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Generative AI in the transportation and logistics industry

Introduction

Generative AI helps organizations create competitive advantage through unique capabilities.

The transportation and logistics sector is continuously evolving, striving to achieve significant advantages in efficiency, cost reduction and customer satisfaction. However, it faces increasing complexities due to growing customer expectations, rapid market fluctuations, and the rising need for sustainable practices. The way forward is to empower employees with intelligent digital tools which support quicker decision-making, end-to-end visibility, early problem detection and resolution, and elimination of non-value adding activities.

Generative AI (Gen AI) offers promising solutions to address these challenges. Gen AI can analyze large volumes of diverse data in real time to gain relevant insights in logistics operations. Additionally, it can serve as a co-pilot for operations and customer service organizations to drive productivity while reducing the cost of errors.

What is Gen AI?

Gen AI represents the forefront of artificial intelligence, focusing on creating contextually appropriate content. In general, the term refers to a type of neural network that can generate new and contextual content based on human instructions. The large language models (LLMs) that underpin gen AI have been trained on vast amounts (typically more than a billion parameters) of text data, enabling them to comprehend and generate human-like responses in natural language.

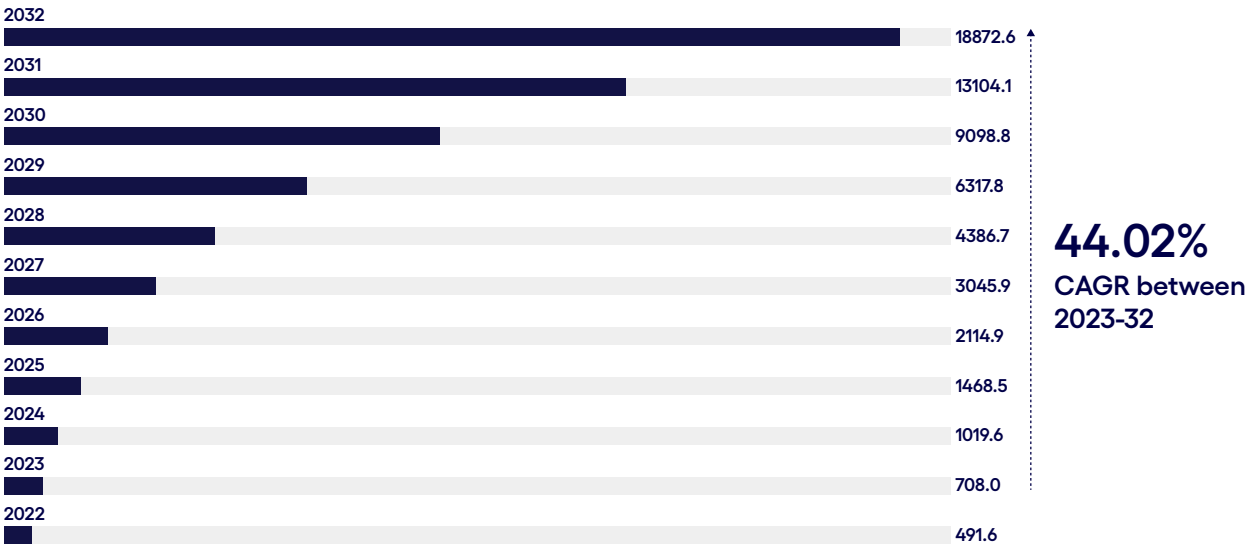
Instead of relying solely on historical data, gen AI focuses on generating new instances of data that resemble the training dataset. Gen AI algorithms such as generative adversarial networks (GANs) or variational autoencoders (VAEs) learn underlying patterns and characteristics of the data and use this knowledge to generate new data points.

Four key things gen AI tools perform well:

- Generating the latest content with little or no guidance.
- Summarizing existing content in a manner that can be understood by the target audience.
- Holding intelligent conversations with a human-like understanding of various domains.
- Performing chain-of-thoughts (CoT) activities.

Gen AI potential for transportation and logistics

Gen AI has the potential to revolutionize the logistics industry in the coming years. According to a Precedence Research report, the market is set to grow at an annual rate of 44% to $19 billion by 2032. The drivers for this exponential growth are changing consumer behavior, cost pressures, labor shortages and disruption in the logistics industry.



