TRENDS IN LOGISTICS 2024

TOYOTA

MATERIAL HANDLING

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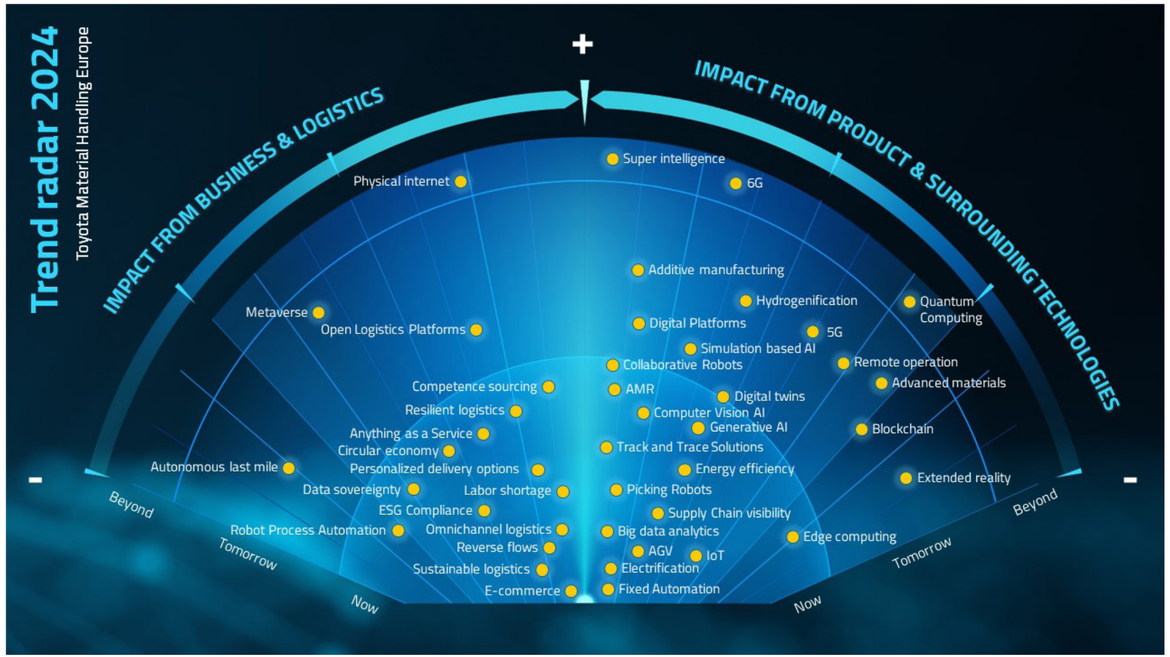


Introduction

'Trends in Logistics', an annual report published by Toyota Material Handling Europe, provides an overview of developments that affect the world of logistics - with a focus on Europe. Our main objective is to be up to speed and fully prepared when investing in future opportunities and technologies, so that we can anticipate and counteract threats and, most importantly, support our customers by keeping them well-advised, helping them make the right decisions for the future. The report aims to provide a simple overview of key trends, including business climate, consumer demands and new technologies.

