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Data: The next wave in forestry productivity

To achieve both environmental and production goals, the forestry industry needs effective management and harvesting processes. Today, they are being transformed through more effective use of data.

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October 2020

Sustainable forestry involves the establishment and management of timberlands for wood production and for social and environmental purposes. Forestry products are pretty much ubiquitous in our lives, whether for wooden homes, tissue paper, or renewable packaging.

Importantly, forests help us address climate change through CO_2 sequestration as a natural consequence of tree growth. They provide a renewable resource to substitute fossil fuels in energy and replace more carbon-intensive materials in construction and packaging. Today's digital advances are helping the forestry industry drive sustainability and production efficiency.

The productivity imperative

Forestry operational productivity has increased dramatically over the decades thanks to several phases of technological advancement. Scandinavia is one of the regions that is leading the productivity journey (Exhibit 1). The first phase saw a switch from conventional, horse-drawn transportation to motorized trucks, with productivity (on a per-worker basis) doubling between the mid-1950s and mid-1960s. Forest management then benefited from a second phase of efficiency gains following expansion in the use of chain saws, as well as motorized fellers, which delivered a doubling in productivity over two decades.

In the mid- to late 1970s, there was a pause lasting several years when labor productivity plateaued subsequent to that widespread mechanization. Subsequently, even greater productivity gains were realized during a further phase of mechanization between the 1980s and the early years of this century. That phase saw the introduction of automation into forestry, sparked by advances in electronic communications and a surge in computing power. The impact was significant. For example, productivity per worker in Sweden (which has been at the forefront of forestry management) increased by 300 percent within 25 years.

Through the years, most efforts aimed at boosting productivity in the forestry industry have centered on improving the efficiency and effectiveness of machinery, with enhancements being driven by a requirement to handle the greater volumes of wood being harvested, as well as by safety reasons. Today,

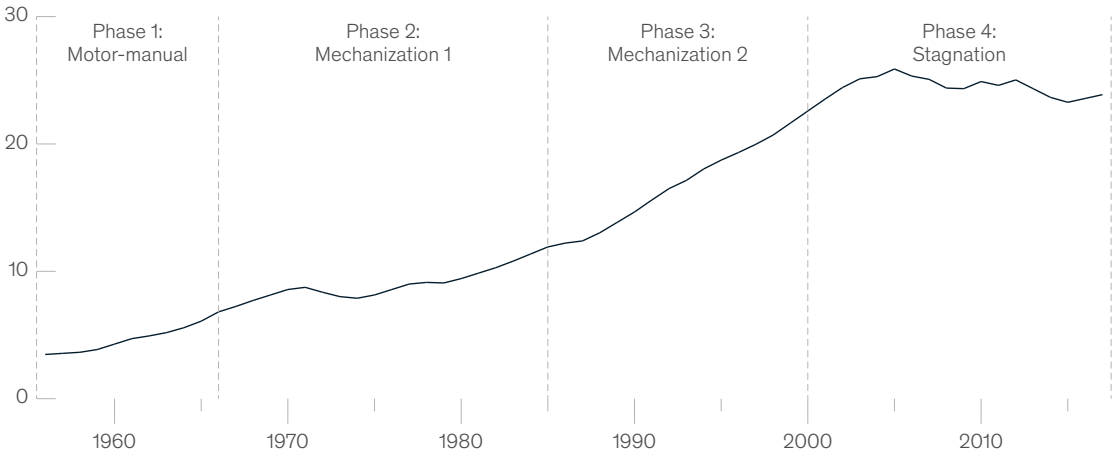
forêts de connifères en Scandinavie

C'est un plaidoyé
Rien que ça

Exhibit 1

Sweden developed its forest-industry productivity through mechanization.

Standing volume per worker day in the Swedish forestry industry, rolling 3-year average, cubic meters



Source: The Forestry Research Institute of Sweden (Skogforsk)

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however, in the era of Industry 4.0 and the age of analytics, using big data and integrating operations across an entire organization have become essential in managing forest resources more effectively.

Significant opportunity to boost productivity

That's a statement, it's not a demonstration

There is significant potential to improve productivity in forestry operations today. Overall equipment effectiveness (OEE) in harvesting (felling and log making) is typically 30 to 45 percent, varying by region and system configuration, with generally higher levels in regions with higher labor costs (Exhibit 2). That wide variation among regions—and often even among a company's harvesting crews—testifies to the opportunity for improvement through applying best practices.