Source: Precedence Research

Growth drivers

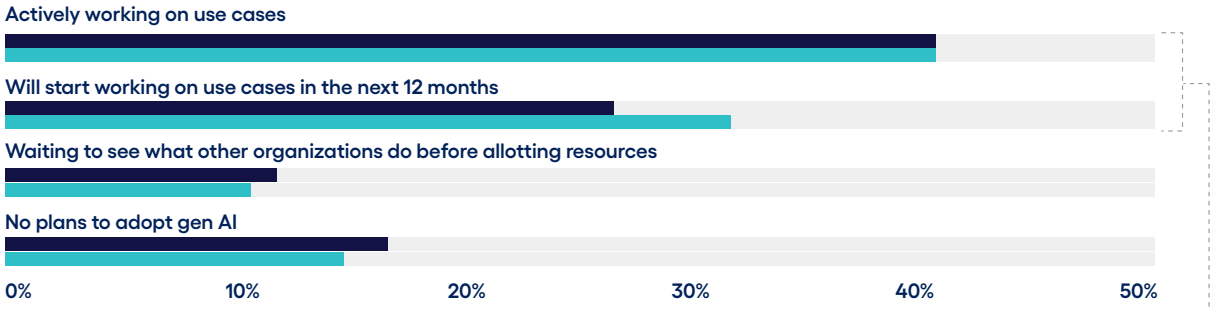
- 'Amazon Effect'
- Cost Pressure
- Labor Shortage
- Supply Chain disruptions & constraints
- Increasing competition & death of middlemen
- Changes in regulatory environment & laws
- Focus on Sustainability
- Changing consumer behavior

44%
Market share in 2022
(North America)

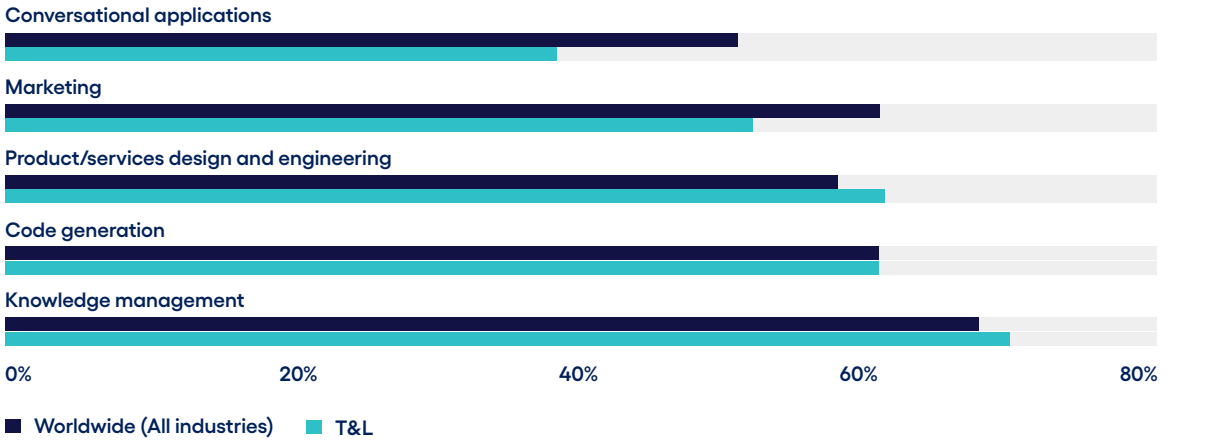
Highest growth in the forecast period
(Asia Pacific)

62%
Cloud-based deployment

An IDC survey examined the adoption intentions and sentiment of companies about gen AI. It found that more than 50% of T&L firms are already investing in implementing gen AI use cases, about 70% of them being applicable in areas such as knowledge management, marketing (better shipper/lead conversion, enhanced dynamic pricing/quoting) and product/service design.



Areas of investment



We at Cognizant, through our interactions with our customers and prospective discussions, have identified a set of use cases in which gen AI can drive competitive advantage. These use cases are broadly classified into three categories:

Conversational

Human-like conversations with customers, suppliers and more.