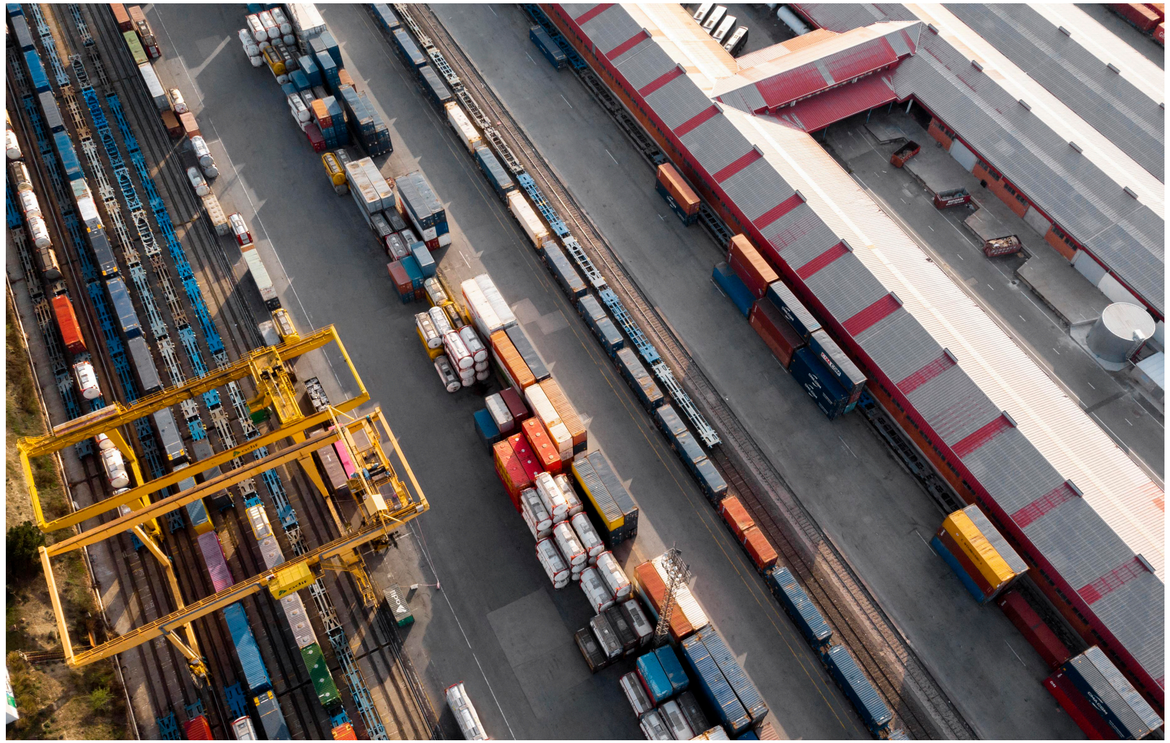
To monitor, understand and track these developments, Toyota Material Handling Europe is continually updating its 'Trend Radar'. To do this we collaborate with many sources of information, including the Fraunhofer Institute for Material Flow, Logistics IML and Interact Analysis, as well as hosting in-depth discussions with our customers who are key drivers in the logistics industry.

However, although we are using multiple high-quality sources, predictions about the future will always involve a degree of speculation and uncertainty, given the fast development and the complexity of the industry we are operating in.

Updates to the Trend Radar

There are several adjustments in the Trend Radar since the 2023 edition was published. Here is a summary of the main changes:

- The past 12 months have seen major developments in generative AI, such as ChatGPT, and has consequently been added as a key topic, which also covers Natural Language Processing (NLP).
- Last year we saw RTLS (real time location systems) as a trend for equipment such as forklifts. However, as the trend also encompasses many other fast-growing applications, we rename the initiative to 'Track and Trace Solutions'.
- The area of robotics is accelerating, and we have now identified several sub-categories to better track developments and impacts. The categories are AGV (Automated Guided Vehicles), AMR (Autonomous Mobile Robots), Collaborative Robots and Picking Robots.
- Some years ago, 'Extended Reality' was predicted to grow fast in the logistics industry, and quite a few applications were targeted and showcased, like in the areas of quality control and order picking support. However, the scaling is not happening as predicted, partly due to expensive equipment, thus we move it to less impact.
- The freedom to choose different e-commerce delivery options is spiralling demand for flexible options such as home delivery, pick-up at store and self-serve boxes. This can also include individualised payment options. Thus, 'Personalised Delivery Options' is new on the radar.
- Statutory reporting of financial results is now being expanded to include reporting on environmental and social governance. Therefore 'ESG compliance' is new on the radar.
- 'Digital platforms' are another addition to the 2024 Radar, used to share and connect data, goods information and services that can bring major benefits to supply chains. Digital platforms also enable outsourcing of individual services and can be utilised by multiple organisations.



Executive summary

Here are the headline trends from this year's report:

- **Business landscape:** The economic trend in Europe is expected to improve in 2024 with gross domestic product (GDP) growth and lower inflation, which in turn will improve consumer confidence and have a positive impact on the logistics industry. However, geopolitical turmoil continues to threaten supplies and movement of goods, which is encouraging some operators to review global sourcing and supply chains. E-commerce growth rate has slowed but keeps at around 11%. Return rates in e-commerce remain high and challenging.

- **Environmental and social governance:** Strong focus still lies on environmental and social issues, with the introduction of the new Corporate Sustainability Reporting Directive (CSRD) in 2023, a directive that will affect over 50,000 companies in Europe. Circular economy is gaining traction in many arenas, from the clothing sector through to industrial equipment. Planning for re-use of batteries and forklifts will become increasingly self-evident.

