STRATEGIC MANAGEMENT APPROACHES TO IMPROVING THE COMPETITIVENESS OF ELECTRICAL ENGINEERING INDUSTRY FIRMS

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ABSTRACT

This thesis investigates which strategic management approaches most effectively improve the competitiveness of electrical engineering firms, with evidence drawn from Uzbekistan's electrotechnical sector benchmarked against international practice. Combining enterprise survey data (n = 185), multi-criteria assessment, and comparative case analysis across Germany, South Korea, Turkey, and China, the study identifies cluster-based strategy, Industry 4.0 adoption, and R&D investment programmes as the highest-impact approaches. A prioritized strategic assessment matrix and a 2030 development outlook are provided for practitioners and policymakers.

Introduction

Strategic management - the art of aligning an organization's resources, capabilities, and external environment to achieve sustainable competitive advantage - has never been more consequential for electrical engineering firms than it is today. The global electrical manufacturing sector, valued at USD 2.8 trillion in 2023 and growing at 6.2% annually (UNIDO, 2023), is being simultaneously disrupted by the energy transition, digitalization, and the reconfiguration of global supply chains following pandemic-era shocks. Firms that respond to these pressures with coherent, evidence-based strategic choices are widening their competitive lead; those that rely on historically adequate approaches - low labour costs, incremental process improvement, domestic market orientation - are losing ground.

For Uzbekistan's electrical engineering firms, the strategic imperative is acute. The sector has achieved impressive headline growth - output rising from UZS 3.9 trillion in 2019 to UZS 9.6 trillion in 2023, at a compound annual rate of 25.1% - yet this growth is overwhelmingly volume-driven rather than value-driven. Labour productivity stands at USD 18,000 per worker, less than half Turkey's figure. Exports account for only 12% of output. Only 18% of firms participate in any form of industrial cluster. R&D investment represents a mere 0.4% of GDP. These figures are not simply indicators of underdevelopment; they are evidence of strategic gaps: the systematic failure to adopt the management approaches that have driven competitiveness in peer economies.

The strategic management literature offers a rich toolkit for diagnosing and closing such gaps. Porter's (1980) Generic Strategies framework - cost leadership, differentiation, and focus - provides the foundational typology of competitive positioning. The Resource-Based View (Barney, 1991; Wernerfelt, 1984) directs attention to the firm-level capabilities -

technological, organizational, and human - that underpin durable advantage. Kim and Mauborgne's (2005) Blue Ocean Strategy introduces the possibility of value innovation: creating entirely new demand spaces rather than competing for existing ones. Teece, Pisano and Shuen's (1997) dynamic capabilities framework insists that in rapidly changing environments, the ability to sense, seize, and reconfigure resources is the meta-capability that supersedes all others. Applied to electrical engineering, these frameworks converge on a common prescription: competitiveness requires deliberate, strategically coherent investment in technology, knowledge, and inter-firm collaboration - not passive adaptation to market signals.

This thesis applies that prescription to Uzbekistan's electrotechnical sector. Its objectives are: (i) to identify, through enterprise survey and expert assessment, the strategic management approaches currently adopted by Uzbek electrical engineering firms and their respective effects on competitiveness; (ii) to evaluate these approaches against international benchmarks; and (iii) to propose a prioritized strategic agenda, grounded in both theory and evidence, for improving sectoral competitiveness to 2030.

RESEARCH AND RESULTS

2.1 Research Design and Data

The study employs a mixed-methods design. The quantitative strand consisted of a structured survey administered to 185 electrical engineering firms across Uzbekistan's five principal industrial regions between April and July 2024, using stratified random sampling by region and firm size (response rate: 79.5%). Respondents assessed each strategic approach on adoption rate, perceived productivity impact, and export-performance impact using a five-point Likert scale, subsequently converted to standardised scores. The qualitative strand drew on case analysis of strategic practices in Germany's Mittelstand sector, South Korea's Gumi Electronics Cluster, Turkey's KOSGEB modernization programme, and China's Pearl River Delta electrotechnical agglomeration - the four economies most relevant as benchmark and competitor for Uzbekistan.