Referential

Refer, summarize, and interpret information such as contractual documents and more.

Creative

Create new content such as documentation, product design enhancements, software code and more.

Early interest use cases

This section details specific gen AI use cases in customer experience, transportation execution and contract advisory that can be leveraged by the transportation and logistics industry as immediate value generators.

Customer experience

Customer relationship management

- Sales planning activities can be completed faster, as gen AI-powered applications enable the discovery of new strategies for accounts that can help generate communications quickly and effectively, ensuring that these communication workflows stay personalized and efficient.
- Gen AI can support real-time customer service with multilingual support as well as automated personalized email marketing. This could enable automated email processing, categorization of emails and self-service assistants for better customer service.
- Salesforce's Einstein GPT is one tool that can be used for personalized email marketing, customer service call center assistance and more. Another company, Air.ai, has launched a tool that can facilitate up to 40-minute-long customer service conversations, sounding human-like. SugarCRM is revolutionizing the customer service experience by summarizing case histories and creating user guides for customer queries.

Transportation execution

Optimized transportation routes

- One longtime problem for trucking and freight forwarding companies has been the planning of efficient transportation routes. Gen AI algorithms can analyze tariffs, trade agreements, traffic patterns, public transportation data, and other variables to generate optimal routes and minimize costs.
- Gen AI models can be used by international shipping companies when considering factors such as shipping volumes, vessel capacities, and port capacities to determine the fastest delivery method, lowest cost option, sustainable route identification and ways to minimize carbon emissions.
- Supply chain technology company Project 44 has recently developed Movement GPT, which allows users to conversationally access vital shipment information and other key transportation insights. DHL, a global logistics company, now uses generative AI to adjust and optimize delivery routes.

Efficient delivery tracking

- Delivery tracking and optimization are critical aspects of any delivery business, and customers expect accurate, real-time updates on their deliveries. Businesses can provide customers with personalized and accurate delivery tracking information by integrating vector database retrieval with gen AI to retrieve information on delivery times, driver location and other relevant data. This feature can improve efficiency and reduce costs, enabling businesses to provide faster and more efficient tracking.
- EasyDispatch is a big data and AI-powered logistics management platform developed by Alibaba Cloud. It enables businesses to optimize their logistics operations by providing real-time parcel tracking and analysis, intelligent dispatching and predictive maintenance capabilities. The tool is used to provide natural language processing capabilities to EasyDispatch, which enables users to interact with the platform through text-based commands.

Contract advisory

Smart supplier contract management

- Suppliers can utilize Gen AI technology to revolutionize contract management by tracking, analyzing and automating compliance processes, generating standardized and customized templates that can reduce the overall costs and time involved. It can auto-generate contract documents for suppliers and can set alerts for contractual commitments, clause deviations, data privacy commitments, contractual obligations regarding data breaches and much more, which can improve overall compliance.
- Companies including Ironclad, Evisort and Spotdraft have already integrated gen AI with contract management systems to speed up negotiation, contract generation and review process. Gen AI can identify and categorize types of contracts from databases into groups based on type and function, using pattern-matching algorithms.

Other potential use cases

Sales and marketing

Better lead generation and conversion

- The challenge most 3PL firms are facing today is identifying and prioritizing which leads are most likely to convert into paying customers. Gen AI algorithms can analyze large sets of data, identify patterns, and make predictions about which leads are most likely to convert and improve efficiency across the sales funnel. This allows sales teams to focus on high-quality leads, increasing the chances of closing deals and improving the overall efficiency of the sales process.
- Gen AI can drive customer engagement by segmenting customers based on their interactions with the brand. From there, it will provide recommendations based on patterns in data. Overall, gen AI can help companies generate and convert leads by providing an effective follow-up approach through tailored pitches for the sales team that will improve productivity and sales decisions.
- SugarCRM's Gen AI initiatives is set to revolutionize sales and lead conversion by automatic tasks and translations while creating sales copies that convert to leads. It boosts marketing efficiency by smart segmentation and personalization of campaigns.

