

A Study on Adverse Effects in the Existing Demolition Technologies and Deriving Modified Technologies to Maximize the Reuse of Demolished Building Materials

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ABSTRACT: Demolition is the process of removing the building elements by sequential order. This paper discusses analysis on, the existing demolition techniques and analyzing adverse effectiveness of each and every technique. A survey is conducted on various demolition industries in Tamilnadu. Suggestions for installation of recycling material plant to maximize the reuse of demolished building materials are made.

KEYWORDS: Demolition techniques, adverse effects, reuse of demolished materials.

I. INTRODUCTION

Demolition is an art of dismantling the buildings structure without affecting the surrounding occupants with proper planning. Each and every building structure is designed for an economic period. After service economic period reaches its existence become very dangerous to occupants and to the surroundings. For this purpose, the old structures need to be demolished for replacement by new structures. Small structures can be demolished by manual methods, machinery and advanced techniques are required for demolition of bigger structures. Advanced techniques are also required for faster demolition and demolition in confined areas.

Demolition methods can vary depending on the area where it will be held on, time available, the building material, the purpose of the demolition and the way that debris is going to be disposed. Time saving methods is more expensive than the slower ones. If noise, dust, and vibrations are to be restricted, it will add to the cost of demolition.

The growing importance of recycling and practicing environmental sustainability in demolition has even given rise to new industry buzzwords such as deconstruction. Deconstruction is the selective dismantlement of building components, specifically for re-use, recycling, and waste management. It differs from demolition where a site is cleared of its building by the most expedient means. Various demolition methods, comes under Non-Engineering and Engineering demolition are normally used. Both were used in conjunction with more traditional methods such as hand tools. Use of any of these methods requires a proper understanding of the structure and the use of appropriate methods at minimizing the risks of causing damage to persons, properties and the neighborhood environment.

This paper covers the methods commonly used in demolition of structures giving attention to the planning and execution of the demolition work, ensuring safety at the work place, advantages and disadvantages, application of the techniques in required place, new methodology to control the adverse effects to the occupants and surroundings and also to maximize the reuse of demolished materials.

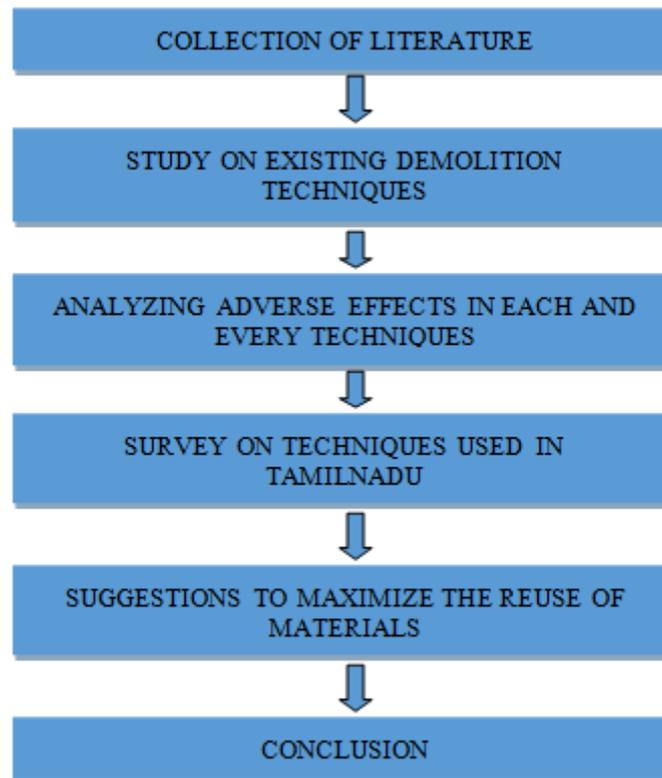
II. METHODOLOGY

The methodology adopted for this study is as follows. A detailed study on existing demolition techniques and suggestions for installation of recycling material plant to maximize the reuse of demolished building materials.

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III. EXISTING DEMOLITION TECHNIQUES

A. Various demolition techniques:

- a) Demolition by Manual method,
- b) Demolition by Saw Cutting method,
- c) Demolition using Water-Jet method,
- d) Demolition by Wrecking Ball method,
- e) Demolition by Wire rope pulling method,
- f) High reach (or long reach) demolition excavators,
- g) Demolition by Explosive method,
- h) Demolition by Implosive method,
- i) Non-Explosive demolition agent,
- j) Kajima cut & Take down method.

B. Adverse effects in existing demolition techniques:

A deep analysis on demolition of building techniques shows that, health safety is must. The demolition process should carry out with proper planning by a special team of technical knowledge persons. There is different kind of effects occurring in every demolition techniques.

Cost of implementation, Time delay because of slow implementation, Labour requirements is high, Critical injuries because of falling of building elements in manual method, wastage of water in water jet method, cost of explosives is high, special team is required for controlled demolition, Noise pollution, Air pollution, heavy dust, Possibilities death, in and around the surroundings.