Moreover, even the best-performing forestry operations have an OEE level well below those of most other manufacturing processes, such as those in pulp and paper, oil and gas, and steel. That said, Scandinavia stands out, with relatively high OEE in forest operations. That is thanks to a high level of mechanization, based on state-of-the-art harvesting technology embraced early on, plus extensive use of the data collected by the machinery to enable operational improvement.

The benefits of improved productivity in forestry speak for themselves. The first is financial: many forestry companies spend well more than $100 million on harvesting and transport.[1] Achieving a five-percentage-point improvement in OEE (with the same equipment, labor, and other inputs) could translate into a 10 to 20 percent reduction in costs. And by reducing costs throughout the wood supply chain, the industry can ensure the competitiveness of renewable wood-based products, ranging from fiber packaging to wooden construction and biomass energy.

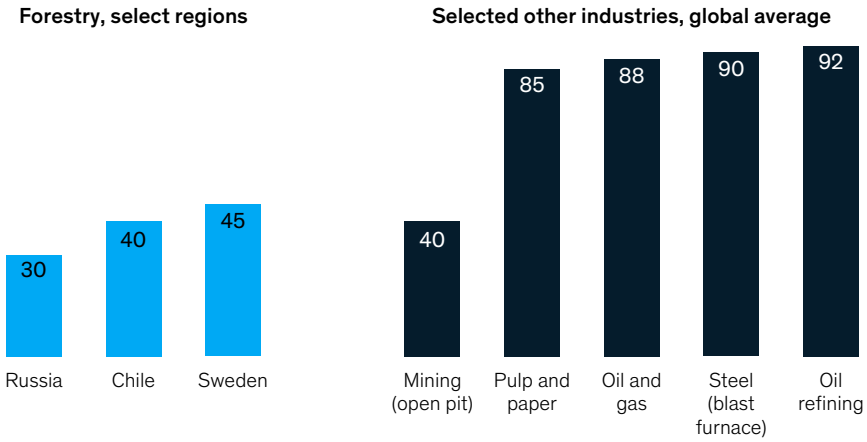
How analytics can improve forestry productivity

There are opportunities within forestry to harness the power of analytics to uncover small

Exhibit 2

Forestry lags behind other manufacturing industries in overall equipment effectiveness.

Overall equipment effectiveness, %



Source: McKinsey: Paper, Forest Products & Packaging Practice; Energy insights; MineLens; and SteelLens

Ce ne sont pas les mêmes industries, pourquoi les comparer. Si on ne peut pas comparer l'industrie minière du pétrole, pourquoi comparer avec l'industrie du bois. Un process ne marche pas pour tout et surtout, depuis le début de ce rapport, il n'est fait aucun cas du type de forêts, résineux, feuillus ou même du type de géographie, terrains plats, vallons.

[1] Assuming harvesting and wood-transport costs of $30 per cubic meter and an annual wood supply of three million to ten million cubic meters for large forestry companies.

Ce rapport est réellement borné sur la gestion forestière de plantations. Faut-il encore parler de forêt?

improvements in operations (2 to 4 percent in OEE). For example, combining advanced analytics for harvest and logistics planning with predictive and preventative maintenance can increase mean time between failures and reduce mean time to repair (Exhibit 3). Other potential areas to explore include improving the way forestry machinery is operated. For example, operators running the equipment suboptimally and losing tempo[2] can be responsible for a loss of 5 to 10 percent in OEE.

We should note that the optimization of forestry operations needs to involve clear departmental responsibilities and effective communication among different groups. Almost 40 percent of OEE for a processor[3] can be lost through poor organization. That can be seen in poorly negotiated contract lengths for workers, reserving the wrong equipment on a specific task, and operational delays from suboptimal management of stoppages in the field.

Underperformance can also be detected across the forestry value chain. For example, in log transport (trucks), conservative fleet sizing can lead to paying higher contract costs for a larger-than-required fleet of underutilized equipment. Further, poorly timed shift starts and lack of controlled lunch breaks often lead to two peaks of queuing at the loading and unloading points, resulting in increased process delays and fleet sizes. Combined with the optimization of a mill's wood-yard layout and inventory control, queues can be eliminated to boost third-party trucks' productivity (and, as a consequence, reduce the tariff paid).

