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LESSONS FROM DISASTER HOUSING SOLUTIONS:

Building resilient supply chains through system design

Lessons from post-disaster housing show how systems thinking, demand aggregation, advance planning, and cross-sector collaboration can help supply chains build resilience before disruption strikes.

By Lauren Finegan, Jarrod Goentzel, and Tim Russell

Looking at supply chain challenges across industries, few domains face more complex coordination problems than post-disaster housing recovery. Yet the solutions emerging from this sector—grounded in systems thinking, demand aggregation, and cross-sector collaboration—offer valuable lessons for supply chain professionals managing their own complex operational environments. In May 2026, the MIT Humanitarian Supply Chain Lab held a roundtable in partnership with the National Institute of Building Sciences (NIBS) on delivering resilient housing after disasters. Insights from the roundtable extend beyond residential reconstruction and speak directly to how practitioners can design, finance, and scale solutions in uncertain conditions.

The system-of-systems problem

The roundtable framed post-disaster housing as requiring three interacting domains: demand, supply, and the enabling environment. Participants stressed a critical principle: failure in any single domain stops the entire system. A survivor may need housing, builders may have capacity, and financing may exist; yet without aligned codes, inspectors, permitting pathways, or utility coordination, nothing moves forward.

This framing applies directly to supply chain management at large. When pharmaceutical companies coordinate last-mile delivery across regions, when automotive networks manage supplier disruptions, or when retailers surge fulfillment capacity, they face similar coordination challenges. The roundtable identified that many failures occur not from single-point bottlenecks but from misalignment across the system. For example, a brilliant warehouse automation strategy fails if the permitting process takes eight months; a cost-optimized sourcing decision falters if the regulatory environment shifts; and a production surge plan collapses if transportation capacity isn't pre-arranged.

Supply chain professionals managing complex operations should adopt the same diagnostic lens to explicitly map the demand domain, the supply domain, and the enabling environment. Ask which parts of your system can move independently and which require orchestration.

Demand aggregation as operational insurance

One of the most actionable insights from the roundtable centers on demand aggregation. The housing system uses demand aggregation effectively in the niche of FEMA's manufactured housing inventory. By creating predictable, aggregated demand, FEMA enables manufacturers to invest in tooling, production lines, and supply chain infrastructure that wouldn't otherwise be economical.

The roundtable included DreamBuild, a Texas-based community development organization that transformed affordable housing delivery. Rather than building homes one-off, they designed a system of five standard "box" types configurable into 36 different layouts. The smallest unit costs $100,000 and families can add on incrementally. This approach respects local building practices while providing a standardized manufacturing platform. When disasters strike, they pivot this same system to disaster recovery, delivering homes in three months instead of the typical years-long reconstruction timeline.

The principle here is that predictable demand enables standardization, which enables efficiency, which enables speed and cost reduction. This applies whether you're managing disaster housing, semiconductor supply chains, or food distribution networks. Companies that can aggregate demand—through contracts,

planning, or coordination mechanisms—can invest in more efficient supply systems. Companies that face fragmented, unpredictable demand face higher costs, longer lead times, and more variability.

Terminology as operational infrastructure

An unexpected but critical finding from the roundtable is that terminology matters operationally. Confusion between modular, manufactured, mobile, and industrialized construction affects city council votes, state legislation, mortgage products, appraisals, insurance assumptions, and survivor trust. For example, local officials have opposed "modular" construction, believing it to be synonymous with mobile homes. Lenders used different terminology, creating additional certification burdens. Survivors heard about "trailers" despite decades of HUD code standards.

This lesson extends broadly. When your supply chain ecosystem uses imprecise or inconsistent terminology, decisions ripple through the system with unintended consequences. A resilient facility means different things to different stakeholders; a critical supplier can lack operational definition; and a tier-one partner is often interpreted inconsistently across regions. Supply chain professionals should treat common terminology—codified in standards, training, and organizational documents—as infrastructure investment rather than cosmetic convenience.

Pre-disaster planning: Designing for predictability

Perhaps the most repeated insight from the roundtable is that much of recovery success is won or lost before the disaster. Participants emphasize pre-disaster reconstruction planning, catalog development, code adoption, factory certification, financing pilots, data systems, and local workforce development as force multipliers for post-disaster response.

One example is the Altadena Prefab Showcase in California, which created a community-facing, neutral information environment where survivors could walk through model homes, compare quality, and learn about factory-built options without mastering technical jargon. Accompanying handbooks organized options by the problems they solved rather than industry terminology. Listening tours and volunteer residents acting as liaisons between individual households and local authorities built trust with disaster survivors. This pre-disaster investment shaped survivor demand in ways that enabled faster, more resilient reconstruction.

For supply chain professionals, this same practice applies in that scenario planning, supplier relationship investments, regulatory pre-engagement, process standardization, and workforce development are essential before disruption hits. Companies that wait until crisis hits to figure out alternative sourcing, design flexibility, or rapid capacity scaling face months of coordination overhead, while companies that pre-designed these capabilities can activate them within days or weeks.

Cross-sector collaboration as competitive advantage

The roundtable brought together federal agencies, state and local housing organizations, insurers, homebuilders, industrialized construction experts, standards bodies, resilience experts, financial institutions, community development organizations, nonprofits, academics, and design professionals. Just as no single entity determines the survivor journey, no single part of the system can scale resilient housing alone.

The enabling environment requires alignment across codes and standards, policy and regulation, insurance products, financing mechanisms, workforce development, data systems, education, and governance structures. When these elements worked together, as in the successful Maui modular housing project, outcomes improved dramatically. When they worked in silos or at cross-purposes, delays and costs multiplied.

This mirrors the pattern in resilient supply chains. The most adaptable networks are those where manufacturers, logistics providers, customers, regulators, and financial institutions maintain sufficient dialogue and alignment that disruption signals propagate quickly and coordinated response becomes possible. Companies that treat suppliers as adversaries, customers as price-shoppers, and regulators as obstacles struggle to build resilient systems, while companies that invest in relationship depth, transparency, and shared planning are better positioned to adapt.

Conclusion

For supply chain practitioners, the key takeaway is that the principles underlying successful housing system design apply to your operational challenges.

In order to apply best practices, first, map your system as demand, supply, and the enabling environment and ask which failures would cascade through your network and why. Second, invest in demand visibility and aggregation, as the more predictable and aggregated your demand signal, the more your supply system can optimize. Third, standardize terminology and processes, which will compound across every subsequent decision. Fourth, build relationships, standards, and capabilities before disruption hits. Finally, treat resilience not as a cost center but as operational insurance—an investment in adaptive capacity that pays dividends in stability, margin protection, and competitive advantage during uncertain times. •

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