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IV. DISCUSSION

A. A survey on Demolition techniques used in Tamilnadu:

Tamilnadu is one of the developing states in India. The selection of demolition is based on the site location and area covered around the selected buildings, Figure: 1 shows that the methods which are frequently used by various industries. The development of the place is mainly based on the wealth and infrastructure of the buildings. In Tamilnadu normally high rise buildings are less, Figure: 2 shows that the types of buildings demolished in various industries. So for the demolition purpose manual method, machineries and drillers are preferred. This study helps in future for safety demolition and effective usage demolished building materials. Now-a-days the demolished building materials are using only for dumping before road laying, back filling of lands and wells and timber for burning bricks in industries, Figure: 3 shows that the types of recycled materials used in construction industries . In foreign countries they are using the demolished building materials effectively by installing a recycling of construction waste plant. By this recycling process the cost of materials and debris value gets increased.

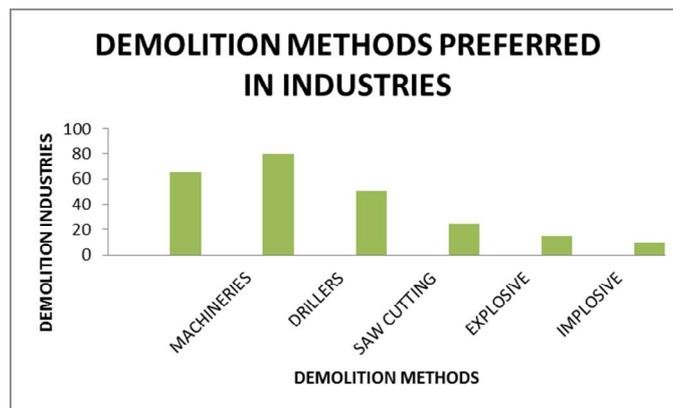


Figure:1 Demolition methods used in various demolition industries

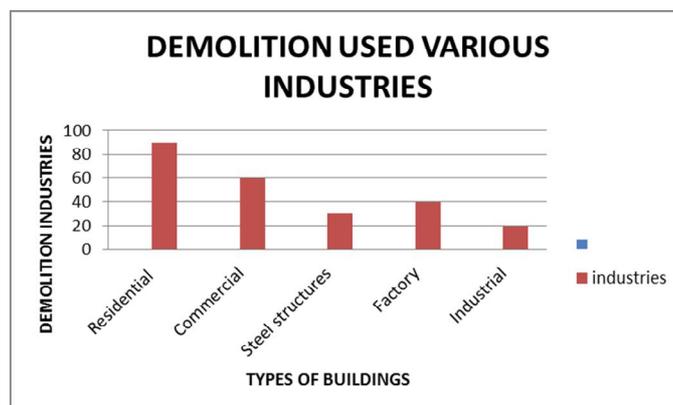


Figure:2 Types of buildings demolished in various industries

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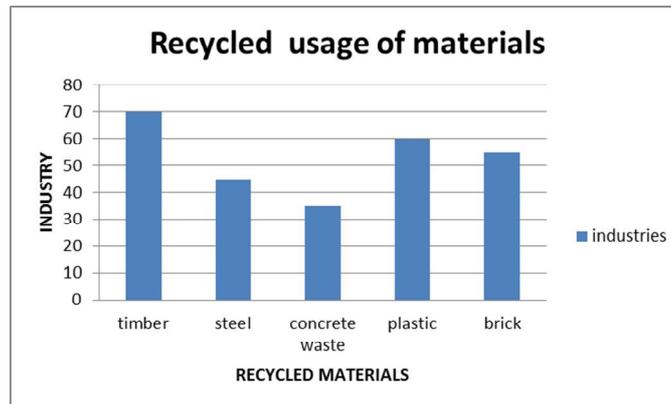


Figure:3 Types of recycled materials used in construction industries

B. Future scope:

From the recycling plant the materials are recycled for the construction process. Though the demolished materials are partially mixed with the raw materials, the strength achieved using these materials is good enough. The materials obtained after recycling are aggregate, crushed sand particles, recycled metallic bars and recycled plastics (pvc pipes, plastic doors etc.,). Initial cost of installation of the recycling plant is high, but in future the beneficial cost may reach profit.

$$\text{Benefit cost ratio} = \frac{\text{Fresh raw material rate}}{\text{Recycled material rate}} \quad (1)$$

Benefit cost ratio should be more than 1 and then only it is profitable as shown in equation (1) [5].

V. CONCLUSION

The selection of demolition method depends upon various factors such as site condition, type of structures, age of building, height of building and economy. While comparing all the demolition techniques, implosive method of demolition seems more efficient and also completion time is very low. The reuse of demolished materials in this controlled demolition will be appreciable when compared to the other types. However all safety measures should be considered for each demolition process.

The installation of recycling plant for demolished building materials will have a good scope in future due to scarcity of fresh raw materials required for construction purpose. As a result of the scarcity of these fresh raw materials, it is economy replace with recycled demolition building materials for construction works.

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