- **Energy:** The trend to steer away from fossil fuels and gear towards renewable energy continues, with further emphasis on electrification, particularly so for road vehicles. However, concerns regarding grid capacity and availability of renewable electricity haven't yet disappeared. Energy storage is therefore becoming a key area, leading to a rise in the use of batteries or hydrogen. IC engines running on HVO (Hydrotreated Vegetable Oil), or even hydrogen, are new options further explored. Next generation batteries such as Solid-state batteries promise high capacity but aren't readily available yet.

- **Labour:** The economic slowdown has impacted recruitment levels, but there's still a general shortage of labour in most European countries, in part due to a decline of the working age population. Consequently, staff expectations remain high, with increased overall remuneration and flexible working schedules being top of mind. In logistics, we see a trend in the pursuit of new skills required to support automated operations and digital processes.

- **Strategic trends in logistics and emerging technologies:** There are some key areas of development in the logistics industry in 2024 worth highlighting. Labour challenges and the growth of e-commerce continue to encourage automation, driving a great desire for simple, flexible systems using new adaptable navigation technologies. Improvement in order picking efficiency is another key area, based on route and process planning, and automation. Workplace safety is a top priority right now, based on new pro-active solutions, whilst digitalisation for supply chain visualisation is becoming commonplace. Lastly, expectations of the benefits to be derived from artificial intelligence are significantly high.

Business landscape

The logistics industry is directly affected by many factors including the economic outlook, consumer demand and product availability.

European economic trend

EU economy was generally quite weak in 2023 with declining manufacturing output, subdued foreign demand, and tighter financing conditions impacting investment and consumer spending. The services sector was also impacted due to spillover effects from weakened industrial activity, and knock-on effect of higher interest rates.

However, the overall economic outlook is expected to improve from 2024 onwards as inflation falls, household incomes recover, and exports from the European Union pick up. Recent studies and surveys indicate that after a sluggish 2023 the GDP growth will pick up in the first half of 2024 and grow to 1.5% in 2025.

The inflation rate fell during 2023 compared to 2022. The decrease has been broad-based, with food inflation slowing, although remaining high historically. Energy prices initially fell by 4.6% but have recently become less predictable due to geopolitical tensions. Inflation rate excluding energy and food also dropped, supported by improved supply conditions and the impact of a tighter monetary policy. Whilst underlying inflation measures are regressing, strong domestic price pressures persist, driven by rising wages. Longer-term expectations regarding inflation hover around 2%, but some indicators stay elevated and require close monitoring.

Geopolitical impacts

Geopolitical risks and the impact on global production and trade are widely discussed, but so far there is limited evidence of increased fragmentation in global value chains. However, recent disruptions, including the COVID-19 pandemic and geopolitical tensions, raise many questions.

Despite analysis showing no significant changes in European trade patterns, many companies appear to be adjusting trading relations and supply chain management - although it is a process that may unfold gradually due to the many challenges and costs.

A survey focused on leading firms operating in the eurozone conducted by the European Central Bank (ECB) reveals that many multinational companies, with substantial operations inside and outside the EU, anticipate increased (re)location of operations in the next five years for greater resilience. The survey indicates a higher proportion of firms expecting to (re)locate production both into and out of the EU, with a notable trend toward near-shoring and friend-shoring. Near-shoring is expected to intensify, and friend-shoring (move production to countries politically closer to the main country of sales) is anticipated to become more commonplace, with 42% of firms considering this strategy compared to 11% in the previous five years.

Consumer demand and e-commerce

The recent slowdown of the economy, with high inflation and increased interest rates, has reduced the growth rate of e-commerce, but still leaves it at a two-digit level overall in Europe. The fundamental consumer buying behaviour still indicates ongoing and continuous growth, and according to EU statistics, 68% of the inhabitants in the EU ordered a product or service online during 2022, which is a growth of 25% in five years. There is, however, quite a big gap between the leader of the pack, Denmark, where 88% of its citizens aged 16-74 years bought or ordered goods or services online, and Bulgaria at the other end of the spectrum, with 23% of internet users buying or ordering online.

Since consumer products like fashion, electronics and DIY form a major slice of e-commerce pie, it is reasonable to expect that the growth pattern going forward will be closely linked to the economy in general, but there are exceptions - for example, pharmaceuticals show a faster growth rate.

The ongoing growth in e-commerce requires transformation for many companies as they need to serve two supply channels [omni-channel logistics]. This proves difficult, especially if a supply chain designed to serve a network of stores is also expected to perform competitively when delivering single units, coordinating orders being supplied from different locations. It demands investments in software, e-commerce platforms and, in many cases, a level of automation - in addition to the existing business.

