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Determining the Dimensions, Components, and Indicators of Transformational Digital Leadership in SAIPA Automotive Group

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A B S T R A C T

The purpose of this study was to identify and develop the dimensions, components, and indicators of transformational digital leadership in SAIPA Automotive Group. This study employed a qualitative developmental research design grounded in the interpretive paradigm and guided by an inductive approach. Data were collected through semi-structured interviews with 17 experts, senior and middle managers, policymakers, consultants, and specialists with substantial experience in digital transformation, leadership, information technology, innovation, and automotive industry management. Participants were selected using purposive criterion-based sampling, and interviews continued until theoretical saturation was achieved. The collected data were transcribed and analyzed using Braun and Clarke's six-phase thematic analysis method with the support of MAXQDA software. Trustworthiness was enhanced through repeated data review, continuous comparison of codes and themes, expert participation, and systematic documentation of the analytical process. The analysis resulted in the extraction of 570 initial concepts, which were reduced to 354 basic codes after removing overlaps and redundancies. These codes were subsequently organized into 26 subthemes and 7 overarching themes. The final model of transformational digital leadership consisted of: (1) Digital Transformation Leadership and Strategy, including transformational leadership, digital vision, strategic alignment, and dynamic capabilities; (2) Data Governance and Digital Technologies, encompassing data governance, analytics, artificial intelligence, and digital infrastructure; (3) Digital Transformation in Production and Operations, including smart manufacturing, digital operations, supply chain digitalization, and digital product management; (4) Digital Innovation and Technology Ecosystem, comprising innovation capability, knowledge management, ecosystem collaboration, and digital R&D; (5) Digital Market and Customer Value Creation, including digital customer experience, digital marketing, connected services, and customer analytics; (6) Human Capital and Digital Culture, involving digital culture, talent development, employee empowerment, and change management; and (7) Security, Risk, and Macro Digital Governance, including cybersecurity, digital governance, risk management, and digital sustainability. The findings demonstrate that transformational digital leadership in the automotive industry is a multidimensional and integrative phenomenon extending beyond technological implementation.

Keywords: *Transformational Digital Leadership, Digital Transformation, SAIPA Automotive Group.*

1. Introduction

Digital transformation has become one of the most decisive forces reshaping contemporary organizations, especially large industrial enterprises whose survival depends on speed, flexibility, data-driven coordination, and continuous technological renewal. In industries such as automotive manufacturing, digital transformation is not limited to automation or the installation of advanced information systems; rather, it involves the reconfiguration of strategy, leadership, organizational culture, human capabilities, production systems, customer relationships, and innovation ecosystems. Recent studies have shown that digital transformation requires organizations to rethink how they create value, how they organize resources, how they interact with stakeholders, and how they develop new capabilities in uncertain and technology-intensive environments (Elia et al., 2024; Gun et al., 2024; Senadjki et al., 2024). In this context, leadership has emerged as a central explanatory factor because the implementation of digital technologies alone does not guarantee transformation unless leaders can align technological change with strategic priorities, employee commitment, organizational learning, and innovation capability (Gaol et al., 2024; Malik et al., 2025; Türk, 2023).

The concept of digital leadership has therefore gained growing attention in management research. Digital leadership refers to the capacity of leaders to guide organizations through digital disruption by creating a digital vision, supporting technology-based innovation, developing digital capabilities, and enabling employees to work effectively in digitally mediated environments. Unlike conventional leadership models, digital leadership requires simultaneous attention to technological literacy, strategic agility, data-based decision-making, digital culture, cybersecurity awareness, human capital development, and ecosystem collaboration (Gheyratmand & Jalali, 2024; Khabareh, 2025; Munsamy et al., 2023). Recent empirical and conceptual studies have emphasized that digital leadership plays a significant role in developing digital dynamic capabilities, supporting business model innovation, and steering organizational change in conditions of uncertainty (Albannai et al., 2025; Malik et al., 2025; Tuyen et al., 2025). Accordingly, organizations that seek successful digital transformation need leaders who are not merely technology adopters, but strategic interpreters of digital change.

At the same time, the transformational dimension of leadership remains highly relevant in the digital era. Transformational leadership emphasizes vision creation, inspirational motivation, intellectual stimulation, individualized consideration, value-based influence, and the capacity to mobilize followers toward change. Studies on transformational leadership in contemporary organizations show that this leadership style is closely associated with innovation, employee motivation, learning, commitment, and adaptability (Goens & Giannotti, 2024; Gonze & Gianotti, 2024; Matsunaga, 2024). In digital contexts, transformational leadership becomes even more important because digital transformation often generates ambiguity, resistance, skill gaps, role changes, and uncertainty about future work processes (Matsunaga, 2025). Thus, transformational digital leadership can be understood as a hybrid leadership logic in which transformational influence is combined with digital vision, technological orientation, organizational agility, and innovation-driven change.

The relationship between transformational leadership and digital transformation has been confirmed in several recent studies. For example, transformational leadership has been shown to influence acceptance of information technology innovation, particularly when shared leadership and management innovation are present (Aghashahi Ardestani & Abbasi, 2023). Similarly, organizational entrepreneurship and organizational learning have been linked to transformational leadership style, suggesting that leaders who encourage learning and entrepreneurial behavior can strengthen an organization's readiness for change (Pajouhan et al., 2024). Other studies have highlighted the role of

transformational leadership in digital creativity, cognitive stimulation, tacit knowledge sharing, and researchers' innovativeness (Kowcharska & Rebelo, 2025; Kucharska & Rebelo, 2025; Wang & Shao, 2024). These findings suggest that transformational digital leadership is especially important in organizations that need to move from routine-based operations to innovation-oriented, knowledge-based, and digitally integrated systems.

Digital transformation also requires a strategic architecture that connects leadership decisions to business models, operational systems, and organizational outcomes. The digital transformation canvas, for example, presents transformation as a structured process that includes strategic intention, value creation, technology integration, organizational redesign, and performance outcomes (Elia et al., 2024). Similarly, digital government and public-sector transformation studies emphasize the need for clear governance structures, digital strategies, capability building, and institutional coordination (Bank, 2023; Eslamkhah et al., 2024; Kyambade & Namatovu, 2025). Although such studies often focus on public organizations, their insights are also relevant for large industrial enterprises such as automotive groups, where digital transformation requires coordination across multiple units, stakeholders, processes, and technological platforms.

