

Insights into Pharmaceuticals and Medical Products

Building New Strengths in the Healthcare Supply Chain

Pharmaceuticals and Medical Products Operations

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Article at a glance

The bar is rising for healthcare supply chains

Healthcare supply chain is facing increasing pressure. Pharmaceutical and medical device production is getting more complex as companies expand their portfolios in order to align to rapidly changing markets. Global economic growth is creating new demand for affordable, effective healthcare products from hundreds of millions of people living in emerging economies. Quality and compliance issues are also on the rise creating further risk in the supply chain.

The industry's current supply chain model will not be able to meet these challenges forever, requiring companies in the sector to develop new capabilities and new ways of working together.

The strategic advantage of superior supply chain performance

Better supply chain performance won't just allow pharma and medical device companies to tackle the issues they face today but will also provide significant strategic benefits. First, it can reduce costs, by shortening manufacturing lead times, slashing inventory levels across the value chain, and cutting product obsolescence. Second, it can improve access, reducing drug and device shortages in developed markets and delivering affordable healthcare to millions more people in emerging markets. Third, it can transform safety, by making it harder for counterfeit products to enter the supply chain and reducing the human and financial toll of medication errors. Our analysis suggests that the healthcare sector can improve its margins by tens of billions of dollars and improve patient safety by making supply chain improvements.

Five critical capabilities

The healthcare sector can learn much from other industries that have developed their supply chain capabilities into a sustainable source of competitive advantage, delivering superior service and flexibility at dramatically lower cost. Better supply chain performance comes from better linking supply chain strategy to business strategy. Five specific capabilities hold the key:

1. Segmentation, to better match supply chain capabilities with the requirements of specific products, markets and customers
2. Agility, to reduce costs and increase flexibility through fast, responsive manufacturing and logistics processes
3. Measurement and benchmarking, to drive continuous improvement through a clear understanding of real supply chain costs and capabilities
4. Alignment, to enable fast, accurate data exchange across the value chain by the use of global standards
5. Collaboration, to capture the benefits of high performance supply chains beyond company borders and across the complete healthcare value chain

However, supply chain transformations are hard as siloed efforts result in sub-optimal outcomes at best. An integrated and holistic cross-functional effort is needed to transform the supply chain.

Building New Strengths in the Healthcare Supply Chain

Products, markets, regulators and patients are making new demands on pharmaceutical and medical device supply chains, from the factory floor to the bedside, and these demands are rising at an accelerating rate. For example, McKinsey's proprietary Pharma Operations Benchmarking (POBOS) suggests that complexity, as defined by number of SKUs per packaging line, has increased by more than 50% over the last 5 years. The industry's current supply chain model will not be able to meet these challenges forever, requiring companies in the sector to develop new capabilities and new ways of working in order to transform speed, efficiency, flexibility and reliability across the entire value chain.

Better supply chains won't just allow pharma and medical device companies to tackle the challenges they face today, like increasing product complexity, global market growth and increased regulatory scrutiny. The payoff from investment in these capabilities is large and strategic, with the potential to give millions of patients worldwide access to safer, more cost effective healthcare, while offering companies significant cost and inventory reductions and enabling new sources of revenue.

Our analysis suggests that healthcare companies could make significant progress, saving tens of billions of dollars and thousands of lives a year. With greater cross-value chain collaboration, the impact of supply chain innovation in healthcare could be even greater, as other industries have demonstrated.

In this paper, we examine three key areas of benefit delivered by higher supply chain performance: reduced costs, improved healthcare access and better patient safety. We will then describe the capabilities, both internal and across the value chain, that pharma and medical device companies will need to develop in order to turn this potential into reality.

The bar is rising

Pharmaceutical and medical device production is getting more complex, as companies expand their product portfolios in order to align to rapidly changing markets and lengthen product lifecycles.

Global economic growth presents its own challenges. Hundreds of millions of people in emerging markets are looking to the healthcare industry for more affordable products. In the last decade or so, the global trade in medical devices and pharmaceuticals has grown more than four times faster than commerce overall.¹ We expect that trend to continue, given shifting SC infrastructure footprint, medical advances, an aging global population and increasing wealth in emerging markets.