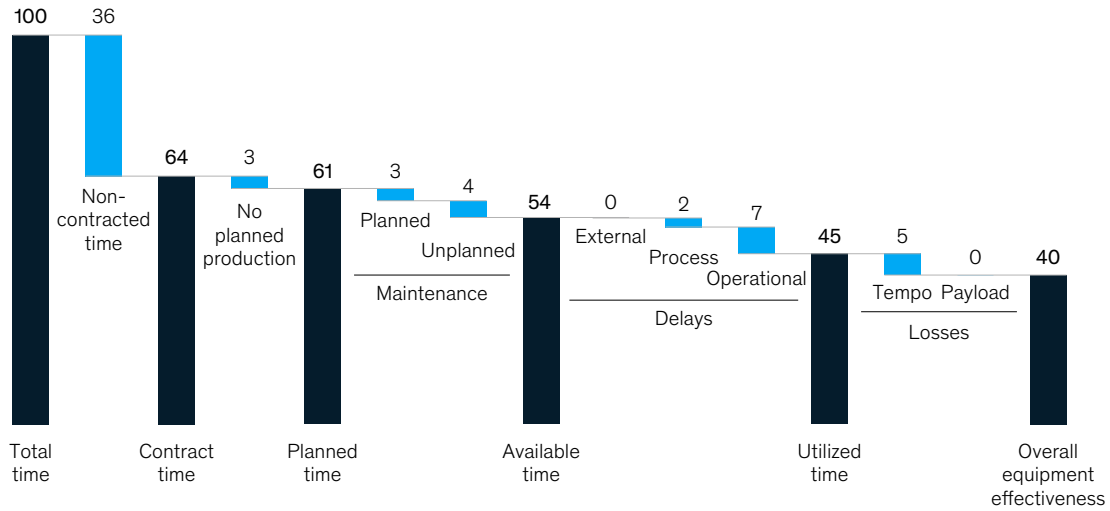
Interestingly, a recent study has found additional potential for performance improvements beyond OEE. Within a fleet of some 700 trucks, we observed a variation in unloaded truck weight of around two metric tons among different truck models. Because most countries cap combined

Il n'y a pas une industrie du bois, mais plusieurs industries du bois suivant les utilisations que l'on en fait. Là aussi, ce n'est pas pris en compte dans l'étude et la généralisation ne fonctionne pas.

Exhibit 3

Monitoring forestry-equipment efficiency during harvesting can boost productivity.

Illustrative overall equipment effectiveness for processor, standard time-usage model, % of annual hours



Source: McKinsey Paper, Forest Products & Packaging Practice (modified example)

[2] The operating rate of the machinery.
[3] The equipment that receives a felled and debranched tree stem and cuts it into various log grades to fit orders and maximize potential of that stem.

Ce dont ils ne parlent pas, c'est que pour avoir tous ces équipements, il faut des méga entreprises et donc tuer les petites entreprises pour que les grosses vivent mieux, et surtout, qu'elles aient les moyens d'investir dans de lourds équipements. Les petites entreprises ne peuvent pas avoir le même type de machines que les grandes et si le rapport McKinsey avait dû servir à quoi que ce soit, c'est offrir des solutions en tenant compte du paysage humain.

payload and truck weights, additional truck weight will naturally decrease the maximum achievable payload. Through awareness, better contractor selection, and joint procurement practices, truck specification—and, consequently, payload—can be optimized.

Forestry's productivity journey

Whatever the starting point, any forestry company can achieve productivity improvements. In the course of our work, we have seen that even the most advanced forestry companies still have work to do in bridging the productivity gap with comparable industries.

For those yet to move to mechanization, that could be a first step. However, it would be a missed opportunity not to leapfrog to a lean, data-enabled, *and* mechanized harvesting system—condensing 40 years of experience from Scandinavia (and other regions with advanced productivity) into the space of just a few months. To help companies establish their starting point in the productivity journey, McKinsey has built a global benchmarking solution for forestry, paper, and pulp operations.

For mechanized companies that aren't yet collecting productivity data, our advice is to begin systematically collecting structured data as soon as possible. Newer equipment may have existing onboard systems, and those that don't can be retrofitted with telematics and operator-input systems. On a number of occasions, we have seen the simple act of measuring (and telling operators they are being measured) boost productivity by several percentage points.

For companies with advanced data systems and mechanized equipment, the next horizon of productivity will come from harvesting data to yield insights on how to reduce cost, increase throughput, and maximize yield while simultaneously creating more sustainable forest-management systems. Areas in which to focus are cost drivers and sources of throughput and yield loss, such as labor and fleet size, fuel burn per square meter, quality losses from felling and log making, and throughput from payload and speed losses.

