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Reshaping Global Value

Technology, Climate, Trade – Global Value Chains under Pressure

In Collaboration with A.T. Kearney

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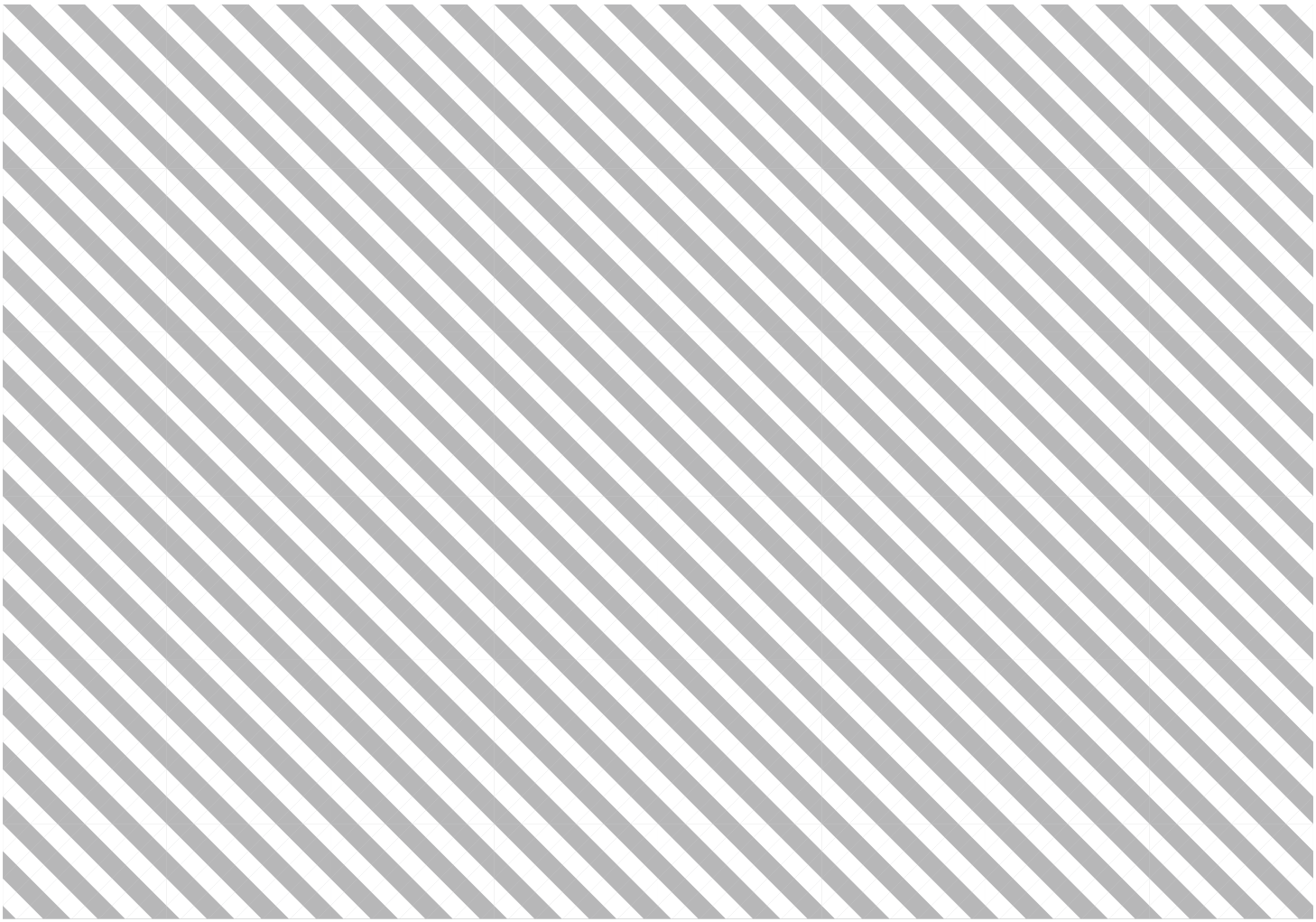

World Economic Forum
91-93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland
Tel.: +41 (0)22 869 1212
Fax: +41 (0)22 786 2744
Email: contact@weforum.org
www.weforum.org

United Nations Development Programme
1 UN Plaza
New York NY 10017
USA
www.undp.org

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Executive summary

Global value chains (GVCs) are the lifeblood of the world's economy, accounting for more than two-thirds of global trade. GVCs have been one of the primary driving forces behind an economic escalator that has delivered many of the past century's most extraordinary gains. Complex, multi-echelon GVCs have grown exponentially since the 1990s and, today, are an essential engine of global economic development and GDP growth. GVCs have helped some, albeit not all, countries and communities lacking strong infrastructure to participate in the global production and trade system. They are the integrating mechanisms that determine how many global and local businesses are configured and the crucial channels of access that allow them to succeed.