Enhanced dynamic pricing and quoting

- Gen AI models can help freight brokerages perform advanced analysis on customer demand, carrier capacity, market conditions and competitor pricing to help generate the best shipment quotes for customers. It can also make benchmarking simple, with the only constraint to its power being the amount of data a company has. When provided a description of the load, it can refer to previous descriptions and determine what type of quote to provide. Gen AI provides a scalable tool to optimize quotes, increase revenue and drive efficiency.
- Tech logistics company Transfix uses gen AI to optimize load assignments and pricing based on market conditions.

Order processing

- Gen AI chatbots can play a valuable role in facilitating order processing through customer call centers. They can assist customers with various aspects of the order management process, including placing orders, checking order status and making modifications. By integrating with backend systems such as inventory management and order fulfillment systems, chatbots can streamline the order process and provide real-time updates to customers, ensuring a seamless and efficient experience.

Procurement

Informed procurement decisions with market data

- Through its ability to process large volumes of external data to identify comparable products and competing suppliers, gen AI offers a unique opportunity to benchmark product, quality and cost information to drive recommendations for minimizing the overall cost of purchase; guide buying/purchasing processes; indicate supplier risk positions; and provide supplier recommendations by utilizing immense amounts of external data (such as market indexes, company credit ratings, and publicly available information about suppliers).
- Moreover, generative AI can assist in developing negotiation strategies by analyzing previous negotiation outcomes and market conditions. It can suggest optimal pricing, terms, and conditions, tailored to each supplier.
- An autonomous sourcing startup, Globality Inc., has launched a gen AI-based conversational chatbot called Glo in its procurement platform to gain insights on the supplier and product data, and is already embraced by many of its clients to make informed decisions around purchasing products and identifying suppliers.

Transportation planning

Intelligent fleet management solutions

- Logistics companies and carriers that have large fleets can use gen AI to efficiently ask questions about their vehicle fleet, vehicle performance, idling times, fuel economy, vehicle usage, cost savings and more through a chat interface. The gen AI algorithms use natural language processing, which easily recognizes patterns and trends based on data-driven insights. In turn, this uncovers potential issues and areas of improvement and provides recommendations based on real-world data, enhancing fleet performance.
- Transportation technology company Geotab recently launched a beta version of its gen AI software called Project G that provides customers with a digital chat assistant and enables them to access advanced fleet data and insights.

Transportation execution

Dynamic warehouse and inventory management

- Inventory management within warehouses can get complicated when inventory control managers are handling tens of thousands of inbound and outbound units every day. With the introduction of gen AI, warehouses can avoid stockouts and excess surpluses, increase product visibility and more. With insights derived from demand, lead times, stock levels and more, optimal inventory levels for warehouses to carry are determined. When a connected warehouse and gen AI tools are combined, warehouse operators can audibly ask questions of the AI to determine where monitoring or attention should be allocated.
- Generative AI-powered systems can dynamically organize warehouse layouts based on product popularity, order forecasts of specific items, hence reducing travel time within the warehouse and increasing productivity.
- Gen AI tools Forecast Pro Quick Tour can analyze large volumes of data related to warehouse management such as product locations, movement times and demand patterns. From this data, AI can generate optimized warehouse layouts that maximize efficiency in product handling and storage.

Efficient and personal package design

- Gen AI can be used to create personalized shipping labels that include not only the recipient's name and address, but a more personalized package to each specific customer. To speed up package design, reduce labeling errors and cut down delivery time. Gen AI can be used to customize/innovate brand packaging with variations (different packaging versions can be created). For example, international spirits giant Diageo has co-developed a tool integrated with gen AI to stimulate creative innovation and speed package design.

Fraud detection

- The package and delivery sector in the T&L industry has been a victim of fraudulent activities. Gen AI, with its neural networking (especially GANs), can form a discriminative network to sift through huge quantities of data and identify irregular patterns of fraudulent activities. Additionally, gen AI can forecast potentially fraudulent activities using historical data, boosting reliability and security.
- A leading package delivery company is exploring a gen AI solution to identify fraudulent emails spamming their customer support team, frauds related to payment transactions, unexpected alerts requesting account information, etc.

