

# Construction Sustainability in Indian Perspective.

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## ABSTRACT

This paper presents a study of scenario of Construction Sustainability in India in terms of how the Indian construction companies are coping with the urge of incorporating sustainability in their projects. Since few decades there is a drastic increase in environmental degradation. Construction industries contributing to a major part of this cause. In order to prevent the degradation by construction companies we need to implement sustainable tools and practice of project management. In this study a brief check on the scenario of Indian construction companies has been taken in terms of their progress towards sustainable development. A questionnaire carrying questions related to sustainable practices in project management and the role of project management, was circulated among the people related to construction field. The responses received were used to deduct the conclusion about the scenario of Indian construction companies. Some best strategies used to attain sustainability in a construction project are: use of available assets, use of renewable sources of energy, use of green materials, building green structures, taking advantage of natural day light, reducing water wastage and pollution, ensuring the safety of workers etc.

**KEYWORDS:** Sustainability, construction, design tools, sustainable practices, construction project management.

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## I. INTRODUCTION

What is sustainability?

The first and foremost term that we need to understand is 'Sustainability'. Sustainability originates from a Latin word 'Sustinere' meaning 'to hold'. Sustainability means meeting our current needs without negotiating the ability of future generations to accomplish their own needs. In addition to natural resources, we also need social and economic resources. Sustainability is not just environmentalism. From numerous literatures linked to sustainability, it is found that sustainability is not narrowed to just environmental issues but also encompasses social impartiality and economic development.

The building construction business, by its actual nature, is a major client of normal assets. In any case, with developing worries over environmental change and the limited idea of these assets, there is expanding tension on development firms to decrease their ecological effect. While there are difficulties associated with taking on feasible development techniques, there are likewise extraordinary advantages as well.

Environmental Sustainability:

Ecological harmony is kept up with, each of earth's ecological frameworks are kept in balance while regular assets inside them are consumed by people at a rate where they can renew themselves.

Economic Sustainability:

To make sure human societies across the earth can preserve their independence and have access to the resources that they necessitate, financial and other, to meet their necessities.

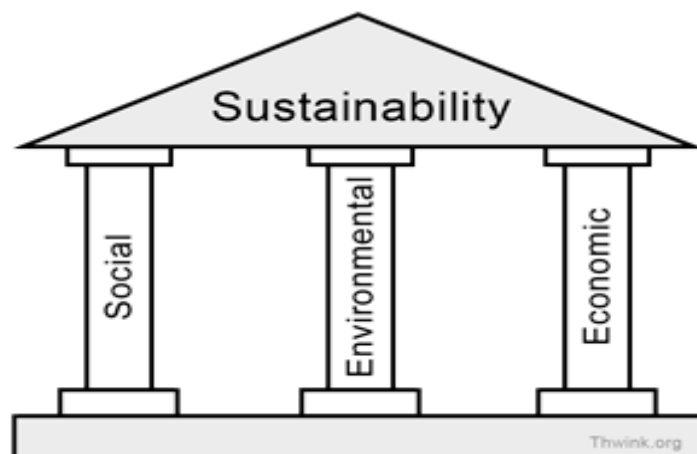


Figure 1 Three pillars of sustainability.

Social Sustainability:

To make sure universal human rights and basic necessities are achievable by all people, who have access to sufficient resources in order to keep their families and societies healthy and secure.

Importance of sustainability in construction industry:

Sustainability expands the excellence of our lives, guards our ecosystem and conserves natural resources for future peers. In the commercial world, sustainability is connected with an organization’s all-inclusive approach, taking into account everything, from manufacturing to logistics to customer service. Going green and sustainable is not only advantageous for the company; it also maximizes the profits from an environmental focus in the long-term. Below given are some of the major reasons for why maintaining sustainability is important:

- Ensures a Future for All
- Reduced Energy Usage
- A Healthy Habitat for All
- Societal Impact

## II. Literature Review

Mokal et.al (2015) describes construction industry as one of major consumer of natural resources. The author has mentioned five sustainable construction building materials in his paper. The author describes green buildings as “people with healthy, comfortable and safe living, working and activities of the space, while the building full life cycle process to achieve efficient use of resources with minimum impact on the environment of buildings, also known as sustainable building envelope”. The author chose following five materials by considering their easy accessibility, price and strength:

- lime.
- sand lime bricks.
- eco-friendly tiles.
- colored lime plaster.
- reflectasol glass.

