lineview

Global Benchmarking Report

Food & Beverage Manufacturing

Contents

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The Industry Context: A Volatile Economic Climate

The food and beverage industry is facing a perfect storm of rising costs from climate change, geopolitical conflict, skills shortages, inflation, regulations and deglobalization. Agricultural commodity costs have surged[1] amidst the fallout from geopolitical conflicts,[2] growing trade restrictions on staple crops[3] such as maize, and disruption to harvests from extreme weather events. For example, the World Bank's Beverage Price Index recently soared close to a five-year high, primarily because of El Nino weather patterns.[4] There have been similar increases in packaging costs[5] from plastics to paper pulp due to environmental regulations, supply chain disruption, a post-COVID boom in online shopping and tariffs on aluminum[6] affecting canned food and beverages.

With packaging causing 40% of plastic waste[7], pressure for more sustainable biodegradable and recyclable materials could further increase these costs. At the production end of the supply chain, volatile energy prices and skills shortages are also increasing the cost of manufacturing operations. For example, some UK manufacturers have seen energy bills increase up to 500%[8] and average vacancy rates of 5.1%.[9] Similar skills shortages and energy price rises are being seen worldwide. This is worsened by inefficient manufacturing processes that drive significant material, water and energy waste, exacerbating operational costs and environmental impacts.

The current economic backdrop creates a growing imperative for manufacturers to understand the causes of production inefficiencies and unlock savings through smarter manufacturing processes. A proliferating array of new sustainable, healthy products, packaging and processes similarly create a need for agile, future-proof production lines combining flexibility with efficiency.

Harnessing Lineview data from global manufacturing facilities at some of the world's biggest food and beverage brands, this report opens a new window into the state of global food and beverage manufacturing. It reveals some of the hidden causes of manufacturing costs and inefficiencies, and potential countermeasures that could help reduce food and beverage prices and unlock major economic and environmental benefits. It also charts the disruptive impact of emerging trends from sustainable packaging to new production processes and healthy, sustainable alternative products.

Finally, the report explores how some companies are pioneering a digital transformation in production that could help the food and beverage industry adapt to a more volatile economic climate.

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1. https://www.statista.com/statistics/1453888/annual-food-price-index-worldwide-by-category/
2. https://www.statista.com/statistics/1111134/monthly-food-price-index-worldwide/
3. https://ahdb.org.uk/news/arable-market-report-03-february-2025
4. https://openknowledge.worldbank.org/server/api/core/bitstreams/9e84a1ca-8a6b-45c1-8693-01edc068408d/content
5. https://www.fooddrinkeurope.eu/wp-content/uploads/2025/01/FoodDrinkEurope-Data-Trends-2024.pdf
6. https://www.cbsnews.com/news/steel-aluminum-tariffs-consumer-prices-beer-automobiles/
7. https://ourworldindata.org/data-insights/packaging-is-the-source-of-40-of-the-planets-plastic waste#:~:text=Around%2040%25%20of%20the%20world's,in%20China%2C%20it's%2045%25
8. https://www.fdf.org.uk/fdf/what-we-do/environmental-sustainability/energy-costs/#:~:text=The%20seriousness%20of%20the%20energy,drink%20manufacturers%20across%20the%20country
9. https://www.fdf.org.uk/globalassets/business-insights-and-economics/fdf-state-of-industry-survey/si-q3-2024.pdf

02
Methodology

Lineview's Global Benchmarking Data Report analyzed global production performance across 33 leading food and beverage companies over 12 months. The report compares Overall Equipment Effectiveness (OEE), efficiency and availability across six key line types: Non-Returnable Glass Bottles; cans; polyethylene terephthalate (PET); Returnable Glass Bottles and Returnable PET, and Bag-In-Box (BIB). Additionally, the report examines how drives to improve cost and carbon efficiency through lightweight materials are impacting production reject rates. It also compares crewed time with efficiency across individual production lines to understand the factors driving exceptional performance at some companies.