A major challenge in digital transformation is the development of digital capabilities. Digital dynamic capabilities allow organizations to sense technological opportunities, seize them through strategic action, and reconfigure resources to sustain competitiveness. Digital leaders play a key role in developing these capabilities because they shape priorities, allocate resources, support experimentation, and create an organizational climate that enables digital learning (Albannai et al., 2025; Ly, 2024). Organizational agility is also central to this process, because digital transformation requires rapid decision-making, flexible structures, and the ability to respond quickly to changing market and technological conditions (Ly, 2024). In uncertain environments, transformational leadership and employee self-efficacy can function as antecedents of digital transformation and, ultimately, firm performance (Gun et al., 2024). Therefore, digital transformation is both a technological and a leadership-mediated organizational capability.

Human capital is another critical dimension of digital transformation. Digital leadership is closely linked to the development of future-ready employees, data-driven HR systems, digital HR leadership, and evidence-based people analytics (Albrecht & Dolbin, 2023; Marler & Fisher, 2023; Ullrich & Doelben, 2023). The future of human resource management in a digital world depends on the ability of organizations to integrate digital technologies with talent management, employee development, workforce analytics, and new forms of work design (Bondarouk & Parry, 2023). Global human capital trends also show that organizations must treat digital transformation as a social and human transformation, not merely as a technical project (Deloitte, 2024). Thus, transformational digital leaders must develop employees' digital skills, reduce resistance to change, foster psychological readiness, and build a culture in which employees can participate actively in digital innovation.

Organizational culture is equally important in enabling digital transformation. Studies have shown that digital leadership affects digital culture and employees' digital capabilities, and these factors can influence organizational performance and sustainability (Shin et al., 2023). Digital culture includes openness to technology, data-driven thinking, learning orientation, collaboration, innovation, and tolerance for experimentation. Without such a culture, even advanced technologies may remain underused or fragmented across organizational units. Digital transformational leadership can strengthen organizational commitment and employee performance by shaping the work environment in ways that support digital participation and innovation (Qiao et al., 2024). Furthermore, symmetrical internal communication has been identified as a mechanism through which digital transformational leadership can enhance innovation capability, suggesting that communication transparency and participation are vital for digital change (Majumdarr et al., 2025).

The automotive industry provides a particularly important context for studying transformational digital leadership. Automotive firms are increasingly affected by smart manufacturing, connected vehicles, artificial intelligence, digital supply chains, customer experience platforms, predictive maintenance, digital twins, and data-based product development. These developments require leaders who understand both industrial operations and digital technologies. Studies on digital transformation and firm performance indicate that the value of transformation depends on the ability to integrate technological initiatives with organizational capabilities and strategic leadership (Cui, 2025; Senadjki et al., 2024). In addition, green digital innovation has become an important pathway through which digital leadership can support corporate transformation and sustainability (Cui, 2025). For automotive companies, this is

highly relevant because digitalization is increasingly connected with energy efficiency, environmental responsibility, smart mobility, and sustainable production.

The Iranian organizational and industrial context further increases the importance of studying digital leadership. Recent Iranian studies have examined digital transformation trends in government organizations, digital leadership in infrastructure communication organizations, digital leadership competencies, and validation of digital leadership models in the banking industry (Eslamkhah et al., 2024; Ghasemi Ghanchehnazi & Atashsouz, 2024; Khabareh, 2025; Shateri et al., 2025). These studies demonstrate growing national attention to the managerial and organizational requirements of digital transformation. However, the automotive industry has specific structural, technological, operational, and cultural characteristics that distinguish it from banking, public administration, communication infrastructure, and general service organizations. Therefore, a context-specific model is needed to identify the dimensions, components, and indicators of transformational digital leadership in large automotive groups.

SAIPA Automotive Group represents a complex and strategically important case for such inquiry. As a large automotive organization, SAIPA operates within an environment shaped by production complexity, supply chain interdependence, technological pressure, market uncertainty, customer expectations, regulatory requirements, and the need for innovation in products and services. Digital transformation in such a context requires the integration of smart production, data governance, digital supply chain management, customer experience platforms, human capital development, cybersecurity, and innovation ecosystems. Studies on domain knowledge and machine learning also show that the successful use of advanced digital technologies requires the fusion of technological tools with deep organizational and sectoral knowledge (Sundberg & Holmström, 2024). This insight is particularly important for automotive firms, where digital systems must be aligned with engineering knowledge, manufacturing processes, quality control, logistics, and after-sales services.

Despite the expanding literature on digital leadership and transformation, several gaps remain. First, many studies examine digital leadership at a general organizational level without identifying industry-specific dimensions suitable for automotive manufacturing. Second, much of the existing literature focuses either on digital leadership or transformational leadership separately, while fewer studies examine their integration as transformational digital leadership. Third, there is limited qualitative evidence on how experts, managers, and digital transformation specialists interpret the competencies, behaviors, and indicators required for digital leadership in large industrial groups. Fourth, although prior studies have explored digital leadership scales, digital strategy, HR transformation, business model innovation, and public-sector digitalization (Albrecht & Dolbin, 2023; Bank, 2023; Munsamy et al., 2023; Türk, 2023), there remains a need to develop a grounded framework that reflects the lived managerial and technological realities of SAIPA Automotive Group.

The theoretical significance of the present study lies in its attempt to connect transformational leadership theory with digital leadership and digital transformation research. Moral development and value-based leadership remain important foundations for transformational influence because digital transformation creates ethical, social, and human consequences that leaders must manage responsibly (Turner, 2022). Communication and uncertainty management are also central because digital transformation often increases ambiguity among employees, requiring leaders to reduce uncertainty and create shared understanding (Matsunaga, 2025). Studies on transformational leadership in digital environments, including virtual and platform-based leadership contexts, further show that leadership influence is increasingly exercised through digital communication, networked interaction, and technology-mediated participation (Eitan & Gazit, 2024). Therefore, transformational digital leadership must be examined as a multidimensional construct that includes strategy, technology, culture, communication, ethics, and employee empowerment.

