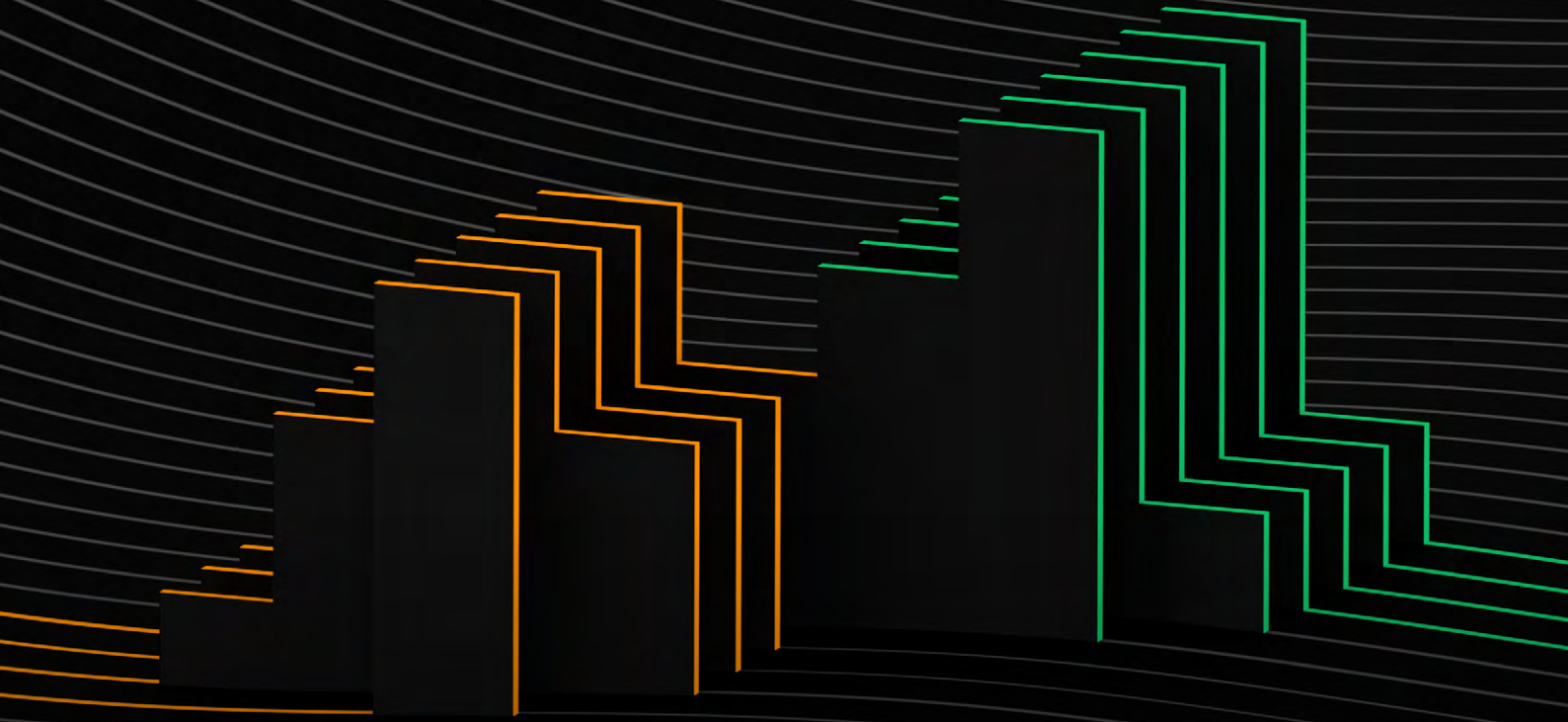




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# The networked industrial enterprise



Extract from the Ericsson Mobility Report  
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# The networked industrial enterprise

Suppliers and manufacturers must design for resilience and flexibility in value chains. The transition to Industry 4.0 will depend on locally and globally interconnected operations to support smart production and life cycle management.

Around 70 percent of international trade today involves global value chains (GVCs). These are made up of domestic and international enterprises that trade and transfer materials, goods and services.

To compete in the global economy, enterprises become increasingly specialized. This has led to a considerable fragmentation of value-adding activities throughout the whole value chain, ranging from design and engineering through production to after-sales services. Historically designed and driven by cost concerns, GVCs today have grown so dispersed and complex that governance has become very challenging, leaving enterprises more vulnerable to disruptive shocks. According to a recent study, 60 percent of executives have zero visibility beyond their tier 1 suppliers.<sup>1</sup> The automotive industry is an example that illustrates the complexity; there is an average of 250 publicly disclosed tier 1 suppliers, extending up to 850 for the largest manufacturers. Yet, their respective and non-visible tier 2+ suppliers number 18,000.<sup>2</sup>

With rising market volatility, resilience and risk mitigation have increased in importance relative to cost and efficiency. Investing in improved information systems and communications infrastructure is one way to counteract sub-optimal operations or imbalances in supply and demand. For example, faster procurement of components from a reliable supplier supports just-in-time manufacturing, avoiding both delays and excessive inventory.