After testing their properties, following results were deducted:

The author chose Eco-friendly tiles as a sustainable material because these tiles are durable when compared to ceramic tiles. Also, the eco-friendly tiles are manufactured from locally available materials and use less amount of energy resources in their production.

Ogunde et.al (2017) in a case study of Nigerian construction company tried to find out the challenges faced by the company to inject sustainability in their project management. In their study they published a questionnaire among various personnel related to civil engineering and the responses were used for analysis. With the help of those responses some challenges faced by the construction companies were examined. In order for a project manager to succeed in his project following skills shown in figure are crucial:

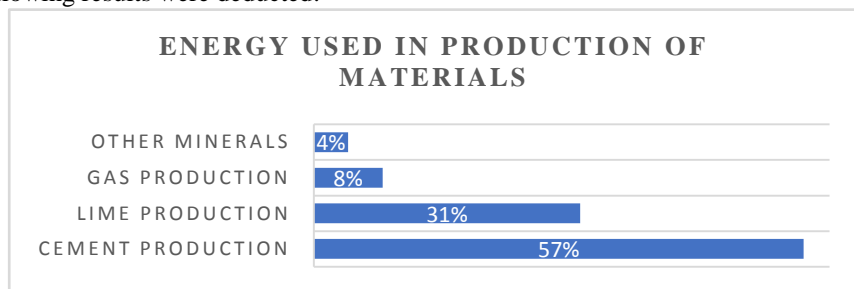


Figure 2 Energy used in production of materials.

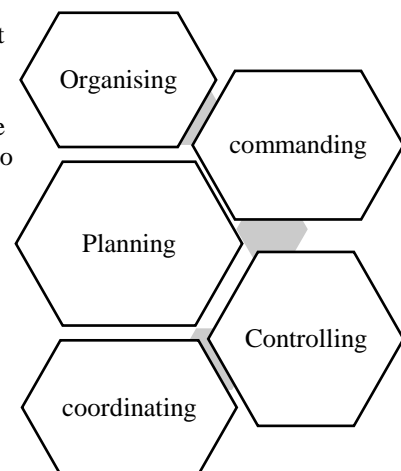


Figure 3 Crucial skills for PM.

### III. Research Methodology.

A questionnaire in the form of google form was designed taking into consideration the available literature review. The questionnaire was distributed through online platforms due to the covid restrictions. Total 110 questionnaires were circulated among different categories of respondents all over India. Among the distributed questionnaires a total of 71 responses were received from the respondents. The responses were collected by either mailing the google forms or by sharing it through social media platforms such as LinkedIn. The trustworthiness of the responses is expected to be decent as the survey was done by selective distribution of survey forms. The type of respondents includes civil engineering students, civil engineering professors, working civil engineers, project managers, contractors etc.

Following detailed responses were received:

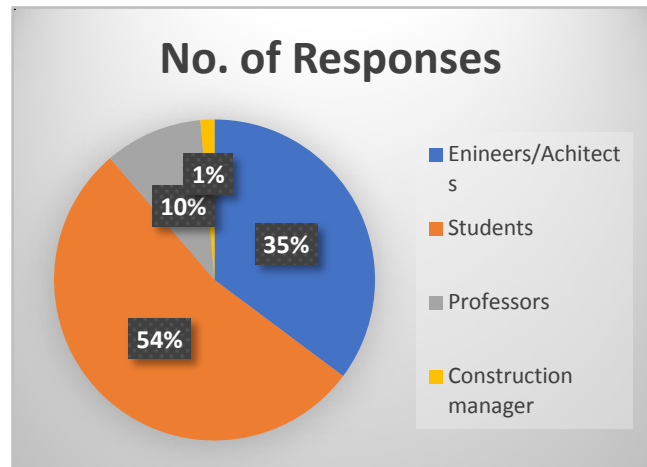


Figure 4 Pie chart types of respondents

1. Number of people aware about the term sustainability?

Out of 71 responses received only 1 respondent was not aware of the term sustainability. So, here arises the need of developing the awareness about sustainable construction among the common people as well as the people related directly to the construction industry.

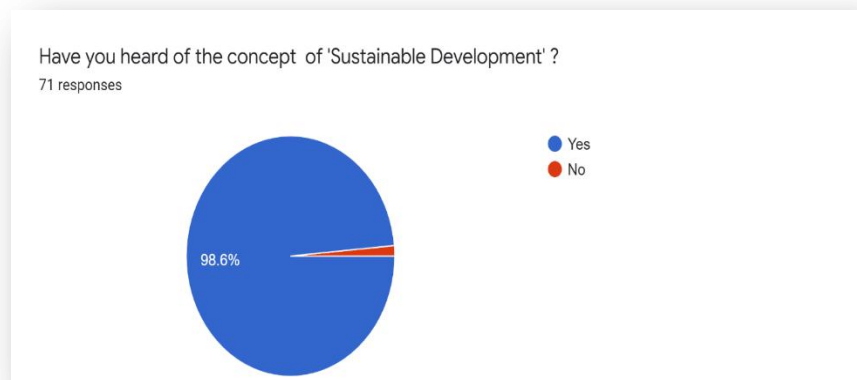


Figure 5 Number of people aware about the term sustainability.

2. Are you anyhow related to construction field?

Out of 71 responses 60 people were solely related to construction field and 10 people were not.

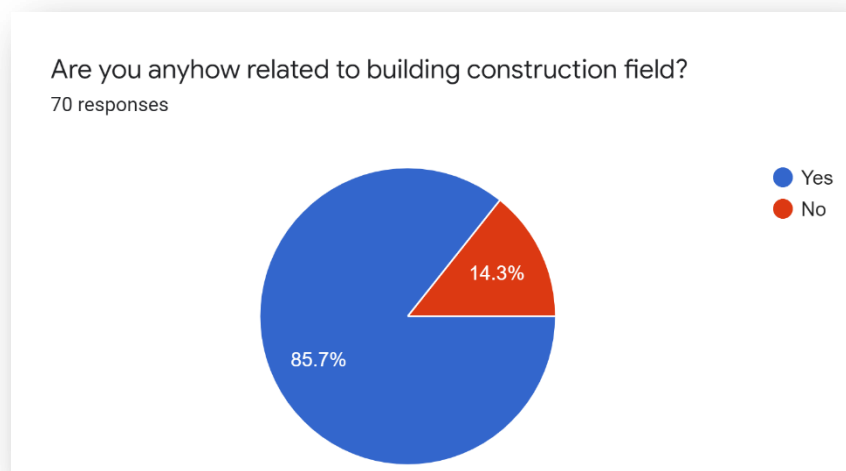


Figure 6 People related to construction industry.