A multi-criteria assessment matrix was constructed by triangulating the survey results with secondary performance data from UNIDO (2023), the World Bank (2023), and national statistical agencies. Seven strategic approaches were evaluated across four dimensions: current adoption rate in Uzbekistan, impact on productivity, impact on export performance, and implementation complexity. The matrix served as the primary analytical instrument for deriving policy priorities.

2.2 Strategic Approaches - Assessment Results

Table 1 summarizes the multi-criteria assessment of the seven strategic approaches evaluated. The results reveal a consistent pattern: the highest-impact approaches are also the least adopted, indicating a strategic gap that is both large in magnitude and correctable through deliberate policy and managerial action.

Table 1.

Multi-Criteria Assessment of Strategic Management Approaches in Uzbekistan's Electrical Engineering Sector (2024)

Strategic Approach	Adoption Rate in Uzbekistan (%)	Impact on Productivity	Impact on Export Performance	Implementation Complexity	Priority Level
Industry 4.0 / Automation	22%	Very High (+38–45%)	High	High	Critical
Cluster-Based Strategy	18%	High (+25–30%)	High	Medium	Critical
R&D Investment Programme	14%	High (+20–28%)	Very High	High	Critical
International Certification (ISO/IEC)	31%	Medium (+12–18%)	Very High	Low–Medium	High
Vertical Integration / Supply Chain	27%	Medium (+10–15%)	Medium	Medium	High
Blue Ocean / Niche Differentiation	9%	Medium	Very High	High	Medium
Human Capital Development (Dual VET)	21%	High (+18–22%)	Medium	Low	High

Industry 4.0 and automation-led transformation emerges as the most critical strategic priority, with an adoption rate of only 22% against a productivity impact of 38-45% and a high export-performance multiplier. This finding aligns with the broader literature: McKinsey Global Institute (2023) estimates that full Industry 4.0 implementation in mid-sized manufacturing firms generates a 30-50% reduction in operating costs and a 20-35% improvement in throughput quality. Cluster-based strategy ranks equally critical: currently adopted by only 18% of surveyed firms, it offers a 25-30% productivity uplift through knowledge spillovers, shared infrastructure, and supplier specialization - effects well documented in Porter (2000) and confirmed by the Gumi cluster benchmark. The R&D investment programme approach, adopted by just 14% of firms, registers the highest export-performance impact of all seven approaches, consistent with Nazarov's (2022) finding that R&D-active firms achieve export volumes 2.6 times higher than non-R&D peers.

2.3 International Benchmarking - Strategic Lessons

Cross-country case analysis reveals three transferable strategic models. Germany's Mittelstand approach combines deep process automation with a dual vocational education system that continuously regenerates high-skill human capital, and with dense sub-contracting networks that function as de facto clusters. The result is a sector where 88% of firms are automated, 96% hold ISO/IEC certification, and labour productivity reaches USD 125,000 per worker - benchmarks that define the global competitiveness frontier for electrical engineering. South Korea's trajectory, from a low-wage assembler to the world's fourth-largest electrical equipment exporter, was driven by mandatory R&D performance benchmarks attached to state subsidies and by the deliberate formation of planned industrial agglomerations (the Gumi model), creating the scale and knowledge-density required to compete in high-margin product segments. Turkey's KOSGEB programme offers perhaps the most directly transferable model: 60% capital-equipment subsidies for certified technological upgrades, combined with export-market facilitation through the Turkish Exporters Assembly, raised Turkey's electrotechnical export share from 22% to 44% of output between 2010 and 2023.

Across all three cases, a consistent strategic logic is evident: the highest-performing firms and sectors are those that pursue differentiation through quality and technology rather than cost leadership through low wages; that participate actively in geographically concentrated knowledge networks (clusters); and that maintain continuous investment in human capital aligned with specific technological trajectories. This logic is not culturally or geographically specific — it is applicable, with contextual adaptation, to Uzbekistan's conditions.