Although improving transparency and traceability on the shop floor will improve many internal metrics, an enterprise is not an island. It exchanges resources, capital and competence in markets subject to regional and geopolitical power dynamics.

**Interconnectedness is key for adaptability**  
Multinational enterprises (MNEs) lead the fragmentation, shifting their activities depending on a variety of business criteria and cost conditions. They insource products and services both domestically and internationally, but outsourcing and offshoring are still dominating trends. Small to medium-sized enterprises (SMEs) make up most of the economy and act as partners, suppliers and distributors. They play a major role in inclusive growth in societies.<sup>3</sup>

Regardless of size and reach, the key to adaptability is to strengthen the interconnectedness of enterprises. This will not only optimize supply chains and material footprint, but ultimately create the most value for customers in each part of the value chain. However, networking capabilities to connect products, people and processes simultaneously on one common platform are often lacking.

The fragmentation of and interdependencies within GVCs make connectivity an even more critical foundation for growth. Connectivity not only improves internal and external collaboration and transparency, but upgrades the enterprises' own positions in the value chain.

## Industry 4.0

The Fourth Industrial Revolution (Industry 4.0) changes the way products are manufactured and consumed. It creates unprecedented levels of automation, compliance and performance by merging physical and virtual worlds through a combination of technologies like Industrial Internet of Things (IIoT) and augmented reality (AR). This not only caters to smart operations at plant level but also applies through the entire supply chain.

According to the Organization for Economic Co-operation and Development (OECD), many SMEs struggle to link up to GVCs, and most fail to deliver products and services beyond their local market. By lowering the barriers to global marketplaces and strengthening specialization, purely domestic SMEs can enlarge their pool of buyers, increasing exports and ultimately improving national GDP.

There are three critical capabilities for successful involvement in GVCs:

- unique products and services
- strong managerial and operational competencies
- flexibility to adapt to changing demands

These capabilities mark distinct competitive advantages that can be unlocked with Industry 4.0.

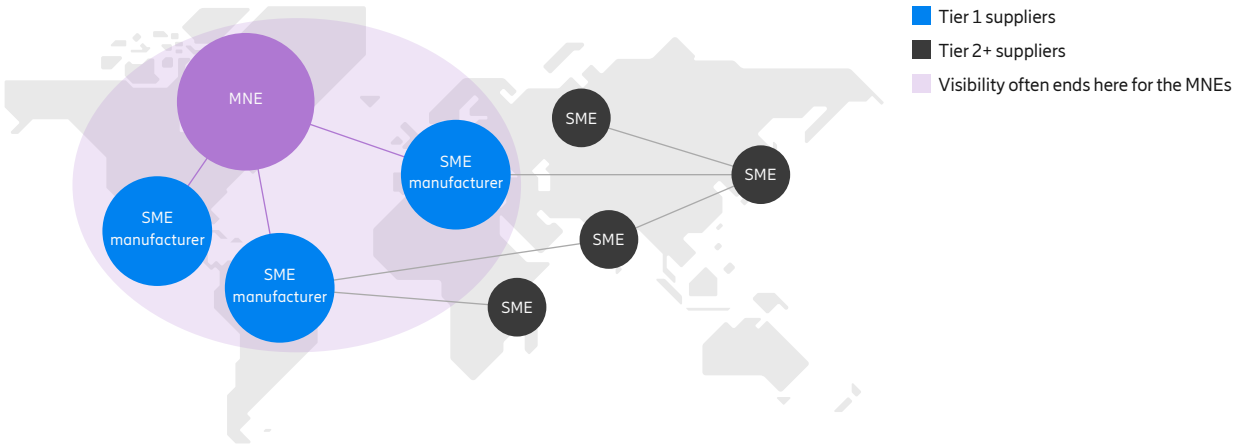
However, many SMEs lack the competence and investment capacity to implement the Industry 4.0 solutions (for example, IIoT, advanced automation, AR and predictive maintenance) necessary to fully enable these capabilities. On the other hand, MNEs have challenges with governance and improvement of their value chains, as these are seldom truly centralized or expertly coordinated.