The practical significance of this study is that it can provide SAIPA Automotive Group and similar industrial organizations with a structured understanding of the leadership requirements of digital transformation. A clear model of transformational digital leadership can help organizations identify leadership competencies, design development programs, evaluate digital readiness, prioritize transformation projects, improve data governance, strengthen digital culture, and align innovation efforts with strategic goals. Such a model can also support better decision-making in areas such as smart manufacturing, digital supply chain, digital customer experience, cybersecurity, digital human capital, and technology partnerships. Since digital transformation is a long-term and organization-wide process, leaders need an integrated

framework that enables them to coordinate technological, cultural, operational, and strategic change.

Accordingly, the aim of the present study was to determine the dimensions, components, and indicators of transformational digital leadership in SAIPA Automotive Group.

2. Methods and Materials

The present study was conducted using a qualitative research design with the aim of determining the dimensions, components, and indicators of transformational digital leadership in SAIPA Automotive Group. In terms of research philosophy, the study was grounded in an interpretivist paradigm, because the phenomenon under investigation—transformational digital leadership—is deeply connected with organizational meanings, managerial experiences, cultural interpretations, technological perceptions, and the lived understanding of experts and managers involved in digital transformation. From the perspective of purpose, the study was developmental, as it sought to develop a conceptual and practical framework for identifying the main dimensions and indicators of transformational digital leadership in the context of the automotive industry. The research approach was inductive, since the dimensions and components of the model were not imposed in advance through a predetermined quantitative framework, but were extracted from the experiences, perceptions, and expert judgments of participants. The study was also field-based, because the data were collected directly from knowledgeable individuals who had practical or strategic involvement in leadership, digital transformation, organizational development, technology management, data management, smart production, innovation ecosystems, and digital infrastructure within SAIPA Automotive Group and its related organizational environment.

The research strategy was qualitative case study combined with thematic analysis. SAIPA Automotive Group was selected as the organizational case because it represents a large industrial and automotive organization facing complex challenges in digitalization, smart manufacturing, data-driven decision-making, digital infrastructure development, supply chain transformation, cybersecurity, and organizational cultural change. Therefore, examining transformational digital leadership in this organizational context made it possible to understand the phenomenon in a real and industry-specific setting. The main objective of the qualitative design was exploration and deep understanding; therefore, the study focused on discovering how experts and managers define transformational digital leadership, what competencies and behaviors they associate with digital leaders, what organizational and technological barriers they identify, and which indicators they consider necessary for evaluating the effectiveness of digital leadership in SAIPA.

The participants included experts, senior and middle managers, policymakers, consultants, and specialists in the fields of leadership, digital transformation, information technology, smart manufacturing, data analytics, artificial intelligence, cybersecurity, human resource development, digital supply chain management, innovation ecosystems, and organizational transformation. Participants were selected through purposive and criterion-based sampling. The main criterion for inclusion was having at least five years of managerial, professional, or specialized experience related to digital transformation, leadership processes, organizational decision-making, or digital projects in SAIPA Automotive Group or its related industrial and organizational network. Participants also needed to have sufficient familiarity with leadership practices, digital strategy, technology-based change, and the institutional, cultural, and structural conditions of the automotive industry. Sampling continued until theoretical saturation was reached; that is, interviews were continued until no substantially new codes, concepts, or themes emerged from the data. In total, 17 individuals participated in the interviews. The interviewees included senior information technology managers, digital transformation planning managers, human resource development and digital training managers, strategic management consultants, smart production managers, data and artificial intelligence specialists, organizational transformation project managers, digital infrastructure experts, technology policy specialists, supply chain digital transformation managers, innovation ecosystem managers, smartization project managers, digital maturity assessment specialists, digital product development managers, business intelligence analysts, academic experts in emerging technologies, and cybersecurity transformation managers.

The main data collection tool in this study was the semi-structured interview. This method was selected because it allowed the researcher to guide the conversation around the central research questions while also giving participants enough freedom to express their experiences, interpretations, examples, and professional judgments in depth. The semi-structured interview format was particularly

appropriate for this study because transformational digital leadership is a multidimensional and context-dependent phenomenon, and its indicators cannot be adequately identified through closed-ended or predefined instruments. Through open and flexible questioning, the researcher was able to explore participants' views on the leadership competencies required for digital transformation, the specific challenges of digitalization in SAIPA, the behavioral characteristics of successful digital leaders, the role of organizational culture in digital transformation, and the criteria needed to assess the effectiveness of transformational digital leadership.

Before beginning each interview, the purpose of the study was explained to the participants, and they were informed that the collected data would be used only for academic and research purposes. Ethical considerations were observed throughout the data collection process. Participants were assured that their personal information, including name and surname, would not be reported in the study, and that any information they preferred not to disclose would be respected. Interviews were conducted either in person at the participant's workplace or, where necessary, through telephone communication. Each interview lasted approximately one hour, depending on the depth of responses and the participant's availability. With the participants' consent, interviews were recorded and then transcribed for analysis. During the interviews, the researcher used probing questions to clarify meanings, obtain examples, and deepen the discussion whenever necessary.

The interview protocol consisted of demographic questions and main research questions. The demographic questions addressed characteristics such as gender, age, educational background, job position, and work experience. The main interview questions focused on the most important characteristics and competencies of a digital leader in the automotive industry, the digital transformations experienced by SAIPA in recent years, the role of organizational leaders in guiding or accelerating these transformations, the structural, cultural, technological, and human resource barriers to digital leadership, and the ways in which leaders should respond to such barriers. Participants were also asked to describe the distinctive behaviors and managerial styles of leaders who had been successful in creating digital transformation, the types of strategic decisions and managerial actions that could accelerate digital transformation across SAIPA Automotive Group, the future path of digitalization in Iran's automotive industry, and the skills that SAIPA leaders need to develop in order to face that future. Additional questions explored the degree of alignment between SAIPA's current organizational culture and digital transformation, the role of leaders in creating a data-driven and innovative culture, and the indicators that could be used to evaluate the effectiveness of digital leadership in the organization. At the end of each interview, participants were invited to add any further points that they considered important but had not yet discussed.

