

Determinants of TMT Bar Selection: An Empirical Study of Engineers' and Contractors' Preferences

Mrs.S.Suganya¹, Ms.M.Deepa²

¹Assistant Professor, Mepco School of Management Studies, Mepco Schlenk Engineering College, Sivakasi-626005, India

²2nd Year PG Student, Mepco School of Management Studies, Mepco Schlenk Engineering College, Sivakasi-626005, India

ABSTRACT:

This study explores the key determinants influencing the selection of Thermo Mechanically Treated (TMT) bars among professionals in the construction sector, specifically targeting engineers and contractors. The objective is to examine the impact of demographic characteristics, promotional activities, and user satisfaction on brand preference and selection criteria. A structured questionnaire was employed as the primary data collection tool, and responses were gathered from a sample of 132 respondents actively engaged in construction-related decision-making.

The findings indicate that product quality is the most critical factor guiding TMT bar selection, followed by promotional activities and price considerations, with availability having comparatively minimal influence. Statistical analysis revealed significant associations between demographic factors such as professional experience, organizational affiliation, and role—and preference for specific brands, notably VIZAG and Birla Steel. While promotional activities showed moderate relevance, most participants emphasized technical performance and brand reliability as the primary basis for their choices. Furthermore, a high level of satisfaction was observed among users regarding their currently preferred TMT brands.

The study concludes that manufacturers aiming to enhance market penetration and brand loyalty should prioritize quality assurance and performance consistency, while also adopting demographic-specific marketing strategies to better address the needs and expectations of diverse professional groups.

Keywords: TMT bars, material selection factors, construction materials, BIS certification, corrosion resistance, mechanical properties, brand preference

INTRODUCTION:

In the realm of construction, the choice of materials is paramount to the success and longevity of any project. Among these materials, TMT (Thermo-Mechanically Treated) bars have gained significant prominence due to their superior properties and performance characteristics. TMT bars are essential for reinforcing concrete structures, providing the necessary tensile strength and ductility to withstand various loads and environmental conditions. As such, the selection of TMT bars is a critical decision made by engineers and contractors, influenced by a multitude of factors.

TMT bars are produced through a unique process that involves rapid cooling of hot steel bars, which enhances their strength and flexibility. This process results in a product that is not only strong but also resistant to seismic forces, making it ideal for construction in earthquake-prone areas. The bars are available in various grades, each suited for different applications, which adds to the complexity of the selection process. Mechanical properties play a crucial role in the selection of TMT bars. Engineers often refer to the yield strength and ultimate tensile strength of the bars to ensure they meet the structural requirements of the project. Ductility, or the ability of the material to deform under stress without breaking, is also essential for structures that may experience dynamic loads, such as those from wind or seismic activity.

Compliance with national and international standards, such as those set by the Bureau of Indian Standards (BIS) or ASTM (American Society for Testing and Materials), is vital. Engineers prefer TMT bars that are certified, as this ensures that they meet specific quality benchmarks and performance criteria.

Corrosion resistance is another significant factor. In many construction environments, especially those exposed to moisture or chemicals, corrosion can significantly reduce the lifespan of TMT bars. Engineers often look for bars with anti-corrosive properties or coatings that enhance durability, ensuring that the structure remains safe and functional over time.

The ease with which TMT bars can be welded or shaped is a significant consideration for contractors. Bars that can be easily manipulated without compromising their structural integrity allow for greater flexibility in design and construction processes. Budget constraints are a reality in construction projects. Engineers and contractors must evaluate the cost of TMT bars in relation to their performance and longevity. While cheaper options may be tempting, the long-term costs associated with maintenance and repairs can outweigh initial savings.

The availability of specific grades and types of TMT bars can influence selection. Contractors often prefer suppliers who can provide consistent quality and timely delivery, ensuring that project timelines are met without delays. Increasingly, engineers and contractors are considering the environmental impact of their material choices. Sustainable practices, such as using recycled steel or eco-friendly production methods, are becoming more important in the selection of TMT bars.

REVIEW OF LITERATURE:

Patel, H., & Joshi, M. (2020), In the paper “Comparative Analysis of TMT Bar Brands in India”, the study evaluated brands based on elongation, ductility, and bendability. Engineers preferred brands that comply with Fe500D and Fe550D standards for their superior seismic performance in earthquake-prone zones.