3. Do you think Indian construction companies are making efforts to go green?

It is quite evident from the above chart that the majority of the respondents believe that the Indian construction industries are lagging behind the trend of going green. Though there are few popular green structures certified

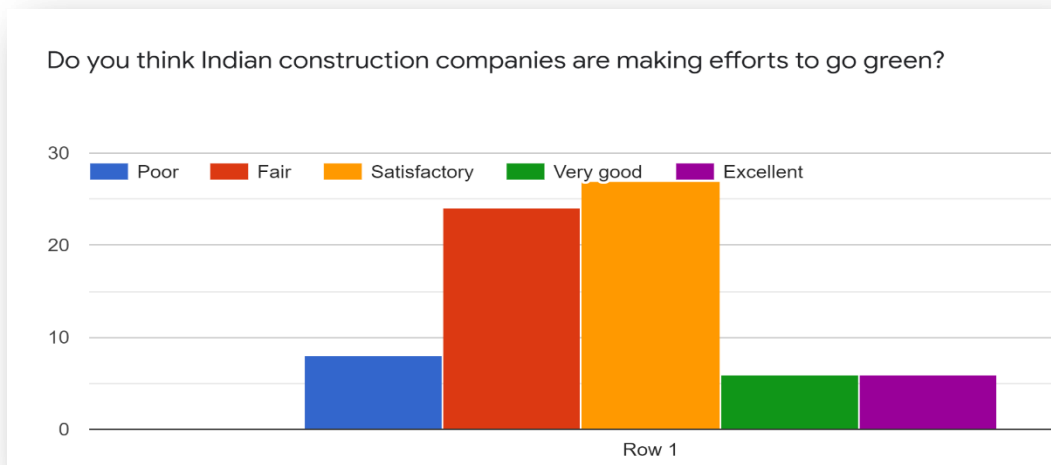


Figure 7 Do you think Indian construction companies are making efforts to go green?

by GRIHA and IGBC, but we still have a long way to go. There is room for improvement in this field which gives an opportunity for the investors to invest in green ideas.

4. Do you think project managers play any role in implementing sustainable construction practices?

In order to put any plan to work it is the ultimate responsibility of the project manager to interpret and implement that plan practically. Same is the case with introducing sustainable practices in construction industry. More than 40 respondents out of 71 believe that the project manager plays a significant character in implementing sustainability in construction field.



Figure 8 Role of project managers.

5. Three dimensions of sustainability.

Sustainability is a broad term meaning satisfying the needs of present generation but at the same time caring for the needs of future generation. Sustainability is a further classified into three pillars viz; social, economic, and most importantly the environmental. the environmental factor seems to seek more importance than the other two

pillars. In order to achieve environmental sustainability, the construction companies are trying to reduce material wastage, minimizing their carbon footprint and decreasing other harmful impacts on environment as low as possible. 69 responses were in favor of having knowledge about the three pillars of sustainability and 2 were not in favor of having any knowledge about the three pillars of sustainability.

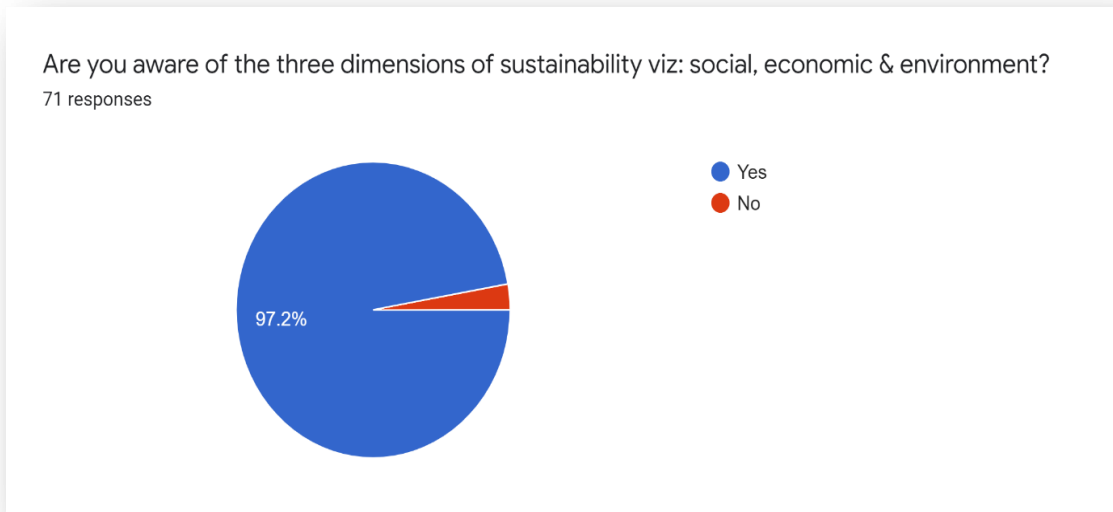


Figure 8 Three dimensions of sustainability.