Reverse logistics are still a complicating factor, with return flows still high – for example, the fashion industry typically sees return rates of 50% and this causes a major logistical challenge, impacting overall profitability. Although technology is being developed to reduce return flows, like digital dressing rooms and size translation tools, some businesses still struggle to handle returns, not least due to repackaging demands. This is particularly evident with products that are assembled by the buyer and need to be returned afterwards. It is also reasonable to anticipate growing pressure to reduce waste in return flows, given the increasing importance of sustainable practices.

Furthermore, it is also plausible to anticipate a growing focus on last-mile deliveries, with a need for higher levels of collaboration between suppliers in order to share delivery networks and reduce emissions from road vehicles.

Environmental and social governance

With higher expectations from business relations, and tightening legislation and redefined reporting standards, environmental challenges and social matters also gain importance in 2024. This has implications in terms of carbon emissions, sourcing of materials, labour practices and end-of-life preparation. The logistics industry is subject to close monitoring in these respects, given the nature of the business and associated activities.

We will focus on two key topics in this report – the new Corporate Sustainability Reporting Directive and the transition towards a more circular economy.

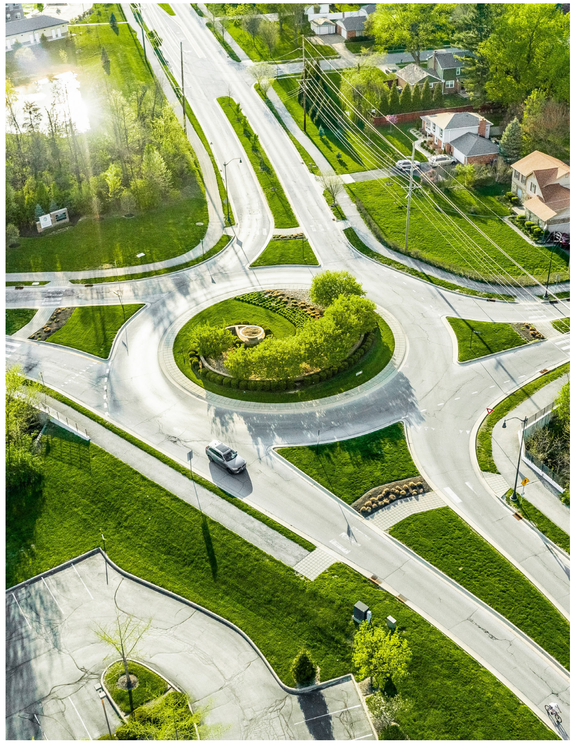
Corporate Sustainability Reporting Directive (CSRD)

Historically, companies have been measured principally by their financial performance – but that is now changing, as investors and other stakeholders in society want to know companies' environmental performance and understand how they manage social aspects - named Environment, Social and Governance (ESG). ESG is quickly becoming increasingly important, and surveys show that company management is having to adapt at a very fast pace.

The EU has now enacted the Corporate Sustainability Reporting Directive (CSRD) to enhance sustainability reporting standards. Applicable from 2024, it applies to all 'large' companies, defined by the number of employees (250+), annual revenues (€50m+) and balance sheet (€25m+). This means it impacts around 50,000 companies, replacing the Non-Financial Reporting Directive (NFRD). The CSRD mandates digital reporting, third-party assurance, and introduces the European Sustainability Reporting Standards (ESRS).

If a business is found guilty of non-compliance with the CSRD, it can expect administrative sanctions and three possible punitive actions: a public denunciation, an order to change conduct, and financial penalty.

For supply chain management, CSRD necessitates robust risk assessment and management, integration of ESG considerations, sustainable procurement practices, and environmentally responsible principles in supply chain management. The road freight logistics industry, a major emissions contributor, will see implications, requiring sustainable transportation modes and business practices that minimise the environmental impact of the logistics network and delivery.



Circular economy

The EU produces more than 2 billion tons of waste every year. Reducing this waste and transitioning to a circular economy will be a vital step towards achieving sustainability targets. Circular economy can simply be described as 'repair, re-use and re-cycle' - and this model can be applied to almost any type of goods, from simple products like clothing, up to more complex items such as cars and industrial equipment, enabling a prolonged lifetime and lessening environmental impact.

