The Role of Artificial Intelligence for Technology Managers in the Logistics Industry

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Abstract: The increasing strategic importance of technology has strengthened the role of technology managers (TMs) such as Chief Technology Officers (CTOs), while advances in artificial intelligence (AI) offer new opportunities to support role-specific executive decision-making. However, existing research largely examines AI support from a general strategic management perspective and provides limited insights into TM-specific applications. This study addresses this gap by investigating how TM presence is reflected in practice, which organizational and environmental factors shape the role, which stakeholders are most relevant, and where AI can provide role-specific support. A qualitative research design was employed, involving five semi-structured expert interviews with TMs and related decision-makers from Swiss logistics companies. The interview data were analysed using qualitative content analysis, resulting in a framework linking TM responsibilities, organizational and environmental influences, stakeholder interactions, expected organizational outcomes, and AI-enabled support mechanisms. The findings show that TMs fulfil a hybrid strategic-operational role, acting as an interface between technology, business processes, and stakeholders. Major challenges include information overload, fragmented knowledge, system complexity, technology investment uncertainty, stakeholder coordination, and resistance to change. Furthermore, the findings highlight the critical importance of relationships with supervisors, peers, and employees in shaping technology-related decisions and outcomes. The study identifies several role-specific AI application areas, including knowledge management, technology scouting, decision support, investment evaluation, system transparency, process documentation, and stakeholder communication. AI is perceived not only as a tool for improving efficiency but also as a mechanism for supporting transparency, evidence-based decision-making, organizational alignment, and innovation management. The proposed framework contributes to the technology management and CTO literature by establishing a bridge between technology leadership and AI-supported management. At the same time, it provides practical guidance for organizations seeking to leverage AI to strengthen technology leadership, improve decision quality, and enhance innovation capabilities under conditions of increasing technological complexity and uncertainty.

Keywords: Chief technology officer (CTO), Technology management, Technology strategy, Logistics industry, Artificial intelligence (AI)

1. Introduction

Technology managers (TMs), including Chief Technology Officers (CTOs) (Adler & Ferdows, 1990), face increasingly complex challenges. For example, besides overseeing technology and innovation activities, their responsibilities are to translate technical expertise into business decisions and research & development (R&D) priorities, align technology with strategy, coordinate stakeholders, govern ESG performance and develop digital platforms (Cetindamar & Pala, 2011; Cui et al, 2026; Charden et al, 2026; Garms & Engelen, 2018; van der Hoven et al, 2012; Xiong et al, 2026). While research highlights the potential of Artificial Intelligence (AI) to support top management decision-making (Bevilacqua et al., 2026; Jorzik et al., 2024), little is known about the role of AI in supporting TMs, specifically. The literature review shows that a considerable amount of literature exists discussing the TM role by researching aspects such as the historical development, responsibilities, or challenges, and a separate broader literature on AI-supported strategic management and required skills, but so far almost no direct bridge between them. Considering the strategic importance of the TM role, respectively the highly specialized functional knowledge behind this role, we claim that AI tools should offer also role-specific support, besides the undoubtedly highly valuable general support for strategic managers. This study addresses this gap by examining how the TM role is manifested in practice and identifying areas where AI can provide role-specific support. We thus state the following research questions. How is TM presence currently reflected in practice? What are organizational and environmental aspects challenging TMs? Who are the relevant stakeholders for TMs? What are potential areas for AI-support specific to TM presence? Based on expert interviews from the Swiss logistics industry, the study develops a qualitative framework linking TM responsibilities, challenges, stakeholder interactions, and AI-enabled support mechanisms. Following prior literature, the term TM is used broadly to encompass CTOs and other related managers.

