A Study on Growth of Ready Mix Plaster over Traditional Site Mix

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Abstract

Building Materials are price sensitive and there is a continuous pressure to reduce the per square feet cost in the real estate sector. A product called Ready Mix Plaster (RMP) or Ready Plaster is gaining growth & its acceptance is increasing over the traditional plaster. This RMP is expensive and still accepted by the industry.

Our purpose was to study why there is an acceptance of RMP & why the sector is adapting this premium product over traditional cheaper version during times when cost is critical. Site observations and calculations lead us to the real reason behind the success of this product which actually is not expensive when we considered the complete picture. Our research explains the process, costing & time factor in detail and gives you the reasons for RMP replacing the traditional product across many areas.

Keywords – Wall Plaster, Building Materials, Cement Mortars, Drymix Mortars, masonry work

Introduction

After completing the brick work in any building construction, the next stage is plastering. As described in Wikipedia, Plaster is a building material used for the protective or decorative coating of walls and ceilings and for moulding and casting decorative elements. In English "plaster" usually means a material used for the interiors of buildings, while "render" commonly refers to external applications. Another imprecise term used for the material is stucco, which is also often used for plasterwork that is worked in some way to produce relief decoration, rather than flat surfaces.

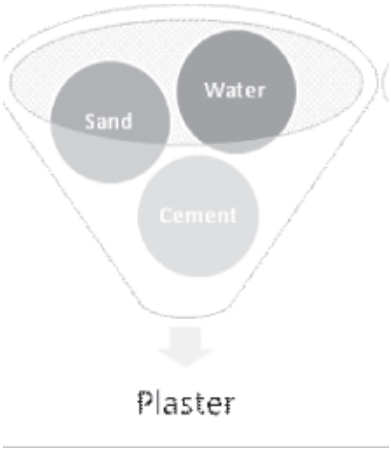
The most common types of plaster mainly contain either gypsum, lime, or cement,but all work in a similar way. The plaster is manufactured as a dry powder and is mixed with water to form a stiff but workable paste immediately before it is applied to the surface. The reaction with water liberates heat through crystallization and the hydrated plaster then hardens.

Plaster can be relatively easily worked with metal tools or even sandpaper, and can be moulded, either on site or to make pre-formed sections in advance, which are put in place with adhesive. Plaster is not

a strong material; it is suitable for finishing, rather than load-bearing, and when thickly applied for decoration may require a hidden supporting framework, usually in metal.

For our study, we will refer to the grey cement and sand based plaster which is used for the internal as well as external walls.

Table 1: Traditional Plastering Method

	Traditional plaster is made at site by mixing sand, cement & water. The sand and cement are mixed in proportion of 1:4 to 1:6 subject to application and thickness. This job needs a highly skilled mason. Any mistakes in the mixing or proportions can lead problems.

Limitations and issues in Wall Plastering using Traditional Mix

1. Mixing accuracy

The mixing at site is not always accurate due to errors. In case of lesser cement, it affects the bonding and the strength of the plaster. In case of excess cement, higher heat is generated and can leading to cracking of the plaster. Water inaccuracy does have any major effect because the role of water is to ensure the flow and react with cement to generate heat of hydration.

2. Water Curing

All plasters are cement based. The main property of cement is to mix with water and make the entire mix hard after releasing the heat of hydration. This heat needs to be controlled. Therefore, the site workers have to spray water over freshly plastered walls for a period of 7 days. This process is called curing. It is a very important process and if not done properly can lead to cracks in plaster and then begin water leakage.

3. Skilled Labour

As the country develops and processes towards a larger economy, availability of skilled labour becomes short. The labour for masonry job is very limited in India. The young generation prefer other jobs in call centres or are computer based. These are comfortable jobs and have white collar status. Thus, selection of masonry as a professional is very limited. Government technical institutes which offer technical certification in masonry struggle to get good students. Thus shortage of skilled masons is a very big problem and traditional mix definitely needs skilled masons.