<sup>1</sup> [www.weforum.org/agenda/2020/09/4-ways-industry-make-supply-chains-sustainable](http://www.weforum.org/agenda/2020/09/4-ways-industry-make-supply-chains-sustainable)

<sup>2</sup> [www.mckinsey.com/business-functions/operations/our-insights/why-now-is-the-time-to-stress-test-your-industrial-supply-chain](http://www.mckinsey.com/business-functions/operations/our-insights/why-now-is-the-time-to-stress-test-your-industrial-supply-chain)

<sup>3</sup> [oecdobserver.org/news/fullstory.php/aid/6062/SMEs\\_are\\_key\\_for\\_more\\_inclusive\\_growth.html](http://oecdobserver.org/news/fullstory.php/aid/6062/SMEs_are_key_for_more_inclusive_growth.html)

Figure 22: The challenging governance of GVCs



**Lowering barriers for interconnectedness**

Advanced collaboration in the GVC will be dependent on high-performing networks with ubiquitous coverage. The choice of connectivity solutions determines the flexibility and quality of the enterprises’ digital foundation and the possibility to improve operations. However, presently there is no standard “plug-and-play” model to cater for all MNEs’ and SMEs’ needs. Cellular networks can bridge both global and local needs of enterprises, but adoption barriers must be lowered, whether they are technical, economic or organizational. One way is to offer simpler packaged connectivity solutions to SMEs, or even private–public hybrids to MNEs.

To speed up enterprises’ Industry 4.0 transformations, centers of excellence are established to test new infrastructure in collaborative environments where competence in new technologies is available, such as at the 5G-Industry Campus Europe in Aachen.<sup>4</sup>

The convergence of enterprises’ operational technology and ICT can be accelerated through more open and tighter partnerships. The same is true for advanced operations. In order to develop true flexibility in the value chain, supply, manufacturing and business criteria must be aligned through system(s) integration. This is the only way to deliver smart, advanced operations. Effectively, this shift in the enterprise operating model also means departing from a linear, sequential view of supply and value chains to an interconnected cyber-physical system for better governance and decision-making on all factors related to input and output.

**Digital integration – a new industry benchmark**

The smart manufacturing process follows four distinct stages; connecting devices on site, connecting lines on the shop floor, connecting and digitalizing a whole factory, and finally establishing a “network of factories”. Historically, MNEs have improved their position in the value chain through acquisitions and mergers of other enterprises and suppliers by either vertical or horizontal integration. Going forward, “digital integration” may become a new competitive benchmark. Instead of expanding through direct ownership and risking becoming overextended, the interconnected enterprise can network its way to smarter operations.

In many cases, up to 80 percent of supply chain costs are determined by the location of facilities and the flow of materials and products between those facilities. The ability to track, trace connected assets and exchange real-time insights and map dynamics of suppliers, distributors and buyers can considerably mitigate risk. Thus, a digitalized supply network presents a competitive advantage, particularly when navigating an increasingly complex global business environment.

The Ericsson Manufacturing and Supply footprint numbers four factories, eight electric manufacturing services sites and eight supply hubs globally. By investing in one common Ericsson Factory Network, sites can deploy smart manufacturing faster by collaborating internally and connecting to an ecosystem of equipment suppliers. Shifting from linear and siloed processes, the digital supply network can integrate business demands with operational needs, responding faster to change and new customer requirements. The benefits for Ericsson as an MNE are higher quality, better resource management, faster product introduction and delivery precision.