Reddy, S., & Kumar, B. (2019), Their research “Brand Influence and Dealer Recommendations in Construction Material Purchase” showed that contractors often rely on dealers' advice when selecting TMT bars, especially in rural and semi-urban projects. Established brands with dealer incentives are more likely to be recommended and used.

Nayak, S., & Rao, K. (2021), Their article “Impact of Price and Availability on Contractor Decisions” emphasized that while quality is important, price and local availability often override technical aspects for small and medium contractors. Local manufacturers sometimes dominate the market due to quick delivery and credit options.

Verma, D., & Mishra, P. (2019), In their research “Marketing Influence and Buying Behavior in Construction Steel”, it was found that brand reputation and promotional strategies (like seminars for engineers and reward schemes for contractors) significantly impacted product choice. Brands that invested in relationship marketing saw higher loyalty.

Arora, M., & Suresh, D. (2020), This study “Sustainability and Green Construction Trends in India” emphasized the emerging preference for eco-friendly TMT bars that minimize carbon footprint. While large firms and builders have started considering sustainability certifications, small contractors still prioritize price and basic quality.

Dasgupta, R., & Iyer, T. (2021), In the article “Comparative Study of Fe500 and Fe550 TMT Bars in Commercial Structures”, it was found that engineers often prefer Fe550 for high-rise and commercial buildings due to better tensile strength, while contractors lean toward Fe500 due to cost savings and easier availability.

Mishra, R., & Gupta, S. (2020), Their research “Dealer Influence and Purchase Decisions in Construction Materials” identified that small contractors are highly influenced by dealer relationships, incentives, and credit facilities. Engineers, however, tend to prioritize structural integrity over personal benefits.

Rani, L., & Saxena, V. (2021), Their article “BIS Certification and its Impact on TMT Bar Selection” found that BIS-certified products are more trusted by engineers, especially in government contracts. Lack of visible certifications often deters selection even if the quality is comparable.

Yadav, R., & Kaushik, D. (2022), Their research “Technological Innovations in TMT Bars” concluded that new developments such as rib pattern optimization, corrosion-resistant alloying, and heat-treated steel have started influencing premium project decisions.

Iyer, N., & Raj, A. (2021), The authors, in “Corrosion Resistance vs. Cost: A Balancing Act”, found that engineers working on coastal or industrial sites are willing to invest in corrosion-resistant TMT bars even at higher cost if long-term maintenance benefits are clear.

Bhattacharya, S., & Prasad, K. (2020), The study “Supply Chain Challenges in Steel Distribution” indicated that brand selection is also affected by ease of logistics, ability to supply on short notice, and stock availability at the dealer’s end.

OBJECTIVES:

- To identify the most important factors influencing the selection of TMT Bars among engineers and contractors.
- To examine how Demographic characteristics of engineers and contractors influence their preferences in selecting TMT Bars.
- To analyse the impact of promotional activities, discounts and offers on TMT Bar selection.
- To assess the level of satisfaction regarding current TMT steel brands being used by engineers and contractors.

METHODOLOGY:

The study is Descriptive 132 respondents participated in the study, and data were collected from them through a structured questionnaire. Mean, Frequency, Chi-Square, Pie Chart and Bar Charts application was made to identify the results.

FINDINGS OF THE STUDY:**Table 1, Factors Influencing the Selection of TMT Bars:**

S.No	Factors influencing the selection of TMT bars	Average	Rank
1	Product	4.483	1
2	Place	4.186	2
3	Price	4.136	3
4	Promotion	4.043	4

Inference:

It is inferred that the product itself is considered the most important factor in the selection of TMT bars, indicating that quality, specifications, and other product attributes are prioritized by engineers and contractors. The distribution or availability of TMT bars is the second important factor among those listed, suggesting that it is next high concern compared to the other factors. Price is the third most important factor, indicating that while cost is a consideration, it is not the primary driver compared to product quality and promotion. Promotional activities and brand communication also play a least significant role, suggesting that how TMT bars are marketed influences decision-making. The most influential factors for selecting TMT bars are predominantly centred on the product quality, followed by Distribution. Price and Promotion are important but less critical in influencing selection decisions.