Quality and compliance issues are also on the rise—due to greater product complexity and increasing regulatory scrutiny. According to the Food and Drug Administration, the US had about five drug recalls per week in 2005, forcing hospitals and pharmacies to scramble to alert the affected patients and get those products off the shelves. By 2011, the US was averaging more than 19 recalls per week, but few hospitals or pharmacies had made any major advances in their recall processes. Many still rely on manual record-keeping, which is slow, costly and prone to errors.

*"We're seeing dramatic increases in recalls and in harm to patients.
What we're not seeing is any major improvement in recall processes."
— National regulator*

1 World Trade Organization (<http://stat.wto.org>)

Lower costs

Cutting costs in the healthcare supply chain has the potential to make pharmaceutical products and medical devices more affordable to more people, and to increase shareholder value along the way. While the healthcare industry has unique challenges, it can learn from other industries.

Pharmaceutical and medical device supply chains lag in performance behind other industries – e.g., Fast-moving consumer goods (FMCG) industry is likely a couple of decades ahead in supply chain capabilities and performance (See Exhibit 1). Our experience in many supply chain diagnostics and transformations show that the healthcare industry can make dramatic improvements. Pharmaceutical and medical device supply chains could cut manufacturing lead times and obsolescence and allow manufacturers, distributors, hospitals and pharmacies to carry significantly smaller inventories.

Industry research, together with our own experience serving clients, has revealed opportunities to boost profits throughout the value chain, from about 6 percent in retail settings to 20 percent in hospitals and device and medical supplies manufacturers by improving supply chain performance to industry best practice (See Exhibit 2 on next page). This includes some savings in areas outside of supply chain operations, e.g. hospital savings from reduced adverse drug events.

Exhibit 1

Operational metrics suggest huge opportunities

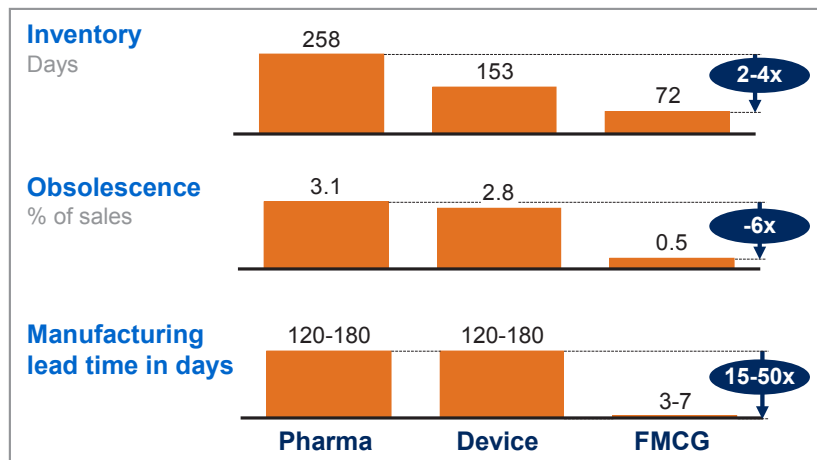
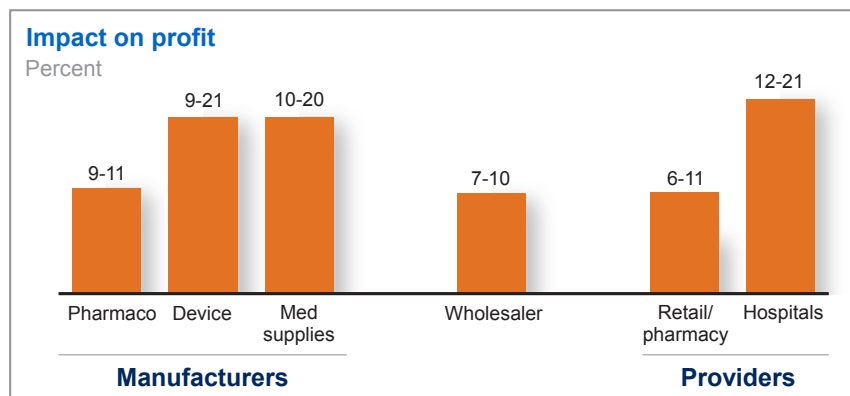


Exhibit 2

Opportunity across the value chain from supply chain transformation



Improved access

Today's supply chain shortcomings have severe impact on human health. Even in the US, which does not face all of the challenges found in the developing world, drug shortages have nearly tripled since 2005. Providers pay an average of 11 percent more for products experiencing shortages—more than half a billion dollars in additional costs for hospitals worldwide.² Shortages also create opportunities for counterfeiters and grey market vendors, threatening patient safety and cutting into the revenues of legitimate companies.

