach to monitoring and preventative maintenance (Hassan, 2007).

Maintenance personnel are the key people who the data shall be collected from since they carried out the maintenance work from the beginning such as attending to the public's complaints, site visits, prepare costing, supervising maintenance works and verifying completed works before payment can be made. The data base of this study consists of forty six (46) respondents representing the four local authorities under study. These are Ampang Jaya Municipal Council (12 respondents), Seberang Perai Municipal Council (18 respondents), Kuantan Municipal Council (6 respondents), and Malacca Municipal Council (10

respondents). The respondents provide two types of information central to the analysis: their perceptions on several aspects of the implementation of infrastructure maintenance; and tangible data on complaints from the public and budgetary allocation as well as actual expenditure for infrastructure maintenance works.

In infrastructure maintenance, the analysis looks at the challenges facing management; the critical factors that affect maintenance implementation and what to emphasize when carrying out infrastructure maintenance work. In evaluating the performance of the local authorities in maintenance work, the study looks at the number of complaints made by the public as well as at the seriousness with which the local authorities inspected and maintained their infrastructure facilities. In analysing departmental concerns for infrastructure maintenance, the study also looks at the annual allocation for and the actual expenditure of these works.

2. Challenges Facing Management

Table 1 shows the seven potential constraints that would adversely affect any local authorities in managing their infrastructure maintenance programmes and the percentages of respondents who consider these constraints challenging ones. The constraints are listed in decreasing order of percentage size. It can be seen that not having enough staff is the most common challenging constraint to infrastructure maintenance programmes of the four local authorities, with 91.3 per cent of the respondents saying this. Under allocation of budget follows at a close second (89.1%).

Table 1: Challenging Constraints Facing Management in Maintenance Work and Percentage of Respondents

Constraint	Challenging	Not challenging
1. Under-staffed	91.3	8.7
2. Under allocation of budget	89.1	10.9
3. Incompetent contractors	69.6	30.4
4. Lack of skills and competency among staff	67.4	32.6
5. Lack of equipment, plants and machineries	60.9	39.1
6. Poor leadership and support from the management	50.0	50.0
7. Long work procedures and process	43.5	56.5

Other constraints considered challenging to more than half of the respondents are incompetent contractors (69.6%); lack of skills and competency among staff (67.4%); and lack of equipment, plants and machineries (60.9%). It is remarkable that as many as half of the respondents do not consider poor leadership and support from the management a challenge to their maintenance work. The same goes with long work procedures and process; less than half (43.5 per cent) of the respondents consider it challenging. That is, the respondents are generally not too concerned if there is poor leadership in their organizations, or the management is not supportive; they still think their maintenance work would not be

adversely affected. Evidently, the respondents are least perturbed by long work procedures and process as affecting maintenance work.

3. Critical Success Factors to Infrastructure Maintenance

Table 2 shows seven factors that the respondents varyingly consider critical to the successful implementation of infrastructure maintenance programmes of the local authorities under study. The factors are listed in decreasing order of percentage size. It can be seen that sufficient budget is the factor considered by the largest percentage of respondents (89.1%) to be critical to the successful implementation of infrastructure maintenance work.

Table 2: Critical Factors for Successful Implementation of Infrastructure Maintenance and Percentage of Respondents

Factor	Critical success factor	Not success factor
1. Sufficient budget	89.1	10.9
2. Sufficient staff	71.7	28.3
3. Competent contractors	71.2	28.3
4. Skillful and competent staff	69.6	30.4
5. Sufficient equipment, plants and machineries	69.6	30.4
6. Clear and concise work procedures	54.3	45.7
7. Good leadership and support from the management	52.2	47.8

The other six factors are perceived by the respondents as critical success factors. In descending order, these are sufficient staff (71.7%); competent contractors (71.2%); skillful and competent staff (69.6%); sufficient equipment, plants and machineries (69.6%); clear and concise work procedures (54.3%); and good leadership and support from the management (52.2%).

As is the case with constraints to maintenance work, where both sufficiency of staff and budget pose the biggest challenges, and poor leadership and support from the management poses less challenge, both sufficiency of budget and staff constitute critical success factors of maintenance work to the largest proportion of the respondents (89.1% and 71.7%, respectively). Again, as is with the earlier case, where poor leadership and support from the management poses the least constraint to maintenance work, this factor is relatively the least critical for the successful implementation of infrastructure maintenance programmes.

4. Project Implementation Stages and Maintenance Delays

There are six stages in a project implementation. Table 3 shows these stages and the corresponding percentages of respondents perceiving it to have caused delays in the overall project implementation. The largest proportions (67.4%) of the respondents consider the preparation of documents is the biggest contribution to delays in the implementation of maintenance project. This is followed by the construction stage (65.2%), site visit or inspection (60.9%), and approval process and site possession by contractor (52.2% each). The stage where delays are least likely to originate is the preparation of letter of award as only 23.9 per cent of the respondents think that this stage causes delays.

Table 3: Project Implementation Stage Causing Delay in Maintenance Work and Percentage of Respondents

Project stage	Causing delay	Not causing delay
1. Preparation of documents	67.4	32.6
2. Construction	65.2	34.8
3. Site visit or inspection	60.9	39.1
4. Approval process	52.2	47.8
5. Site possession by contractor	52.2	47.8
6. Preparation of letter of award	23.9	76.1

5. Improving Project Stages to Enhance Maintenance Works

In this section, the emphasis is on which of the stages need improvement to enhance maintenance work. Table 4 shows the project stages and the corresponding percentages of respondents perceiving it as needing improvement in order to enhance the implementation of infrastructure maintenance work. The largest proportions (75.6%) of the respondents consider the preparation of documents stage to be needing improvement. This is followed by the construction stage (73.3%); approval process (68.9%); site visit or inspection (64.4%); site possession by contractor (51.1%); and preparation of letter of award (26.7%). That is, except for preparation of the letter of award stage, all the project stages need improvement, in particular, the preparation of documents stage and construction stage. This consistency is even more evident during the preparation of documents stage, which has the largest proportion of respondents identifying it as in need of improvement. The same applies to the other stages.