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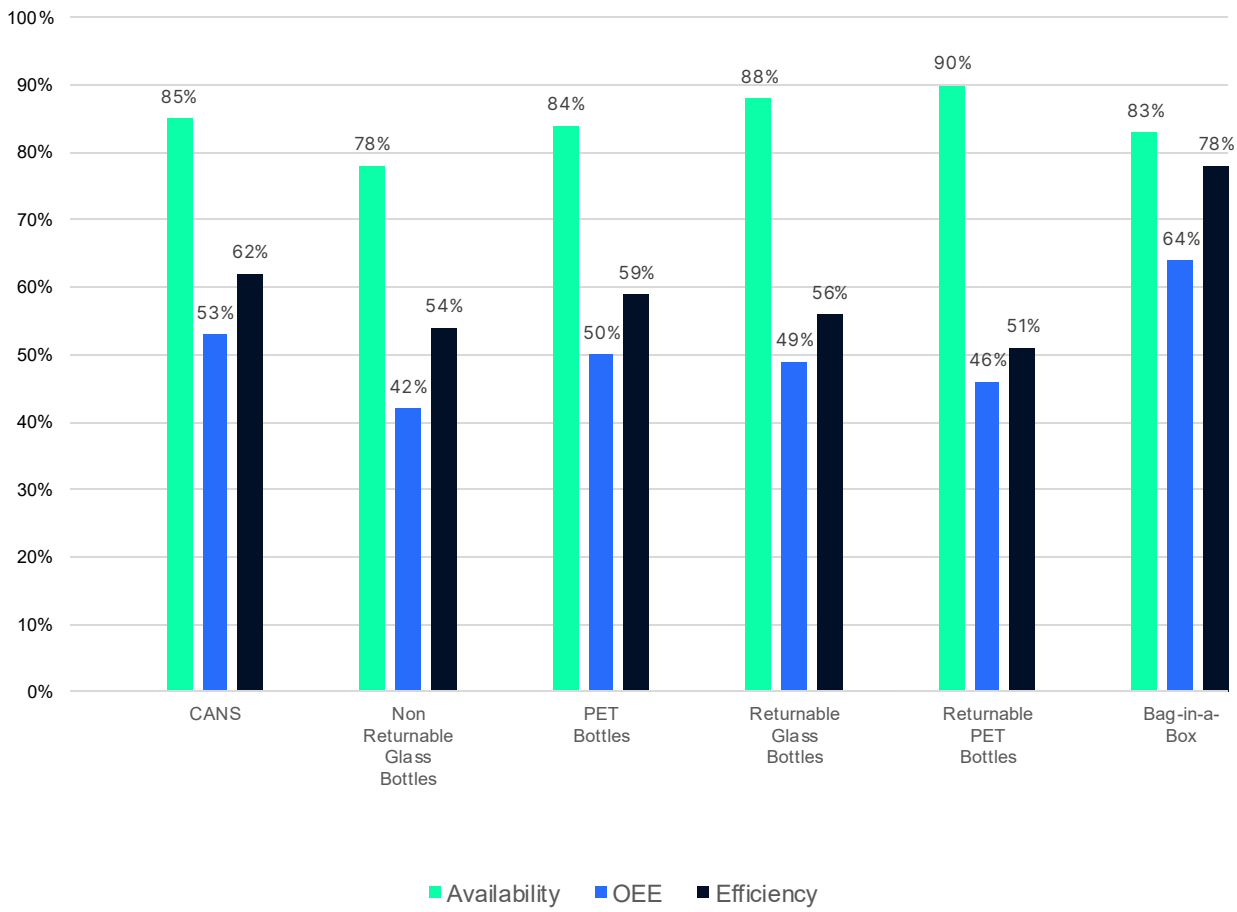
The State of Global Food and Beverage Manufacturing

Lineview compared performance across six major types of food and beverage production lines to understand disparities in manufacturing costs and performance across industries. The data reveals how production costs and delays are acutely affected by the proliferating range and complexity of products and packaging, the increasing requirement for changeovers between diverse products and the rise of a circular economy of returnable containers.