Improving access to customers and patients in emerging markets will improve their health, of course, but it will also provide exceptional new growth opportunities for many companies that are now finding it difficult to build revenues at home. Industry observers estimate that medical products revenues in emerging markets will rise from \$170 billion in 2011 to more than \$230 billion in 2016, while pharmaceutical sales will rise from \$545 billion to \$660 billion.³ Even in established markets, supply chain best practices can increase patient access to short supply products, and therefore act as a revenue accelerator for the healthcare industry.

Enhanced safety

Supply chain security breaches are on the increase, threatening patient safety. Not incidentally, supply chain breaches also reduce revenues and raise costs. Research suggests that breaches are increasing by an average of more than 33 percent every year, mostly in China, India and Brazil.⁴

Countries with the highest risk of counterfeiting tend to be the fastest-growing pharmaceutical markets, with projected annual growth of 10 percent. Our conservative estimate suggest that global counterfeit supply could reach 5 percent of the market and \$70 billion in lost sales by 2016. But given the rapid growth in counterfeiting the situation may be far worse by then.

2 ASA press release, May 2011; FDA report on drug shortage 2011; Premier Healthcare Alliance

3 Business Monitor International, 2011

4 Pharmaceutical Security Institute; International Policy Network, "Keeping it real," 2009

The consequences of breaches include ineffective therapy, increased drug resistance due to substandard medications, injury and death—all of which tend to reduce people’s trust in the healthcare system.

Breaches are not the only threat to health. Studies confirm that in the developed world, medication errors occur for roughly 10-20 percent of all inpatient hospital admissions. About a third of those lead to adverse drug events (ADEs); about one in ten thousand patients admitted dies from such ADEs (See Exhibit 3).

The financial toll is also high. Each ADE leads to incremental healthcare cost of an average of about \$4,700 to \$8,750 in the US, and we estimate \$20 billion to \$90 billion in additional costs to the healthcare system globally.

Improved supply chain processes are central to the fight to improve patient safety. There are already plenty of good examples of technologies and process changes delivering real benefits today. Brigham & Women’s Hospital in Boston has cut medication errors by about 40 percent and ADEs by 50 percent by identifying and matching medications and patients.⁵ Patients in Ghana, Nigeria, and India can now verify the authenticity of their medications with a text-message-based anti-counterfeit platform. Computerized drug trolleys are improving patient safety and hospital inventory management around the world.

There is much more to be done, however. We estimate that adopting a common global data standard and improving supply chain processes could slash counterfeiting in half and yield \$15 billion to \$30 billion in sales by 2016 that would otherwise be lost to counterfeits.

Exhibit 3

Patient safety and public health incidents in hospitals

SOURCE: press articles



More than 44,000 patients die annually in the U.S. due to clinical errors, 7,000 of which are from medication errors



Of about 8 million hospital admissions in England each year, 850,000 result in a patient safety incident, costing the NHS about \$2 billion



In New Zealand, in-hospital adverse drug events occur at a rate of about 10%, of which three quarters are classified as preventable



Eight hospitals in Hong Kong needed two weeks to find 30 patients affected by a recall of a hip replacement system

5 Poon et al. (2010), “Effect of Bar-Code Technology on the Safety of Medication Administration,” *New England J Med* 362(18)

Building a new healthcare supply chain

A typical Asian laptop manufacturer can accept an order on a Monday and deliver a pallet of freshly assembled customized computers to a European customer on Tuesday of the following week. In contrast, a typical pharmaceutical manufacturer has a lead time of about 75 days to deliver to distribution centers out of a formulation and packaging plant in the region.

How can medical device and pharmaceutical manufacturers close the gap for cost, speed and accuracy and improve the performance of their supply chains? Our research and experience across multiple industries in supply chain suggest that there are a few best practices (beyond good basics such as good forecasting and planning) a supply chain needs to embrace to transform its performance.

- Strongly link supply chain and business strategy
- Create high-performing tailored supply chains using segmentation and end-to-end thinking
- Create agile supply chain to capture demand
- Make deliberate network choices (internal/external) along with robust supplier management
- Embrace complexity that matters
- Leverage collaboration across partners to reach new frontiers of performance

In addition, best performers have great execution discipline (e.g., measurement & strong performance management) and work seamlessly across functional boundaries (e.g., through a strong S&OP process and aligned incentives). Healthcare supply chains also need to align across the industry on a common global data standard to dramatically improve patient safety as well as SC efficiencies.