The qualitative data were analyzed using thematic analysis based on the six-phase approach of Braun and Clarke. This method was selected because it provides a systematic and flexible framework for identifying, organizing, interpreting, and reporting patterns of meaning within qualitative data. The goal of analysis was to extract the basic themes, organizing themes, and overarching dimensions related to transformational digital leadership in SAIPA Automotive Group. The analysis process began after the interviews were transcribed. The researcher carefully reviewed the interview transcripts several times in order to become familiar with the data, understand the overall meaning of participants' statements, and identify preliminary ideas relevant to the research objective. This repeated reading helped the researcher move beyond surface-level responses and recognize deeper patterns related to digital leadership competencies, organizational culture, strategic vision, innovation, digital infrastructure, data management, ecosystem interactions, and transformation-oriented leadership behaviors.

In the next stage, initial codes were generated from meaningful statements in the interview transcripts. Sentences, phrases, and expressions that were directly related to the research questions were identified and coded. These codes represented the smallest meaningful units of analysis and included concepts such as digital vision, data-driven decision-making, technological agility, innovation orientation, digital culture building, employee empowerment, smart production leadership, cybersecurity awareness, ecosystem collaboration, resistance management, digital learning, strategic alignment, and leadership support for transformation. The coding process was conducted carefully and iteratively, so that similar codes were compared, refined, merged, or separated where necessary. MAXQDA software was used to organize the qualitative data, manage codes, retrieve coded segments, compare concepts, and facilitate the systematic development of themes.

After the initial coding process, related codes were grouped into broader thematic categories. At this stage, the researcher searched for patterns among the codes and organized them into preliminary themes. Codes that reflected similar meanings were placed together, and each thematic cluster was given a provisional label. These preliminary themes were then reviewed in relation to both the coded extracts and the entire dataset. The purpose of this review was to ensure that each theme was internally coherent, clearly distinguishable from other themes, and sufficiently supported by the interview data. Where necessary, themes were revised, combined, divided, or renamed. This process continued until the thematic structure accurately reflected the participants' views and provided a meaningful explanation of transformational digital leadership in the context of SAIPA Automotive Group.

In the later stages of analysis, the final themes were defined and named. The researcher clarified the scope, meaning, and conceptual boundaries of each theme and determined how each one contributed to the overall understanding of transformational digital leadership. The analysis ultimately focused on identifying the main dimensions, components, and indicators that constitute transformational digital leadership in SAIPA. Attention was given to the relationship between leadership competencies and organizational transformation, the role of digital strategy in directing change, the importance of data management and digital infrastructure, the influence of organizational culture and digital mindset, the contribution of innovation and ecosystem interactions, and the necessity of aligning technological transformation with human resource development and strategic decision-making. Finally, the results were reported in a structured narrative form, presenting the extracted themes and explaining how they collectively formed the qualitative model of transformational digital leadership in SAIPA Automotive Group.

To enhance the trustworthiness of the qualitative findings, several strategies were considered during data collection and analysis. The researcher attempted to ensure credibility through prolonged engagement with the data, repeated reading of transcripts, careful coding, and continuous comparison of codes and themes. The use of expert participants with direct experience in digital transformation and leadership strengthened the relevance and depth of the findings. Dependability was supported by documenting the analytical process, including the stages of transcription, coding, theme development, review, and final interpretation. Confirmability was addressed by grounding interpretations in participants' statements rather than imposing predetermined assumptions. Transferability was supported through detailed description of the research context, participant characteristics, sampling criteria, interview process, and analytical procedure, allowing readers to judge the applicability of the findings to similar organizational and industrial contexts.

3. Findings and Results

The present study aimed to determine the dimensions, components, and indicators of transformational digital leadership in SAIPA Automotive Group. The qualitative data were obtained through semi-structured interviews with 17 experts, senior and middle managers, specialists, consultants, and policymakers familiar with digital transformation in the automotive industry. After transcription and repeated review of the interviews, the data were analyzed through thematic analysis. In the open coding stage, 570 initial concepts were extracted. After removing repeated and overlapping codes, these were reduced to 354 basic concepts. Through continuous comparison, refinement, and thematic clustering, the final structure of the findings was organized into 7 main themes and 26 subthemes.

Table 1

Main Theme of Digital Transformation Leadership and Strategy

Main Theme	Subtheme / Component	Basic Themes / Indicators
Digital Transformation Leadership and Strategy	Transformational and Inspirational Leadership	Transformational leadership; inspirational leadership; value-based leadership; participative leadership; supportive leadership; organizational transformation leadership; organizational digital transformation leadership; inspiring employees; creating a shared vision; strengthening team spirit; creating a sense of organizational ownership; motivating employees for digital transformation; organizational trust-building; building trust in transformation; transparent managerial communication; managerial transparency; active listening by managers; effective communication during change; employee participation in decision-making; participation in strategic decisions; conflict management during transformation; receiving employee feedback; digital accountability

Digital Transformation Leadership and Strategy	Digital Transformation Vision and Strategy	Digital vision; digital strategy formulation; alignment of technology strategy with business strategy; digital transformation program; digital roadmap; prioritization of digital projects; digital project portfolio management; alignment of projects with strategy; digital resource management; technology budget allocation; analysis-based decision-making support; rapid managerial decision-making; data-driven decision-making; digital value creation; creation of digital value; technology-based competitive advantage; sustainable digital competitive advantage
Digital Transformation Leadership and Strategy	Digital Foresight and Dynamic Capabilities	Monitoring emerging technologies; tracking technology trends; monitoring competitors in technology; evaluating new technologies; technological foresight; future-oriented thinking; digital scenario planning; sustainable transformation management; development of dynamic capabilities; organizational adaptability; managerial flexibility; organizational resilience; digital crisis management; digital business continuity; rapid system recovery; management of rapid changes

The first main theme, digital transformation leadership and strategy, indicates that the success of digital transformation in SAIPA Automotive Group depends on leaders who can simultaneously provide strategic direction, inspire employees, and mobilize organizational resources toward a shared digital future. The findings show that transformational digital leaders must create a clear digital vision, formulate an actionable roadmap, align technology initiatives with business strategy, and prioritize digital projects based on strategic value. This theme also emphasizes the behavioral side of leadership, including trust-building, transparent communication, participative decision-making, active listening, and conflict management during transformation. In addition, the presence of digital foresight and dynamic capabilities shows that leaders must not only respond to current technological needs but also anticipate future technological trends, strengthen organizational resilience, and prepare the organization for rapid change in the automotive industry.