2. Literature Review

2.1 Development of TMs

The TM role emerged in the 1970s and evolved from an R&D focus into a strategy-oriented technology management position when some firms begun using the CTO title for specific senior most technology management functions (Wu et al, 2021; Probert and Tietze, 2009; Adler and Ferdows, 1990). The literature describes the CTO as the most senior executive for R&D related technical matters and outlines activities such as technology coordination across business units, representation of technology in top management, assessment of technological implications in strategic decisions, and management of the external technology environment (Wu et al, 2021; Cetindamar and Pala, 2011; Adler and Ferdows, 1990). Thus, the strategic influence of TMs is particularly pronounced in technology- and R&D-intensive industries, where technological developments are a key competitive factor. Furthermore, influence depends on hierarchical power, and relationships with other executive roles (van der Hoven et al, 2012). Recent work also shows substantial heterogeneity. Some TMs remain deep technical experts, while others become executives shaping innovation strategy across the top management team (Garms and Engelen, 2018).

2.2 Responsibilities of TMs

TMs are responsible for an organization's R&D-related technology agenda, usually spanning product, process, and sometimes as well information technologies, with a stronger company growth and innovation orientation than for example Chief Information Officers (CIOs) (Cetindamar and Pala, 2011; Cui et al, 2026; Wu et al, 2021; Garms and Engelen, 2018; Adler and Ferdows, 1990; Smith, 2003; Xiong et al, 2025). Their focus has become broader besides running R&D alone, because they represent technology in top management and connect technical decisions to firm strategy (Cetindamar and Pala, 2011; Cui et al, 2026; Medcof, 2008). Table 1 provides an overview.

Table 1: Functional foci and responsibilities of TMs

Focus	Responsibilities	Example literature
Technology scanning and enterprise platform	Monitor emerging technologies and competitors' technology portfolios	Cetindamar and Pala, 2011; Cui et al, 2026; Charden et al, 2026; Probert and Tietze, 2009
R&D and project selection	Supervise R&D and choose research projects with business value	Cetindamar and Pala, 2011; Smith 2003; Xiong et al. 2025
Strategy integration	Advise the CEO and TMT, align technology and corporate strategy, prepare business cases	Cetindamar and Pala, 2011; van der Hoven et al, 2012
Cross-unit coordination	Coordinate technology efforts across business units to create synergies and avoid duplication	Cetindamar and Pala, 2011; Wu et al, 2021
External interface	Manage relationships with universities, suppliers, regulators, industry groups, and media	Cetindamar and Pala, 2011; Smith 2003

2.3 Challenges of TMs

TMs face challenges such as getting enough organizational power to influence strategy, translating complex technical expertise into business decisions, adapting priorities under uncertainty, and coordinating many stakeholders (Garms and Engelen, 2018; van der Hoven et al, 2012; Cetindamar and Pala, 2011). TMs are often expected to integrate technology into firm strategy without being given enough strategic influence (Medcof, 2008; Wu et al, 2021; Uttal et al, 1992; Xiong et al, 2026). Strategic influence depends heavily on informal networks, business knowledge, and CEO access (Medcof, 2008; Medcof, 2007; Arendt et al, 2005). The role often gains influence, when firms face stronger adaptation pressure (Bendig et al, 2022). In this case, TMs often must decide what technologies to adopt, discard, fund, and defend (van der Hoven et al, 2012; Medcof and Lee, 2017; Robb, 1994). Those choices are difficult, since besides selecting technology, the role needs to deal with due diligence, ESG requirements, external partnerships, and culture building all at once under high pressure (Cui et al, 2026; Smith, 2003; Medcof and Lee, 2017). Thus, TM effectiveness depends on relationships, trust, communication and knowledge exchange with Chief Executive Officers (CEO) and other executives (Smith, 2003; Zhen et al, 2012; Cetindamar and Pala, 2011; Xiong et al, 2021). Challenges are therefore less about executing basic tasks but about securing and sustaining enough influence, credibility, and relationships to fulfil responsibilities.