The analysis indicates that the growing diversity and complexity of food and beverage production is significantly affecting operational costs and environmental impacts. It highlights the need for accelerated digital transformation of manufacturing to enable the adaptation of production for shifting market demands while reducing spiraling costs and inefficiencies.

Comparing Operational Metrics Across Beverage Line Types



Note: The percentages have been scaled and rounded to the nearest whole number.

Non-Returnable Glass Bottles (NRGB)

Lineview data shows that NRGB production is the second least efficient, likely due to glass lines experiencing more minor stops and breakdowns rather than speed losses.

NRGB lines also have the lowest OEE at 42% and the lowest availability at 78%, driven by the highest planned downtime (34% of all loss percentage) among all major bottle line types. Smart data is now helping adapt NRGB production lines to increasingly diverse demands.

For example, Single Minute Exchange of Die (SMED), a technique first used to accelerate equipment changeovers in the automotive industry, has been adapted to help bottling plants streamline and combine changeover tasks and enable seamless and speedy adaptation for new products. Manufacturers can also use advanced data analytics to ensure the correct equipment is already in place before changeovers, record and reduce gaps between actual times and target times, benchmark against best practices and enable successful changeovers to be recorded and replicated across plants. Advanced data analytics is also helping transform performance by providing actionable insights on the true causes of declining OEE to guide operational improvements. Chris Spray, Manufacturing Excellence Director at Lineview, observes: "This reflects the need for frequent changeovers to accommodate a proliferating range of packaging, bottles and flavors.

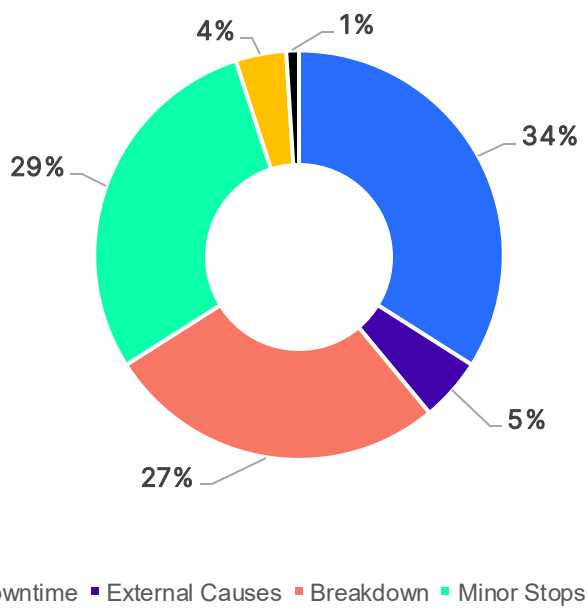
For example, increasingly popular alternative beverages from craft beers and luxury/spirits to Ready-to-drink (RTD) cocktails and non-alcoholic beverages require complex changes to production processes, increasing downtime and inefficiency.

With RTD cocktails and non-alcoholic beverages projected[10] to significantly increase their market share[11] over the coming years, this indicates major process optimization will be needed to adapt production while maintaining productivity."

10. https://www.imarcgroup.com/non-alcoholic-beverage-market
11. https://www.grandviewresearch.com/industry-analysis/bottled-rtd-cocktails-market-report

Breakdown of Production Time Lost to the Six Major Losses for NRGB Lines

Note: The percentages have been scaled and rounded to the nearest whole number.



