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# A critical literature review on reuse and recycling of construction waste in construction industry

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## ABSTRACT

Development squander material is a significant issues of development field. This paper says that, detailed study on literatures, list of materials used, reuse of materials, sources of wastes and the places where the materials can be reused. Finally, comparison of percentage on waste materials (Standard waste and Actual waste at site through interview), Table for the sources and reuse of waste as per literature study, suggestion have been given to reuse the waste and suggestion given to manage the materials.

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## 1. Introduction

Advancement waste involves unfortunate material conveyed direct or by chance from the structure site. Building waste is comprised of materials, for example, blocks, solid, utilize wood, steel, total, mortar, tiles and so forth. . . Or on the other hand unused for different reasons during development by the development enterprises. Reusing is one of the most essential issues of day in the improvement business. Material recovery, scrap, reusing has a wide extent of focal points for environmental and network as well as for the organizations/business. The material reuse should be possible by rescuing, repairing and reusing material inside a similar structure or in another structure.

Reuse should be considered as a need appeared differently in relation to reusing anyway this option continuously doesn't occur. Reuse routinely requires irrelevant planning before reapplication in a near application, while reusing ordinarily requires isolating waste into a homogeneous material for a lesser worth application or introduction as swap feed stock for created parts. An ordinary misguided judgment lies between the areas of reuse and reusing of old structures; they are routinely seen as together when they are truly fighting choices for the procedure with use of benefits.

By and large, the reuse of building materials and things has been high, with the structure squares of old structures consistently used to shape new ones, and old materials re purposed until not, now fit for use; in any case this has reduced over the latest 70 years. The parts behind this move in lead and in what capacity may we rearrange the procedure with decline in the reuse of things and materials should be settled. To this end, reuse of end-of-life building things and materials in tendency to reusing and recovery. A lot of this has been focused on the headway of pre-obliteration and pre-rebuilding surveys to empower reuse through setting targets and perceiving markets for reusable resources going before work beginning.

### 1.1. Material waste

Squander in development can be characterized into three principle types: misuse of materials, exercise in futility and misuse of apparatus. In any case, this examination centers around materials squander. Development material squanders allude to materials from building destinations that are unusable with the end goal of development and must be disposed of out of the blue. This definition avoids earth materials, however incorporates some other which should be moved somewhere else from the building site or utilized on the site itself other than the proposed explicit reason for the undertaking because of harm, overabundance or non-use or

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which can't be utilized due to rebelliousness with the details, or which is a result of the development procedure.

### 1.2. Material specific reuse and recycling

An enormous extent of the waste delivered on building destinations is recoverable for reuse and reusing. This anyway relies upon site practice and whether squander the board has been organized or not. While it is conceivable to reuse and/or reuse a significant number of the waste materials created nearby, the achievability will rely upon the economic situations for each sort of material. Material reuse can take

- The high worth utilization of materials in a comparative application for example optional utilization of a window outline, or in an alternate application for example the utilization of auxiliary blocks for clearing.
- The low worth utilization of materials in a comparable application for example the utilization of a squashed solid street surface as a street sub layer or in an alternate application for example the utilization of wood off-cuts as shades. Various structure.

A portion of the issues that should be considered during the arranging of material explicit reuse and reusing include:

- Providing a focal (advantageous), yet isolated, storeroom for reusable waste nearby;
- Determining reusing open doors for different waste materials in the area of the undertaking;
- Determining related expenses identifying with squander holder rental, squander transportation and waste removal charges.

## 2. Literature review

Shalaka Vishwa Sraw Patil [1]. The author says that construction industry facing major issues that was the construction waste material for progress. It is imperative to lessen contamination and secure condition. Plastic might be utilized to supplant a touch of the material in a solid blend. This plastic totals gave inside cooler, when the external temperature is raised, as looked at the typical cement. Second think we use waste coconut shells is the best material for concrete. In hardened concrete, using sisal mix should reduce weather related problems. The two methods are given best solution to reusing common solid waste material.