Yet, today, GVCs are undergoing profound changes, with sweeping implications for those who are dependent on them as pathways to economic success. Driving these changes is a "perfect storm" at the nexus of three mega-trends that are disrupting our global production system and reshaping the distribution of global value: emerging technologies; the environmental sustainability imperative emerging from the accelerating global climate emergency; and the reconfiguration of globalization. Individually and in combination, these three mega-trends have fundamental implications for how value is created and distributed along GVCs, and thus for how businesses define their strategies and nations advance sustainable development.

Facing up to these disruptions requires new approaches to ensure an orderly, inclusive and sustainable transition. These approaches will need to include new forms of business strategy and government policy and practice, supported by a new generation of public-private partnerships.

To secure their places in tomorrow's global economic system, developed and developing countries – as well as small and medium sized businesses (SMEs) and multinational corporations (MNCs) – urgently need to understand the risks and opportunities associated with the impending changes to GVCs, and the future shape of production as a driver of economic growth and development.

Recognizing this urgency, the World Economic Forum and the United Nations Development Programme (UNDP) have undertaken a joint effort to develop a better understanding of the ongoing transformations in production and GVCs from both a corporate and broader sustainable development perspective. In collaboration with A.T. Kearney, the partners developed a new Strategic Value Framework that helps stakeholders understand the likely impacts and implications of disruptions across GVCs, and thus what needs to be done to adapt to them, when and by whom.

Specifically, this Strategic Value Framework provides a methodology for quantifying the likely extent of GVC reconfiguration under different disruptive scenarios. It is an analytic resource that businesses and governments can use to both identify risks and seize opportunities by informing the design and execution of a new generation of strategies and policies.

Crucially, the Strategic Value Framework will help drive dialogue across the private and public sectors, thereby opening new opportunities for collaboration. The value of the framework will ultimately be measured by its effectiveness in generating actionable insights that help countries engage with business in upgrading their production base and aligning their strategies and practices to shape and secure their future share of global value.

Reshaping Global Value provides a challenging view of how today's GVCs are being transformed, and a compelling case for the need for public and private actors to come together to better understand the nature, pace and implications of the ongoing disruptions and take collaborative action accordingly. The key to understanding the scale of the forthcoming changes is appreciating their systemic features. To this end, the paper highlights the limits of predictive models given the inherent uncertainties, and the lack and uneven distribution of relevant data.

These constraints can be overcome by applying the methods of scenario analysis, data analytics, use case-driven assessments and, above all, dialogue.
Towards that end, this paper:

– Offers a new Strategic Value Framework to test hypotheses and understand the implications of disruptive trends on GVCs.

– Identifies capabilities that can help businesses, governments and public-private partnerships to prepare for those disruptive trends, stay ahead of potential negative effects and continue to grow value.

– Makes a case for change and issues a call to action for businesses, governments and public-private partnerships to ensure an inclusive transition towards the future GVC landscape, including by rethinking their strategies and pathways to economic growth, and considering wholly new approaches to economic planning, policy-making, capacity development and business practices.

The Strategic Value Framework balances the granular analysis required to offer insights that are useful to specific sectors within countries, and the aggregated assessments necessary to also draw regional and global conclusions. The framework first profiles a current GVC in terms of three pillars:

- **Economic value pool** indicates where value is generated by industry and quantifies it in a value pool consisting of absolute revenues, relative profitability and net-retained profit across five stages of value creation – extraction, processing, forming, assembly and distribution.

- **Geographic concentration of supply** assesses the degree to which each stage in a GVC is supplied with production inputs from local, national, regional and global groupings of suppliers across the five stages of value creation.