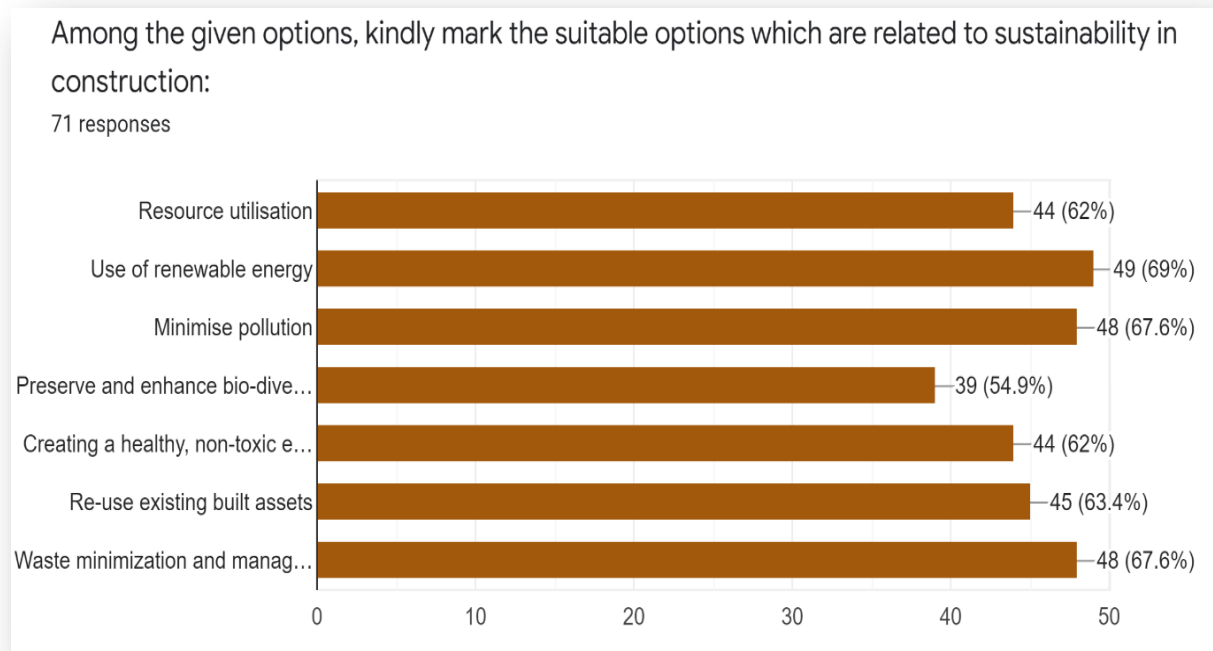


Figure 9 options related to sustainability

6. Mark the suitable options helpful to achieve sustainability in construction?

There are a lot of factors that help in achieving sustainability in construction industry. Some of those factors were asked to our respondents and the responses are shown in the chart above. It is seen from the data collected that 62% of the participants think resource utilization can help in achieving sustainability. Also, the use of renewable energy helps in achieving sustainability as voted by 69% of the respondents. Similarly reducing pollution in the environment helps in attaining a green environment. The majority of the respondents believe that re-use of existing assets and minimizing waste can help us to achieve a sustainable development (63.4% & 67.6% respectively).