Avhad et al. [2]. The creator says that ecological securing is the most basic for human's life. Not just for endurance additionally our duty. Ensure common assets, manageable improvement are need capable think in current development works. We invested 90% of our energy in building like additionally streets, thruways, spans and so on we take half materials from nature. Nature won't help us in unsurpassed, so we reuse the materials look at the materials after we use it. In every year we produce 300 tons squander from development and destruction, and half recouped for reusing, and rest is land filled. From the outcome in the wake of utilizing old utilized materials. Which implies we may utilize it and get quality solid blend.

Senthil Kumar et al. [3]. The author says that sustainable development not only based by improvement of designable buildings is also from protection of environment. With the rapid development of urbanization many buildings gets demolished and produce lot of waste. Recycled Aggregate (RA) come from building waste is alluded to as Recycled Aggregate Concrete (RAC). Many test result for the RAC and conventional concrete have been examined and compared. Split elasticity, and flexural quality, utilization of the reused materials are gives answers for development and destruc-

tion (C&D). Finally test result shows Concrete aggregate is help and solve an environment issues apart from conventional concrete.

Lalit Gamashta and Swarna Gumashta [4]. The author says that need of reusing, recharging of cement and workmanship structures is raising all over nation ,particularly creating nations squander materials and blocks are reuse after destruction and it will help in decreasing the environmental pollution secondly it will reduce land-fill method. This method explore at earth 92 conference held at Brazil, are most welcoming thought. Environmental damage caused by deforestation, unreasonable mining, hazardous toking, exhaustion of ozone layer, contamination of streams and oceans and it also affect health of entire planet, some important possible application are suggested like washing using old materials not affect weathering, using broken bricks in use full methods finally it will supportive in limiting pulverization to earth outside layer and sparing nature.

Demir and Orhan [5]. The creator says that Waste Clay Brick (WCB) is silicate strong waste its reusing has extraordinary ecological and social criticalness. The ebb and flow research of the effect of WCB as recyclable on the machines and as channel in design torments, as channel plastic materials after altered. It is utilized in creations of recyclable antiquated building block lately it likewise disposing of fluorine, smelling salts, nitrogen and phosphate. This technique have likewise a few issues like diverse wellspring of WCB, retaining capacity, efficient incentive as of late. The recyclable utilization of WCB pulled in more. It has laid a strong cellar for improving its capacity.

Vivan [6]. The creator says that pace of reusable and recyclable waste in development materials. He take six kind of significant waste materials, these are plastic, paper, timber, metals, glass, and cement. Five case considering are led by him and examination of these case, he discover "metal" is the critical degree of reusable and recyclable waste, and plastic is the low level of reuse and recyclable squandered.. At long last he propose to the reusable and recyclable rate and suggest fathom thought for us.

Mehrdad Abkenari, Alireza Rezaei, Naghmeh Pournayeb [7]. The creator says that to create and creating nations confronting significant issues that is development squander materials produce. It will most prominent effect for ecological so that reuse the development squander material. To be forestall condition contamination reusing waste material is a significant however not just for condition and abatement space occupation. Ought to be comprehended that having cautious data about the quality and extent of waste materials and it place. The effective arrangement to exercises identified with reusing of development squander and lessen the natural contamination expressed the monetary outcomes got.

Makegaonkar et al. [8]. The author says that development and destruction squander in development industry in India produces around 20–32 million tons of waste every year. Most extreme C&D squander in India is getting arranged into the landfills. It is getting regular sullying. The removal of C&D squander it ought not to be executed appropriately. Center around this paper is reuse and reuse of C&D squander material. Principally disclosed to the examination is reused total we can fill the hole between the interest and supply of the development material and the reused total utilized in the advancement work will in like manner decrease the cost of the assignment and minimization of tainting of earth by least evacuation of C&D waste into the territories fills.

Davorin Kralj, Mirko Markic [9]. This paper base on reuse building material for condition confirmation and supportable improvement. To realize techniques used to diminish waste and increment benefits through rescue, reuse, reusing development squander. This writing following "green" the board procedure are intended to secure condition, spare asset and monitor vitality. Introducing attributes of reuse material made of light weight concrete with totals containing ex planted glass. To plan advancement with least of waste and to improve essentialness capability in structures.