Demographic characteristics of engineers and contractors influence their preferences in selecting the TMT Bars:

Chi square test is used to show the association between Demographic factors like Experience, Role and type of organisation and the TMT steel brands are currently being used

Null hypothesis: There is no significant association between Demographic characteristics and the TMT steel brands are currently being used

Alternative hypothesis: There is a significant association between Demographic characteristics and the TMT steel brands are currently being used

Table 2, Association between the Experience, and the TMT steel brands currently used

S.NO	Variable	Asymptotic significance	Null Hypothesis	Interpretation
1	Experience and JSW	0.652	Accepted	There is a no significant association between an Experience and JSW steel
2	Experience and VIZAG	0.036	Rejected	There is a significant association between an Experience and VIZAG
3	Experience and Tata Tiscon	0.061	Accepted	There is no significant association between an Experience and Tata Tiscon
4	Experience and Amman TRY	0.138	Accepted	There is no significant association between an Experience and Amman TRY
5	Experience and Birla	0.417	Accepted	There is no significant association between an Experience and Birla Steel
6	Experience and Other steels	0.273	Accepted	There is no significant association between an Experience and Other steels

Inference:

While observing the results of the chi square test shown in the table, the Asymptotic Significance is lesser than 0.05 ($p < 0.05$), the null hypothesis is rejected that there is a significant relationship between the two variables. Hence it is found that, Demographic factors like Experience do not influence their preferences in selecting the TMT Bars. There is a significant association between an Experience and VIZAG impact in the influence their preferences in selecting the TMT Bars.

Table 3, Association between Role and the TMT steel brands are currently being used

S.NO	Variables	Asymptotic significance	Null Hypothesis	Interpretation
1	Role and JSW	0.072	Accepted	There is no significant association between a Role and the TMT steel brand are currently used

2	Role and VIZAG	0.202	Accepted	There is no significant association between a Role and the TMT steel brand are currently used
3	Role and Tata Tiscon	0.090	Accepted	There is no significant association between a Role and the TMT steel brand are currently used
4	Role and Amman TRY	0.396	Accepted	There is a significant association between a Role and the TMT steel brand are currently used
5	Role and Birla steel	0.000	Rejected	There is no significant association between a Role and The TMT steel brand are currently used
6	Role and Other steels	0.064	Accepted	There is no significant association between a Role and The TMT steel brand are currently used

Inference:

While observing the results of the chi square test shown in the table, the Asymptotic Significance is lesser than 0.05 ($p < 0.05$), the null hypothesis is rejected that there is a significant relationship between the two variables. Hence it is found that, there is a significant association between a Role and Birla steel impact in the influence their preferences in selecting the TMT Bars.

Table 4, Association between Type of Organization and TMT steel brands are currently being used

S.NO	Variables	Asymptotic significance	Null Hypothesis	Interpretation
1	Type of organization and JSW	0.079	Accepted	There is no significant association between a Type of organization and the TMT steel brand are currently used

2	Type of organization and VIZAG	0.566	Accepted	There is no significant association between a Type of organization and the TMT steel brand are currently used
3	Type of organization and Tata Tiscon	0.228	Accepted	There is no significant association between a Type of organization and the TMT steel brand are currently used
4	Type of organization and Amman TRY	0.097	Accepted	There is no significant association between a Type of organization and the TMT steel brand are currently used
5	Type of organization and Birla Steel	0.001	Rejected	There is a significant association between a Type of organization and the TMT steel brand are currently used
6	Type of organization and other steels	0.084	Accepted	There is no significant association between a Type of organization and the TMT steel brand are currently used

Inference:

While observing the results of the chi square test shown in the table, the Asymptotic Significance is lesser than 0.05 ($p < 0.05$), the null hypothesis is rejected that there is a significant relationship between the two variables. Hence it is found that, there is a significant association between a Type of organization and Birla Steel impact in the influence their preferences in selecting the TMT Bars.