You can already find clear examples of circular economy. For example, recent surveys show that the growth-rate of sales of used clothes is now outperforming the growth-rate of new clothes, and that younger consumers are far more inclined to buy second-hand items than previous generations have been.

Whilst the private secondhand market is not regulated and logistics and delivery challenges are handled individually, some leading companies are already building new operations to participate in the re-use market. For example, Ikea is establishing a network of 'Buy-back and re-sell' services where used furniture can be offered to new users.

The circular economy can also be applied to more advanced products – in fact for some items it is a necessity. For example, an electric car is a complex product for which the traditional do-it-yourself approach when it comes to maintenance is out of question. Instead, it is anticipated that car manufacturers will recycle cars in a chain of refurbishment centres, preparing the vehicles for a second and third life.

In the world of logistics, some used products can be given a completely new purpose, for example lithium-ion batteries in forklift trucks that are reaching end-of-life can be re-used for static energy storage in mobile applications. A vital part of preparing a complex product such as a forklift for a longer lifetime in different forms requires conscious design, meaning that from the start products are designed and built with hardware upgrades and technology refreshes in mind.

An increasing number of companies are now specifically procuring pre-used equipment to meet their sustainability targets.

Energy

Transformation towards renewable energy

There is a clear ambition to reduce dependence on fossil fuels – but this ambition comes with new challenges.

Transforming to new sustainable energy sources is currently one of the biggest challenges for supply chain. Take the example of road transport, which accounts for some 15% of the total fossil fuel consumption. The transformation is ongoing in several areas, and clearest is maybe the trend of moving from internal combustion engines to electric vehicles.

This means the need for electricity is growing fast. According to McKinsey consulting, electric cars are projected to grow 4 times until 2030, estimated to reach 64 million vehicles. Consequently, investments in sustainable energy sources, such as solar and wind, are also growing fast. However, the pace of adopting these newer energy forms may not match the speed at which we are reducing fossil fuel usage. It presents a scenario where supplies and infrastructure are not in sync with targets and ambitions, and this is likely to persist during the coming years.

Since wind and solar energy will never provide a predictable supply of energy due to variations in weather patterns, new solutions are needed to be able to store and level out supply.
In this area hydrogen can play a big role as additional energy storage. A vital part of the energy infrastructure will also be high performing batteries that can store energy at very high capacities, can be charged quickly, are recyclable and have a long lifetime. Batteries will therefore not only be used for mobility purposes, like in cars, but will become a part of the overall energy landscape – potentially big enough to store energy for entire sites and cities.

There are also other important ongoing activities. For example, fossil diesel is being complemented with renewable fuels such as HVO, and hydrogen is being tested for use in internal combustion engines as well as in fuel cells for electric vehicles - all contributing to major steps towards zero emissions. However, significantly due to cost and supply challenges, hydrogen fuel cells only represent around 0.1% of the current forklift market.

There is evidence of some leading companies investing in energy self-sufficiency. For instance, Amazon has invested in hydrogen generation and storage systems.

New battery technologies

The development of battery technologies is experiencing rapid growth and according to the recently released updated battery road map by Toyota Motors, different types of batteries will lead to important steps in decreasing cost, reducing charging times and significantly improving range.

Toyota Motors has also announced breakthroughs in next generation units, like solid state batteries, which will introduce electric cars with a range of around 1000 km, bring charging times down to 10 minutes and will use less rare minerals, already in the time span 2027-28. It is anticipated that these new battery technologies will also have a positive impact on other vehicles used in logistics operations (e.g. forklifts), but it is too early to assess the benefits in this type of operation.

Labour

Availability and performance of labour has a significant impact on the logistics industry. Many countries have clearly felt staff shortages, following the Covid-19 pandemic. This latest review of the labour market has been prepared in association with Randstad, the world's largest recruitment agency.

Labour availability

Despite a recent slowdown in hiring, global unemployment rates remain historically low - especially in Europe. Talent scarcity persists in Germany and the UK, while Spain and Italy face higher-than-average unemployment. Full employment levels persist in Poland, Germany, and the Netherlands, making it challenging to fill vacancies.

Several large economies already see a decline in the working-age population, with projections showing significant falls through 2050 in Germany and France, and lesser declines in Italy and Poland. Spain and Belgium will also experience a modest decline after this decade, except for The Netherlands, which expects a gradual rise.

The ageing of industrialised nations will worsen labour market structural issues. As retirement level increases and older workers reduce workforce activity, talent scarcity will intensify, presenting challenges for employers to procure and retain human resources for growth optimisation.