PET

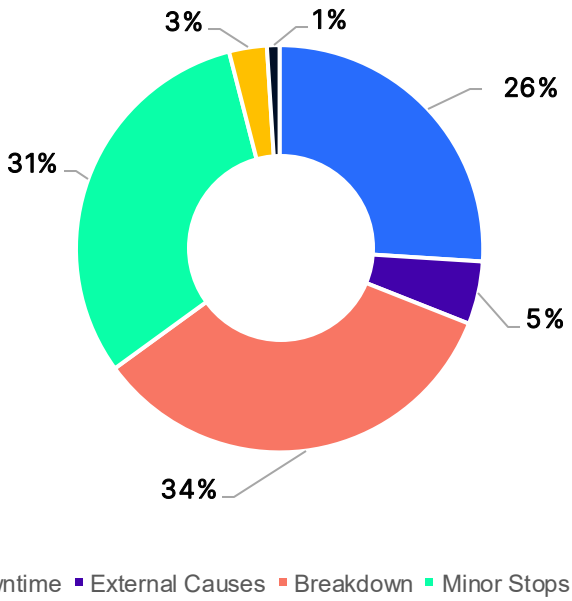
PET lines perform at a mid-level, with 59% efficiency, 84% availability and an OEE of 50%. This indicates uptime and efficiency are being affected by the introduction of complex packaging formats and diverse variants requiring frequent changeovers for industries such as soft drinks. The need for complex, quick changeovers for different bottle types also creates a growing risk of errors causing minor stops that sap productivity and efficiency. Chris notes: “Growing demand for healthy, sustainable aseptic juices that stay fresh for longer without refrigeration also requires intensive cleaning and sterilization of production equipment, exacerbating costs and delays. The global aseptic packaging market alone is expected to grow to over $185 billion by 2032,[12] increasing pressure on these production lines.”

There are now several remedial measures for more diverse, complex PET lines. High-speed cameras, alarms or beacons can be strategically placed around production lines to flag minor stops early. Technologies such as data analytics and AI now enable predictive maintenance or cleaning of, for example, aseptic lines to prevent stoppages before they arise. Similarly, changeovers can be optimized through smart data-driven management of planned downtime and a focus on using data to drive ‘right first time’ changeovers.

12. https://www.fortunebusinessinsights.com/aseptic-packaging-market-106589

Breakdown of Production Time Lost to the Six Major Losses for PET Lines

Note: The percentages have been scaled and rounded to the nearest whole number.



Cans

As relatively simple lines with no need for labelling or complex packaging, cans have the second highest efficiency and OEE (62% and 53% respectively) of the six major line types.

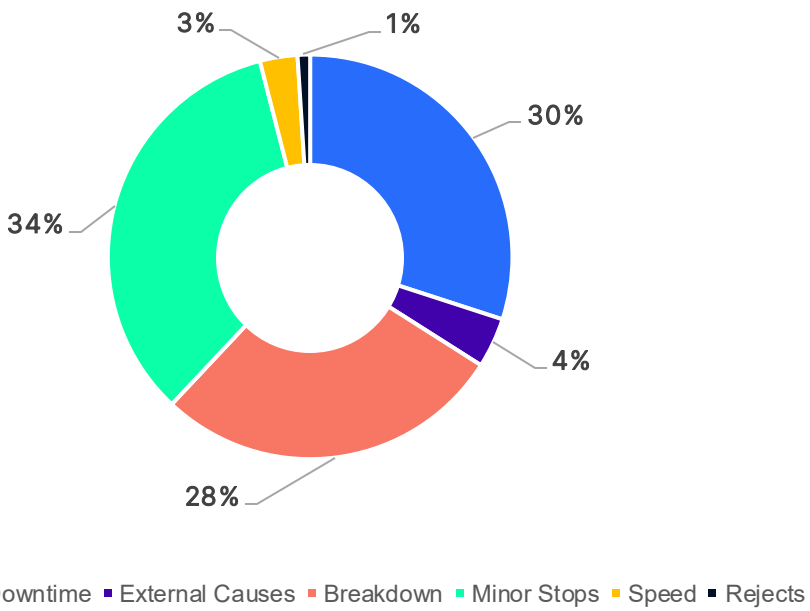
Lineview data shows that as line complexity increases, overall performance often declines. A key contributor to this trend is the industry shift toward cost-saving, space-efficient "skinny" cans, which are more susceptible to damage during handling and transit.

Recent data indicates that up to one-third of total losses on can lines now result from issues occurring in the area between depalletizers and fillers. This is largely due to the increased fragility of lightweight can variants. The resulting material waste highlights the growing challenges of transporting and managing thinner cans effectively.

As the industry continues moving toward slimmer can formats, success will depend on close real-time monitoring and strong handling practices to reduce waste and maintain line efficiency.