Table 5, Impact of promotional activities on TMT Bars selection:

S.NO	Particulars	Frequency	Percentage
1	Yes	46	34.8
2	No	86	65.2
Total		132	100.0

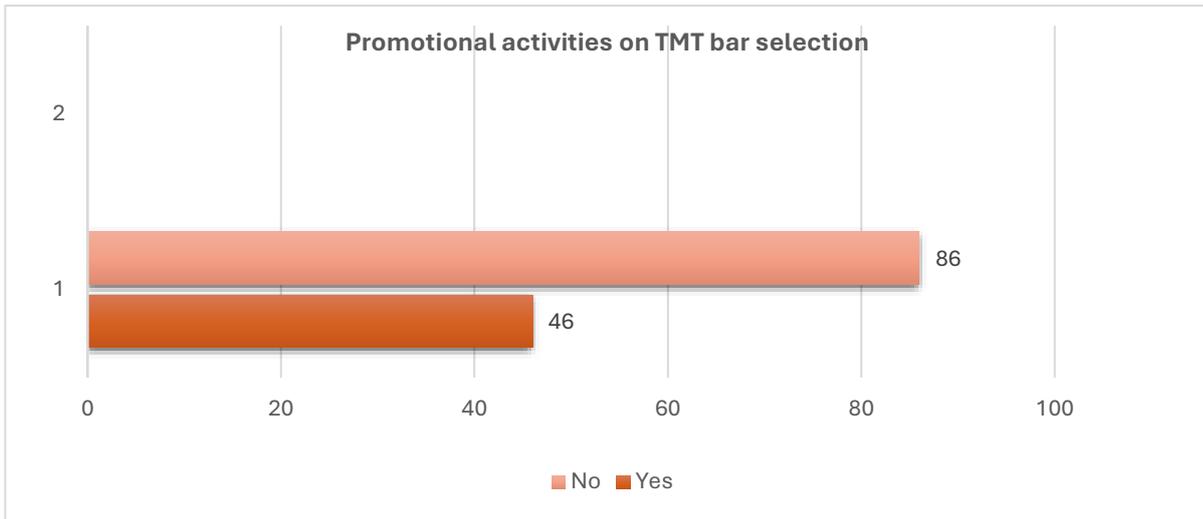


Fig: 1 Impact of promotional activities on TMT Bars selection

Inference:

From the figure 1, it indicates that promotional activities have limited influence on TMT bar selection. Purchasing decisions are largely driven by functional and quality-related factors rather than marketing promotions. Therefore, firms in the TMT bar industry should prioritize product reliability and brand credibility over aggressive promotional campaigns.

Table 6, Level of Satisfaction regarding current TMT steel brands being using by engineers and contractors:

S.No	Particulars	Frequency	Percentage
1	Highly Satisfied	47	35.6
2	Satisfied	73	55.3
3	Neutral	12	9.1
4	Dissatisfied	-	-
5	Highly Dissatisfied	-	-
Total		132	100.0