This increases the viability and attractiveness of introducing automation in parts of the logistics process.

Staff expectations

Rising living costs have an impact on staff expectations. Inflation has generally been outpacing salary adjustments, prompting demands for higher remuneration packages. Another key factor is job flexibility, with 40% of applicants refusing jobs that lack flexible hours, and 27% quitting over inflexibility.

Overall, staff prefer flexible schedules (83%) and flexible locations (71%) – which can be a challenge in logistics operations. Younger and female workers value flexibility more. Staff are also seeking monthly living cost support (41%) or off-cycle salary increases (39%).

Employers are responding with varied adjustments, including quarterly reviews and one-time payments. There is a clear need for employers to reconsider work policies, exploring hybrid schedules and flexible workdays for increased employee satisfaction.

Regular staff surveys are essential for understanding employee financial stress and developing effective initiatives for retention.

New competencies in logistics

The future of logistics is significantly driven by technological advancements such as digitisation, automation, sustainability and changing customer expectations. This shift requires new skills. To meet this demand, upskilling and reskilling of the existing workforce is imperative.

Logistics is becoming increasingly digitalised, requiring skills in new tools like transportation and warehouse management systems. A digitally competent workforce is vital as these systems become more interconnected and widespread.

The trend towards automation continues, creating a scarcity of automation engineers and so-called "super-users" that provide initial support which is crucial for maintaining automated solutions.

As AI and big data analytics become more vital to operations, this evolution will reinforce the need for skilled individuals in areas that are already under lot of pressure from a talent pool perspective, impacting recruitment.

While AI and automation may appear to pose a threat to the labour market, studies suggest a positive correlation between AI exposure and employment growth in tech-intensive areas. A transitional period may lead to displacement, but success in the evolving work landscape requires adaptation through reskilling and upskilling.

Strategic trends in logistics

Automation

Labour shortages are continuously driving a desire for automation. Typical areas in logistics where automation is getting traction are picking, transportation, inventory, and sorting.

However, inflation and interest rates are putting pressure on automation investments, and a slowdown has occurred during the past year. In 2023, the number of warehouses adding automation globally was expected to drop 30% compared to 2022, but still being higher than pre-covid times according to Interact Analysis reports. For 2024 the forecast is that automation investments will turn around and start growing again, continuing to grow through 2025 and onwards.

Complexity in the commissioning of automation systems also has a dampening effect on new installations due to the volatility in the market. Therefore, simplicity of automation in commissioning, operation and adjustment directly by the user (and not by the manufacturer) has become key. This creates added value for customers with high flexibility needs, of which there are many. In addition, this is also driving the interest for new business models with more flexibility in the automation market, such as Robot as a Service, e.g. Pay per Pick.

[See section on Emerging technologies: Simple and flexible automation] (p. 20)

Focus on picking efficiency

The need to meet increasing customer expectations for fast and accurate deliveries and at the same time minimising and optimising operational costs is a challenge that puts high pressure on the fast-moving consumer goods part of the logistics industry.

Key developments to improve efficiency in picking operations are:

- Optimisation of picking cycles where advanced data analytics and AI is used to optimise picking cycles and batch planning
- Automation of picking processes, using mobile automation (AGVs and AMRs) or fixed automation, both for person-to-goods and goods-to-person systems
- Implementation of AI-supported tools like camera-based quality control systems, automatic inventory control and packing optimisation systems.

A major challenge when investing in automated order picking systems is to find the technical solution that best fits specific user requirements.

Strategic trends in logistics

Supply chain visibility

It is anticipated that by 2026, 80% of global and large enterprises will have adopted logistics control towers to improve shipment visibility and performance analytics. This reflects the benefits that can be achieved through tracking and monitoring technologies.

For example, in many traditional supply chains, you find a large portion of waiting time and other inefficiencies, which simply represent waste - or to use a Toyota expression: 'Muda'. To reduce the Muda, the first step is to understand how goods are flowing, equipment is being used and where improvements can be made. This is why supply chain visibility, with the ability to track and monitor the movement of goods, equipment and information across the supply chain, is a critical factor for business success.

Supply chain visibility also plays a crucial role in tracking the environmental and social impact of a company's operations and is increasingly important for companies looking to meet the expectations of eco-conscious consumers and investors, and legislative requirements.
[see section on CSRD] (p. 10)

Supply chain visibility can be supported by tracking goods at different checkpoints, or preferably by using technologies that provide real-time visibility. For outdoor use, GPS technology is already in use, but more cost-effective solutions enabling mass-movements of goods is currently under investigation. For indoor use, there are many developments related to indoor positioning systems using, for instance, vision and different wireless technologies.