Effective design/development with gen AI

- Software development can benefit from using gen AI for writing and validating software for code efficiency and adherence to coding standards.
- It can also be used to analyze software code and prepare product documentation in the most efficient way.
- GitHub Copilot, powered by OpenAI's GPT-3, assists developers in writing code by providing code completions and explanations in plain English. It allows developers to describe their intentions in natural language, and it translates those descriptions into code.
- Data security and privacy can also benefit from gen AI, using natural language descriptions of vulnerabilities in software code, along with resolution recommendations. For example, GitLab AI-powered security feature to leverage Google Cloud's foundation models.
- Gen AI can Identify product or process development processes that are failing to meet business objectives and describe best practices for each process, reducing downtime, increasing productivity and improving the solution.

Enhanced quality control

- Proactive quality assurance: Gen AI models can analyze vast sets of test cases and quickly spot trends, recurring issues and potential points of failure that a human might miss. It can also predict potential issues before they arise. By analyzing the history of test cases and their outcomes, it can forecast likely points of failure in new or modified code.
- Dynamic adaptation: Gen AI can adapt dynamically to changes in software. When a new feature is added or an existing one is modified, it can understand the changes and generate new test cases accordingly.

Global trade management

Automation of trade compliance processes

- Trade rules have become complex over the years, with freight forwarders and brokers having to deal with large datasets. Manually updating custom forms with changing rules is tedious. Gen AI can improve compliance by gathering information from multiple customs documents in any format and filling out customs declarations within minutes.
- Gen AI can also help look up harmonized system of coding (HS) codes, a key aspect of trade compliance. Users can retrieve codes simply by providing the name of the product.
- iCustoms has added an intelligent document processing feature to its product that can automatically process trade compliance documents. The company also offers the ability to provide HS codes with high accuracy.

Invoicing and settlement - finance and accounting

- Gen AI can enable finance and invoicing processes for most of the stakeholders of the logistics value chain such as suppliers, distributors, carriers, brokers and third-party vendors to scale up and become more efficient with new data processing capabilities such as auto-processing of invoices based on specific customer information. Gen AI can utilize image processing and generate suggestions in real-time to enhance informed decision-making and send out invoices on time.
- Moody's and Microsoft co-created an integrated risk assessment and management tool using gen AI that will provide customers with a multifaceted view of risk. This collaboration aims to synthesize and summarize information across Moody's robust data consisting of third-party reference data, counter-party risk assessment, and supply chain management data, resulting in better insights.