Table 2

Main Theme of Data Governance and Digital Technologies

Main Theme	Subtheme / Component	Basic Themes / Indicators
Data Governance and Digital Technologies	Data Governance and Data Management	Data governance; organizational data management; data quality; data integration; data standardization; data cleansing; data lifecycle management; data ownership; metadata management; organizational data architecture; organizational data warehouse; data lake; data access management; data sharing; data security; data protection; data privacy; data policies; data management policy; data-driven culture; organizational data literacy; value creation from data
Data Governance and Digital Technologies	Data Analytics and Artificial Intelligence	Data analytics; big data analytics; predictive analytics; prescriptive analytics; real-time data analytics; data mining; machine learning; deep learning; organizational artificial intelligence; recommender systems; decision-support algorithms; machine vision; natural language processing; customer behavior analysis; automotive market analysis; production performance analysis; supply chain analysis; management dashboards; business intelligence; decision support systems; decision automation
Data Governance and Digital Technologies	Digital Infrastructure and Technology Architecture	Information technology infrastructure; enterprise architecture; digital architecture; service-oriented architecture; cloud computing; edge computing; server virtualization; organizational data centers; industrial Internet of Things; equipment connectivity; industrial networks; 5G networks; digital platforms; organizational API; system integration; ERP systems; MES systems; PLM systems; software development platforms; microservices; agile software development; infrastructure automation

The second main theme, data governance and digital technologies, reflects the centrality of data and technological architecture in transformational digital leadership. The findings indicate that data must be treated as a strategic organizational asset, requiring formal mechanisms for governance, quality control, standardization, ownership, access management, privacy, and security. A data-driven culture and organizational data literacy are also essential because technology alone cannot create value unless employees and managers are able to interpret and use data in decision-making. The findings further show that artificial intelligence, big data analytics, machine learning, business intelligence, and management dashboards can enhance managerial and operational decisions in SAIPA. At the infrastructure level, cloud computing, edge computing, industrial networks, digital platforms, APIs, ERP, MES, PLM, and system integration provide the technological foundation required for large-scale digital transformation.

Table 3

Main Theme of Digital Transformation in Production and Operations

Main Theme	Subtheme / Component	Basic Themes / Indicators
Digital Transformation in Production and Operations	Smart Manufacturing	Smart manufacturing; smart factory; digitalization of production lines; industrial automation; industrial robotics; collaborative robots; cyber-physical systems; industrial Internet of Things; smart production monitoring; intelligent control of production lines; data-driven production; production data analytics; production process optimization; production simulation; production digital twin; predictive maintenance; smart equipment maintenance; production performance management; production quality monitoring; intelligent quality control
Digital Transformation in Production and Operations	Digital Operations Management	Digital operations management; smart production planning; digital production scheduling; real-time operations monitoring; operations performance management; integration of operational information; data-driven operational decision-making; production productivity management; production capacity management; reduction of production downtime; reduction of production waste; energy consumption optimization; energy consumption monitoring; smart energy management; production cost control; continuous digital improvement; digital quality management; digital tracking of parts; smart inventory management
Digital Transformation in Production and Operations	Digital Supply Chain	Digital supply chain; digital integration of the supply chain; supply chain transparency; digital tracking of parts; raw material tracking; digital supplier management; supplier communication platform; digital collaboration with suppliers; supply chain data analysis; demand forecasting; demand planning; supply planning; digital order management; smart logistics management; digital logistics; transportation tracking; smart warehouse management; warehouse management systems; smart distribution management
Digital Transformation in Production and Operations	Digital Product Management	Digital product development; digital product engineering; digital vehicle design; data-based design; modular product design; vehicle platform design; product design simulation; product lifecycle management; PLM system; agile product development; innovation in vehicle design; customer-needs-based design; product performance analysis; digital customer feedback; continuous product improvement

The third main theme, digital transformation in production and operations, shows that transformational digital leadership in SAIPA must be closely connected to the operational realities of the automotive industry. The findings indicate that smart manufacturing, smart factories, industrial automation, robotics, cyber-physical systems, industrial Internet of Things, digital twins, simulation, and predictive maintenance are key indicators of digital transformation in production. These indicators suggest that digital leadership must guide the organization toward higher production efficiency, quality improvement, reduced downtime, and more flexible manufacturing systems. The findings also emphasize that digital transformation should extend beyond the factory floor to include operations management, production planning, cost control, energy management, quality management, inventory management, and supply chain transparency. Digital product management is also central, because the future competitiveness of automotive companies depends on their ability to design, develop, evaluate, and improve products through data-based and digitally integrated processes.

Table 4

Main Theme of Digital Innovation and Technology Ecosystem

Main Theme	Subtheme / Component	Basic Themes / Indicators
Digital Innovation and Technology Ecosystem	Digital Innovation	Digital innovation; technological innovation; digital product innovation; innovation in business models; innovation in automotive services; development of digital services; testing new technologies; innovation laboratory; innovation culture; support for new ideas; idea management; evaluation of new ideas; prototype development; rapid product design; open innovation; data-driven innovation; customer-oriented innovation
Digital Innovation and Technology Ecosystem	Innovation Ecosystem and Technological Collaboration	Innovation ecosystem; collaboration with startups; collaboration with technology companies; collaboration with universities; technological partnerships; corporate venture capital; industrial accelerators; organizational innovation centers; development of innovation networks; technological networking; knowledge exchange with technology partners; research and development collaboration; participation in joint projects; development of innovation platforms; co-creation with industrial partners
Digital Innovation and Technology Ecosystem	Digital Knowledge Management	Organizational knowledge management; digital knowledge management; knowledge sharing in the organization; knowledge documentation; organizational knowledge bases; organizational learning; employee digital learning; training in new technologies; development of digital skills; knowledge transfer in the organization; preservation of organizational knowledge; organizational learning networks; culture of continuous learning; management of organizational experiences
Digital Innovation and Technology Ecosystem	Digital Research and Development	Digital research and development; research on automotive technologies; research on smart vehicles; research on connected vehicles; research on autonomous vehicles; research on automotive software; research on automotive electronic systems; development of new automotive technologies; investment in research and development; management of research projects; development of future automotive technologies; evaluation of emerging technologies

