

# A Critical Review on Multi Criteria Model to Support Maintenance Planning

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## **Abstract**

*Building-maintenance decisions are a challenge for most builders. When builders finish construction, at that place is a warranty period during which maintenance is their duty. These decisions have an effect that goes beyond the financial aspects of maintenance costs, because failures during the warranty period are reflected in customer satisfaction and may have an effect on future sales. Therefore, maintenance strategies should be prepared with a focus on how to best deploy them to optimize both savings and occupant satisfaction. For this purpose, the present paper proposes a multi criteria model based on the delay-time concept to provide the builder with a quantitative tool to support the definition of a maintenance-inspection policy. An example of the diligence of the model is presented, providing dependable outcomes that substantiate the decision maker in determining a better inspection policy.*

**Keywords:** Building Maintenance, Delay-time Inspection, Multi Criteria Decision Making (MCDM), Contracting

## **INTRODUCTION**

Setting up an appropriate maintenance strategy is an heavy job for maintenance managers. Building systems include mechanical, electrical, plumbing, security, communication, and data systems, incorporating different components to assure that buildings perform their functions within the mandatory specs. Therefore, it is important to insure adequate maintenance decisions during the life cycle of the building systems. Additionally, an adequate maintenance strategy also depends on the complexity of the organization.

All structures begin to crumble from the minute they are developed, and around then the requirement for upkeep starts. With the expanding costs of new development, the compelling upkeep of the current building stock has turned out to be yet more huge. Progressively, building proprietors are beginning to concede that it isn't to their greatest advantage to do support in an absolutely receptive manner, just that it ought to be outlined and made out as effectively as some other corporate activity. Unavoidably, this has set new requests on property supervisors, expecting them to embrace a more orderly way to deal with their work.

## **LITERATURE REVIEW**

The following are the previous research review based on multi criteria decision making.

**Christer et al. (1982)** studied the modeling of inspection policy for building maintenance and found that once an inspection system is operating, the natures of the defects are likely to change. Changes could arise due to the system change from contingency to inspection and also for behavioral reasons. [1]

**Christer et al. (1988)** found that both the risk and cost aspects of inspecting major civil engineering structures may be modeled as an aid to improving both the efficiency and the effectiveness of the process. [2]

**Horner et al. (1997)** said that with the assistance of building support technique, architects and administrators will have the capacity to take proper choices about choosing the most practical upkeep system for every individual thing in the building and the ideal designation of coordination assets, for example, save parts, devices, and staff which are required for the execution of upkeep exercises. [16]

**David et al. (1999)** claimed that the mechanical framework is the significant territory of trouble in building upkeep since it is one of the main three factors that have been put by the respondents as hazardous for every one of the three administrations of cleaning, reviewing and repairing. [5]

**Abdul et al. (2009)** said that building upkeep administration methods offer the possibility to enhance the execution of support administration frameworks, the frameworks have, nonetheless, been responsive, speculative, and restrictively based. It is these significant shortcomings in the proposed methods that have created the principal issues with the current and proposed assembling upkeep administration system, making their failure enhance the current courses of action. Said that building upkeep administration methods offer the possibility to enhance the execution of support administration frameworks, the frameworks have, nonetheless, been responsive, speculative, and restrictively based. [13]

**Abdul et al. (2010)** discovered that the regular support administration is the way toward arranging, sorting out, coordinating and controlling a customer's assets for a brief span. As such, the significant main thrust of the traditional operation is taken a toll sparing to the client. The client isn't the question of the support administration. This adds to poor administration conveyance, poor client fulfillment and the expansion in upkeep overabundance. [14]

**Joseph et al. (2010)** said that the fall in new building advancements, yet regularly expanding building stocks, has delineated the rising requirement for offices operation and upkeep in Hong Kong. A legitimate arrangement of capable specialists, along these lines, is basic for this creating segment. [10]

**Shafiee et al. (2011)** said that decision making model helps in the selection of maintenance strategy which minimizes the total anticipated cost per unit of merchandise. [11]

**Daniel et al. (2013)** said that the relationship between group size and collective action is non-linear. On one hand, it means that collective action can still function in large owners' groups. On the other hand, it expresses a message that the difficulties of carrying out collective action still exist in such groups. Government should understand these difficulties and assist owners in their hiring of management services. [4]