We find that healthcare players need to build or strengthen five of these “muscles” including: segmentation, agility, measurement, alignment and collaboration. The first three of these are “internal” muscles that companies can develop within their companies. The last two, potentially the most powerful, require them to work together with their customers, their suppliers and even their competitors.

Internal Muscles

1. Segmentation

Many pharma and medical device companies are close to running one-size-fits-all supply chains. Where they do differentiate between product lines, it is often only for cold-chain products. In practice, however, profitability, value density, demand variability, criticality to patients and the cost and service expectations of customers can all vary significantly. These differences can have a profound effect on the optimum planning, production, inventory carrying and logistics processes for different products, markets and customer groups.

Trying to force products with such varied characteristics through a single set of supply chain processes creates multiple inefficiencies for pharma companies: high inventories for some products while others suffer shortages, for example, the use of expensive air transportation when slower surface modes would do, or regular firefighting on the shop floor as production campaigns are hastily rescheduled to meet urgent delivery requirements. At the other extreme, managing

supply chains with different approaches for all products, strains management resources, and boosts complexity and fragmentation.

Leading companies, in the healthcare sector and others, are now tackling these problems by intelligently segmenting their supply chains according to differing product characteristics and customer requirements.

They then develop appropriate forecasting, production and distribution strategies for each category. One company, for example, introduced separate physical flows for small, expensive products in its range and heavier, cheaper ones, allowing it to improve both inventory and service levels. Supply chain leaders using segmentation strategies also often see improvements in customer retention and brand loyalty, as well as sales growth.

The key to effective segmentation is simplicity: four to seven separate segments is often a good balance between performance and complexity. Exhibit 4 shows how a pharma player divides its products into four different segments according to the volume and variability of demand, then optimized planning and production schedules for each segment. Improvement in service levels and reductions in costs and inventories followed.

2. Agility

Supply chains are getting longer and more complex: manufacturing is spreading across the world, markets are becoming increasingly global, more volatile, and SKU complexity is continually rising. In the face of these trends, relying on high inventory levels to maintain service is becoming a costly and ineffective approach, but it is still the one adopted by the majority of healthcare players.

Instead, companies need to step up the responsiveness of their supply chains substantially to sustain or increase service while keeping costs under tight control. Agility means more than just being fast when there is an emergency – it means building an operating model that can systematically better respond to demand shifts and customer wishes, at the same or even reduced cost.

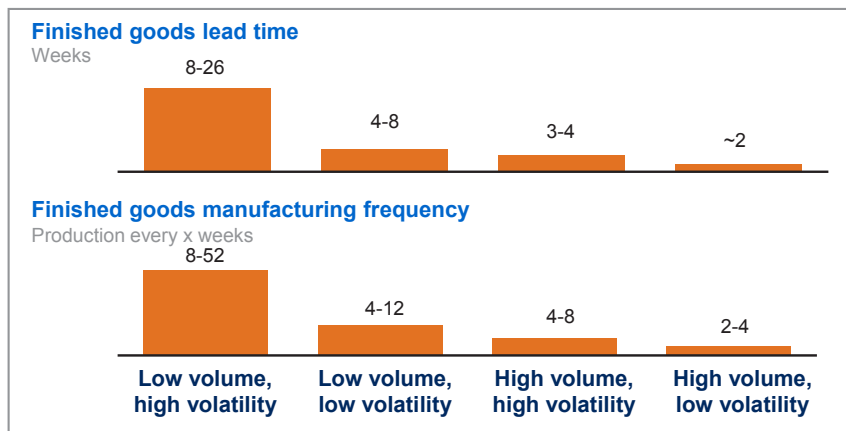
What are the ingredients of an agile supply chain? Companies need efficient and effective processes, higher production frequency, stability in production, and visibility across the supply chain.

Firstly, companies need to accelerate key processes. Take for example the replenishment lead time from plants to distribution centers, which is on average 75 days in pharma, while leading companies reach 30 days, often without additional investments, and allowing much faster market supply and avoiding critical stockouts. In addition, companies must work on increasing the frequency of their manufacturing processes, and much better align their cycle with patient demand patterns. Manufacturing frequency at pharma tends to be quite low – our benchmarking shows that the average SKU is only packaged every 2-3 months, and the share of SKUs that are packaged very frequently (defined as every 2 weeks or less) is roughly only 10 percent.

