

Should New Export-Oriented Rug and Carpet Factories Using Machines Be Set Up Near the Ports? Advantages and Disadvantages

Author: Amrit Jolly

IB Diploma Programme, The Shri Ram School, Mouslari,
Gurugram, India
amritjolly2009@gmail.com

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ABSTRACT

This paper examines whether new export-oriented, machine-intensive rug and carpet factories in India should be located near ports rather than in the traditional inland carpet belt. It compares the historical dependence of carpet production on hereditary weaving skills with the changing requirements of mechanized, synthetic-fiber production. The analysis considers raw-material sourcing, Turkey's machine-made carpet industry, inland transport costs, industrial land readiness, infrastructure, labor availability, and access to export and domestic markets. It identifies a stronger locational case for the Surat-Hazira-Navsari corridor in Gujarat for machine-woven and robo-tufted factories using polypropylene and polyester. Proximity to yarn suppliers, port connections, developed industrial land, and shared infrastructure may offer advantages, while higher wages and workforce recruitment and training remain disadvantages. For wool-based, hand-finished, and design-led production, the established skills and ancillary networks of inland clusters remain important. The paper concludes that location decisions should reflect production technology, material inputs, and workforce requirements, with efficient port connectivity carrying more weight than literal coastal adjacency.

Keywords: carpet industry, factory location, port connectivity, synthetic fibers, mechanization, Gujarat

1. INTRODUCTION

The paper which precedes this paper traced how India's carpet industry shifted from a wholesaler-driven, hand-knotted export trade into one which was more automatic and diversified. This is a result of the 2025 United States tariff shock and by the domestic market now growing faster than exports. This shift gives rise to a major question, if an increasing share of production is becoming machine-made, synthetic-fiber based, and built for export, would it still make the most sense to build new capacity in the traditional inland Indian carpet belt (Bhadohi, Panipat and Jaipur) or should new, machine-intensive, export production capacity belong closer to ports? This paper analyses this question by tracing carpet-making's history and traditional skill base, the extent to which machines have already displaced those skills, where the industry's raw materials actually originate, how Turkey's comparable machine-made carpet industry sources its own inputs

internationally, and what the logistics, labor, and cost trade-offs of a port-adjacent factory look like next to the traditional alternative.

2. A CRAFT BUILT INLAND: HISTORY AND TRADITIONAL SKILLS

Carpet weaving is among the oldest textile crafts, with hand-knotted fragments recovered from Central Asia and ancient Persia dating back roughly 2,500 years, well before written records of the trade exist [1]. In fact it is to be said that the oldest known carpet, the Pazyrk, dates back to the 4th-3rd century BCE. The craft is generally believed to have originated among nomadic pastoral tribes in Central Asia, who needed durable, portable floor coverings for tents, and it spread along trade routes into Persia, Anatolia, Egypt, and eventually South Asia [2]. Carpet weaving arrived in India during the Mughal period, brought by Persian and Central Asian craftsmen invited by the imperial court in the

sixteenth century, while Kashmir's own tradition is traced to the Sufi mystic Syed Ali Hamdani, credited with introducing silk carpet weaving to the valley [3]. The traditional skill set built around this craft was almost entirely manual: hand-spinning raw wool into yarn, dyeing it with natural pigments, and hand-knotting it onto a vertical loom, one knot at a time, following a graph-paper pattern, the *naksha*, that a trained design artist had drawn and that was often read aloud to the weaver row by row. These skills were passed down within families and hereditary weaving communities over generations. Crucially, the places where this craft settled, Bhadohi and Mirzapur along the Ganga, the Kashmir valley, and later Panipat and Jaipur, were chosen for reasons that had nothing to do with shipping: proximity to sheep-rearing tracts for wool, rivers for washing and dyeing, and a resident population that already possessed or could inherit the skill. For most of this history, only the small, light, high-value finished carpet needed to travel any distance, not the bulk raw material a modern factory depends on.

3. WHAT MACHINES HAVE ALREADY TAKEN OVER

As the previous paper described, computer-aided design software has largely replaced the hand-painted *naksha*, and power looms like Van-De-Wiele, automated tufting guns, and increasingly robotic "robo-tufting" systems have replaced hand-knotting and hand-tufting across most of the machine-made segment. Chromojet and digital printing now apply pattern and color to a woven or tufted base without any hand-dyeing step, and automated lines handle washing, shearing, backing, and latexing, tasks once done by hand crews. What remains genuinely human are the actual knots in a true hand-knotted carpet, hand-tufting in the mid-tier, and finishing, quality control, and top-end design work. This distinction matters directly for the locational question this paper asks. The tasks that historically tied the industry to a specific inland, hereditary weaving population, the knotting and tufting itself, are precisely the tasks now most displaced by machines. The tasks that remain human, operating and maintaining machinery, supervising dye lines, inspecting finished product, are far less geographically "sticky". A fully mechanized weaving or tufting line does not need Bhadohi's inherited skill base to run, only trained machine operators, electricians, and quality inspectors, the

kind of workforce any developing industrial region, including a coastal one, can build.