Breakdown of Production Time Lost to the Six Major Losses for CAN Lines

Note: The percentages have been scaled and rounded to the nearest whole number.

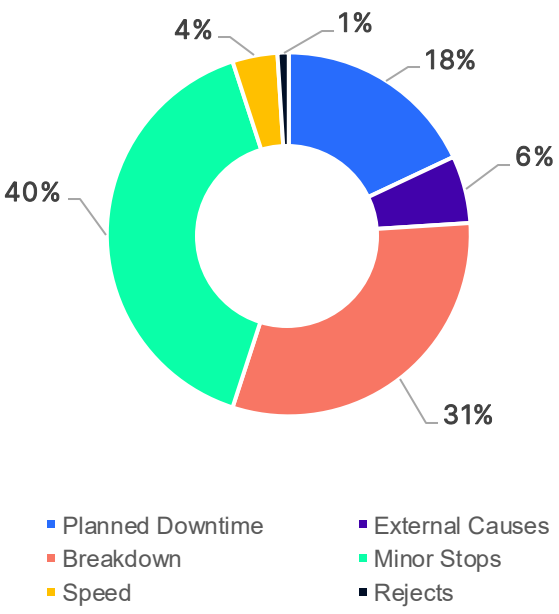


Returnable Glass Bottles and Plastic (RGB and Returnable PET)

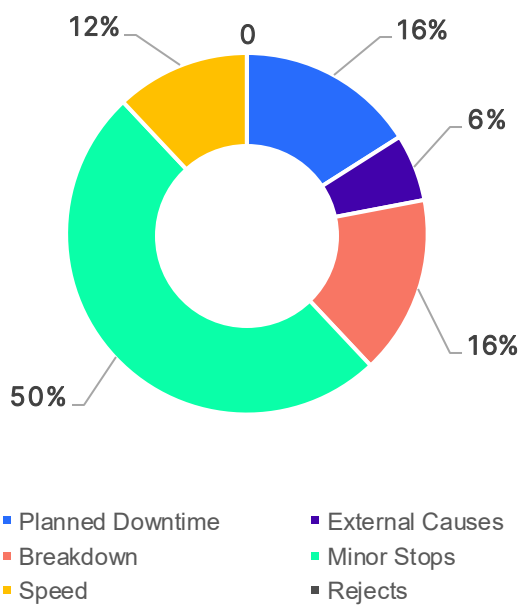
RGB and Returnable PET lines show low OEE at 49% and 46%, with efficiency at just 56% and 51%, despite high availability levels of 88% and 90%. This performance gap is largely due to complex quality control processes such as inspection, sniffing, and washing of returnable containers, along with variation in bottle age and condition.

With the RGB market expected to surge to $26.5 billion by 2034, process optimizations will be essential to prepare production lines for increased demand. A key strategy is adopting Lineview's Line Balance Optimization (LBO) methodology, which improves uptime by preventing unplanned stoppages and minimizing their impact. LBO uses advanced automation and control, including the 'Five Levels of Control', to optimize equipment speeds, maximize conveyor accumulation, and keep the critical machine running. By balancing workloads across machines and conveyors, this data-driven approach enhances production flow, resilience, and restart performance, making it a key enabler of scalable and efficient RGB production.

Breakdown of Production Time Lost to the Six Major Losses for RGB Lines



Breakdown of Production Time Lost to the Six Major Losses for Returnable PET Lines



Note: The percentages have been scaled and rounded to the nearest whole number.