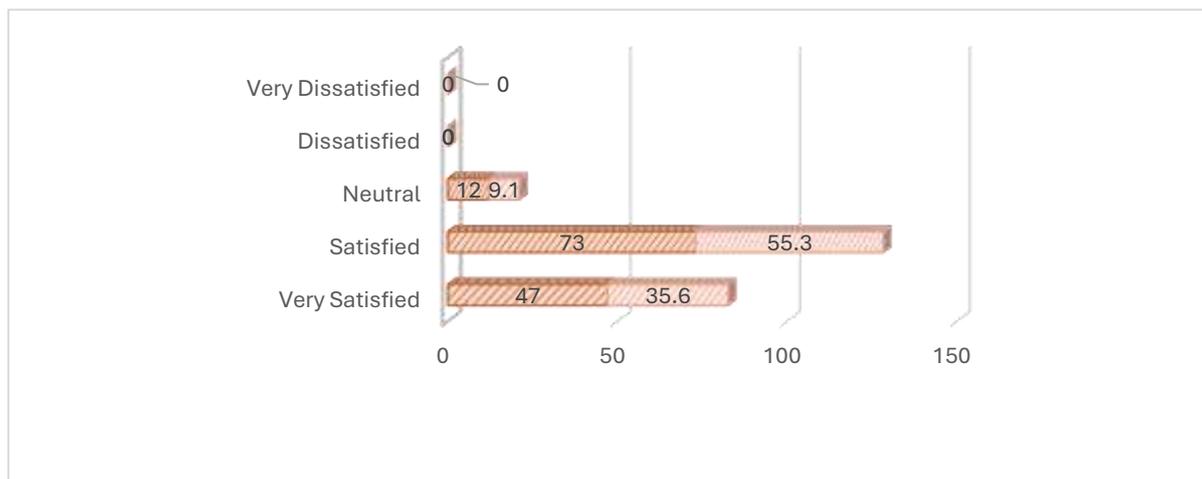


Fig 2, Level of Satisfaction regarding current TMT steel brands being using by engineers and contractors

Inference:

From the figure 2, it is inferred that Most of the individuals are fall under the Satisfied (53) category indicating generally positive response toward overall satisfaction. A fewer respondents chose the Very satisfied (47) and a (12) of respondents classified their satisfaction as Neutral, suggesting minimal dissatisfaction.

Conclusion:

The study examined the key factors influencing the selection of TMT bars among engineers and contractors, focusing on demographic factors, promotional impact, and satisfaction with current brands. The findings reveal that product quality is the most important factor in the decision-making process, followed by promotional activities and price, while availability holds comparatively less importance. This indicates that professionals prioritize strength, durability, and technical specifications when choosing TMT bars.

Demographic factors such as experience, professional role, and type of organization show specific associations with brand preference. Notably, VIZAG steel is preferred based on experience, while Birla steel is associated with certain professional roles and organizational types. These results suggest that brand preference is influenced not only by product attributes but also by the user's professional background and work environment.

Although promotional activities rank second among influencing factors, most respondents stated that promotions do not strongly affect their choice, emphasizing that technical performance outweighs marketing efforts. Additionally, satisfaction levels with current TMT brands are largely positive, indicating that market offerings meet professional expectations. Overall, technical strength, durability, and brand reputation remain the primary drivers of TMT bar selection.

DISCLOSURE

This project report is the original work of the researcher and has been carried out solely for academic purposes as part of the MBA program at Mepco School of Management Studies, Mepco Schlenk Engineering College, Sivakasi. The study has not been published or presented in any other form prior to this submission. All information, analysis, and interpretations are intended purely for academic evaluation and to provide practical insights into understand the key factors influencing the selection of TMT bars among engineers and contractors.

REFERENCE:

Patel, H., & Joshi, M. (2020). Comparative analysis of TMT bar brands in India. *International Journal of Structural Engineering and Construction*, 9(1), 33–40.

Reddy, S., & Kumar, B. (2019). Brand influence and dealer recommendations in construction material purchase. *Indian Journal of Building Materials*, 7(3), 88–95.

Nayak, S., & Rao, K. (2021). Impact of price and availability on contractor decisions. *Construction Economics Review*, 8(2), 55–63.

Verma, D., & Mishra, P. (2019). Marketing influence and buying behavior in construction steel. *Journal of Marketing & Construction Management*, 8(3), 66–74.

Arora, M., & Suresh, D. (2020). Sustainability and green construction trends in India. *Journal of Green Building Materials and Practices*, 6(4), 21–29.

Dasgupta, R., & Iyer, T. (2021). Comparative study of Fe500 and Fe550 TMT bars in commercial structures. *International Journal of Civil and Structural Engineering*, 10(2), 73–81.

Mishra, R., & Gupta, S. (2020). Dealer influence and purchase decisions in construction materials. *Journal of Material Supply & Distribution*, 7(1), 58–64.

Rani, L., & Saxena, V. (2021). BIS certification and its impact on TMT bar selection. *Journal of Civil Compliance and Safety*, 8(3), 91–99.

- Yadav, R., & Kaushik, D. (2022).** Technological innovations in TMT bars. *Indian Journal of Engineering and Steel Technology*, 10(1), 18–26.
- Iyer, N., & Raj, A. (2021).** Corrosion resistance vs. cost: A balancing act. *Steel and Concrete Performance Journal*, 7(4), 59–66.
- Bhattacharya, S., & Prasad, K. (2020).** Supply chain challenges in steel distribution. *Journal of Logistics & Construction Resources*, 9(1), 47–54.