Original Research Article

How digital transformation drives high-quality development in manufacturing: A case study of Supcon technology

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Abstract: Digital transformation (DT) is now a principal route by which manufacturers pursue high-quality development, yet how it works at the firm level, above all from accounting and auditing angles, is still underexplored. Taking Supcon Technology, a leading process-industry intelligent-manufacturing firm, as a case, this paper builds a two-tier framework that runs from the drivers of transformation through five dimensions of high-quality development to the financial and auditing effects that follow. The case shows that, under combined technological, organizational, and environmental pressures, Supcon moved through informatization, digitalization, intelligentization, and ongoing expansion, and built a digital base organized around AI and data. Performance improved across all five dimensions examined, namely profitability, growth, operating efficiency, innovation, and sustainability. The transformation also reshaped financial management, tightened internal control and disclosure, and introduced audit risks that had not previously arisen. The findings extend work on the microeconomic consequences of DT and speak to transformation decisions, the changing role of accountants, and the prevention of audit risk.

Keywords: digital transformation; high-quality development; manufacturing enterprises; financial performance; audit risk; Supcon technology

1. Introduction

High-quality development sits at the center of China's economic agenda, and folding digital technology into the real economy is now a stated priority. The digital economy passed 53 trillion yuan in 2023, which has pushed manufacturers to treat DT as a route to sharper competitiveness. The reality is more uneven: Surveys put 78% of manufacturers calling DT a strategic priority, yet only 14% feel they have seen the results they expected, with many still unable, unwilling, or afraid to transform. How DT actually feeds into high-quality development therefore matters for both theory and practice.

Three gaps stand out in the literature. Most studies look past the firm and concentrate on macroeconomic effects or isolated technologies, leaving the financial and auditing consequences at enterprise level underexamined. High-quality development is usually pinned to a single macro indicator such as total factor productivity (TFP), with few efforts to combine financial quality, efficiency, innovation, and sustainability in one frame. And the knock-on effects of DT, from financial-management reform to internal-control change, disclosure improvement, and new audit risks, have not been traced in a joined-up way. This paper takes Supcon Technology Co., Ltd. (688777) as a representative case and uses a two-tier framework running from the drivers of transformation through five development dimensions to the resulting financial and auditing effects. It offers a finance-oriented, five-dimension reading of high-quality development, grafts the TOE framework onto that reading, and maps the derivative effects of DT across finance, control, disclosure, and audit risk.

2. Literature review and theoretical framework

We treat DT as a strategic move in which a firm draws on emerging information technologies to rebuild

how it operates and creates value. Of the several ways scholars have measured it, the text-analysis approach that mines annual-report keywords has caught on most widely, being both objective and easy to replicate[4]. High-quality development is a layered concept; read from an accounting standpoint, it should show up not in any single figure but in the joint movement of profitability, growth, operating efficiency, innovation, and sustainability. Most evidence points to DT as a positive force for such development, and in manufacturing recent work finds it lifts TFP indirectly by sharpening innovation and cutting costs[5], though a few studies warn the effect can turn negative past some threshold.

The argument rests on three theories. The TOE framework treats the uptake of new technology as the product of interacting technical, organizational, and environmental conditions[1], which we use to make sense of why and how Supcon transformed. The resource-based view locates competitive advantage in the heterogeneous resources and capabilities a firm commands[2]; in a digital economy, where data are a primary factor of production, that lens clarifies how DT reorders a firm's resource base. Value chain theory sees advantage as emerging from interlocking value-creating activities[3]. Because DT rewires each link of that chain, from R&D through production, supply, sales, and service, it offers a way to trace how the transformation reaches each development dimension in turn.

3. Research design

Supcon Technology suited a case of this kind for three reasons. It is representative: Its DCS has held the largest domestic market share for fifteen straight years, its SIS for three. Its transformation runs the full course, from an Industry 3.0 product supplier to an Industry 4.0 solution provider and on toward a globally competitive industrial-AI company. And its STAR Market listings give disclosures full enough for a close-grained study. The analysis draws on Supcon's 2021–2025 annual reports, ESG and sustainability reports, interim announcements, third-party industry studies, and figures checked against the Wind and CSMAR databases; 2025 data come from the performance express report and the third-quarter report.

The framework has two layers. The first uses the TOE lens to set out the technical, organizational, and environmental pressures behind the decision to transform. The second asks how well the transformation worked, reading its effects across five dimensions of high-quality development before turning to the accounting sequelae in financial management, internal control and disclosure, and audit risk.