Bag-In-box (BIB)

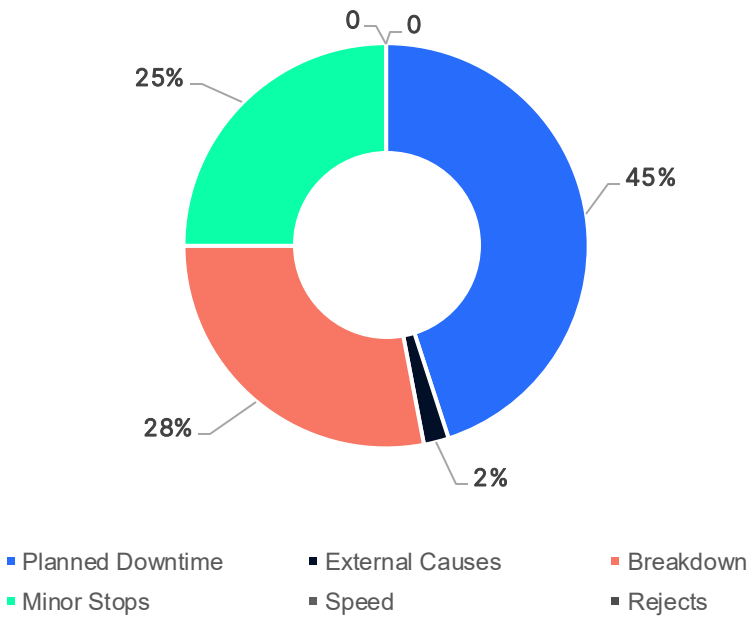
This line exhibits the highest level of performance and efficiency with 64% OEE and 78% efficiency and 83% availability. This is due to the comparative simplicity and low speed of BIB production lines which makes it easier to achieve highly efficient production. Smart real-time data can unlock further efficiencies by identifying trends behind chronic losses such as long-term loss of machine speed or repeated production rejects.

Cumulatively, Lineview data shows that manufacturing performance and efficiency across the food and beverage industry is heavily influenced by the complexity of products, packaging and manufacturing processes.

Simple, slower line types producing low volumes of the same product are often highly efficient and productive while complex, varied lines producing diverse products often exhibit lower efficiency and performance. Recent innovations, such as RTD cocktails and aseptic products and refillable glass bottles and PET, are further impacting on manufacturing costs. This indicates that recent market diversification and product innovation will require a parallel transformation of manufacturing processes.

Breakdown of Production Time Lost to the Six Major Losses for Bag-In-Box Lines

Note: The percentages have been scaled and rounded to the nearest whole number.



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The State of Global Food and Beverage Manufacturing

Lineview data also indicates that growing demand for healthy, sustainable products is negatively impacting on manufacturing performance as production lines struggle to adapt. For example, the aseptic market is expected to see significant growth due to their health and environmental benefits as they have a long shelf life, do not require refrigeration and their packaging is made from renewable sources. Yet aseptic lines have an average OEE of just 43% and efficiency of just 53% which could cause significant additional production costs and delays.

This is due to the complex cleaning processes and technologies required for sterilization of the production line from clean-in-place technologies to clean fill processes. This indicates that major process optimizations will be needed to fulfil growing consumer demand for aseptic products without an accompanying increase in production costs. There has also been a growing drive for the move to a circular economy in food and beverage with the returnable glass bottle market alone set to grow to over $26.5 billion by 2034.

Yet the comparatively poor OEE and efficiency of returnable glass bottles and PET indicates that circular economy innovations are introducing new complexities to the production process that could exacerbate production costs and inefficiencies. The drive to reduce plastic pollution and carbon emissions is also creating growing demand for sustainable packaging yet data indicates that this may be worsening production inefficiencies.