7. What are the steps you as a company are taking to reduce material wastage?

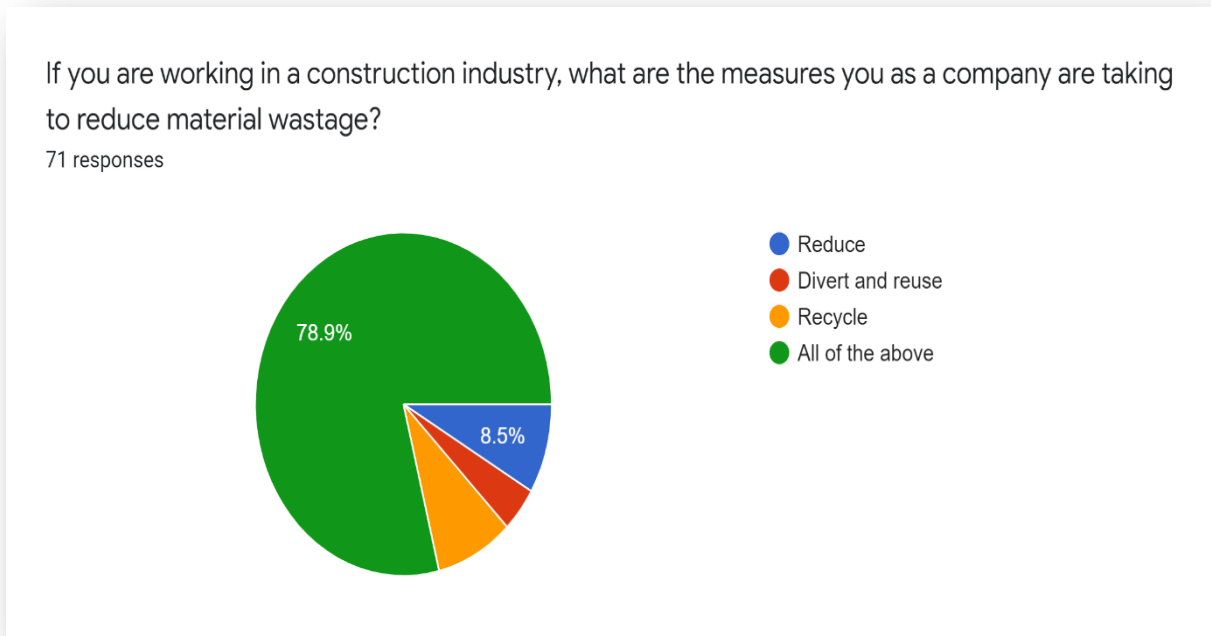


Figure 10 steps to reduce material wastage.

In order to reduce wastage of material there are many strategies such as reduce, divert and reuse & recycle. So, the participants were asked to mark the best choice from the above given options as per their knowledge and experience. So, the pie chart shows that the majority (78.9%) of the participants chose all of the given options as their best strategy to achieve sustainability. While others also chose reduce (8.5%), divert and reuse (4.2%) and recycle (8.4%) as their best strategy to attain sustainability in construction industry.

8. Steps taken to reduce water pollution?

Water pollution and wastage is also a major environmental issue prevailing at pace since few decades. It is observed that construction industry contributes negatively to this issue. In order to make a positive impact on this issue there are various strategies which can help us to reduce the water pollution and the same were asked to our respondents. Strategies such as practicing ethical and legal waste disposal (5.6%), keeping cement and sand secure so that it doesn't get mixed with the fresh water (2.8%), prevent construction waste water from entering the natural river streams (7%), encouraging water harvesting and reusing the water at site (5.6%) and using all of the above strategies together (78.9%).