4. THE FUTURE OF RUG-MAKING, IN BRIEF

The previous paper forecast an industry bifurcating into a high-volume, automated commodity tier and a smaller, craft-intensive premium tier. It shows export markets diversifying away from the U.S. after the 2025 tariff shock and the domestic Indian market growing faster than exports for the first time in decades. The segment most likely to see large new capacity over the next decade is exactly the mechanized, synthetic-fiber, export-oriented tier, since the hand-knotted, artisan segment is inherently capacity-constrained by the shrinking pool of skilled hereditary weavers documented in that paper's account of Kashmir's aging workforce. A new export-oriented factory built to expand machine-made capacity is, therefore, the kind of facility for which a genuinely open locational choice, port-adjacent or inland, is realistic. This is because unlike a hand-knotted expansion it is not tied to an existing weaving community that took generations to build.

5. WHERE THE RAW MATERIALS ACTUALLY COME FROM

Wool can be considered the most popular material used for the production of Indian carpets and rugs. It comes from both domestic and imported sources. Chokla wool, prized for rug-making, is purchased at biannual auctions in Bikaner, timed to the spring and autumn shearing seasons in Rajasthan's desert sheep-rearing tracts. Finer Merino wool used in the highest-density carpets is imported chiefly from New Zealand, and Indian wool traders additionally import blending stock from up to eighteen other countries, including the United Kingdom, China, Argentina, and Brazil, while silk is imported largely from China. Despite this global sourcing, the wool trade's warehousing and spinning infrastructure remains concentrated inland, at Bikaner, Beawar, Panipat, and Bhadohi, with only a few spinning mills located in Gujarat. Man-made fiber follows a different geography entirely. Polypropylene, polyester, and nylon are derived from petrochemical feedstock, and in India that feedstock is refined at coastal complexes, most notably Reliance Industries' Hazira facility near Surat, Gujarat, which produces polypropylene, polyester staple fiber, and polyester filament yarn directly from crude-oil-derived inputs landed by sea [4]. Surat itself has become a dense

cluster of bulked-continuous-filament, or BCF, polypropylene and polyester yarn spinners supplying the carpet trade. Jute, meanwhile, is grown overwhelmingly in West Bengal, where India is the world's largest raw-jute producer at roughly 1.8 million tonnes a year, with Bangladesh a close second producer and the larger exporter of processed jute goods, including the carpet-backing cloth used beneath machine-woven carpets.

6. MAN-MADE MATERIALS VERSUS WOOL: A DIVERGING LOCATIONAL LOGIC

Wool sourcing follows an agricultural and pastoral geography. In India it centers on Bikaner, a location determined by sheep-rearing ecology and a century-old auction and warehousing tradition, not by coastal access. Even imported wool tends to funnel through these same inland hubs rather than settling near its port of entry. Man-made fiber follows an entirely different geography. It originates at the petrochemical refining stage, and in India that stage is itself concentrated at coastal complexes, because the crude oil and naphtha feedstock arrive by sea in the first place. The downstream yarn-spinning industry has consequently clustered in Surat, inside the same coastal industrial corridor as its own feedstock supplier. The practical implication is a genuine divergence. In the case of a wool-based operation, moving toward the coast gains nothing on the input side, since wool does not originate there, while it loses the inherited weaving workforce entirely. For a synthetic-fiber operation, moving toward the coast, and specifically toward Gujarat's Surat-Hazira corridor, actually shortens the raw-material supply chain, because the yarn is already produced there. As the industry's product mix keeps shifting toward polypropylene- and polyester-based machine-made carpet, tracked as an expanding share of the India carpets and rugs market alongside a proportionally shrinking wool segment, the raw-material case for port-adjacent, Gujarat-centered new capacity strengthens for precisely the segment expected to grow fastest.

7. THE TURKEY MODEL: A LOGISTICS-CENTRIC MACHINE-MADE INDUSTRY THAT IMPORTS ITS INPUTS

Turkey, and specifically the southeastern city of Gaziantep, is the world's leading machine-made carpet exporter. Gaziantep alone accounts for