<sup>4</sup> www.5g-industry-campus.com

**Figure 23: How the Industry 4.0 transformation affects economic models**

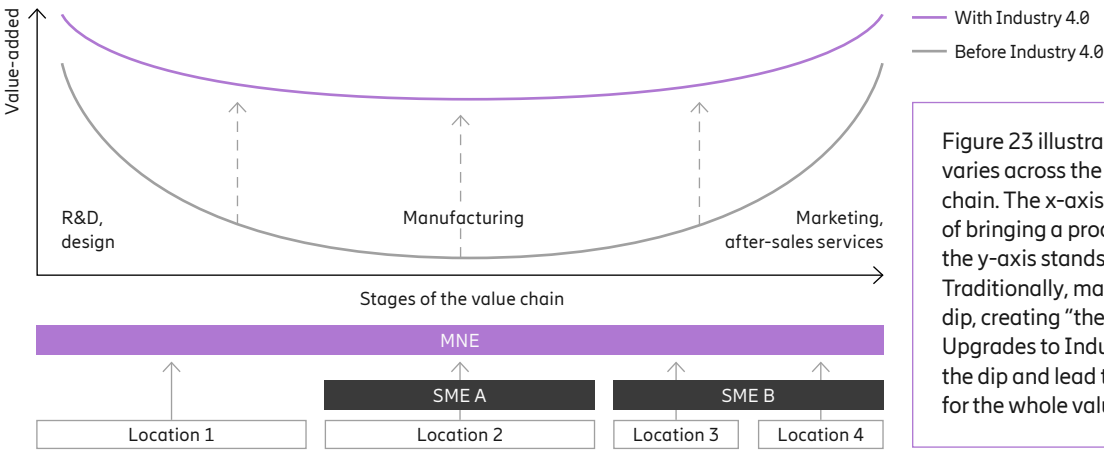


Figure 23 illustrates how value-added varies across the stages of the value chain. The x-axis represents the stages of bringing a product to market, and the y-axis stands for the value-added. Traditionally, manufacturing makes a dip, creating “the smiling curve”. Upgrades to Industry 4.0 counteract the dip and lead to an upwards shift for the whole value chain.

**Multi-SIM lowers barriers for roaming**

To enhance GVCs there is a need for different connectivity solutions. In order to support both central and local decision-making for manufacturing and logistics, there are several network options available for MNEs and SMEs responsible for different value stages and sites. A private (dedicated) network executes critical applications locally so sensitive data does not leave the factory premises, which is a basic requirement for most manufacturers. On the other hand, a public network connects sites and assets that need wide-area coverage at customer premises and during transit for smarter logistics. A digital supply network or the extended enterprise might need both, connecting dedicated sites, product flows and services.

To support interconnected operations, factory assets like OEM machines can be connected throughout their lifecycles with multi-SIM card technology. With the capability to store multiple or dual profiles, the asset can easily shift between public and private networks. As profile switching typically takes 20–30 seconds, this approach does not support seamless roaming, but it does not require any reboot of the device either. Applications like automated guided vehicles (AGVs) or autonomous mobile robots (AMRs) that are constantly moving between a private and public network on a campus are not suited for this solution. However, there are many applications where a short break in connectivity is acceptable when the identity is saved.

For example, when products are assembled at multiple factory sites, traceability from one to the other is valuable, both when it comes to fast fault-finding and to facilitate just-in-time manufacturing. To improve governance and customer management, new connected industrial assets can switch “roles” from shipping to deployment and even to service mode. Naturally, each stage may have specific connectivity requirements and rules as to when the device should switch profile.

**Interconnected enterprises transform economic models**

In Figure 23, whether the enterprise controls the entire value chain end-to-end (MNE) or is a contributor (SMEs A and B) in the chain, smarter integration of manufacturing and business can lead to shifts in traditional economic models. The manufacturing stage, providing standardized products in high volumes, has historically been viewed as having the lowest value-add in both the value and supply chains, whereas the highest value-adding stages have been R&D, marketing and after-sales services. With the development of the digital factory within the context of Industry 4.0, the value-add of the manufacturing stage will increase alongside the evolution of advanced industrial automation and reshoring. The R&D stage will also signify a higher value-add, as Industry 4.0 implies investments in advanced industrial automation, artificial intelligence (AI), up-skilling labor and co-creation with customers. Increased interconnectedness with manufacturing would bring faster prototyping and deployment of innovations.

The goal of the digital factory is to effectively align business needs and operational processes through advanced information systems. These can be well supported by cellular solutions interlinking the globally dispersed enterprise. The integrated information flows limit waste with smarter, timelier decisions. Even if most use cases today focus on optimizing a production line or site, the integration and potential savings go well beyond the shop floor. Smart manufacturing takes place across locations with feedback loops, for example with digital twins strengthening design and quality of the product, or faster sourcing of components from a supplier that is more resilient to disruptive events. The ability to change or tailor even in-process orders, constantly incorporating customer needs through marketing insights, better balances actual demand with supply. Enhancing and exploiting these types of interlinkages is where efficiencies and value can be unlocked for the enterprise, regardless of its place or participation in the value chain. By lowering barriers to cooperation, actual networks can help mitigate some of the volatility, uncertainty and complexity of industrial governance and trade. In turn, this encourages digital integration and the establishment of networked enterprises.

New technologies have always driven waves of globalization. Industry 4.0 can bring forth the networked enterprise for smarter collaboration across borders, advancing a more inclusive and interconnected world.



Ericsson enables communications service providers to capture the full value of connectivity. The company's portfolio spans Networks, Digital Services, Managed Services, and Emerging Business and is designed to help our customers go digital, increase efficiency and find new revenue streams. Ericsson's investments in innovation have delivered the benefits of telephony and mobile broadband to billions of people around the world. The Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York.

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