The fourth main theme, digital innovation and technology ecosystem, indicates that transformational digital leadership must move the organization beyond internal technology implementation toward continuous innovation and external collaboration. The findings show that digital innovation includes innovation in products, services, technologies, and business models. Establishing innovation laboratories, supporting new ideas, developing prototypes, using open innovation, and designing customer-oriented digital solutions are important mechanisms for strengthening innovation capacity. The findings also highlight that SAIPA's digital transformation cannot be achieved in isolation. Collaboration with startups, technology companies, universities, accelerators, industrial partners, and research centers is necessary for accessing knowledge, technologies, and capabilities that may not exist fully inside the organization. Digital knowledge management and digital research and development further support this theme by enabling the organization to preserve knowledge, learn from experience, develop future-oriented technologies, and remain connected to emerging trends in smart, connected, and software-based vehicles.

Table 5

Main Theme of Digital Market and Customer Value Creation

Main Theme	Subtheme / Component	Basic Themes / Indicators
Digital Market and Customer Value Creation	Digital Customer Experience	Digital customer experience; customer experience management; customer experience design; digital customer journey; customer journey map; digital interaction with customers; personalization of customer experience; smart customer service; digital responsiveness to customers; digital complaint management; omnichannel customer communication; online customer communication; digital customer support; improvement of customer satisfaction; increase of customer loyalty; customer experience analysis
Digital Market and Customer Value Creation	Digital Marketing	Digital marketing; data-driven marketing; social media marketing; content marketing; digital advertising; digital campaigns; advertising effectiveness analysis; digital brand management; online reputation management; personalized marketing; customer-behavior-based marketing; marketing automation; customer relationship management; digital market analysis
Digital Market and Customer Value Creation	Digital Automotive Services	Connected vehicle services; online automotive services; mobile automotive services; automotive applications; digital after-sales services; online vehicle service reservation; online vehicle fault diagnosis; remote vehicle monitoring; remote vehicle software updating; data-based automotive services; automotive service platform; smart automotive service management; digital automotive support
Digital Market and Customer Value Creation	Customer Behavior Analysis	Customer behavior analysis; customer data analysis; analysis of customer preferences; customer satisfaction analysis; customer loyalty analysis; customer feedback analysis; analysis of online customer comments; analysis of purchase patterns; prediction of customer behavior; customer segmentation; customer modeling; customer lifetime value analysis

The fifth main theme, digital market and customer value creation, shows that transformational digital leadership should ultimately result in improved customer value and stronger market responsiveness. The findings indicate that digital transformation in SAIPA must include the redesign of customer experience through digital customer journeys, omnichannel communication, personalized services, smart customer support, digital complaint management, and systematic customer experience analysis. Digital marketing also plays an important role through data-driven campaigns, social media marketing, content marketing, digital brand management, and marketing automation. In the automotive context, digital value creation also appears in connected vehicle services, mobile applications, online service booking, remote monitoring, digital after-sales services, and software updates. Customer behavior analysis enables the organization to understand preferences, satisfaction, loyalty, purchase patterns, and lifetime value, thereby supporting more precise and responsive decision-making in sales, service, and market development.

Table 6

Main Theme of Human Capital and Digital Culture

Main Theme	Subtheme / Component	Basic Themes / Indicators
Human Capital and Digital Culture	Organizational Digital Culture	Digital culture; innovation culture; data-driven culture; organizational learning culture; digital collaboration culture; technology acceptance in the organization; digital mindset of managers; digital mindset of employees; valuing innovation; encouraging employee creativity; support for experimentation and trial-and-error; cultural flexibility; employee participation culture

Human Capital and Digital Culture	Digital Human Capital Development	Development of digital skills; training in new technologies; artificial intelligence training; data analytics training; development of information technology skills; digital empowerment of employees; development of digital leaders; development of technology managers; e-learning; organizational online training; skill development programs; digital talent management
Human Capital and Digital Culture	Digital Change Management	Digital change management; organizational change planning; guiding organizational transformation; reducing resistance to change; acceptance of digital transformation; change communication; employee participation in change; management of employee resistance; training during the change process; monitoring transformation progress; evaluation of change outcomes
Human Capital and Digital Culture	Employee Empowerment	Employee empowerment; employee participation in innovation; work autonomy; agile work teams; cross-functional teams; team-level decision-making; strengthening problem-solving skills; managerial support for employees; employee access to data; employee access to digital tools; motivating employees for innovation

The sixth main theme, human capital and digital culture, demonstrates that digital transformation is fundamentally dependent on people, culture, and organizational readiness. The findings show that a digital culture should be based on innovation, learning, data-driven thinking, collaboration, technology acceptance, creativity, experimentation, and employee participation. In this regard, leaders must shape the digital mindset of both managers and employees. Digital human capital development is also essential and includes training in new technologies, artificial intelligence, data analytics, information technology, digital leadership, and digital talent management. The findings further indicate that digital transformation requires structured change management. Resistance to change must be reduced through communication, participation, training, monitoring, and evaluation. Employee empowerment is also a key component, because digital transformation becomes sustainable when employees have autonomy, access to data and digital tools, participation in innovation, and the ability to solve problems through agile and cross-functional teamwork.