Beyond speed and frequency, an agile supply chain model needs 2 more key ingredients as critical enablers – stability in production and replenishment and visibility. Many pharma and medical product companies see the need to re-emphasize stability, be it through a systematic decoupling in their supply chains (managing the right product and information flow “loops”), through stable planning and scheduling (e.g. cyclic planning), or tightened performance management to increase supply reliability of third parties and in-house plants. A minimum degree of stability is recognized by many as a key prerequisite for a responsive supply chain. Lastly, companies need better visibility in their supply chains to effectively react to critical demand changes. Many companies are working

Exhibit 4

Segment – improve service levels and reduce supply chain planning costs



on upgrading their S&OP capabilities to FMCG industry standards. For example, improvements include a better cross-functional and disciplined process, understanding demand and supply scenarios and underlying assumptions, ensuring effective communication, and building a stronger forward-looking transparency on potential supply issues and bottlenecks.

A responsive supply chain will be key to cope with the new environment without risking excessive inventories and write-offs. As high inventory levels hide other problems too, the new responsive operating model will also incentivize a whole new wave of operational improvements, as well as prepare companies for new business models to come – e.g. the introduction of personalized medicines which will require radically different supply chain set ups.

3. Measurement

According to Lord Kelvin “You cannot improve what you do not measure”. Making a stepchange improvement in supply chain performance requires from pharmacos a transparent measurement of performance and strict use of benchmarks to challenge the existing maturity levels (see Exhibit 5). However many pharmacos still struggle to obtain sufficient transparency on many key metrics. The challenges include different elements: a lack of focus on driver metrics as opposed to outcomes, a lack of standard definitions and central data availability, as well as a lack of apple to apple benchmarks that could allow meaningful performance aspirations.

Many companies have established transparency in outcome metrics, first of all inventory coverage (driven by Finance) and customer service level, which are relevant metrics to measure the end-result of how the supply chain is managed. Another key outcome KPI is the total cost to serve. However, pharmacos and med device companies need to build better transparency on their cost performance, including conversion, transport (inbound, interplant, primary/secondary distribution), warehousing, inventory holding, staff costs and obsolescence. This could enable both operational cost savings and optimization of route-to-market approaches and product portfolios.

The situation is less encouraging when it comes to structural drivers or capabilities: Responsiveness (e.g., replenishment lead time), manufacturing frequency, supply reliability (e.g., schedule adherence), and stability (e.g., share of rush orders, planning accuracy) are largely not systematically measured or managed across the network. Consumer goods companies are clearly more advanced here, for example they measure very systematically metrics like the manufacturing frequency index, which measures the share of SKUs which are produced with high frequency (e.g. once per week or better).

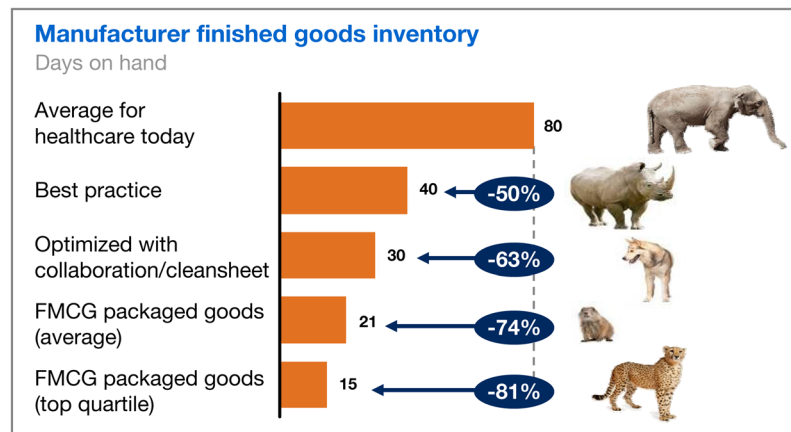
In addition, we see the need to do more groundwork to ensure a true standardization of metrics across different countries or plants. Our Supply chain diagnostic and benchmarking work shows that often for KPIs like service level or days on hand, available data are not fully comparable between countries. This could be due to different definitions, deviations in calculation details in local systems, or different approaches to exceptions or manual adjustments. Solving these basic issues is a key prerequisite to drive value and actions from performance measurement.

