

# Editorial: Tariff Uncertainty and the Engineering Manager's Dilemma

—HELEN ROGERS 

Technische Hochschule Nürnberg 90489  
Nürnberg, Germany

Member, IEEE

—ALEXANDER BREM 

University of Stuttgart 70174 Stuttgart,  
Germany

Senior Member, IEEE

IEEE DOI 10.1109/EMR.2025.3609416

**F**OR engineering managers working in global organizations, tariffs have become an unpredictable force shaping all aspects of project delivery, sourcing, and design. Once treated as an issue reserved for finance or executive teams, trade-related taxes now directly influence engineering decisions on a daily basis. The challenge is not just that tariffs are higher but that they are volatile, shifting with political agendas that are difficult to predict.

The USA has been at the center of much of this volatility. Since the start of the new Trump administration in 2025, existing broad-based tariffs have escalated into targeted hikes aimed at key industries such as metals, energy, and technology components [1]. For engineering managers, these increases translate directly into higher costs for critical materials, disrupted supplier relationships, and uncertainty in project budgets. In practical terms, this could mean a design optimized for cost efficiency at the start of the year may require a complete reevaluation within months.

Perhaps unsurprisingly, other economies have responded in kind. China has countered with its own tariff increases on certain U.S. goods, while simultaneously extending preferential treatment to favored trading partners. The EU has sought compromise but as it stands is intending to impose high retaliatory

duties in areas such as steel and agriculture if current negotiations fail [2]. Emerging markets in Latin America, Africa, and Southeast Asia are also dynamically adjusting tariffs as the political situation develops. This “dynamic environment” is requiring engineering managers across the world to manage the fallout that will likely ripple across supply chains.

For managers running global teams in different markets, the impacts are practical and immediate. Supplier qualification now requires more than checking technical capability: it also demands a more thorough geographic and political risk assessment. Sourcing raw materials or specialized components involves calculating not only price and quality but also a heightened probability of further tariff shifts. Contracts must be written with added flexibility to allow for switching of suppliers, and designs must build in substitutions where possible in the case that a particular material or component becomes cost-prohibitive.

The uncertainty is compounded by regional divergence. Some nations are lowering tariffs on strategic imports to attract ongoing investment, while others are raising them to shield domestic manufacturers. Such variability means engineering managers cannot assume stability, and must prepare to adapt to fragmented and sometimes contradictory trade policies.

This volatility further requires engineering managers to adopt new skills and mindsets. Scenario planning to assess risks becomes as critical as technical planning. What happens to a product line if raw material costs rise significantly overnight? Can a design be reengineered to substitute alternative materials or components? Do regional manufacturing hubs need to be duplicated to serve different tariff zones? These are no longer abstract questions but real considerations for managers balancing cost, quality, and time-to-market.

### GROWING ROLE OF TECHNOLOGY

How can technology help to manage this situation? For example, additive manufacturing (AM) could become a powerful tool for navigating tariff uncertainty. By enabling localized production and, in the case of multimaterial AM, combining different materials within a single build, it reduces reliance on vulnerable supply chains and offers engineers flexibility in design choices. This technology is still maturing, but if current trends continue, it could provide longer-term resilience to engineering organizations [3].

Beyond manufacturing innovations, artificial intelligence (AI) also has an active role to play. AI-enabled analytics has the potential to rapidly process global trade data, predict potential tariff changes, model cost scenarios, and even highlight vulnerabilities in complex supply chains. Where managers once relied on quarterly reports and manual spreadsheets, AI tools now provide near-real-time insight into how tariffs affect materials, logistics, and project timelines.

Automation and machine learning also make it possible to quickly test various design alternatives. If trade barriers suddenly make a specific electronic component prohibitively

expensive, then AI-driven design platforms can suggest substitutes, simulate performance, and estimate cost implications. This reduces the lag between tariff shocks and engineering responses, giving companies that use it an edge over competitors.

Collaboration tools powered by AI are likewise maturing to the extent that they can transform how geographically distributed teams work. Intelligent assistants can ease multilingual coordination across markets, flag potential compliance risks in documentation, and even optimize schedules across multiple time zones. These efficiencies free up engineering managers to focus less on administrative firefighting tasks and more on strategic decision-making [4].

The challenge, of course, lies in integration. Managers must guide teams through adopting new tools, ensuring data quality, and upskilling talent to use AI effectively [5]. Success requires blending traditional engineering judgment with the AI-based recommendations. Those who embrace this shift will be better equipped to respond to tariff-driven disruptions and keep innovation projects running smoothly.