Improved-productivity efforts can start with the following actions:

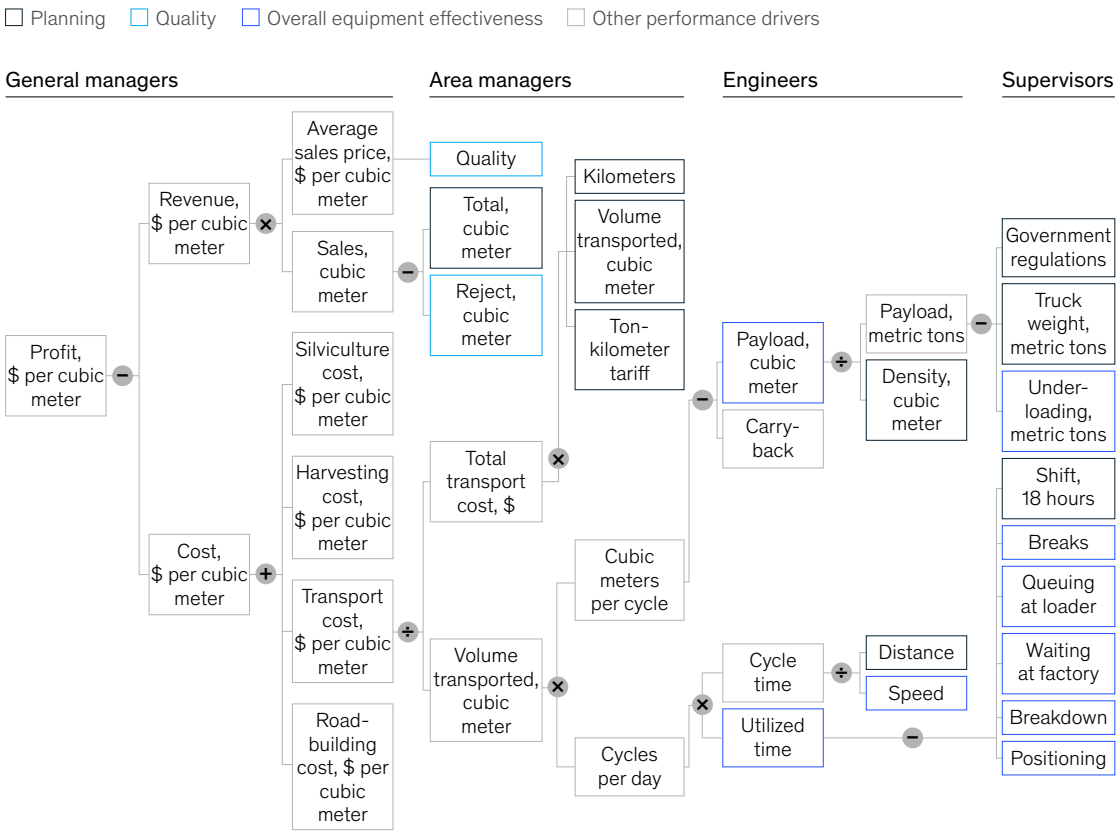
- standardizing data into a clear time-usage model
- displaying appropriate information for a given parameter to the specific stakeholders (such as operators, supervisors, managers, planners, and business leaders) who can control it
- introducing and embedding a continuous-improvement mindset among employees and contract workers and supporting it with capability building, key performance indicators (and their monitoring), management control systems, and operator incentives for improvement (Exhibit 4)

It would be a missed opportunity not to leapfrog to a lean, data-enabled, and mechanized harvesting system.

Exhibit 4

Cascading key performance indicators can link management and supervisors at different levels to drive overall productivity improvements in forestry.

Example transport cost value driver tree



Source: Modified example adapted from McKinsey's work in the basic-materials sector

Improving the productivity of forestry operations ensures that they are sustainable and efficient. It also has significant value. We have seen that even the regions and operations most advanced in forestry operations have further gains to be made to reach the levels of adjacent industries. For integrated forestry players, improvement will result in lower costs and increased competitiveness for downstream operations (such as saw mills, pulping, and biomass). Nonintegrated forestry companies can establish themselves as suppliers of choice to the downstream customers increasingly conscious about the sustainability, as well as the cost, of their raw materials.

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