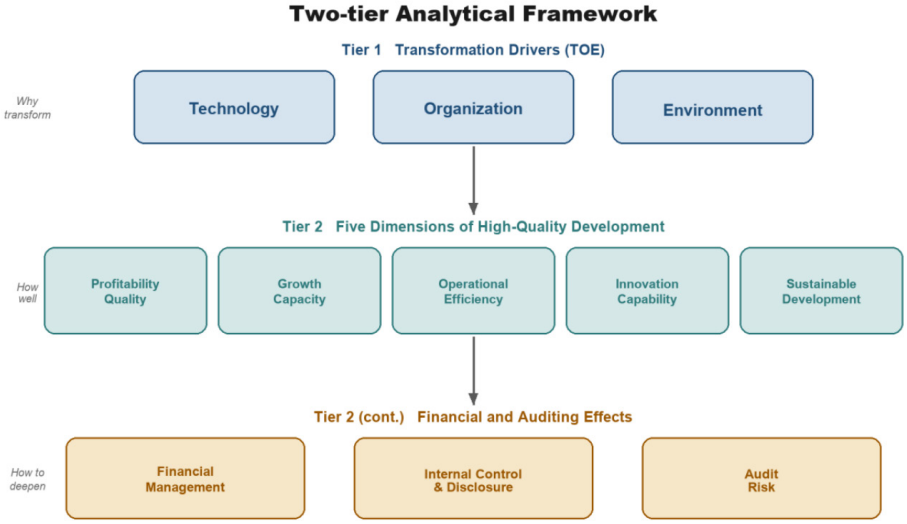


Figure 1. Two-tier analytical framework.

4. Digital transformation process and drivers

Founded in Hangzhou in 1999, Supcon Technology is a globally minded provider of intelligent-manufacturing solutions. By 2025 it had served more than 35,000 customers, installed over 100,000 control systems, and gathered upwards of 100 EB of real-time industrial data. Its transformation unfolded in four overlapping stages. During informatization, from founding through 2020, the company digitized business processes and began stockpiling raw operational data. Digitalization, from 2021 to 2023, brought

in integrated product development (IPD), lead-to-cash (LTC), and integrated supply chain (ISC) processes, set up an ESG committee, and put a Data Strategic Plan in place that treated data as a core asset; by the close of 2023, 91% of key business areas were covered. Intelligentization, over 2022–2024, introduced an intelligent control system, a simulation platform, and an industrial-AI architecture, and in June 2024 Supcon released a universal control system and a process-industry time-series large model. From 2024 onward, expansion pushed 56 digital projects to full coverage of major processes, opened a membership-subscription business that signed 622 customers, and lifted overseas revenue 118.27% in a year.

Read through the TOE lens, the forces at work were mutually reinforcing. On the technology side, the spread of AI, big data, and the industrial Internet left the company little choice but to build an AI-and-data foundation if it wanted to keep its lead. Inside the firm, growth, globalization, and the strategic turn toward industrial AI made data-driven management unavoidable, since the old experience-based style of deciding could no longer keep up. Outside, customers wanted more than automation, namely safety, quality, lower carbon, and better returns; the dual-carbon policy pressed hard on energy-intensive process industries, which account for roughly 78% of China's carbon emissions; and rivals, established internationals and newer cross-border entrants alike, were closing in. DT became, in effect, the answer to all three pressures at once.

5. Impact of digital transformation on high-quality development

Table 1 collects the indicators that matter for the five dimensions. Profitability tells a clear story: Between 2021 and 2024 operating revenue doubled, from 4.519 billion yuan to 9.139 billion yuan, growing more than 30% in both 2022 and 2023, and operating profit climbed from 639 million yuan to 1.200 billion. The 2025 dip, an 11.66% fall in revenue tied to a slowing economy and tighter capital spending downstream, is a reminder that DT sharpens profitability over the medium and long run but does not by itself abolish the cycle; for that, firms need recurring lines such as subscriptions.

The growth picture is strong at home and abroad. Domestically, the DCS market share climbed from 33.8% to 45.1%, keeping Supcon first in the industry for a fifteenth year, while overseas revenue rose from 184 million yuan to a 749-million-yuan peak in 2024, a 118.37% jump built on projects with Saudi Aramco, Pertamina, and Petronas. Operating efficiency improved in step: The administrative expense ratio fell from 6.64% to 4.51% and the selling expense ratio from 11.84% to 8.69% between 2021 and 2024, as a unified digital base and a company-wide push into AI simplified processes and tightened coordination. Innovation shifted from breadth toward depth, with R&D intensity reaching a high of 11.79%, cumulative valid patents doubling from 395 to 853, and the share of invention patents rising from 63.8% to 83.4%. On sustainability, a third-party customer-satisfaction score moved from 87.60 to 90.47, ESG governance took clearer shape after the 2023 committee, and domestic substitution deepened across the mainstream process industries.

Table 1. Key performance indicators of supcon technology, 2021–2025.

Indicator	2021	2022	2023	2024	2025
Operating revenue (100M yuan)	45.19	66.24	86.20	91.39	80.73
Operating profit margin (%)	14.14	13.16	13.75	13.13	6.22
DCS domestic market share (%)	33.8	36.7	37.8	40.4	45.1
Overseas revenue (100M yuan)	1.84	2.50	3.43	7.49	6.45
Administrative expense ratio (%)	6.64	5.70	5.22	4.51	5.04
Selling expense ratio (%)	11.84	9.40	9.15	8.69	10.50
R&D intensity (%)	10.99	10.45	10.53	10.70	11.79
Cumulative valid patents	395	522	669	745	853
Invention-patent share (%)	63.80	68.01	69.81	77.18	83.35
Customer satisfaction (score)	87.60	—	—	—	90.47

Note: Compiled and calculated from Supcon's annual reports and ESG reports.