Supply chain benchmarking will be a key to drive performance in the industry. Commercially available benchmarking tools and approaches have provided a rough guidance on the high-level opportunity on service, cost, and inventory, however not delivered fully comparable results, nor tangible recommendations on how to capture the value. However, especially due to the complexity and diversity of operating models in healthcare (e.g., companies with completely different geographic footprint, or different portfolio dynamics across Rx, mature products, Gx, branded Gx, or OTC), benchmarks need to reflect key structural differences between players and their impact on performance. Our own POBOS benchmarking has recently been extended to include the capability to normalize for such structural differences based on 10 structural factors, and isolate the performance gap arising out of structural differences.⁶

Robust benchmarking is a great first step for any healthcare player looking to improve and then sustain their supply chain performance.

Exhibit 5

Measure – raise the aspirations



⁶ <http://solutions.mckinsey.com/catalog/POBOS.html>

External muscles

While internal optimization of their supply chain processes offers pharmaceutical companies the opportunity to deliver better service to their customers at lower cost, they have even more to gain by optimizing supply chains externally, improving the way they are managed across the entire healthcare value chain. Delivering such improvement requires companies to master two further muscles: the way they align supply chain processes between organizations, and the way they collaborate with their customers and suppliers.

4. Alignment

Today's healthcare supply chain, from manufacturer to patient, remains fragmented, with limited visibility and interconnection. What if manufacturers could monitor real-time patient demand changes and shift their production schedules accordingly, hospitals and pharmacies knew exactly where short-supply devices and drugs were and when they would be delivered; and regulators could recall adulterated products with accuracy from every point in the supply chain? Unfortunately, in today's world, manufacturers and their trading partners struggle to deliver "perfect orders" and spend countless hours chasing down errors in financial transactions and cleaning up the orders they receive from customers.

Such integration is possible. FMCG manufacturers already build their production plans on the basis of point of sale information from their retail customers, for example, but so far the healthcare sector has only managed it in pockets. In order to scale in a cost-effective way, these pockets must be connected. In fact, because these efforts are not consistent or global, they may actually raise the cost and complexity of the global healthcare supply chain by spawning incompatible requirements and systems.

To build cost-effective global interconnectedness, the healthcare industry could align around a single set of global standards that support data interchange, processes and capabilities required to cost-effectively achieve the kinds of benefits we describe in this article. The grocery industry has demonstrated the value of this kind of global standards alignment with its adoption of GS1® standard barcodes, a change which has created billions of dollars in value.⁷ While new processes, tools and systems were required to deliver this value, global standards were a critical prerequisite. The healthcare industry has not yet adopted a common global standard but that will have to change if the industry wants to reap similar benefits as in the grocery sector. Without a single, global standard, tackling the challenges of product complexity, global reach and improved supply chain safety and security will be significantly more costly and difficult for the healthcare industry – we estimate 5% and more in additional costs for industry players.

5. Collaboration

Effective, transparent communication through the use of common standards is part of the challenge for true end-to-end supply chain integration, but as in other sectors, different players in the supply chain need to find ways to collaborate more effectively together on the basis of that data in order to reap the full potential benefits.

For example, when two channel partners in the healthcare industry embarked on a recent collaborative project to improve supply chain performance, they were able to identify opportunities to reduce their joint inventory by 20 percent while still increasing service levels enough to deliver a predicted 1 percent increase in revenues.

⁷ 17 Billion Reasons to Say Thanks: The 25th Anniversary of the UPS and Its Impact on the Grocery Industry" (PWC, 1999)

Often, the key barriers to such collaboration are not technical, but cultural. In the example above, just getting to the collaboration table was the most significant challenge for the two companies, which previously had a primarily transactional relationship. Making the collaboration work required great care in determining how it would be managed and how benefits would be shared, with considerable involvement from senior managers to overcome roadblocks. But as a result of the process, the two companies now enjoy a closer and more open working relationship, laying the foundation for future collaborations in other areas.