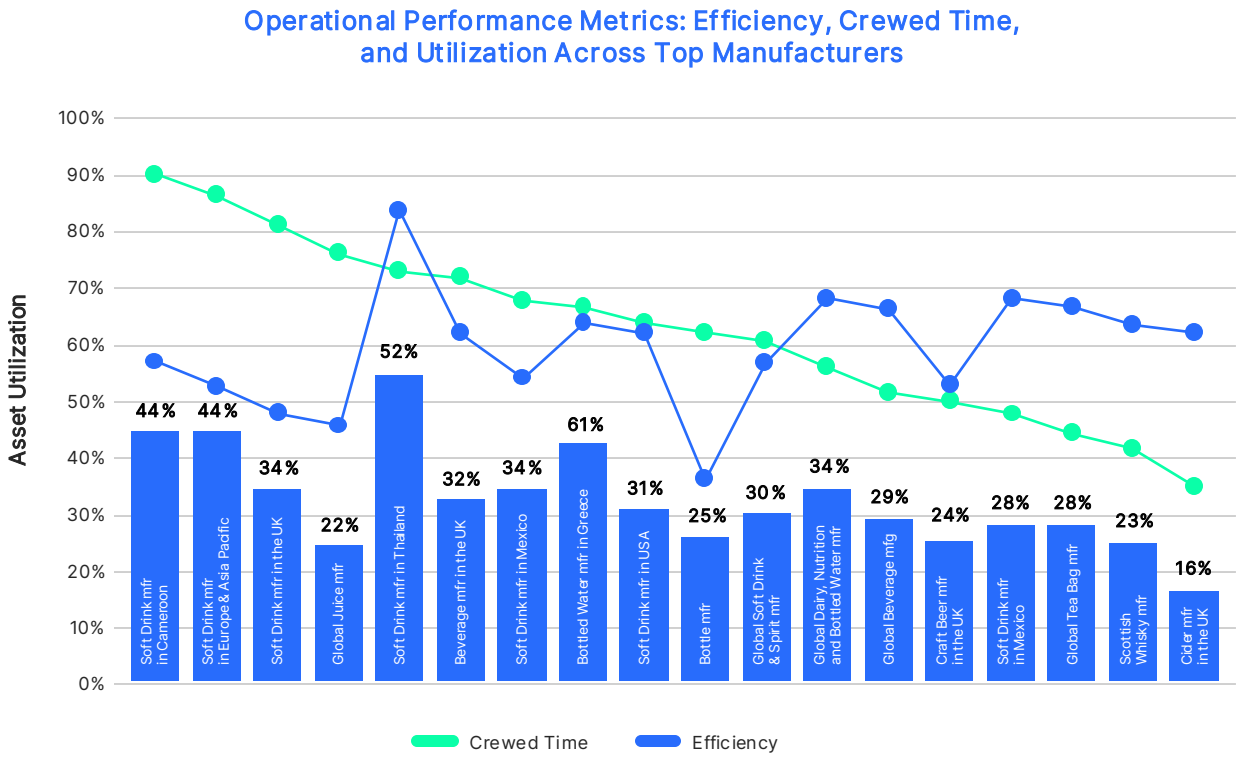
For example, many containers such as cans are being made lighter to reduce the consumption of raw materials and thus curb supply chain costs and carbon emissions. Yet thinner containers are also more prone to damage when being transported from pallets to filling machines and Lineview data shows that can damage now accounts for a third of all losses in can fillers.

This indicates that the shift to sustainable materials will necessitate close and comprehensive monitoring of end-to-end production processes to help reduce losses. The accelerating adoption of more healthy, sustainable products, packaging and processes will require a parallel digital transformation to unlock extra cost efficiencies and higher performance across increasingly complex lines. This includes new data-driven strategies to improve everything from production rejects to minor stop losses and enable more lean and agile manufacturing.

05

Pioneers in Digital Transformation of Manufacturing

The data shows that top-performing manufacturers are upskilling their teams to use production data for proactive, plant-wide process improvements. Several are achieving high efficiency despite lower asset utilization, reflecting a strategic focus on optimizing crewed time and making effective use of planned downtime. For example, one manufacturer reached 84% efficiency with 73% crewed time and 52% asset utilization. Others achieved 69% and 68% efficiency with crewed times of 49% and 44%, and asset utilization of 28% in both cases. These results suggest that efficiency gains are being driven by targeted operations during crewed periods rather than simply maximizing runtime. In contrast, some manufacturers with higher crewed time and asset utilization are seeing comparatively lower efficiency. One example shows 90% crewed time and 44% asset utilization but only 57% efficiency, indicating opportunities to rethink how production time is structured and how data is used to drive continuous improvement. Note: Crewed time refers to the total time included in the OEE calculation. Availability is defined as the measure of when a line is 'available' to run, excluding Planned Downtime and External Losses.