### MOVING TARGET

As many organizations stocked up their warehouses in the US and associated markets in anticipation of these changes, one could argue that the effect of the tariffs is only just starting to be felt. As uncertainty becomes the new normal, for engineering managers, success will lie not in predicting every potential policy change, but rather in building in agility to organizational processes. That means cultivating diverse supplier networks, embedding flexibility into design, embracing technology, and investing in skills to enhance resilience.

The global tariff environment we are currently experiencing is unlikely to return to the relative stability of the past decades. For engineering managers, the ability to navigate this uncertainty will define not only their own effectiveness but also their firm's competitiveness in an increasingly fragmented world.

### IN THIS ISSUE OF EMR

A selection of short Technology Manager Notebook articles provides some strategic impulse reading to stay on top of trending issues. This almost inevitably includes AI-related topics, as well as asset and program management. Here, we currently also look for more articles in the future. See also an earlier editorial on this, in case you are interested in specific topic areas [6].

Engineering management is a multifaceted discipline, covering eclectic issues spanning rapidly evolving technologies, processes, and even governance requirements. As noted in previous issues, this diversity is reflected in our current issue of EMR.

Do you understand social value and, in particular, why it is important? This issue starts with an article that explains how to create and claim social value in a project context. The frame of reference is the new space economy, making for some future-oriented observations. In today's climate, online reviews and ratings heavily influence user behavior, meaning they can make or break a business. Our second article provides valuable recommendations on how to reduce undesirable outcomes in electronic word-of-mouth communities.

Becoming greener is on the radar of many organizations and is thought to be especially important for those who target Generation Z customers. However, after analyzing 496 responses, our third article found no direct relationship between

environmental knowledge and green purchasing choices. This issue also covers a new balanced scorecard ontology and a review of smart healthcare employing quantum Internet of Things. Again, we have several articles in the context of AI, which show the importance of this technology for corporate strategy [7]. One article is about the use of AI in modern business education, and another one is about an AI-based framework to improve program management of complex systems. The third one covers lateral thinking-classified perspectives for the adoption of AI,

with guidance notes for engineering managers. The broad coverage of engineering management topics is furthermore underscored by articles about the identification and prioritization of success factors in software development, the impact of strategic foresight on innovation and the adoption of controls, and the saga of development in 3-D printed bioimplants from a business perspective.

The issue rounds off with an article that proposes a framework to assist with managing the core engineering task of evaluating

agility. While everyone feels as though they know what *agility* means in their organization, measuring and managing it in practice is another matter! This comprehensive framework, focusing on software development, provides interesting insights.

Comments, feedback, and offers to be part of our growing community of authors and reviewers are encouraged as always via the journal website (<https://www.ieee-tems.org/about-emr>).

## REFERENCES

- [1] The Economist, "The tariff show: How to strike a trade deal with Donald Trump," 2025. [Online]. Available: <https://www.economist.com/finance-and-economics/2025/07/03/how-to-strike-a-trade-deal-with-donald-trump>
- [2] A. Bounds, "EU officials criss-cross the globe for trade deals," Financial Times, 2025. [Online]. Available: <https://www.ft.com/content/129d9255-093b-45c0-afdf-43716bee7700>
- [3] A. Wagner, H. Rogers, and A. Le, "Exploring new frontiers in multimaterial additive manufacturing," *IEEE Eng. Manage. Rev.*, vol. 53, no. 2, pp. 122–133, Apr. 2025, doi: [10.1109/EMR.2024.3412403](https://doi.org/10.1109/EMR.2024.3412403).
- [4] S. Biel, A. Hahn, V. Bilgram, and H. Rogers, "From hybrid to AI-first innovation management," *IEEE Eng. Manage. Rev.*, early access, Jan. 8, 2025, doi: [10.1109/EMR.2025.3527744](https://doi.org/10.1109/EMR.2025.3527744).
- [5] R. G. Cooper and A. M. Brem, "Insights for managers about AI adoption in new product development," *Res.-Technol. Manage.*, vol. 67, no. 6, pp. 39–46, Nov. 2024.
- [6] A. Brem, "Artificial intelligence in engineering management—An editor's perspective (2023)," *IEEE Eng. Manage. Rev.*, vol. 51, no. 2, pp. 6–8, Jun. 2023.
- [7] X. Ferras-Hernandez, P. A. Nylund, and A. Brem, "Strategy follows the structure of artificial intelligence," *IEEE Eng. Manage. Rev.*, vol. 50, no. 3, pp. 17–19, Sep. 2022.