In our experience observing successful collaboration projects, we have identified six essential steps that can make the difference between a productive collaboration and a frustrating one. First, companies should collaborate in areas where they have a solid footing, to build on strengths rather than compensating for weaknesses. Second, they can turn win-lose situations, in which the benefits of a potential collaboration fall more to one party than the other, into win-win opportunities by agreeing on sophisticated benefit-sharing models. Third, they should select partners not only on the potential value of the collaboration, but on their capabilities and willingness to collaborate as well. Fourth, they must dedicate resources to the collaboration initiative and ensure senior leadership involvement. Fifth, they should jointly manage performance and measure impact to avoid misaligned incentives. Sixth and finally, they should enter any collaboration with a long-term perspective, and be prepared to overcome initial hurdles in order to lay the groundwork for a strong ongoing relationship.

At a recent meeting of senior pharma and medical device industry supply chain executives, we asked attendees which of these five supply chain muscles they thought offered the greatest opportunity. More than 70 percent of them said that improved collaboration across the value chain had the greatest potential to deliver value.

Supply chain transformations are not easy

Many supply chain transformations lead to sub-optimal outcomes or get stuck in analysis paralysis. Some of the key issues we have seen resulting in failed efforts are: siloed approaches, “death by 1000 initiatives”, complexity, lack of capabilities and misaligned culture or incentives.

Companies may not need to trade off different aspects of supply chain performance in their quest for improvement, but many do so inadvertently, by making changes in one aspect of their supply chain processes that lead to unexpected extra costs or problems elsewhere. Companies that adopt this “siloed” approach often struggle to create any significant impact by their efforts. In practice, the supply chain function is one of the most cross functional of all business processes, and any attempt to drive improvement must also be cross functional in nature.

Companies in many sectors have overcome the problem of local optimization through an integrated ‘control tower’ approach in which a small group of leaders from across the organization work closely together to identify opportunities for performance improvement and to capture them by driving change quickly through the entire organization. Those changes will usually be wide ranging, encompassing both processes, like forecasting and production planning, and infrastructure, like the design of the supply chain organization. Critically, they will also include changes to the way supply chain performance is managed, and to the mindsets, behaviors and culture of staff.

The impact of such a holistic approach can be both fast and significant. One white goods manufacturer embarked on a project to improve the supply chain performance of a single key category. Within three months the transformation project resulted in a 30 percent improvement in on-time-in-full delivery performance, an inventory reduction of 10 percent and improved employee productivity. Their customers acknowledge that this improvement in service level had taken them from “worst to first” place in a very short time. Even more powerful, the change to processes, management and culture the organization put in place during that time laid the foundations for ongoing supply chain performance improvements that the company is still enjoying today.

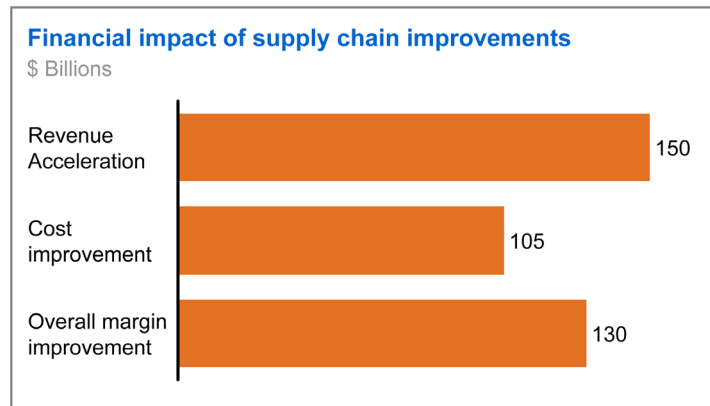
Benefits of better supply chains, financial and beyond

We estimate that supply chain expenses now represent nearly 25% of pharma costs and more than 40% of medical device costs (including conversion cost). The annual spending is so vast—about \$230 billion in pharma and \$122 billion in medical devices—that even minor efficiency gains could free up billions of dollars for investments in other areas.⁸ Our analysis suggests that, by adopting supply chain advances that are already well established in other industries, the healthcare sector has the potential to improve its margins by \$130 billion, including the cost savings in hospitals that would result from reduction in medication errors (See Exhibit 6).

But supply chain opportunities do much more than improve the bottom line. By embracing the challenge of supply chain leadership, pharma and medical device companies have the opportunity to further the most important missions of the healthcare industry: providing safe, affordable access to products that can enhance or even save the lives of people across the world.

Exhibit 6

Opportunity we can see today



⁸ Evaluate; BMI; OECD; EFPIA; HRI; Espicom corporate reporting; McKinsey analysis