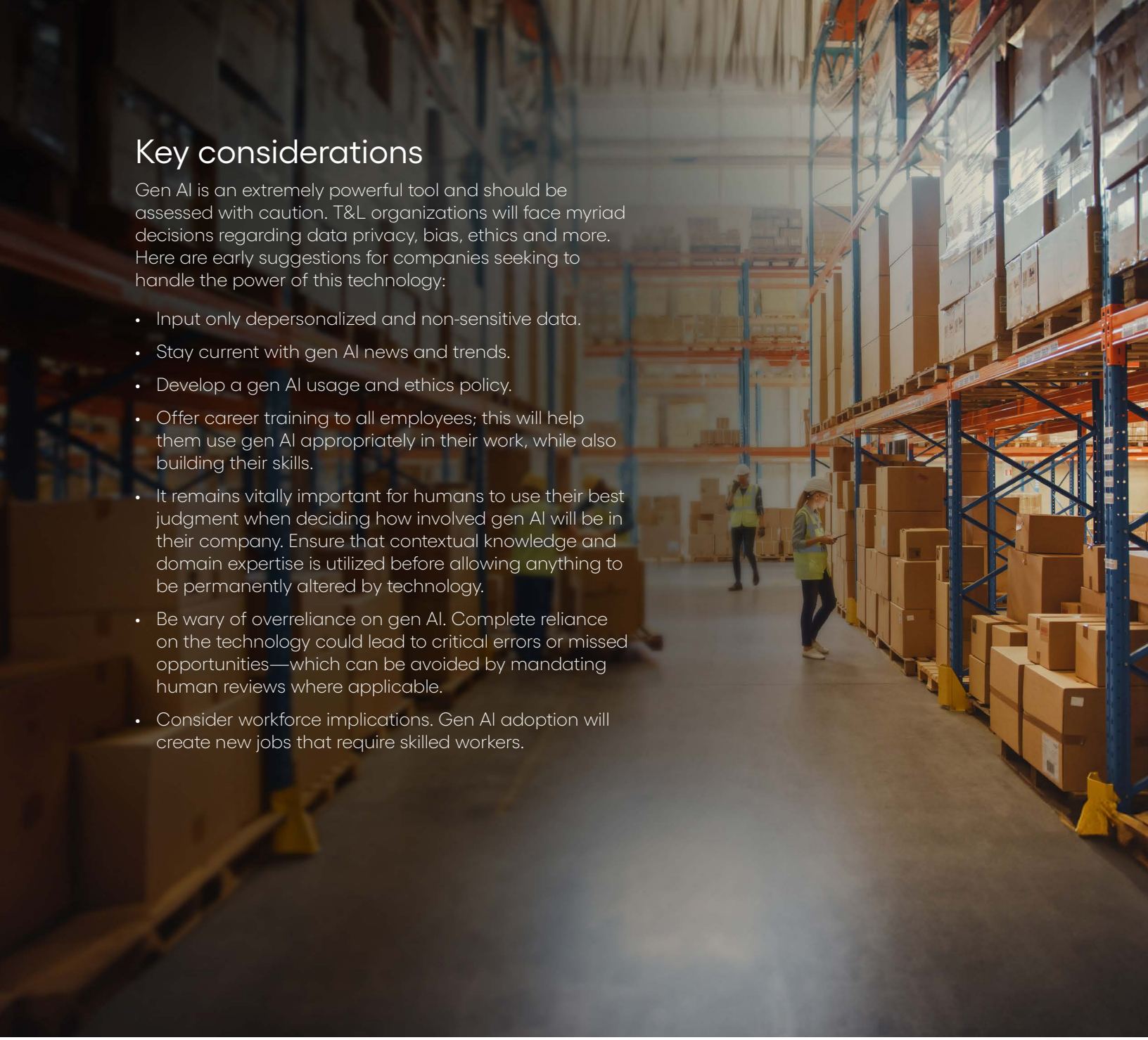
Document creation, search and synthesis

Auto-generating customs documents and other logistics documents

- The once time-consuming process of drafting customs documents and other logistics-related documents (carrier performance reports, business process documents, etc.) can be streamlined with gen AI. This can improve labor efficiency, reduce errors, increase customer satisfaction, and make documentation faster and standardization more widespread.
- Gen AI can be leveraged to develop applications to search for documents such as BOL and POD at one place for different customer requirements. Additional features such as translating documents to a different language could also be incorporated in a gen AI application.

As gen AI technology evolves, some of the generative models have gained traction in the logistics space for their wide-ranging applicability across the T&L value chain. The following illustrates some use cases where these models come into play.

Gen AI model	Description	Application in T&L
 Variational autoencoder (VAE)	• Often used in image and video processing • Works by taking an input image and encoding it into a lower-dimensional representation, which is then decoded to produce an output image	• Intelligent Quality Control • Distribution Center/ Warehouse Traffic simulation & prediction
 Generative adversarial networks (GANs)	• Used to generate new data samples that are similar to the training data (Generator) • Accurately classify the data as real or fake (Discriminator)	• Document Generation, Search & Synthesis • Route Optimization • Fraud Detection
 Recurrent neural networks (RNNs)	• Used for sequential data processing, such as natural language processing and time-series analysis • Output of each step is used as the input for next step	• CRM-Better CX, Improved sales • Delivery Tracking
 Long short-term memory (LSTM) networks	• Type of RNN that is designed to handle long sequences of data which can be complex and difficult to analyze • LSTMs can learn to recognize patterns in data that occur over long periods of time	• Dynamic Pricing/Quoting • Better Lead Generation & Conversion • Smart Contract Management & Negotiation • Informed Procurement Decisions



Key considerations

Gen AI is an extremely powerful tool and should be assessed with caution. T&L organizations will face myriad decisions regarding data privacy, bias, ethics and more. Here are early suggestions for companies seeking to handle the power of this technology:

- Input only depersonalized and non-sensitive data.
- Stay current with gen AI news and trends.
- Develop a gen AI usage and ethics policy.
- Offer career training to all employees; this will help them use gen AI appropriately in their work, while also building their skills.
- It remains vitally important for humans to use their best judgment when deciding how involved gen AI will be in their company. Ensure that contextual knowledge and domain expertise is utilized before allowing anything to be permanently altered by technology.
- Be wary of overreliance on gen AI. Complete reliance on the technology could lead to critical errors or missed opportunities—which can be avoided by mandating human reviews where applicable.
- Consider workforce implications. Gen AI adoption will create new jobs that require skilled workers.