Individual plants have also achieved significant success across multiple lines by creating a data- literate workforce. One plant in Poland was able to achieve over 90% efficiency across three production lines by upskilling their workforce in using smart data to understand their most common losses and unlock productivity gains. Chris observes: The top-performing companies are characterized by a myopic focus on understanding common production losses, embedding data skills across the workforce and using data strategically to drive systemic improvements. Manufacturing inefficiencies are often a case of death by a thousand cuts with many minor events cumulatively affecting productivity and the leading companies are constantly incrementally tweaking everything from machine settings to conveyor speeds to drive collective improvements.

Note: The percentages have been scaled and rounded to the nearest whole number.

Case Study

Most improved factory of 2024: Creating a high-performance workforce culture

One bottling plant in Scotland achieved a dramatic turnaround through a new leadership approach, instituting a high-performance, data-driven team culture geared towards continuous improvement.

The Challenge

The plant's productivity lagged other company locations at just **65%** productivity compared to **78%** at the highest performing plants and, without intervention, its future looked uncertain. The challenge was compounded by a reactive firefighting mindset among the workforce, instead of a focus on growth and continuous improvement.

The Leadership Approach: data over opinion

More than 50 leaders conducted over 8 weeks of training in everything from change management to data-driven decision-making. The leadership emphasized accurate data and the routines that drive enhanced performance, including Short Interval Control (SIC), Root Cause Analysis (RCA) and Standard Settings. They also introduced comprehensive management reviews, reliability reviews and 24-hour feedback loops to ensure continuous improvement and accountability.

The Execution

The plant introduced a published plan, standardized routines and a new leadership baseline. All employees were trained in preventative maintenance, condition monitoring and digitalized routines to drive efficiency. Best practices were continually shared across the workforce through internal benchmarking and cross- site visits.

The Results

The factory achieved a sustained increase in productivity from **65**% to **77%**, with all employees actively engaged in improvement cycles. The shift to a growth mindset turned the plant into the company's most improved site in 2024

Ian Rowledge, founder of Lineview, said:

There is growing diversity in the market with demand for everything from varying pack sizes to niche products such as craft beers and this requires more versatile production. The companies that keep up with shifting market demands while controlling costs are habitually using production data to improve business outcomes, similar to the way that personal trainers continually monitor metrics such as VO2 Max to progressively improve their results. Over time, this creates a virtuous circle of continuous improvement where losses feed into progressively improved processes that benefit the bottom line. This data is also helping create AI and machine learning systems that can suggest the optimal routes to improved efficiency just as satnavs guide drivers on the quickest route to any destination.

06
Conclusion

The global food and beverage industry is navigating a transformative era marked by rising costs, increasing complexity, and a growing demand for sustainable practices. As manufacturers face the dual pressures of escalating supply chain costs and the need for more sustainable, health- conscious products, the imperative for digital transformation has never been clearer. The Lineview Global Benchmarking Report highlights the critical role of smart, data-driven manufacturing processes in overcoming these challenges.

To stay competitive, manufacturers need to adopt real-time data analytics to boost efficiency, cut waste, and improve productivity across complex production lines. The move toward sustainable packaging and products is essential for the environment, but it introduces new inefficiencies that require thorough monitoring and targeted process improvements. Companies that invest in workforce upskilling and build a strong foundation in data literacy will be better equipped to meet shifting market demands and sustain continuous improvement.

The report underscores the potential of digital transformation to not only meet current challenges but also to create a virtuous cycle of innovation and efficiency. By leveraging advanced data analytics, manufacturers can optimize changeovers, reduce production rejects, and enhance overall equipment effectiveness (OEE). This strategic approach will enable the industry to balance agility with efficiency, ultimately leading to significant economic and environmental benefits.

In conclusion, the path forward for the food and beverage industry lies in harnessing the power of data to transform manufacturing processes. This will not only help mitigate rising costs and environmental impacts but also position companies to thrive in an increasingly volatile economic climate. The future of manufacturing is digital, and those who lead the charge will set the standard for a more sustainable and efficient industry.