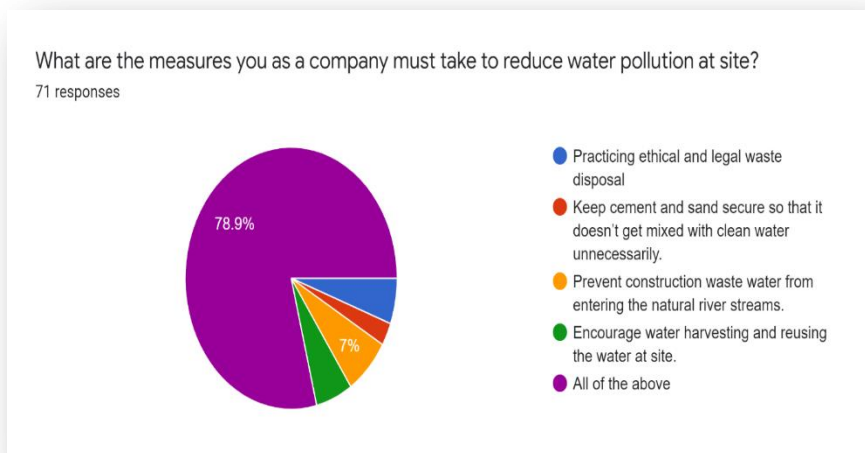


Figure 11 steps to reduce water pollution.

9. Steps taken to reduce noise pollution at site?

Any working construction site is bound to produce noise coming out of loud machinery and equipment, labor at work, different kind of ponding noises etc. which makes it unpleasant for the surrounding residents of that construction site. In order to reduce this noise pollution, some methods have been proposed and the same were asked to our respondents viz; engineering controls (58%), administrative controls (34.8%), personal protective equipment (37.7%) and preventive measures (63.8%).