- **Structural characteristics** consist of nine factors that are crucial to GVC competitiveness at each stage, while considering the main interdependencies between countries and sectors most relevant to value-chain participation: reliance on economy of scales; cost of labour; labour intensiveness; innovation intensiveness; supply concentration; demand concentration; competitive landscape; relative wages; and other indirect costs.

The Strategic Value Framework then provides a scenario tool to envision a range of impacts of the three disruptive mega-trends and identify important opportunities and challenges for relevant GVC stakeholders. These implications, in turn, may suggest new approaches, including strategies to develop capabilities that businesses, governments and public-private partnerships may require to upgrade their production base, improve their level of readiness for the future of production and participate in future GVCs. **Appendix A** contains a description of the GVC pillars, and the methodology behind the framework.

Reshaping Global Value also explores the effects resulting from the combination of the disruptive mega-trends, which have previously been studied mainly in isolation, and never considered in the aggregate as a "perfect storm". The resulting insights point to an urgent need for action, not just by governments and businesses, but also through public-private partnerships involving a wider range of actors.

As disruptive mega-trends translate into shifting modus operandi in GVCs, relying solely on reactive responses brings a risk of significant loss of economic and social value. This report therefore builds on the Forum's *Readiness for the Future of Production Report 2018* to recommend proactive development of specific capabilities. Thus, in addition to the relevant and widely accepted drivers of change presented in the previous study – technology and innovation, human capital, global trade and investment, and sustainable resources – this document proposes a set of critical GVC-specific capabilities.

For businesses these include "vertical disintermediation", where operating models are shifted from functional alignment to cross-functional alignment around customers and channels; "demand alignment" to deepen the sources and use of data to tailor offerings to specific customers; and "ecosystem development" to amplify innovation through networks of collaboration, as compared to isolated internal R&D groups.

For governments, important capabilities include the promotion of innovation and technological upgrading; the establishment of broad-based quality education and lifelong learning systems; and the access of exporting industries to regional and global market channels. Governments need also to rethink regulatory approaches so that these send the right signals for all stakeholders to contribute to sustainable development and equitable societies.

Way forward

The Strategic Value Framework helps stakeholders, especially businesses and governments, to understand the implications of disruptions in production systems and identify the capabilities required to proactively drive new value creation. It is meant to inform the development of new business strategies and policies, and to encourage new public-private partnerships and strengthen cooperation. By implementing the Strategic Value Framework, the World Economic Forum and UNDP are driving in-depth industry sector-specific analysis and regional and country dialogues to support the transition to the future of production and new global value chains.

1. Global value chains and strategies for countries and businesses

- **GVCs play an important role in the development of businesses and national economies. More than two-thirds of world trade takes place within the framework of GVCs.**
- **Rapid expansion of GVCs created opportunities for many countries – particularly developing countries – to participate in global markets and drive their economic development.**
- **Businesses have benefitted from GVCs by reducing production costs and gaining access to new resources and technologies.**
- **The extent and nature of participation in GVCs varies, with benefits unevenly distributed between and within countries.**

GVCs encompass the cross-country, end-to-end processes by which goods are produced, consumed and dealt with at the end of their life cycles. Diverse entities coordinate activities across them, from raw material extraction through to processing, forming, assembly, distribution and either disposal, reuse or recycling. Industrial and business strategies have relied on and helped shape global networks of production that underpin GVCs.

Today, more than two-thirds of world trade occurs through GVCs,[1] although most GVC activity is in intermediate goods and embedded services rather than finished goods and thus not visible to consumers. Production of the iPhone, for instance, spans 200 suppliers residing in 43 different countries and six continents.[2] A single iPhone component, the A12 chip, is designed in California, fabricated in China or Taiwan and packaged and tested in the Philippines. This sort of geographical distribution is not limited to small, easily transportable components. The Airbus A380, the world's largest passenger aircraft, consists of 4 million individual parts produced by 1,500 companies from 30 countries around the world.[3] Both the iPhone and the Airbus A380 illustrate the scope and complexity of today's GVCs, with borderless production systems hopping between developing and developed countries.