4. Sand Quality

The sand which procured for the purpose of plastering is of two types, natural and manufactured. The natural sand is obtained by dredging from rivers. This is harming the environment and is banned in most of the states. The manufactured sand is made by crushing boulders which are excavated from the mountains.

Both these sands contain deleterious materials which have to be removed before usage in plastering. Entry of these materials can affect the quality of plastering. Additional processing and labour cost increase is mandatory when open sand is purchased for plastering.

Literature Review

The subject for review is about plasters and the cost associated with it. We are looking for products which are increasing the quality or increasing the speed or reducing the cost.

Chindaprasirt, P., Buapa,N., Cao, H. T.(2005) The first review done was from a paper written by multiple authors

on the usage of fly ash in plasters. This replaces cement and thus lowers the price of the product. The product demands more water but savings in cement is a big benefit also for the environment.

Mo, K. H., Lee, H. J. et al (2018) The second paper explained the usage of vermiculite in plasters to get the effect of insulation and generates savings in energy ultimately leading to savings in cost. This paper is of a material which is expensive but it makes up in the reduction of energy required due to insulation properties.

Saba, M., Assaad, J.J. (2021) The third paper studied is on usage of recycled sand and checking the performance on plasters. This saves money and uses waste material which is beneficial for the environment. This product also saves time because it requires lesser curing which increases the delay.

Selvaranjan, K., Navaratnam, S., Gamage, J. et al (2021) The fourth paper studied also on usage of waste material like rice husk ash which is a waste of rice. A considerable amount of this waste material can be used without any changes in the performance of the plaster.

Research Methodology

This is a study project and we have gathered information by making observations at a site in Mumbai & speaking to experts.

Figure 1

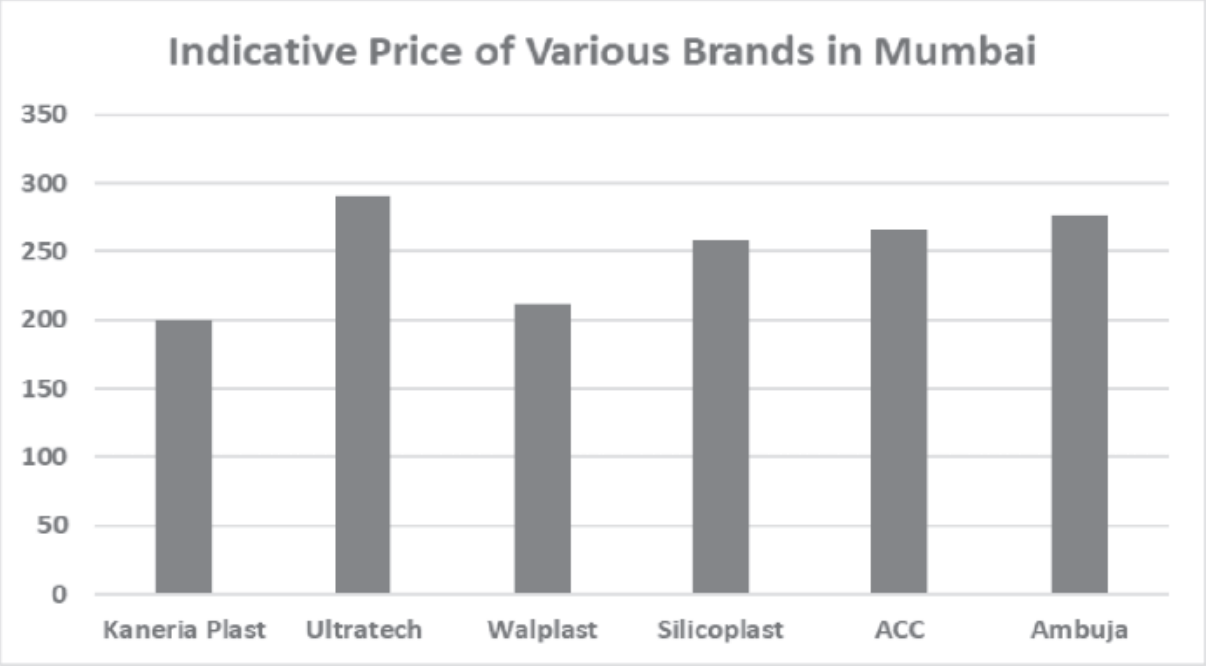
Some of the growing brands in Mumbai for Ready Made Plaster are as below:

Table 2

➢ Kaneria Plast ➢ Ultratech ➢ Walplast ➢ Silicoplast ➢ ACC ➢ Ambuja	The Mumbai market consumes approximately 40,000-50,000 tons of ready mix plaster every month. Some of the brands mentioned are the market leaders. Besides these brands we have observed over 50 more small scale brands who are also selling their product in M umbai. The city has accepted RMP and the market has been growing in double digits over the past decade.

Product Purchase Pricing

Figure 2



Consider the average Landing Price = Rs.250 for a 40 Kg bag = Rs.6.25 per Kg of ready plaster.

Cost of Traditional Plaster on Per kg basis is as follows

Sand Purchase price = Rs.1.75 Per Kgs.

Cement Purchase price = Rs.7.79 Per Kgs.

Net Per Kg price of Wall Plaster = ((Rs.1.75 x 4)+(Rs.7.79 x 1))/5

Answer = Rs. 2.96 per Kgs.

OBJECTIVE = Why is this product getting accepted over traditional mix when there is a perceived price difference of Rs. 3.29 per Kgs.

Table 3: Process Description of Traditional Plaster

Steps	Activity Description	Time	Remarks
1	Unloading Sand at Site from transporter on ground stockpile	Immediate	The Sand is purchased in lot & arrives in dump trucks. They can unload only in certain areas.
2.	Restacking at storage Area	One Shift	Moving sand to the storage area with a loss of material
3.	Screening of Sand to remove deleterious materials	One Shift	Material wastage is produced which is not usable

4.	Removal & Disposing of waste material	Half Shift	This material can be used for filling or is disposed away
5.	Unloading of cement bags at site	Half Shift	50 Kg cement bags are unloaded at site
6.	Taking sand to application area and stacking on ground	One Hour	Wastage in movement
7.	Taking Cement to application area and stacking	One Hour	Left over cement in bag is wasted.
8.	Mixing by Mason & Application , including finishing	One Shift	Requires One skilled and One un-skilled Mason
9.	Rebound Losses		Material falls down & is wasted
10.	Curing	One per Shift	For 7-8 days from the date of plaster

We also studied the process for Ready Mix Plaster used at site & the process was as below,

Table 4: Process Description of Ready Made Plaster

Steps	Activity Description	Time	Remarks
1	Unloading 40 Kg bags of RMP at Site from transporter to storage area	Half Shift	The bags are directly taken to the storage area by manual labour.
2.	Shifting to work / application area and cut open on ground for mixing	One Shift	Direct use
3.	Addition of water, mixing & application.		Immediate use
4.	Curing Time	One per shift	Two days only

It is very clear on site that the procedure of traditional mix is longer and uses more resources over the RMP product. We also tried to do an actual working of the costing for a particular area.

Practical Test

Two materials were taken for comparative testing. We decided to cover an area of 100 sq.ft. for both and the thickness taken was 10 mm.

This was for internal plaster and the substrate for both was the same. Actual mix was prepared and applied. On the other wall we applied RMP. The cost implications were calculated and the results were tabulated as follows.

Please note that the RMP is not only sand + cement. It contents special additives like starch and polymers to enhance properties.

We also saw the post plastering effect when application of the next layer (Wall Putty) was applied and savings of material could be seen.

When we see the holistic picture, it can be concluded that the RMP is a value for money option.