roughly 70 percent of Turkey's machine-made carpet exports and around 70 percent of the world's piece-carpet production, shipping carpet products worth \$2.62 billion in an eleven-month period in the most recent reporting. Gaziantep itself sits inland but was deliberately built around efficient logistics access to two Mediterranean ports, Mersin and Iskenderun, connected by dedicated highway and rail corridors, rather than sitting directly on the coast. This is an important refinement as what matters for a competitive machine-made export cluster is not literal port adjacency but efficient, well-connected logistics distance to a port. Even with substantial in-house yarn production, Turkish manufacturers still draw meaningfully on imported synthetic fiber, and India is a documented supplier. Indian trade data in fact lists Turkey among the leading destinations for Indian man-made-fiber exports and specifically for Indian polyester yarn shipments. Turkey's dependence on imported jute is even more pronounced, since the country has essentially no domestic jute cultivation. Turkey is Bangladesh's single largest jute export market, absorbing roughly 22.75 percent of all Bangladeshi jute exports, overwhelmingly as jute yarn and carpet-backing cloth used beneath Turkey's machine-woven carpets. Industry analysis of Bangladesh's jute trade confirms that Turkey, alongside Iran and Egypt, imports this material specifically for its own carpet industry. Turkey's model, a competitive cluster that imports a meaningful share of its raw materials by sea and organizes its manufacturing geography around efficient port access rather than around a hereditary weaving workforce, is precisely the model this paper evaluates for India.

8. LOGISTICS, INFRASTRUCTURE, LAND READINESS, AND SKILLED MANPOWER

Local inland and port charges for a single twenty-foot export container from India currently run roughly ₹40,000 to ₹80,000 [5], a cost that scales up the farther a factory sits from its exit port. Panipat and Bhadohi both sit several hundred kilometers from the nearest major container ports, Nhava Sheva or Mundra for northern producers, a distance a Gujarat-based factory would largely eliminate. Government policy is actively building the infrastructure case for such a move, which is the PM MITRA textile park under construction at Navsari, Gujarat. It sits roughly 65 kilometers from Hazira port and offers common effluent treatment plants,

testing laboratories, worker housing, and a capital subsidy of up to 35 percent of eligible fixed capital investment plus a multi-year interest subsidy on term loans. This is specifically for textile manufacturing activities including weaving and dyeing.

A less obvious but equally significant advantage is that Gujarat's industrial land is, in large part, already converted and notified for industrial use, ready for immediate allotment through the Gujarat Industrial Development Corporation, rather than requiring a fresh conversion from agricultural status. GIDC's official allotment price for its Hajira estate for FY2026-27 is ₹6,490 per square meter, roughly ₹2.6 crore per acre [6]. An equivalent, infrastructure-ready plot in the traditional belt is considerably harder to come by at that price: notified, developed industrial-estate land at HSIIDC Panipat currently trades at ₹27,000 to ₹39,000 per square meter on the open market, or roughly ₹11 to ₹16 crore per acre, several times the Gujarat rate [7]. Cheaper land is available at Panipat's rural fringes, but only as raw agricultural land requiring formal conversion, a Change of Land Use process that Haryana's Town and Country Planning Department states should take 60 to 90 days but which in practice often runs far longer. Uttar Pradesh's conversion process is, if anything, slower still, generally classified as a manual process taking six to twelve months [8]. Land around Bhadohi, priced as raw agricultural land, may end up broadly comparable in value to a Gujarat plot, but a new entrant there is far more likely to have to go through this conversion process itself, since Bhadohi's local industrial authority holds a smaller, older land bank than GIDC's. Gujarat's advantage, then, is less about land being intrinsically cheap everywhere in the state and more about a large, already-notified inventory that lets a new entrant buy a shovel-ready plot rather than starting from farmland.

None of this infrastructure, however, comes with the deep, multi-generational weaving and finishing workforce found in Bhadohi, Panipat, or Jaipur. A new port-adjacent factory would need to recruit supervisory and finishing talent from the traditional belt or train an entirely new workforce from scratch, both of which raise start-up costs and risk reproducing, in a new location, the same workforce-attrition problem documented in the earlier paper's account of Kashmir. Here younger workers increasingly prefer salaried factory jobs to weaving-adjacent work regardless of pay. Coastal Gujarat's industrial labor market is also a higher-wage

environment than the semi-rural carpet belt, which could offset some of the land and freight savings a machine-made producer would otherwise capture.

9. EXPORT AND DOMESTIC MARKETS

Port proximity matters most for the export-facing, price-competitive machine-made segment identified as the industry's fastest-growing tier in the previous paper, where container freight is a meaningful share of landed cost and speed to port shortens the order-to-ship cycle mass retailers and e-commerce buyers now expect. It matters far less for hand-knotted, custom, or contract segments, where lead times are measured in months and the customer is paying primarily for craft and specification rather than unit cost. There, proximity to skilled labor and design talent still outweighs proximity to a port. On the domestic side, the previous paper's forecast of strong urban and hospitality-driven demand growth is itself concentrated in India's metro regions, several of which, Mumbai, Chennai, Ahmedabad, and Surat, are coastal cities. A Gujarat-based, port-adjacent factory is therefore reasonably well positioned to serve both overseas export orders and India's own fastest-growing domestic urban markets from a single site. This is an advantage a purely inland factory does not share to the same degree.