Table 4: Project Stage Requiring Improvement to Enhance Maintenance Work and Percentage of Respondents

Project stage	Requiring improvement	Not requiring improvement
1. Preparation of documents	75.6	24.4
2. Construction	73.3	26.7
3. Approval process	68.9	35.6
4. Site visit or inspection	64.4	31.1
5. Site possession by contractor	51.1	48.1
6. Preparation of letter of award	26.7	73.3

6. General Performance in Maintenance Work

6.1 Inspection, Inspection Programme and Maintenance Plan

Table 5 shows that none of the local authorities have carried out regular inspections on its infrastructure facilities. In fact, all the local authorities neither have a regular maintenance inspection planning programme, nor a regular inspection programme. It is reasonable to expect that a local authority would have a plan for its infrastructure maintenance programme, from which it develops its inspection programme. With an inspection programme, the actual rounds of inspections of the local public facilities can be carried out more effectively. Thus, this conspicuous absence of inspection programmes and infrastructure maintenance planning programmes are certainly strange. However, further discussion on these issues is beyond the scope of this study. Nevertheless, it is important to gauge how this deficiency on the part of the local authorities manifests in its maintenance performance as reflected in the number of complaints received from the public, which would be the focus of the following sub-section.

Table 5: Regular Inspection, Regular Inspection Programmes, Regular Maintenance Planning Programme and Percentage of Respondents

Item	% Yes
1. Carry out regular inspection of infrastructure facilities	0.0
2. Have regular inspection programme	0.0
3. Have regular maintenance planning programme	0.0

6.2 Maintenance of Roads

Ampang Jaya Municipal Council allocated a total of RM1.5 million in 2005 and RM2.0 million each in 2006 and 2007. It overspent by RM0.5 million in 2005 and in 2006, but under spent by RM0.3 million in 2007. Kuantan Municipal Council allocated a total of RM1.195 million in 2006 and increased it to almost double the amount (RM3.6 million) the following year, of which all were spent. Seberang Perai Municipal Council had a budget of RM1.6 million in 2005, but the allocation was reduced by 6.3 per cent to RM1.5 million in 2006, and subsequently by a substantial 33.3 per cent to RM1.0 million in 2007. In all the three years, actual expenditure was slightly less than the allocations for this local authority. Malacca Municipal Council had allocated budget for its road maintenance far in excess of actual expenditure in 2005 (RM1.5 million allocation against RM151 000 expenditure), in 2006 (RM1.2 million allocation against RM287 000 expenditure), and in 2007 (RM1.25 million allocation against RM285 000 expenditure).

6.3 Maintenance of Drainage

Again, as is the case with road maintenance, Ampang Jaya Municipal Council had a budget which did not cover actual expenditure in 2005 (RM1.5 million allocation against RM2.0 million expenditure), in 2006 (RM2.0 million allocation against RM2.5 million expenditure), and in 2007 (RM2.5 million allocation against RM3.0 million expenditure). Kuantan Municipal Council did not match its budget and expenditure on drainage maintenance as well as it did for road maintenance. In 2005, it under spent its allocation for drainage maintenance of RM418 000 by RM87 000 or 20.8 per cent; and in 2007 it did not spend RM50 000 or 11.9 per cent of the RM420 000 allocation). That is, except for 2006 when the local authority spent exactly all its allocation of RM288 000, Kuantan Municipal Council had excess money for drainage maintenance in 2005 and 2007.

7. Concluding Remarks

Different perspectives have been given by different local authorities which have been explained in this paper. However, generally this paper highlighted that maintenance management practice is not the main obstacle for the local authorities in carrying out infrastructure maintenance works. There are other constraints which may hinder the effectiveness of the maintenance works carried out by the local authorities as highlighted by the maintenance personnel. It can be concluded that;

- i. Not enough staff is the most common challenging constraint. Shortage of experienced staff is also becoming a major constraint in carrying out maintenance work
- ii. Sufficient budget is the critical factor to the successful implementation of infrastructure maintenance works. Long term financial planning for maintenance is also essential
- iii. There are no regular inspections and no regular maintenance planning programmes that have been carried out on the infrastructure facilities. Regular inspection is a fundamental part of a preventive maintenance programme. According to Christian and Pandeya (1997), the economic life of a building or infrastructure can be prolonged through improved initial design and a regular maintenance programme.

There is definitely a need for a further in depth study on the infrastructure maintenance management in Malaysia. The future studies are expected to identify the influenced factors that may hinder successful implementation of maintenance work. It shall also provide a better understanding of the influenced factors and proposed ways to improved it. Future research should also include direct interviews beside questionnaires with comprehensive inquires and then triangulated with more case studies. This would enable us to understand how factors such as shortness of budget being allocation, insufficient staff, lack of competence contractors and inexperienced maintenance staff, the complicated process of preparing documentation would impact the proper maintenance of infrastructure being carried out. For future research the respondents or sample may include more maintenance staffs involved in local authorities in Malaysia. This is important to check for consistency, trend and differences of their constraints and opinions based on their respective local authorities. As defined different local authorities have their own different constraints, however if the study involves more local authorities, the trend can be easily determined.

7. References

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