Having connected different assets throughout the supply chain, over-arching systems that can support visualisation across borders will become increasingly important, and several interesting examples are being rolled out in the markets. We will monitor developments in this key area and publish updates in the next edition of this report.

Advantages of AI

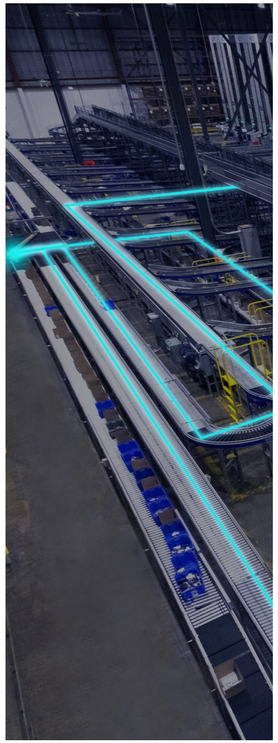
Artificial Intelligence (AI) is arguably the biggest story in business today. 2023 saw a breakthrough in generative AI with the launch of Open AI´s ChatGPT platform, which gained enormous interest in the public domain. Indeed, just after 2 months after its release, it is estimated thatChatGPT attracted over 100 million users. By 2025, daily data generation is expected to reach 460 exabytes, highlighting the significance of big data analytics and AI to understand and drive insights for improvements. Inevitably, it has sparked investments and interest from enterprise software companies to customise or build generative AI solutions adapted to business applications.

Unsurprisingly, AI promises to be a key driver in reshaping the future of logistics. Amongst other benefits it will help to minimise environmental impact by optimising routes and enhancing energy efficiency.

There are numerous of interesting applications for AI in logistics such as:

- Optimisation of warehouses and supply chains
- Forecasting, predictive replenishment and inventory management
- Camera vision for smart vehicles and asset tracking
- Support tools and chatbots

AI will have a big part to play in the future of logistics, shaping the industry for years to come. Embracing this technology gives logistics companies a competitive edge, improving operations to meet demands. We will monitor developments in this key area and publish updates in the next edition of this report.



Benefits of digital twinning

The term 'digital twinning' is widely used today, in the context of logistics planning – but what does it really mean? In short, it can generally be described as a simulation process to predict the outcome of an operation, based on various sources of data.

Digital twins are typically virtual versions of physical objects, systems, or processes, and they have the potential to bring major steps in making supply chains more efficient, working with extensive data and advanced data analytics.

Digital twins integrate data from sources like IoT sensors, computer vision, WMS, and ERP systems, offering real-time visibility across the supply chain or a warehouse. This transparency enables monitoring of shipments, inventory, and asset conditions, facilitating predictive analytics for proactive decision-making, optimising operations, and reducing costs through big data analytics and AI.

As automation grows, digital twin technology becomes crucial for effective simulations and reliable investment calculations. The future of digital twin technology in logistics remains competitive, with various actors promising its functionality.

Micro-fulfilment centres

A micro-fulfilment centre (MFC) is a small storage centre focused on fast delivery of products to consumers, usually related to e-commerce transactions. These centres are known for their flexibility, density, scalability, and proximity to urban areas. In sectors like food, micro-fulfilment centres have demonstrated significant benefits, calculated to generate significantly higher sales volumes due to their response speed and the ability to meet consumer demands. They have been measured to speed up order preparation by 50-100% compared to traditional methods.

However, MFCs also represent increased investment, supply chain complexity, and location-related risks. Recent market data indicates a slowdown in new fulfilment centre growth, although this is partly influenced by Amazon's substantial fulfilment capacity expansion during the COVID-19 e-commerce surge. With e-commerce sales growth rates tapering off, the global construction of new fulfilment centres which was around 4,000 units in 2022, is expected to decrease by about 50% in 2024.

Emerging technologies

In the logistics industry new technologies are emerging constantly, but these are the technologies that are gaining the most attention so far.

Workplace safety - safety technologies

The logistics industry is recognised to include certain hazardous environments, and sadly accidents have historically been too common, often involving forklifts. These days, many new developments and innovative solutions are being launched, all aiming to reduce the number of incidents and to improve staff welfare. Many of these developments are made possible thanks to the emergence of new concepts such as computer vision and the utilisation of different IoT technologies.