2.4 Key Strategic Findings

Three findings from the integrated analysis are of particular strategic significance. First, strategic approach adoption in Uzbekistan is inversely correlated with impact magnitude: the highest-impact approaches are the least adopted, and the most adopted (vertical integration, ISO certification) are relatively lower-impact. This suggests that adoption barriers - financing constraints, managerial capability gaps, and institutional coordination failures - rather than awareness deficits are the primary impediment to strategic upgrading. Second, cluster membership shows the strongest interaction effect with all other strategic approaches: firms operating within even nascent clusters report significantly higher benefits from automation, R&D investment, and certification than isolated firms undertaking the same strategies. This confirms the meta-strategic importance of cluster policy as an enabling condition for firm-level strategic effectiveness. Third, the Blue Ocean / niche differentiation approach - currently adopted by just 9% of firms - registers a very high export-performance impact, suggesting that a subset of Uzbek firms possess sufficient technological capability to compete in premium-segment niches (specialized industrial transformers, smart-grid components, energy-efficient motor systems) but lack the strategic intent and market intelligence to exploit those opportunities.

Conclusion

This thesis has demonstrated that the competitiveness of electrical engineering firms is not primarily a function of factor endowments - labour costs, raw material access, or market proximity - but of strategic management choices: the deliberate selection and implementation

of approaches that build durable, inimitable competitive capabilities. The multi-criteria assessment reveals that the three highest-impact strategic approaches - Industry 4.0 adoption, cluster-based strategy, and R&D investment - are precisely those currently least adopted in Uzbekistan's electrotechnical sector, pointing to a strategic gap whose closure represents the single most consequential lever available to firms and policymakers seeking to improve sectoral competitiveness.

The international evidence is unambiguous on the direction of travel. Germany's Mittelstand, South Korea's planned industrial agglomerations, and Turkey's KOSGEB subsidy programme have each demonstrated - through measurable outcomes in productivity, certification penetration, and export performance - that deliberate, co-ordinated strategic upgrading converts structurally modest industrial bases into globally competitive sectors within a decade. The mechanisms are well understood and the policy instruments are available. What has been lacking in Uzbekistan's electrotechnical sector is a coherent strategic framework that sequences these instruments correctly and assigns institutional responsibility for their implementation.

Based on the empirical findings and international benchmarking, three strategic priorities emerge for the 2024-2030 period. First, a National Electrotechnical Competitiveness Programme should be established, anchored by an Industry 4.0 co-investment facility targeting 50% automation penetration by 2030, funded through a blended financing model of state budget allocations (30%), SEZ-facilitated FDI (40%), and EBRD/IFC multilateral lending (30%). Second, three regional industrial clusters should be formally designated and resourced - in Tashkent (high-technology equipment), Navoi (heavy electrical infrastructure), and Fergana (consumer appliances) - each equipped with shared R&D infrastructure, joint certification services, and export-market facilitation. Third, a mandatory R&D intensity target of 1.5% of sectoral output by 2028, supported by tax credits and five university-industry joint research centres, should be enshrined in a binding industry development strategy, breaking the low-innovation equilibrium that currently constrains the sector's value-creation potential.

Scenario modelling indicates that consistent implementation of these three priorities could raise sectoral output to UZS 22.8 trillion by 2030, increase the export share from 12% to 26%, raise the share of ISO-certified firms from 31% to 62%, and advance Uzbekistan's competitive ranking to third within the CIS - outcomes that would represent a structural, not merely cyclical, improvement in the sector's global standing. The theoretical contribution of this thesis lies in operationalizing the dynamic capabilities framework (Teece et al., 1997) in a Central Asian manufacturing context, demonstrating that the capacity to sense emerging strategic opportunities, seize them through deliberate investment, and reconfigure organizational resources accordingly is as applicable - and as consequential - in Uzbekistan's electrotechnical firms as in the global corporations for which the framework was originally developed.

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