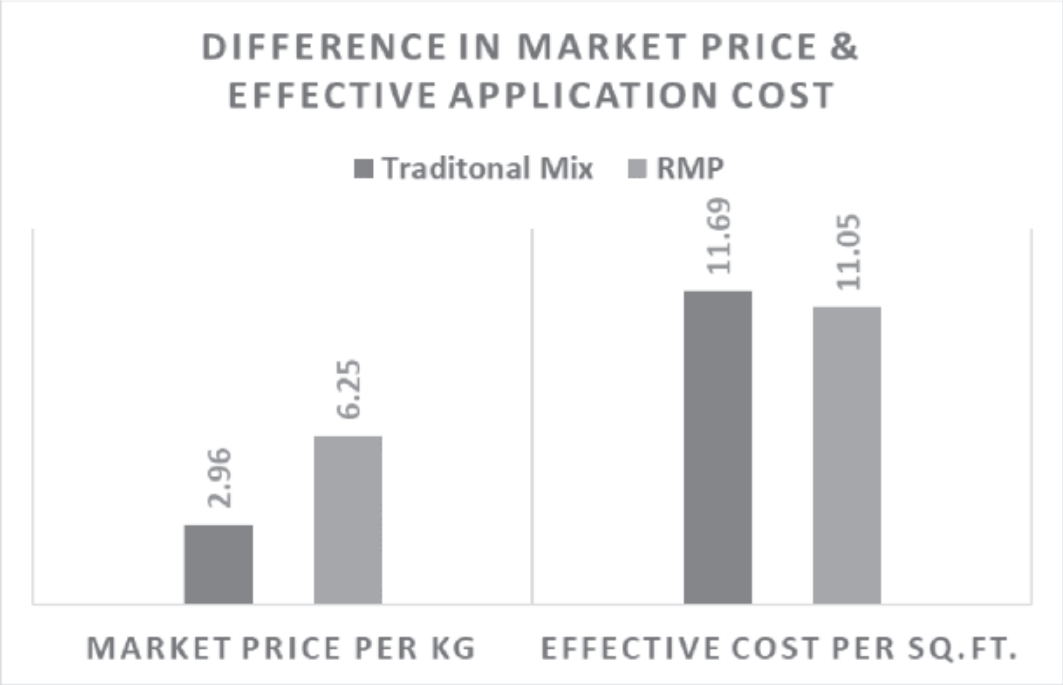
Table 5: Study with costing and comparison

S.No	Description of Cost	Traditional Site Mix	Ready Mix Plaster	Remarks
1	Area Covered in Plast (Sq.Ft.)	100	100	Same for both
2	Thickness for Plaster (mm)	10	10	Same for both
3	Sub-base for Application	Solid Block	Solid Block	Same for both
4	Mix required (in Kgs)	160	160	Difference observed at site
5	Requirment of Sand (1:4) for Mix	120	0	RMP does not need Sand
6	Requirment of Cement (1:4) for Mix	40	0	RMP does not need Cement
7	Actual Purchase of Sand (Kgs)	208	0	+30% Moisture, handling & oversize
8	Purchase of Cement (Kgs)	42	0	5% loss in handling & waste of opened bag
9	Cost of Sand (double washed)	2	0	Per Kg landed at site
10	Cost of Cement	7.79	0	Per Kg landed at site
11	Cost of Sand in Mix	416	0	Price x wt in kgs Rs.1.75 per kg
12	Cost of Cement in Mix	327.18	0	Price x wt
13	Total cost of Material in Mix	743.18	1000	Cost 4 bags of RMP @ Rs250 (Landed Price)

14	Rebound Losses Observed	10%	5%	Actually measured at site
15	Losses in Shrikage	5%	1%	Actually measured at site
16	Labour Cost for 7 day curing	315	45	Considered for 100 Sq.Ft on market rates
	Effective Price of 100 Sq.Ft.	**1169**	**1105**	**RMP is cheaper than traditional mix**

Conclusion & Future Scope

Figure 3



To conclude, we can say that the RMP product is value for money. It has overall savings and is beneficial to the project. It is also eco-friendly and saves water, labour, wastage and rework cost.

RMP is certainly the next technology forward and the Indian market will see more of this product. Factory made products will increase in the entire dry mix industry. Construction activity will involve using more readymade or factory-made products which will reduce site errors, skill level of masons and commercially benefit the project.

Future Scope

Manufacturers of RMP should seek markets beyond metro cities and venture into the semi-urban and rural markets.

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