**Shirley et al. (2013)** discovered that there is no appropriate direction accessible; subsequently, it is basic to build up a deliberate approach that can help the upkeep work force in choosing the most reasonable acquirement strategy. The development of a basic leadership system utilizing AHP and Expert Choice 11 programming principally engaged along two essential constituents that are the conceivable appraisal criteria and the choices accessible for alternative. The appraisal criteria are utilized to assess the choices. [19]

**Garcez et al. (2014)** discovered that When it comes to making portions (ventures) of extra assets, an approach that places the dangers is the most fitting one since this empowers the DM to make an evaluated rundown of underground vaults and, hence, to dispense assets to those at the apex of the rundown until the point that all assets are depleted. [21]

**Xiufeng et al. (2014)** done investigation on flawed upkeep in view of delay time concept and found that with an expanding assessment interim, the normal cycle cost and expected cycle length will

monotonically decay, while the normal cost per unit time will initially lessening to a base and afterward increment to a steady. [22]

**Fei et al. (2015)** expressed that a delay time-based Project Management display limits the normal aggregate downtime caused by disappointments and Project Managers are encouraged to get the ideal PM approach. [7]

**Marcelo et al. (2015)** stated that reliability centered maintenance (RCM) gives the knowledge about resource allocation in maintenance action in better way. The implementation of multi criteria decision model seeks to generate consistent results that can assist managers in their planning of maintenance. [12]

**Robert et al. (2013)** discovered that the model created turns into the key piece of the requirement for vital arranging in building administration and it can likewise be utilized as an apparatus supporting the executive in numerous criteria building evaluation. [17]

**Sabaei et al. (2015)** said that there is a break all in all review for choosing a basic leadership technique in upkeep administration in view of chief inclination and furthermore found that ELECTRE family strategies can be a protected choice for leaders who need to consider all choices and want to outrank the options as opposed to getting rid of them. [6]

**Jiang et al. (2015)** discovered that in respect to the occasional review plot the proposed semi intermittent assessment plan can diminish the aggregate cost and increment the cycle dependability. [15]

**Widodo et al. (2016)** studied the model of bridge deterioration and found that (1) the longest deterioration if the abutment/pier probability value = 0 was happen in the 50th year or an additional 19 years longer (61.29%) from bridge deterioration using the preliminary probability values; (2) bridge deterioration could be prevented under conditions with both the level of probabilities = 0.75 and the time period of the bridge more than 50 years, by repair  $\geq 20\%$  of the annual rate of bridge deterioration probability. [9]

**Cristiano et al. (2017)** said that the use of multi criteria model is favorable in many respects because of the decision maker's participation in the model. Based on the model and result found, the proposed policy has a high potential for effectiveness in practice, it not only helps the decision maker to determine when to carry out inspection, but it also provides a much better view of the consequences of choosing a particular interval. [3]

## CONCLUSION

From the above literature review, we can conclude the following things:

1. Model based on both the cost and risk aspect will improve both the efficiency and the effectiveness of the process.
2. With the assistance of building support methodology, designers and administrators will have the capacity to take proper choices about choosing the most financially savvy upkeep procedure for every individual thing in the building and the ideal designation of coordination assets, for example, save parts, apparatuses, and work force which are required for the execution of support exercises.
3. The mechanical framework is the significant zone of trouble in building upkeep.
4. The traditional upkeep administration is the way toward arranging, sorting out, coordinating and controlling a customer's assets for a brief span. This prompts poor administration conveyance, poor client fulfillment and the expansion in support excess.
5. Basic leadership display helps in the choice of upkeep technique which limits the aggregate expected cost per unit of an item.
6. The advancement of a basic leadership system utilizing AHP and Expert Choice 11 programming will enhance the adequacy and proficiency of basic leadership.

7. Delay time-based Project Management demonstrates limits the normal aggregate downtime caused by disappointments and Project Managers are proposed to locate the ideal PM strategy.
8. Relative to the periodic inspection scheme the quasi periodic inspection scheme can reduce the total cost and increase the cycle reliability.

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