2.4 The Role of AI

While the literature discusses the responsibilities of TMs and practical challenges rather clearly, it does not sufficiently study AI as a tool for TMs specifically. AI support is studied for strategic top managers in general, emphasizing valuable aspects such as mindsets, capabilities, decision support, AI literacy, AI governance, and organizational redesign (e.g., Bevilacqua et al, 2025; Bevilacqua et al, 2026; Jorzik et al, 2023). Thus, the literature discusses how top executives use or are enabled to use AI in broad terms, leaving the TM role intersection mostly unexplored. This gap persists because literature is rather focused on skills and the role itself (Gu et al, 2024; van der Hoven et al, 2012; Hartley, 2011; Medcof, 2008). As discussed above, role effectiveness depends heavily on structural power, CEO trust, and the ability to translate technology into strategic R&D activities with business value. Thus, research should consider studying not only AI support for top managers in general but for TM in particular. Also, TM work is contingent on industry technology intensity, company size, innovation exposure, and relationships with other executives, so AI support will likely vary sharply across contexts rather than generalize cleanly.

3. Research Methods

The study follows a qualitative approach employing five semi-structured expert interviews. A qualitative approach is particularly suitable for exploring under-researched phenomena, capturing rich contextual insights, and understanding complex socio-technical dynamics (Myers, 2013; Walsham, 2006).

3.1 Research Design and Sampling

As discussed above, the existence and responsibilities of the TM role is dependent on various factors. We focus on companies in the logistics industry, to ensure that industry-specific differentiating factors such as R&D intensity are equalized. Purposive sampling was employed to select cases, ensuring that participants possess relevant expertise in technology management (Patton, 2015). Table 2 lists the interview experts. To protect the privacy of the participants, names and companies have been anonymized. All experts occupy management positions either in the top management or in the middle management and are considered key informants with substantial domain knowledge.

Table 2: Selected interview experts

Nr.	Function	Industry	Date
Expert 1	Chief Executive Officer (CEO) and Chief Technology Officer (CTO)	Logistics	November 2025
Expert 2	Head of IT and Processes	Logistics	November 2025
Expert 3	Project Manager	Logistics	November 2025
Expert 4	Partner Logistics and Innovation	Logistics	November 2025
Expert 5	Head of IT	Logistics	November 2025

3.2 Data Collection

An interview guide with 24 questions in four topic categories was created, based on previous literature (e.g., Cetindamar and Pala, 2011; Cui et al, 2026; Gu et al, 2024). The same guide was used for all interviews, to ensure comparability of responses while allowing for follow-up questions. Example questions include “What are your typical jobs-to-be-done?”, “What are innovation barriers?”, “Where do see the potential for AI in your industry?”. All interviews were conducted via Microsoft Teams after prior appointment and were acoustically recorded and automatically transcribed with the consent of the interviewees. The interviews lasted on an average 45 minutes. The transcripts were then revised manually to ensure accuracy and completeness (Poland, 1995), In addition, extensive field notes were taken during the interviews.

3.3 Data Analysis

The interview analysis followed a qualitative content analysis approach. Initially, the transcripts were deductively coded according to the 14 predefined topic categories based on previous literature. Subsequentially,

emergent themes identified were integrated into the coding framework, and the transcripts were inductively coded in a second run to identify unexpected insights. The coding was performed by two researchers independently. Differences in coding were discussed and resolved through consensus, following recommendations for inter-coder agreement in qualitative research (Campbell et al, 2013). The coded data was then analysed and compared with the field notes to ensure coherence and robustness of interpretations. The synthesis led to eight main constructs, as described in more detail in the next section.

4. Findings

Figure 1 shows the framework which emerged based on the content analysis. The framework depicts TM presence in an organization (solid arrows) and is extended by how and where AI tools can support TMs (dotted arrows).