Getting started with gen AI

Organizations may be in various stages of adoption of gen AI technology. The initiatives to scale and accelerate gen AI initiatives depend on current adoption levels. Considering this, Cognizant has developed a five-step framework that details the various activities that organizations can take to scale their gen AI programs.

Guiding principles on getting started with gen AI

Foundational systems, and data assessment and readiness

Assesses organizational data, architecture, infra requirements and build a strong foundation, including operating model and governance.

Organization readiness and change management

Helps employees understand and adopt gen AI to drive company's business, values and strategies

Cross-delivery governance approach

Engages cross-disciplinary teams to define AI strategy as well as track and report progress over time to provide openness on adoption and success

Security and compliance

Evaluates potential risks, regulatory requirements and compliance, and proactively manages these through policy, control, enablers and training

Building a gen AI solution requires a deep understanding of the technology's capabilities and involves several key activities such as problem definition, applicability assessment, data preprocessing, algorithm selection, building a prototype model, fine-tuning the model and then scaling to business functions.

3PL organizations specifically need to consider the maturity of their stakeholders when planning gen AI initiatives, especially carriers that are core to the business and may not be very tech savvy. In addition, external stakeholders, including carriers, often operate with a limited technological backbone. This may complicate gen AI initiatives. To overcome these challenges, organizations need to focus on assessing the availability of data, and correspondingly choose use cases that can be piloted, while taking steps to capture data for other initiatives.

In addition, implementing gen AI requires the identification of a suitable hyper-scaler e.g. Microsoft, Google, OpenAI, AWS, etc. and the skills and expertise needed. Next, specific data governance policies, frameworks for evaluation of identified use cases and identification of suitable LLM models need to be defined.

In parallel, organizations need to define responsible AI principles. Leadership must come from the top and must be translated into an effective governance structure, embedded with organizational principles, complying with applicable laws and regulations. Responsible AI must be CXO-led, starting with a focus on training and awareness and then expanding to execution and compliance. This will help organizations move from a reactive compliance strategy to the proactive development of responsible AI capabilities through a framework that includes security, compliance and governance.

While building capabilities leveraging technology is at the core of gen AI solutions, organizations should also focus on preparing internal and external stakeholders to reap the benefits of the technology. Don't neglect your employees and the change management associated with implementing this new technology. It is imperative for organizations to plan for upskilling and cross-skilling their workforce to leverage the technology to drive adoption and improve productivity.

It is worth collaborating with the right IT partner, who could bring in the experience, and expertise in logistics industry processes, Gen AI, data management, organization change management, business case management and strong program management to prepare an objective roadmap for implementation, support, and guide in prioritization of use cases, selection of LLMs, implementing data governance, security, and privacy practices.

Selecting the right partner

It is critical that logistics clients select the right partner as they embark on a generative AI journey. Any organization that you partner with should bring insights into your business for suppliers, carriers, dealers, operational users, fleet management, and other T&L industry enablers.

Keeping in mind how critical gen AI will be in the T&L industry, Cognizant has invested in a Neuro AI platform that brings together multiple features spanning areas such as IT services, automation, and gen AI, spearheading proof of concepts for multiple clients. Cognizant also has a deep knowledge of open-source language models that can be deployed for specific use cases. We are currently working with several T&L clients to plan their generative AI journey in collaboration with our hyper-scaler partners, and we would be happy to be your partner as you start your journey.

Conclusion

Generative AI has the potential to revolutionize the overall business of global logistics providers - enhancing customer experience, reducing cost, increasing efficiency, and driving innovation in every process. Gen AI is no longer an option, but a necessity to build competitive differentiators for organizations. While technology is still evolving, organizations can determine high-feasibility, high-value use cases that offer a compelling proposition to explore and get started with their gen AI journey. The time to act is now!

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