Jungha Park & Richard Tucker [10]. The maker says that how to improve the advancement waste the board and augmentation the use of reuse and reused materials. In the writing that waste reuse proactive have a conclusive task to carry out in improving decrease of waste. To actualizing reuse techniques a large portion of hazardous impediments are institutional obstructions the writing from the most recent 10 years confronting issue various partners around reuse of development squander in Australia. Finding that institutional distinguish are identified with issue outside of the development business. The survey distinguished current hindrances to execute reuse of development material and mentality of five partner's gathering property holder, modelers, temporary workers, engineers, and the authoritative bodies. A ton of work remains in the regular issue cycle advancement and its relationship to improvement structures material reuse.

Table 1 represent the comparison of standard waste and allowable waste as per qualitative survey interviewers in this site. It may be consisted the approximate material waste it will be calculated the percentage of construction waste material.

Table 2 represent the table explain which material waste mostly generate in construction industry, its percentage value and suggestion for reuse/recycle waste and also to avoid wastages.

**3. Methodology**

This research paper shows that, qualitative survey has been done at site for, list of construction waste materials, percentage of construction waste material sources of waste and concluded with effective utilization of waste at each stage (Fig. 3.1).

- ID of various sort's waste material dependent upon the game plan of various papers and applicable examination information.
- Set up the solicitations identified with squander material in building site.
- Poll review drove being created affiliations and work power interviews with experience in charged and progression experience boss.
- Analysis of data and survey.
- Results and proposition.

**3.1. Data collection**

Date assortment done in two different ways, initial one is to gather the waste materials, which are delivered in building site, assortment of most recent distributed papers and research system, and second one is close to home connection with development organization authorities, in close to home meetings with venture in control, site designers and works. All things considered we enquired that whether the organization has following any waste reuse techniques, reusing strategies, or not, and furthermore gath-

**Table 1**  
Comparison on Standard Waste, Allowable Waste, As Per Qualitative Survey Interview.

Item Name	Standard Waste	Allowable Waste	QS Interview From Site
Cement	1%	1.5%	1.3%
Steel	3%	3-5%	3.35%
Brick	5%	5%	4.42%
Structural steel	10%	5-10%	5-10%
Coarse aggregate	2.5%	5%	4.49%
Fine aggregate	2.5%	10%	8%
Tiles	4-5%	2%	10%
Sand	1.5%	7-10%	3.56%
Block	5%	5-7%	4.49%

**Table 2**  
Effective Utilization of construction waste material.

Items	Major reason for waste	Suggestion for reuse and recycled waste
Cement mortar Standard waste - 10.5% by waste	Material split on ground Left cover mix used that has not been used. Handling and transportation of mortar Brick work joints Plaster thickness	Can be covered to recycled aggregates. Crusted and wed for recycled sand. Can be used as a cement replacement.
Bricks and blocks Standard waste - 5% of brick Standard waste - 5% of block	Poor handling and transportation Delivered the damages of the bricks and blocks	Crushed/chipped and used as landscape material. Ground into powder to make new bricks. Crushed into fine aggregate. Can build outdoor ovens.
Concrete Standard waste - 1%	Poor handling Over - sized foundation Poor storage Poor workmen ship	Which can be separated and reused as base course in garages and pathway. Concrete is generally reused. It is squashed, the support bar is evacuated, and the material is screened for size
Steel Standard Wastage - 3%	Change in design Over ordering Damaged during the transportation to site/on site Lack of good storage location system	Steel maximum 100% recyclable. Steel from reinforcement wire, containers.

ered the information seeing waste reusing material rundown as we gathered how much waste material can creates in building site.