Table 7

Main Theme of Security, Risk, and Macro Digital Governance

Main Theme	Subtheme / Component	Basic Themes / Indicators
Security, Risk, and Macro Digital Governance	Cybersecurity and Digital Protection	Cybersecurity; information security; network security; data security; user access management; multi-factor authentication; data encryption; vulnerability management; monitoring cyber threats; security incident management; response to security incidents; recovery after attacks; security of production systems; security of vehicle communications; security of connected vehicles; automotive software security; cloud system security
Security, Risk, and Macro Digital Governance	Digital Governance and Policy-Making	Digital governance; technology policy-making; digital policy formulation; compliance with digital regulations; compliance with security standards; technology risk management; digital decision-making structures; technology steering committee; digital performance management; supervision of digital projects; technology management frameworks; standardization of digital processes; digital transparency; digital ethics
Security, Risk, and Macro Digital Governance	Digital Risk Management	Digital risk management; technology risk assessment; cyber risk analysis; data risk management; prevention of digital threats; risk monitoring systems; crisis response planning; digital risk scenarios; reduction of system vulnerabilities; business continuity; crisis management program; risk impact assessment
Security, Risk, and Macro Digital Governance	Digital Sustainability and Social Responsibility	Digital sustainability; organizational sustainable development; digital social responsibility; energy consumption optimization; reduction of environmental impacts; green digital transformation; clean technologies; digital waste management; energy efficiency in production; clean vehicles; sustainable innovation; carbon footprint tracking; sustainability reporting

The seventh main theme, security, risk, and macro digital governance, indicates that transformational digital leadership must also ensure control, safety, accountability, and sustainability in digital transformation. The findings show that as SAIPA expands its use of digital platforms, connected systems, smart production technologies, cloud systems, data infrastructure, and connected vehicle technologies, cybersecurity becomes a strategic necessity. Protection of information, networks, data, production systems, vehicle communications, and automotive software must be embedded in digital leadership practices. The findings also emphasize the need for macro-level digital governance through technology policy-making, digital regulations, decision-making structures, project supervision, process standardization, performance management, transparency, and digital ethics. Digital risk management is another essential component, including risk assessment, cyber risk analysis, crisis planning, business continuity, and

vulnerability reduction. Finally, the inclusion of digital sustainability and social responsibility shows that digital transformation should contribute not only to competitiveness and efficiency, but also to environmental performance, energy optimization, clean technologies, sustainable innovation, and responsible organizational development.

4. Discussion and Conclusion

The purpose of this study was to identify the dimensions, components, and indicators of transformational digital leadership in SAIPA Automotive Group. The findings revealed that transformational digital leadership is a multidimensional construct composed of seven major dimensions, including digital transformation leadership and strategy, data governance and digital technologies, digital transformation in production and operations, digital innovation and technology ecosystem, digital market and customer value creation, human capital and digital culture, and security, risk, and macro digital governance. These findings suggest that digital leadership in contemporary industrial organizations extends far beyond technology management and encompasses strategic, cultural, human, operational, and governance-related responsibilities. In other words, transformational digital leadership represents a comprehensive capability that enables organizations to align technology, people, processes, and business models in pursuit of sustainable digital transformation.

One of the most significant findings of the study was the identification of the dimension of digital transformation leadership and strategy. This dimension included transformational and inspirational leadership, digital vision and strategy, and digital foresight and dynamic capabilities. The prominence of this dimension demonstrates that successful digital transformation begins with leadership rather than technology. Participants consistently emphasized the necessity of leaders who can formulate a compelling digital vision, motivate employees, communicate strategic priorities, and guide organizational adaptation in uncertain environments. This finding is consistent with studies that highlight the strategic role of digital leadership in shaping transformation initiatives and ensuring alignment between technological investments and organizational objectives (Elia et al., 2024; Khalkhali et al., 2023; Türk, 2023). The findings also support research showing that transformational leadership remains highly relevant in the digital age because leaders must inspire employees, manage uncertainty, and stimulate innovation while navigating technological disruption (Eitan & Gazit, 2024; Gonze & Gianotti, 2024; Matsunaga, 2024). Moreover, the emphasis on dynamic capabilities and future-oriented thinking aligns with evidence suggesting that digital leaders play a central role in sensing technological opportunities, adapting organizational resources, and maintaining competitiveness in rapidly changing environments (Albannai et al., 2025; Tuyen et al., 2025).

Another important finding concerns the dimension of data governance and digital technologies. The results indicate that data governance, artificial intelligence, analytics capabilities, and digital infrastructure constitute fundamental pillars of transformational digital leadership. Participants repeatedly described data as a strategic organizational asset requiring governance mechanisms related to quality, ownership, security, accessibility, and integration. This finding is consistent with studies emphasizing the growing importance of data-driven organizations and the role of digital leadership in creating analytical capabilities and evidence-based decision-making systems (Albrecht & Dolbin, 2023; Bondarouk & Parry, 2023; Marler & Fisher, 2023). Furthermore, the identified emphasis on artificial intelligence, predictive analytics, machine learning, and business intelligence reflects broader global trends toward intelligent decision-making systems and advanced digital capabilities (Senadjki et al., 2024; Sundberg & Holmström, 2024). The importance assigned to cloud infrastructure, enterprise architecture, industrial Internet of Things, and integrated digital platforms further confirms that digital transformation requires robust technological foundations capable of supporting organizational learning, operational integration, and strategic agility (Bank, 2023; Elia et al., 2024).

The findings also highlighted the importance of digital transformation in production and operations. Smart manufacturing, digital operations management, digital supply chains, and digital product management emerged as key elements of transformational digital leadership in the automotive sector. This finding is particularly significant because it demonstrates that digital leadership in industrial organizations must be deeply embedded within operational systems rather than confined to administrative or information technology functions. Participants emphasized technologies such as industrial automation, robotics, digital twins, predictive maintenance, smart factories, and supply chain integration as essential components of transformation. These results support research indicating that digital

transformation enhances operational performance when leaders successfully integrate technological innovation with organizational processes and employee capabilities (Gun et al., 2024; Senadjki et al., 2024). The findings further align with studies arguing that digital transformation must be connected to value creation across the entire organizational system, including production, logistics, product development, and customer service (Elia et al., 2024; Gaol et al., 2024). In the automotive industry specifically, the movement toward connected manufacturing systems and intelligent production environments requires leaders who can coordinate technological, human, and operational resources simultaneously.