Pulled together, the TOE drivers feed three channels of change: Smarter R&D, finer operating control, and digitally mediated customer service. These lift innovation, efficiency, and market position, which in turn pull profitability, growth, and sustainability along with them. That, in outline, is how DT moves a manufacturer toward high-quality development.

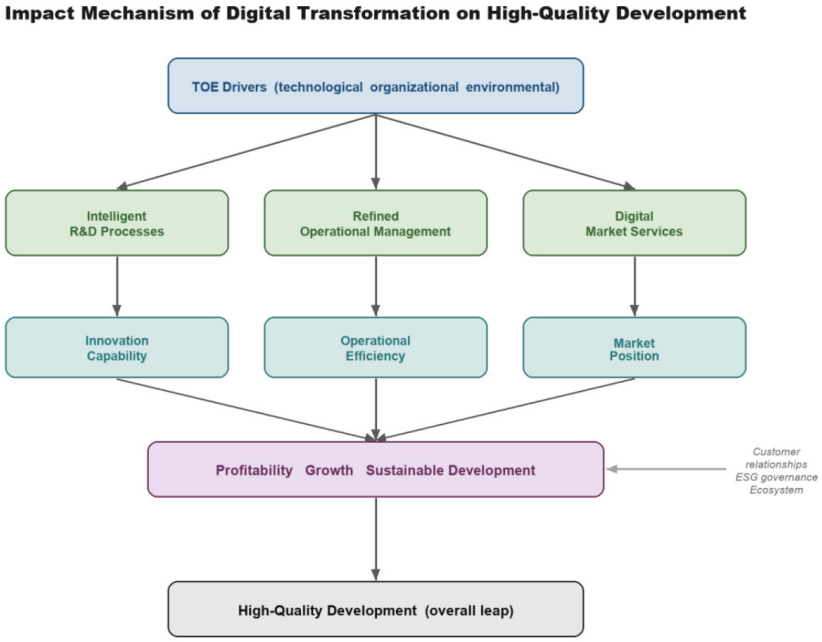


Figure 2. Impact mechanism of digital transformation on high-quality development.

6. Financial and auditing effects

The way finance is run changed as well. Laying IPD, LTC, and ISC on a single digital base gave Supcon end-to-end data continuity, and the finance function moved with it from a back-office accounting role toward a business-partner one, from keeping the books to informing decisions. Data are now handled as a core asset under a three-tier governance structure, which underwrites smarter treasury work and exchange-rate hedging; the trade-off is that as subscription revenue grows, measuring contract liabilities and deferred income becomes harder. A real-time warning system now scans market, operating, and financial risk, and without it the 2025 drops in revenue (−11.66%) and overseas revenue (−13.89%) could easily have landed harder.

Internal control tightened at the same time. Centralized governance shored up both IT general controls and application controls and left clearer audit trails, sharper anomaly detection, and cleaner separation of duties, while ESG disclosure benefited from data gathered in real time. New audit risks arrived with the gains. Concentrating so much data raises the stakes of any breach; the growing use of AI introduces black-box decisions that auditors struggle to parse; and a single fault in the shared platform can cascade across business lines. Audit evidence itself looks different now, less paper and more electronic records and API logs, which calls for computer-assisted techniques and makes continuous, risk-based auditing newly practical. The effects are not wholly beneficial, and firms, auditors, and regulators will need to build skills and rules at much the same pace.

7. Conclusions and implications

Seen through accounting and auditing lenses, the Supcon case shows how DT reaches into the high-quality development of a manufacturer. Its drivers had the three-sided TOE character one would expect. Its effects ran across all five dimensions, with revenue and profit roughly doubling between 2021 and 2024, DCS share rising from 33.8% to 45.1%, expense ratios easing, R&D intensity reaching 11.79%, and customer satisfaction passing 90. The financial and auditing sequelae were real and ran in both directions, and the whole process reads as a chain from TOE drivers, through three channels of change, into five development outcomes and finally the accounting effects.

For managers, the lesson is to treat technology, organization, and environment as one problem rather than three, to read high-quality development through a finance-oriented, five-dimension lens with live monitoring, to push accounting toward a strategic, business-partner posture, and to meet the new risks around data security, algorithmic transparency, and IT systems by reinforcing general and application

controls and reporting through ESG channels. The study has clear limits: A single case generalizes only so far, some figures could not be pinned down precisely, and the focus has been on the upside. Multi-case comparisons, large-sample tests, and an accounting-grounded measure of DT that links to audit fees, opinions, and earnings quality would all be worth pursuing.

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