The ongoing advance of GVCs is abetted by forces that have remained broadly consistent since the end of the Second World War, when the members of the international community came together to open their markets.[4] Governments that recognized the value and opportunities associated with GVC participation developed strategic policy frameworks that favoured cross-border collaboration. The rise of multi-echelon, globalized GVCs (which Professor Richard Baldwin described as "a trade-investment-services-IP nexus") significantly accelerated from the 1990s onwards. Important factors included the globalization of trade, international investment and development of infrastructure. Major enablers included enterprise-level resource planning systems to integrate geographically dispersed production, cross-border flows of intellectual property, managerial techniques and the widening of marketing know-how.[5]

Businesses have benefitted from the expansion of GVCs through lower production costs, greater availability of resources and access to technology. Companies with a global reach can coordinate complex supply chains across borders to enhance efficiency and profits. New production strategies influence the development of GVCs through investment decisions and intra-firm trade.

For developing countries, rapid GVC expansion opened unprecedented opportunities to participate in global markets. Before the rise of GVCs, countries had to build a deep and wide production base in order to compete.[6] With the rise of GVCs, countries often entered foreign markets at lower costs and heightened pace by specializing in certain parts and tasks, joining regional or global supply chains.

According to the World Bank, participation in GVCs is associated with higher productivity gains and economic growth. A 1% increase in GVC participation is estimated to increase per capita income by more than 1%, about twice the effect of participation in conventional trade. As a result, the poverty reduction impact of GVC participation is greater.[7]

The expansion of GVCs has correspondingly provided an increasing role for developing countries in global production and trade. The share of these countries' exports in total merchandise trade almost doubled over the three decades from 1990 onwards, increasing from 24% in 1990 to 45% in 2018.[8] More than half of developing countries' exports take place within the context of GVCs.[9]

Emerging economies have particularly benefitted from the offshoring of labour-intensive stages of manufacturing, heightened international mobility of technology and favourable national and multilateral economic reforms.[10] As a result, emerging economies' share of global value-added trade has steadily increased from 20% in 1990 to 30% in 2000 to more than 40% today.[11]

The extent and nature of GVC participation, however, varies across countries and sectors, and benefits are unevenly distributed among and within countries, particularly the least developed countries (LDCs)

The importance of GVCs to countries' industrial and development strategies, as well as to the growth and production strategies of business, underlines the need to understand the drivers of GVC disruption and strengthen the ability of stakeholders to adapt to these changes. The next chapter of this paper highlights three of the major disruptions, or mega-trends, affecting GVCs.

2. Mega-trends disrupting production systems

- **A "perfect storm" of economic, social and environmental dynamics is reshaping production systems and global value distribution. Projections indicate a maximum potential value loss across end-to-end value chains of -40% at the lower bound and +70% at the upper bound, across a range of possible scenario outcomes.**
- **Emerging technologies are reducing the importance of economies of scale, facilitating the location of production closer to consumers, and enhancing transparency between producers and consumers.**
- **Widespread environmental degradation and a climate crisis profoundly affect GVCs through increasing risks to supply, impacts on resources availability, and actions to address climate change.**
- **Trade tensions and resulting policy uncertainty are further disrupting GVCs.**
- **A global development challenge over the coming decade is to mitigate these risks while securing equitable access to a new era of economic opportunities.**

Today, several economic, environmental and social phenomena are contributing to a "perfect storm" that is disrupting global production systems and reshaping global value distribution. While multiple analyses have previously identified and discussed individual disruptors and their implications, none has explored the possible quantum shift that could arise from the interplay of mega-trends.

This paper aims to address this gap by describing the superposition of three of the mega-trends driving change – emerging technologies, environmental sustainability, and a reconfiguration of globalization. Individually and in combination, these mega-trends carry fundamental implications for how value is created and distributed along GVCs, and thus how businesses define their strategies and nations advance sustainable development.

Emerging technologies

Throughout history, technological innovations have shaped world commerce. A new wave of innovations in digital technologies is fundamentally changing production systems and trade, and has the potential to significantly accelerate global integration.[12] While advancing technologies create tremendous opportunities for countries and businesses, they also raise challenges ranging from data privacy to shifts in market power to income inequality.