The dimension of digital innovation and technology ecosystem also emerged as a critical component of transformational digital leadership. The findings revealed that innovation capability depends not only on internal organizational resources but also on collaboration with startups, universities, technology companies, research centers, and innovation networks. Participants emphasized the importance of innovation laboratories, open innovation practices, research and development activities, and knowledge-sharing mechanisms. These findings correspond with studies suggesting that digital leadership supports innovation by fostering experimentation, collaboration, and organizational learning (Cui, 2025; Majumdarr et al., 2025). Furthermore, the identified importance of innovation ecosystems aligns with contemporary perspectives that view digital transformation as a networked process involving multiple stakeholders rather than a purely internal organizational initiative (Albannai et al., 2025; Malik et al., 2025). The emphasis on knowledge management and continuous learning also supports previous research highlighting the importance of tacit knowledge, adaptability, and innovation-oriented cultures in digitally transforming organizations (Kowcharska & Rebelo, 2025; Kucharska & Rebelo, 2025). These findings suggest that transformational digital leaders act not only as internal change agents but also as ecosystem orchestrators who facilitate collaboration and knowledge exchange across organizational boundaries.

The findings regarding digital market and customer value creation indicate that customer-centricity is a central outcome of transformational digital leadership. The identified components included digital customer experience, digital marketing, connected automotive services, and customer behavior analytics. Participants emphasized that digital transformation should ultimately enhance customer satisfaction, loyalty, personalization, responsiveness, and value creation. These findings are consistent with research suggesting that digital leadership contributes to organizational performance by improving customer engagement and creating innovative service experiences (Malik et al., 2025; Qiao et al., 2024). Moreover, the emphasis on connected vehicle services, digital customer journeys, online service platforms, and data-driven marketing reflects broader transformations occurring across the automotive industry as firms increasingly adopt service-oriented and digitally enabled business models (Cui, 2025; Gun et al., 2024). The findings therefore suggest that transformational digital leaders must view technology not merely as an operational tool but as a mechanism for creating customer value and strengthening market competitiveness.

The dimension of human capital and digital culture emerged as another foundational component of transformational digital leadership. Participants emphasized that digital transformation depends heavily on employee capabilities, organizational learning, innovation culture, and readiness for change. This finding is strongly supported by previous studies indicating that digital leadership enhances digital culture, employee capabilities, organizational commitment, and innovation performance (Qiao et al., 2024; Shin et al., 2023). The identified emphasis on digital skill development, leadership development, talent management, employee empowerment, and change management also aligns with global human capital research highlighting the necessity of preparing employees for digital work environments (Deloitte, 2024; Ullrich & Doelben, 2023). Furthermore, the findings support evidence suggesting that transformational leadership contributes to innovation acceptance and organizational entrepreneurship by fostering learning, participation, and shared responsibility (Aghashahi Ardestani & Abbasi, 2023; Pajouhan et al., 2024). The prominence of employee empowerment and digital culture within the model demonstrates that technological transformation cannot succeed without corresponding changes in organizational beliefs, behaviors, and competencies.

The final dimension identified in the study was security, risk, and macro digital governance. This dimension included cybersecurity, digital governance, digital risk management, and digital sustainability. The emergence of this dimension reflects the increasing complexity of digital environments and the need for leaders to manage technological vulnerabilities alongside opportunities. Participants emphasized cybersecurity, privacy protection, risk monitoring, crisis management, governance structures, and

ethical considerations as critical components of digital transformation. These findings are consistent with studies emphasizing that digital transformation requires governance frameworks capable of balancing innovation with accountability, security, and regulatory compliance (Bank, 2023; Kyambade & Namatovu, 2025). The findings also support recent discussions regarding the strategic role of leadership in ensuring that digital initiatives remain sustainable, secure, and aligned with broader organizational responsibilities (Schiuma et al., 2022; Turner, 2022). The inclusion of sustainability-related indicators further demonstrates that transformational digital leadership increasingly involves balancing technological advancement with environmental and social considerations.

Overall, the findings suggest that transformational digital leadership in SAIPA Automotive Group represents a holistic and integrative framework that combines strategic leadership, technological capability, operational excellence, innovation orientation, customer value creation, human capital development, and governance mechanisms. The identified model extends existing literature by demonstrating that digital leadership in the automotive industry is a multidimensional capability requiring simultaneous attention to technological, organizational, cultural, and strategic factors. The findings also reinforce contemporary perspectives that view digital transformation as an enterprise-wide phenomenon requiring coordinated leadership across multiple organizational domains (Ghasemi Ghanchehnazi & Atashsouz, 2024; Khabareh, 2025; Shateri et al., 2025). Consequently, transformational digital leadership should be understood as a strategic organizational capability that enables industrial firms to navigate complexity, exploit technological opportunities, and create sustainable competitive advantage in the digital era.

The present study has several limitations that should be acknowledged. First, the research was conducted within a single automotive group, which may limit the transferability of the findings to other industries or organizational contexts. Second, the study relied exclusively on qualitative data obtained from expert interviews, meaning that the identified dimensions and components reflect participants' perceptions and experiences. Third, although theoretical saturation was achieved, the number of participants was limited to individuals with expertise in digital transformation and leadership, potentially excluding alternative viewpoints from other organizational groups. Finally, the rapidly evolving nature of digital technologies means that some dimensions of digital leadership may change over time as new technologies, business models, and organizational practices emerge.

Future studies could validate the proposed model quantitatively and examine the relationships among the identified dimensions using structural equation modeling. Comparative studies across different industries could also determine whether the dimensions identified in the present study are specific to the automotive sector or generalizable to other organizational contexts. Researchers may further investigate the effects of transformational digital leadership on organizational outcomes such as innovation performance, digital maturity, employee engagement, operational excellence, and customer satisfaction. Longitudinal studies could provide deeper insights into how digital leadership competencies evolve over time and how leadership influences different stages of organizational digital transformation.

Organizations seeking successful digital transformation should invest systematically in the development of transformational digital leadership competencies among senior and middle managers. Leaders should be trained in digital strategy, data-driven decision-making, innovation management, digital culture development, and change leadership. Organizations should also strengthen data governance mechanisms, invest in digital infrastructure, and establish structures that support collaboration across departments and external innovation partners. Creating a culture of learning, experimentation, and employee empowerment can further facilitate digital transformation. Finally, managers should pay continuous attention to cybersecurity, digital governance, sustainability, and risk management to ensure that digital transformation initiatives remain secure, responsible, and strategically aligned with long-term organizational objectives.

Authors' Contributions

Authors contributed equally to this article.

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In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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