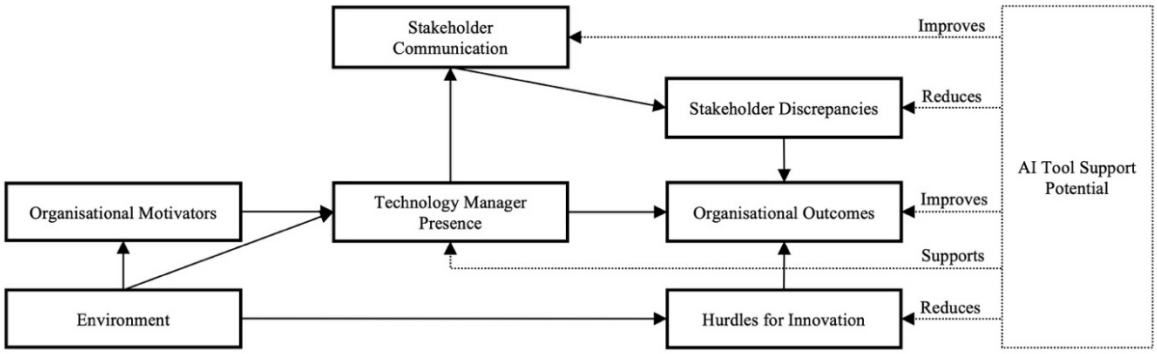


Figure 1: TM presence extended by the role of AI

The following sections summarize the key findings of the interviews regarding TM presence, stakeholder interactions, organizational influences, and AI-enabled support mechanisms. Representative quotations are provided.

4.1 TM Presence

4.1.1 Organizational motivators for appointing a TM

The introduction of the TM role is driven by organizational and environmental factors. Interviewees emphasized the need for specialized expertise that goes beyond the skills of a generalist to accelerate projects, anticipate and evaluate technologies, and support digital transformation. In addition to improving efficiency and resource allocation, the role is intended to help break down outdated patterns and keep track of rapid technological change in order to keep the organization competitive. As such, TMs are expected to provide an independent strategic perspective on technology investments and innovation opportunities. As one expert noted, “it is the bird’s eye view which the TM has” (Expert 5). This requires a clear focus on distinguishing between useful and non-useful technologies to optimize resource allocation. Furthermore, digital technologies and data were perceived as important contributors to competitiveness, innovation, and employer attractiveness.

4.1.2 Expected outcomes of appointing a TM

Interviewees associated the TM role primarily with efficiency gains, faster project execution, process optimization, and improved competitiveness. An internal TM is perceived as a stronger driver than external consultants, as they can exert direct pressure to finalize and implement projects in a timely manner. Additional expected outcomes included higher employer attractiveness, since modern technology tools or manufacturing techniques are considered crucial for increasing the company’s attractiveness on the labour market. Further, increased digitalization, and the strategic use of data are mentioned. Rather than pursuing innovation in all areas, targeted innovation focused on core business processes and technologies that generate measurable business value is emphasized. This selective innovation strategy is intended to ensure that resources are used efficiently.

4.1.3 Hurdles for innovation

The introduction of innovative IT solutions in the logistics industry is hampered by a complex interplay of social, economic and structural barriers. A key factor is resistance to change. One expert stated, “it is resistance to change, I think, which makes innovation difficult” (Expert 1). Several experts emphasize the need to build

acceptance and actively involve knowledge carriers to overcome resistance. In addition to the internal dimension, customer acceptance is also cited as a critical success factor, as expectations for stability and reliability are particularly high in the logistics industry. Companies also face the challenge of not overwhelming customers and employees, which slows down the introduction of disruptive technologies. Economic aspects reinforce these barriers. Justifying high investments in innovative technologies is difficult for the experts, especially when the benefits are uncertain and budgets are limited. One expert stated, "if you really want to implement big innovations with high financial outlay, that is really difficult to justify to the board of directors, to the client" (Expert 3). Added to this is the challenge of choosing the right technologies to avoid disinvestments and dependencies on new systems. This uncertainty is exacerbated by the industry's strong customer focus. Innovations often depend on specific customer requirements. Furthermore, application contexts make it difficult to scale innovations. The suitability of new solutions varies depending on the type of goods transported (e.g., general cargo vs. full truckload), company size and departmental requirements.