For forklift manufacturers, the focus is moving from providing forklifts with features such as light and sound-based warnings towards the use of pro-active systems that detect and classify different objects in the forklift's working area - enabling more accurate and safer operations.

There is not only a human case for these technologies, but also a clear commercial justification. For years, many forklift manufacturers have offered safety-related features, such as shock sensors, that measure impact from collisions and trigger alarms. These management tools have proven to dramatically reduce the number of collisions and save operators thousands of Euros in reduced goods and equipment damages.

Simple and flexible automation

A major challenge for large-scale adoption of automation is to reduce the complexity of installing and commissioning, and to make vehicles more flexible, working in ever-changing environments.

To help address these challenges, there is a fast increase in the utilisation of SLAM (Simultaneous Localisation and Mapping) navigation, based on LiDAR (Light Detection and Ranging) or cameras. These sensors simplify installation and commissioning, and provide vehicles with a comprehensive understanding of their environment, enabling AMRs and AGVs to detect and adapt to changes on their own, and improving safety in their interaction with humans.

The interoperability between different automated vehicles such as Autonomous Mobile Robots (AMR) and Automated Guided Vehicles (AGV) is another key area. More and more, operations will have the potential to consist of different vehicles from different manufacturers, so interoperability will become an important ichallenge. Therefore, a lot of work is being put into the development of industry standards.
A good example of this is VDA5050, which aims to enable mobile robots to work together using a common fleet management software system, rather than different master controllers and software from each brand working on-site.

We will monitor developments in this key area and publish updates in the next edition of this report.

Current innovations in the industry

There are many examples of innovative thinking in the logistics industry. Here are some examples of recent innovations that we have identified in the market.

- **Warehouse digital twin:** Facing operational inefficiencies and high costs, warehouse teams need practical solutions to assist them in decision-making. WareBee, an AI Warehouse Consultant, addresses these challenges by identifying inefficiencies and providing actionable recommendations for improvement. Its real-time warehouse operations monitoring, labour forecasting, and slotting optimisation features enable warehouses to reduce operational costs by up to 15%, lower CO2 emissions, ensure compliance, and plan for the future.
- **Order picking route optimisation:** Swedish-based company Optiplan Innovation offers a solution that enables order picking routes to be optimized on the fly. Promising results show the potential to reduce travelled distance in a multi-order picking process, in the region of 20-40% depending on local conditions.
- **Intuitive Energy Management:** Knowing where and when you consume your electricity has never been as important as it is right now. Swedish based company DAZOQ offers an easy-to-implement and scalable solution consisting of wireless, self-powering sensors, a cloud-based interface and energy reduction advice. With their intuitive visualization of the machines' real-time-energy use DAZOQ enables users to understand and monitor their energy usage patterns, identify saving potential, avoiding peak loads and identify machine errors.
- **Autonomous inventory monitoring:** Various solution providers are addressing the challenges surrounding cycle counting and inventory monitoring. Based in Zurich, Switzerland, with global operations, Verity's system is used to complete thousands of fully autonomous inventory checks every day in warehouses everywhere. The result: valuable insights that enable greater operational efficiencies and faster, smarter supply chains.

Final note

Toyota Material Handling Europe is the global leader in material handling equipment and provides solutions for all kinds of logistics operations. The complexity and the speed at which we see logistics evolve is remarkable, and this evolution will present both threats and opportunities to logistics managers.

The purpose of this report is to provide a summarised picture of what we see emerging in our business, supporting the thinking on how to best embrace and prepare for the future. Still, predicting the future will always be a guessing game and having the agility to flexibly adapt to unforeseen change will be crucial.

If you share an interest in these topics, don't hesitate to contact us to provide your feedback and thoughts. We also recommend our Logiconomi community where topics like these are discussed and examined in more detail.

For more information, please contact:

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Toyota Material Handling in Europe

Total coverage

The Toyota Material Handling network extends to over 30 countries in Europe with more than 5000 mobile technicians.

Always local – with global support

Wherever you are located in Europe, we are always local, due to our extensive coverage, but with the stability and back-up of a worldwide organisation.

Made in Europe

Over 90% of trucks we sell are built in our own European factories, in Sweden, France and Italy – all to TPS quality standards. We employ over 3000 production staff in Europe and work with over 300 European suppliers.

Approximately 15% of our European production is exported to other parts of the world.

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