Production technologies

The convergence of additive manufacturing (3D printing), artificial intelligence (AI), robotics and the internet of things (IoT) is dramatically altering the global production landscape for goods of all types, while bringing producers, consumers and the supply chain together in unprecedented ways.[13]

For example, in additive manufacturing, customization and complexity are no longer limiting cost factors. The rapidly growing list of compatible materials has greatly expanded the potential for additive manufacturing to disrupt different fields, from agriculture and biology to design and manufacturing.[14] This technology has already eliminated the need for a large amount of highly skilled labour and the associated surges in manufacturing costs. For example, a fuel nozzle produced by General Electric now consists of a better-performing single part, versus the 20 finely machined and carefully assembled parts required to fabricate an earlier version.

Blending AI, robotics and IoT with additive manufacturing creates entirely new possibilities for who makes what, and where. Specifically, manufacturers will no longer have to rely on multiple stakeholders scattered across geographies. These technologies will enable them to bring much or all of their production back to their home bases and switch to just-in-time models.[15] As a result, businesses could benefit from major reductions in shipping and inventory costs; near elimination of lead time; a lower risk of intellectual property theft; increased cooperation between stakeholders; faster response to changing market dynamics; and more efficient logistical flows.[16]

Box 1: Emerging technologies driving GVC reconfigurations in footwear manufacturing

New technologies will increasingly allow large industry players to reshore part of their production processes. Adidas, for example, is starting to meet consumers' customization demands with 3D-printed sneakers. This technology requires skills not widely available in low-cost labour countries, where sneakers are currently produced. Local capabilities and available resources in the United States, in combination with high domestic demand for these premium products, resulted in US-based production, drastically changing existing sneaker value chains.

Further reading: "How Adidas Plans to Bring 3D Printing to the Masses".

Digital platforms

Digital platforms will further disrupt the traditional GVC rules of interpersonal and cross-entity engagement, collaboration and competition. Most fundamentally, platforms make physical distances less relevant to the flow of information and services. One need only be online to participate. Over the past decade, the number of online users has more than doubled, and cross-border bandwidth increased by a factor of 148.[17] Digital platforms will enable a much more diverse range of stakeholders to engage in both B2B and B2C transactions.

Enterprise blockchains could be another major disruptor. Klaus Schwab describes the blockchain "distributed ledger" as a programmable, cryptographically secure protocol in which a network of computers collectively verifies a transaction before it can be recorded and approved.[18] The capacity to encode smart contracts into blocks could reduce the need for contracting and clearing-house services, while also preventing accidental or intentional entry of transactions that violate contract terms. No supply chain entity owns the blockchain data, nor can any entity alter any part of the immutable blockchain record or access blockchain data that others cannot. Thus, blockchain can effectively eliminate mistrust as a concern in value-chain interactions.

Digital platforms also reduce the importance of economies of scale, providing both small and large players ready access to research, development, marketing, sales and distribution.[19] This creates lower barriers to entry for smaller players such as SMEs and can provide them immediate proximity to millions of customers.

Consumer expectations

Technology is also disrupting GVCs on the demand side. Increased access to mobile networks and data provides greater transparency between producers and consumers. Willingly or not, consumers now reveal many of their preferences and passions to brands through their online activity.

As technologies bring more customers and suppliers in direct contact, GVCs will see increased disintermediation – the cutting out of "middlemen" from the linear and rigid supply chains of the past in which distributors, wholesalers or other intermediaries often controlled the route to markets. Matchmaking platforms such as Amazon, Alibaba and Google, with the scale to grow markets, are replacing linear value chains with a connect-the-dots logic in which instances of demand are rapidly matched to the best-fit supply. Open communication and frictionless point-of-sale demand data are moving many GVCs away from batch replenishment towards continuous replenishment.

The imperative of environmental sustainability

From pollution and solid waste to water scarcity, desertification and deforestation, the need to address the underlying drivers of environmental degradation is increasingly recognized by stakeholders in government, civil society and business.

The greatest single threat to sustainable development is the global climate emergency.[21] The United Nations Intergovernmental Panel on Climate Change found that only a 12-year window remains to prevent a 2°C rise in average global temperature, an event that would bring catastrophic and irreversible consequences.[22]

Risks to supply

The World Economic Forum's *Global Risk Report* identifies extreme weather events, natural disasters and the failure of climate change mitigation and adaptation as among the top five risks the world has faced since 2018.[23] Extreme events and natural disasters are exacerbated by climate change, which increases their frequency and intensity.

Some GVC players are changing their sourcing strategies to safeguard against supply disruptions. The automotive sector is a prime example, with its multi-sourcing of critical