4.2 Relevant Stakeholders of TMs

4.2.1 Interactions between TMs and supervisors

Relationships between TMs and supervisors are characterized by direct communication, short decision paths, and limited bureaucracy. In most cases TMs report directly to, or are part of the top management, and participate in strategic discussions. In cases where the TM is also the managing director, this creates a direct link between operational responsibility and strategic control. An example from an interview expert shows that management takes on a dual role. Around 70 percent of work involves operational problem-solving, while 30 percent of its activities are strategic in nature. Particularly in SMEs, decision-making is strongly influenced by owners' and executives' attitudes toward innovation, while flat hierarchies facilitate the implementation of technology initiatives. In addition, the existence of competence matrices is mentioned, which define clear responsibilities and structure decision-making powers.

4.2.2 Interactions between TMs and peers

Cooperation with peers is generally characterized by regular communication and collaborative decision-making. While operational managers are actively involved in technology-related discussions, interviewees noted that operational digitalization perspectives are not always sufficiently integrated into transformation initiatives. In addition, the matrix organization is cited as a structural feature that clarifies responsibilities and supports cooperation.

4.2.3 Interactions between TMs and subordinates

Cooperation between TMs and employees is strongly based on trust, participation, and transparent communication. One expert stated, "the essential part is to take the employees along the journey and provide them with the opportunity to have similar experiences when it comes to building trust" (Expert 1). Interviewees emphasized the importance of involving employees in decision-making and solution development. Interaction is often bilateral, which allows for flexible coordination but also carries the risk that individual employees may feel overlooked, especially when new solutions are introduced. Communication is highly problem-oriented, with the focus more on combating symptoms than analysing causes. This points to an operational orientation that sometimes neglects strategic perspectives. This cooperative culture facilitates problem solving but requires greater integration of strategic approaches to ensure long-term improvements.

4.3 Potential of AI-based Tools

The interviews identify four primary areas in which AI can support TMs: knowledge management, system transparency, decision support, and documentation. Overall, AI is perceived as a mechanism for improving organizational outcomes, stakeholder communication, and innovation management. First, AI was described as a knowledge aggregator capable of consolidating fragmented information and supporting both operational and strategic decision-making. One interviewee explained, AI should help "to consolidate the entire data flow and make it more transparent" (Expert 2). Beyond supporting operational tasks, AI was considered valuable for trend monitoring, technology evaluation, and investment preparation. Second, AI can enhance system transparency and integration by consolidating and visualizing information about heterogeneous systems, interfaces, updates, and dependencies. Experts emphasized the importance of predictive monitoring, bottleneck identification, and the creation of a single source of organizational knowledge. As one expert stated, there is a need for "something like a clever data base, a knowledge base, where I can go, which really supports me, and where I can ideally tell it in advance what I want" (Expert 3). Such capabilities enable more proactive technology management and

support organizational transparency. Third, decision support emerged as a key application area. Interviewees emphasized AI's potential to support both operational and strategic decisions by providing cost-benefit analyses, evaluating data availability, assessing organizational impact, and generating innovation proposals based on predefined constraints such as budgets or strategic priorities. One expert remarked, "I would like a tool that maps out the entire system landscape and suggests improvements" (Expert 4). AI was therefore viewed as a means of reducing investment uncertainty while improving transparency and stakeholder acceptance. Fourth, AI can reduce administrative burdens through automated documentation, process visualization, project tracking, and multilingual support. These capabilities can improve consistency, organizational coordination, and communication between technical and non-technical stakeholders. Finally, the findings suggest that AI can strengthen technology investment decisions by systematically aggregating internal and external information, analysing costs, benefits, risks, and data requirements, and supporting evidence-based evaluations. Since investment decisions are typically driven by expected efficiency gains, cost reductions, and business value, AI can improve both the quality and transparency of these decisions. Overall, the interviews indicate that AI functions not merely as an efficiency-enhancing tool but as a strategic support mechanism that improves transparency, decision quality, stakeholder alignment, and innovation management.