**4. Result and discussion**

- Concentrating on reusing the principle kinds of waste will be most financially savvy and can change the task progress
- Construction waste removal charging plan to guarantee that removal of development waste can decrease the waste created
- Reuse or repurpose the current materials once they have been stripped out, diminishing the expense for new materials
- Collaborate with different business and exchanges to recognize the potential open door for trading materials
- Carry out fixes on harmed materials, for example, beds and reuse the transitory materials including mortar sheets, fencing
- Stock heap squashed materials structure yearly periods of undertaking to reuse later on and think about utilizing any extra materials on different occupations
- Maximize waste conceivably through. Reusing and reusing to ensure no materials are squandered send to land fills
- Choose reuse materials for the tasks, these can offer a quality as new materials yet at lower unit cost
- the most astute approach to reuse development squander is to coordinate it again into the new structure
- Standard measurements additionally make it simpler to reuse any materials you have left finished.
- If the reusing focus is close enough discover what they take and when they open
- Maximizing the reuse of development materials direction can be empowered among the works and contractors

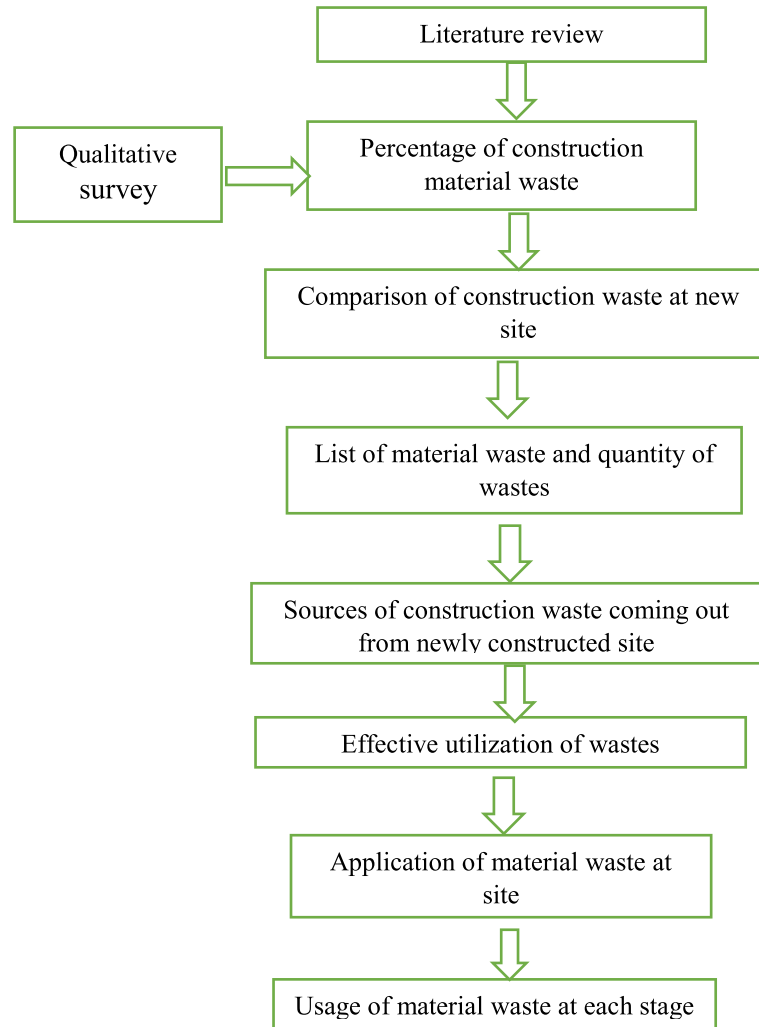


Fig. 3.1. Methodology.

- Good development bookkeeping apparatuses will assist the undertaking with managing the reserve funds to be made through reusing

## 5. Conclusions

The study has given observational proof on the degrees of commitment and the degrees of training of waste reuse/reuse quantities in Chennai development ventures.

- The results demonstrated that the general act of development squander the executives and site squander the executives is lingering behind and has space for a great deal of progress. The development expert's understandings CWM was found to insufficient and the reception was additionally hampered by absence of adequate enactment or government motivating force to energize the lessons of reasonable development.
- Educational foundations ought to remember the educating of maintainable development for the educational plan of experts in development industry. Gatherings and workshops ought to be sorted out to instruct rehearsing experts.
- Government ought to carefully screen the taking care of and removal of development squander (enactment).

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## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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