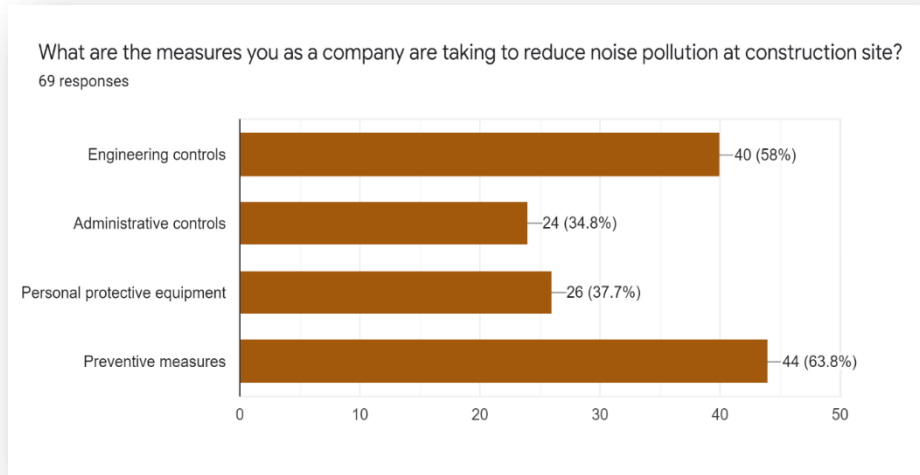


Figure 12 steps taken to reduce noise pollution

10. Barriers in smoothly utilizing the tools and techniques of sustainability?

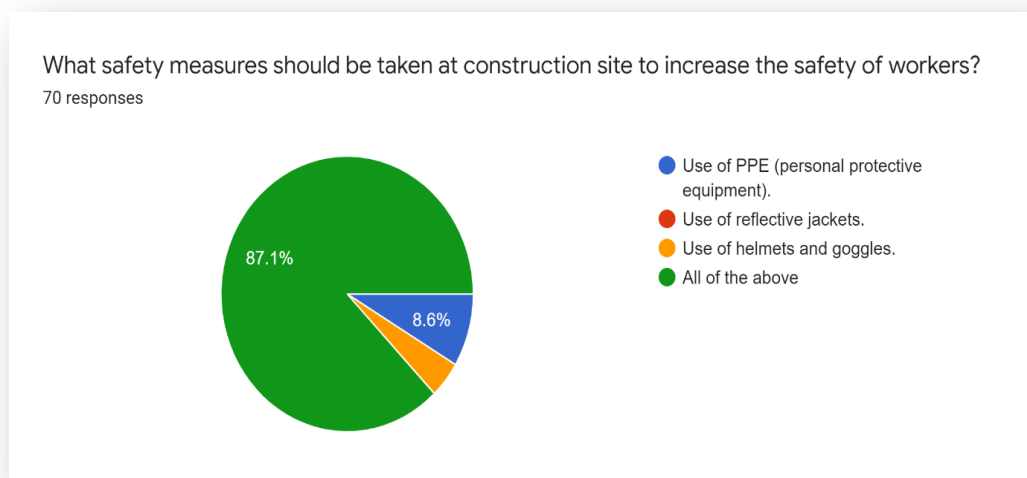


Figure 13 Barriers in sustainable practices.

11. Measures taken to ensure safety of workers at the construction site?

It is always risky to work at construction site. People working at any construction site are always prone to any sort of danger. In order to ensure the safety of the workers it is necessary to adopt some safety measure some of the safety precaution and measures were asked from our respondents and the following responses were collected:

Use of (PPE) personal protective equipment (8.6%).

Use of reflective jackets (0 %) & Use of helmets and protective goggles (4.3%).

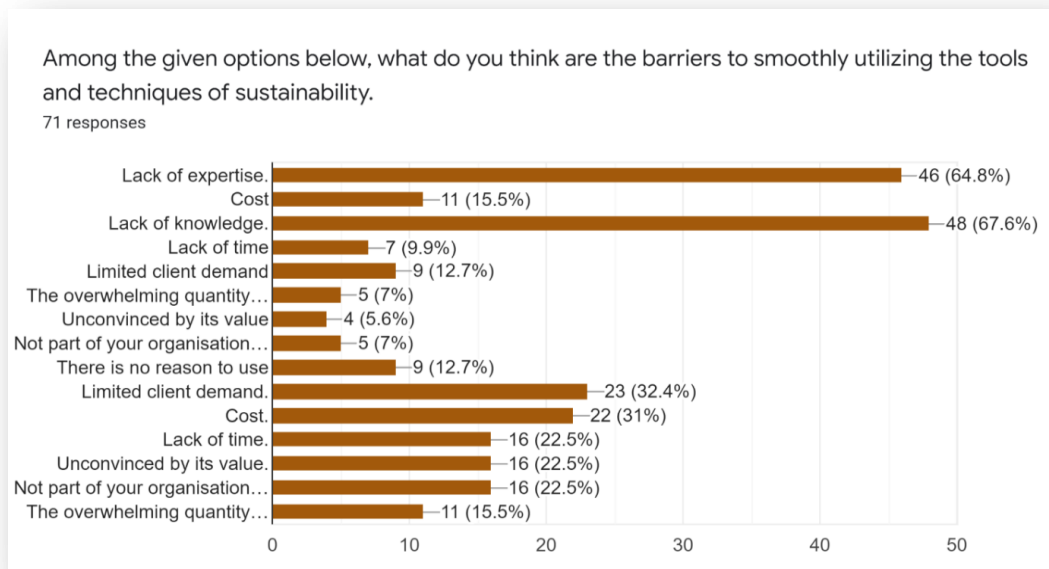


Figure 14 measures taken for the safety of workers at the site.

#### IV. Conclusion

The current study investigates the scenario of Indian building construction industries in terms of their approach towards the sustainable construction practices. This study tries to put forward the challenges faced by the project managers in implementing the sustainable construction practices. In developing countries such as India, it is very difficult to incorporate sustainable tools and practices in the project because there is not much awareness about the concept of sustainability. Sustainability is not just the motive of going green but it encompasses the all the social, economic and environmental facets. It is important to develop awareness among the employees and employers about the benefits of sustainable construction practices. It becomes the need of the hour to identify the critical success factors and develop a framework for the companies.

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