5. Discussion

The findings show that TMs in the Swiss logistics industry occupy a hybrid strategic-operational role that integrates technology, business processes, and stakeholders. Consistent with prior research, TMs act between technological and business domains (Cetindamar & Pala, 2011; Medcof, 2008; Wu et al., 2021), while also maintaining significant operational responsibilities. The study confirms that uncertainty, technology evaluation, stakeholder coordination, and organizational complexity remain central challenges (Garms & Engelen, 2018; van der Hoven et al., 2012; Smith, 2003). The findings reinforce the importance of stakeholder relationships, trust, and communication for TM effectiveness (Medcof, 2008; Smith, 2003; Zhen et al., 2012). Extending the literature on AI-supported management (Bevilacqua et al., 2025; Bevilacqua et al., 2026; Jorzik et al., 2024), the findings identify role-specific AI application areas that support decision-making, transparency, communication, and innovation management.

5.1 Implications for Theory and Practice

This study bridges TM research and AI-supported strategic management. While prior studies have examined TM responsibilities and influence (Adler & Ferdows, 1990; Cetindamar & Pala, 2011; Medcof, 2008), the findings show how AI can support role-specific challenges such as information overload, system complexity, stakeholder coordination, and investment uncertainty. The results suggest that AI functions as a strategic support mechanism rather than merely an automation tool. By enhancing knowledge aggregation, transparency, decision support, and stakeholder communication, AI can strengthen the credibility, influence, and effectiveness of TMs. The findings further indicate that the value of AI is highly role-specific, particularly in areas such as technology scouting, system integration, investment evaluation, innovation management, and communication. Since many barriers to innovation are social and organizational, AI can also facilitate stakeholder alignment and change management. For practice, organizations should leverage AI to support strategic decision-making, technology evaluation, and communication while recognizing that AI complements rather than replaces human capabilities. Effective technology leadership continues to depend on communication skills, industry expertise, strategic judgment, and relationship management. Accordingly, investments in AI should be accompanied by AI literacy, data governance, and managerial capability development. Overall, AI emerges as a role-specific augmentation mechanism that enables TMs to better manage complexity, support innovation, and align technology with business objectives.

5.2 Limitations and Future Research

This study provides exploratory insights based on five expert interviews from the Swiss logistics industry and is therefore not statistically generalizable (Myers, 2013; Walsham, 2006). While the industry-specific focus improves contextual comparability, the findings may not fully transfer to other industries (van der Hoven et al., 2012; Wu et al., 2021). Furthermore, the study relies on expert perceptions and examines the perceived potential of AI rather than the actual implementation and performance effects. These limitations offer opportunities for future research. Given that TM responsibilities and influence vary across industries, organizational sizes, and innovation contexts (van der Hoven et al., 2012; Garms & Engelen, 2018; Wu et al., 2021), future studies could validate the findings in other technology-intensive sectors such as manufacturing, biomedical, or pharmaceutical industries. In addition, further research could examine whether AI-supported analyses, visualizations, and decision-support mechanisms translate into greater strategic influence, legitimacy,

and participation of TMs in top management decision-making (Medcof, 2008; Smith, 2003; Zhen et al., 2012). Finally, longitudinal studies could investigate how AI affects the TM role over time, particularly as the role continues to develop from a primarily technical and R&D-oriented function towards a broader strategic and innovation-focused leadership position (Adler & Ferdows, 1990; Probert & Tietze, 2009; Wu et al., 2021).

6. Conclusion

This study explored the role of TMs in the Swiss logistics industry and the potential of AI to support their responsibilities, stakeholder interactions, and organizational influence. Based on five expert interviews, a qualitative framework was developed linking TM presence, contextual influences, stakeholder relationships, and AI support mechanisms. The findings show that TMs occupy a hybrid strategic-operational role, acting as a bridge between technology and business. Their effectiveness is shaped by technological complexity, stakeholder relationships, investment uncertainty, and barriers to innovation. The study further identifies several role-specific AI application areas, including knowledge management, technology evaluation, system integration, documentation, stakeholder communication, and decision support. Overall, the findings suggest that AI creates value not only through efficiency gains but also by enhancing transparency, evidence-based decision-making, and stakeholder alignment. The proposed framework provides a foundation for future research on AI-supported technology management and technology leadership.

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