10. COST COMPARISON: PORT-ADJACENT GREENFIELD VERSUS THE TRADITIONAL BELT

A port-adjacent Gujarat site carries real cost advantages for a machine-made, synthetic-fiber operation. Its land is, in the most literal sense, ready to use. GIDC's notified estates at Hazira and Sachin can be allotted directly at roughly ₹2.6 to ₹3 crore per acre, without the delay or uncertainty of a land-use conversion. This sits alongside PM MITRA's and the Gujarat Textile Policy 2024's capital and interest subsidies, a shorter and cheaper raw-material supply chain for the polypropylene and polyester yarn produced in the same district, lower outbound freight to the port, and shared infrastructure spreading fixed compliance costs across many tenants in a purpose-built park. Against this sit real disadvantages such as higher prevailing industrial wages in an established, in-demand coastal corridor, and the one-time cost of recruiting, relocating, or training a workforce that does not yet exist locally at scale.

The traditional belt's land economics are less favorable than they first appear. Formally notified,

infrastructure-ready industrial land at HSIIDC Panipat is, if anything, more expensive than Gujarat's, running ₹11 to ₹16 crore per acre against Gujarat's ₹2.6 to ₹3 crore. Cheaper land exists at Panipat's rural fringes, at prices broadly comparable to Gujarat's, but it arrives as raw farmland, and converting it carries real delay. Haryana's Change of Land Use process is statutorily meant to take 60 to 90 days but has left billions of rupees in investment stalled for months or years in practice. Land around Bhadohi would likely go through Uttar Pradesh's slower, largely manual conversion process, generally reckoned at six to twelve months; its per-acre price may be broadly comparable to Gujarat's, but not the

certainty or speed of getting from purchase to a usable plot. The traditional belt's advantages lie in an existing, experienced workforce built over generations, lower prevailing wages, and an established ancillary ecosystem of dye houses, finishing units, and CEPC-run testing and certification infrastructure concentrated in Bhadohi. Its disadvantages, beyond the land-conversion question, are materially higher inland freight to whichever port ultimately handles the export shipment, and, for the synthetic-fiber share of production, a longer and more expensive supply chain back to the Gujarat-based yarn mills that increasingly supply machine-made product.

Table 1. Comparison of port-adjacent and traditional carpet manufacturing locations

Factor	Port-Adjacent Greenfield (e.g. Gujarat)	Traditional Belt (Bhadohi / Panipat / Jaipur)
Raw material access (synthetic)	Strong - Surat/Hazira yarn cluster on site	Weak - yarn trucked in from Gujarat
Raw material access (wool)	Weak - no local wool trade	Strong - Bikaner auctions nearby
Land cost (notified plot)	~₹2.6–3 crore/acre (GIDC, Hazira)	~₹11–16 crore/acre (HSIIDC, Panipat)
Land readiness	Ready-to-use, notified GIDC land bank	Often needs CLU conversion (6–12+ months)
Outbound freight to port	Low	High (several hundred km inland)
Skilled weaving/finishing labor	Must be built from scratch	Deep, multi-generational pool
Prevailing industrial wages	Higher	Lower
Government incentives	PM MITRA + Gujarat Textile Policy 2024	Standard CEPC/EPCH export support

The net picture is that the cost advantage of a port-adjacent site scales with how mechanized and synthetic-fiber-dependent the planned factory is. It is largest for a pure machine-woven, polypropylene or polyester, export-oriented plant, where Gujarat's land readiness, raw-material proximity, and subsidy stack compound each other, and smallest, potentially reversing into a net disadvantage. This is for a wool-based or hand-finished operation that depends on inland skill rather than on imported synthetic yarn or fast land access.

11. CONCLUSION

Should new export-oriented rug and carpet factories using machines be built near the ports? The evidence here supports a segmented answer rather than a categorical one. For the specific class of factory the question describes, machine-woven or robo-tufted, synthetic-fiber, export-oriented, the case for port-adjacent siting, and specifically for Gujarat's Surat-Hazira-Navsari corridor, is genuinely strong. It

shortens the supply chain for a raw material that is itself produced at the coast, reduces the single largest freight cost tying the industry to its inland roots. It is also now actively subsidized by the PM MITRA scheme's capital and infrastructure support. Turkey's own experience in the case of Gaziantep shows that what matters is efficient, well-connected logistics distance to a port rather than literal shoreline adjacency. This shows how competitive machine-made carpet cluster can be built around importing a meaningful share of its raw material by sea, exactly the strategy a new Indian facility would be adopting. But this case weakens sharply the closer a planned factory sits to wool-based, hand-finished, or designed production, where the decisive input is not a petrochemical yarn but a skilled workforce that took generations to build in Bhadohi, Panipat, and Jaipur. This cannot be relocated to a coastal industrial park on the same timescale as a container of yarn.

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