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TECHNICAL ENTREPRENEURSHIP IN HEAVY-DUTY AUTOMOTIVE SERVICES FOR PUBLIC SECTOR ORGANIZATIONS: CHALLENGES, PROCESSES, AND COMPETITIVENESS STRATEGIES

Empreendedorismo Técnico na Prestação de Serviços Automotivos de Linha Pesada para Órgãos Públicos: Desafios, Processos e Estratégias de Competitividade

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ABSTRACT | Heavy-duty automotive services provided to public sector organizations represent a highly technical, competitive, and strongly regulated market segment. At the same time, this sector offers significant opportunities for entrepreneurs who possess expertise in maintenance processes, fleet management, and the quality standards required by public administration. This article presents a comprehensive analysis of entrepreneurship applied to the heavy-duty automotive service sector, highlighting operational methodologies, management practices, regulatory requirements, and critical success factors for companies involved in the maintenance of heavy vehicles, including trucks, buses, agricultural machinery, backhoe loaders, and urban infrastructure equipment. Additionally, the study discusses the impact of digital transformation, the advancement of telematics systems, and the emergence of new contractual models, identifying trends and opportunities that are shaping the future of this market.

Keywords | Technical Entrepreneurship; Heavy-Duty Vehicle Maintenance; Fleet Management; Automotive Services; Public Sector Contracts.

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RESUMO | A prestação de serviços automotivos de linha pesada para órgãos públicos constitui um segmento de mercado altamente técnico, competitivo e regulamentado. Ao mesmo tempo, representa uma oportunidade relevante para empreendedores que possuem conhecimento especializado em processos de manutenção, gestão de frotas e padrões de qualidade exigidos pela administração pública. Este artigo apresenta uma análise sobre o empreendedorismo aplicado ao setor de serviços automotivos pesados, abordando metodologias operacionais, práticas de gestão, requisitos regulatórios e fatores críticos de sucesso para empresas que atuam na manutenção de caminhões, ônibus, máquinas agrícolas, equipamentos de infraestrutura urbana e outros veículos de grande porte. O estudo também discute os impactos da transformação digital, da telemetria, dos sistemas de diagnóstico remoto e dos novos modelos contratuais na evolução desse mercado. A integração entre conhecimento técnico, gestão estratégica e inovação tecnológica é apresentada como elemento fundamental para o fortalecimento da competitividade e da sustentabilidade empresarial no setor.

Palavras-chave | Empreendedorismo Técnico; Manutenção de Veículos Pesados; Gestão de Frotas; Serviços Automotivos; Contratos Públicos.

INTRODUCTION

The heavy-duty automotive service sector has gained increasing relevance in the national context due to the growing demand for fleet maintenance services required by municipalities, public agencies, and state and federal institutions. Essential vehicles, such as waste collection trucks, public works machinery, urban transportation vehicles, and road maintenance equipment, must remain operational to ensure the continuity of fundamental public services.

The technical complexity of these vehicles, combined with the operational responsibilities associated with public-sector activities, requires companies to maintain high standards of mechanical expertise, rigorous operational processes, and compliance with specific technical and regulatory requirements.

The business activity extends beyond vehicle repair; it involves ensuring operational availability, logistical efficiency, safety, reliability, and compliance with applicable technical and legal standards.

By addressing technical, managerial, and regulatory aspects, this article provides an integrated perspective of the sector, bringing together essential elements for entrepreneurs seeking to operate competitively, sustainably, and strategically within this market.

Characteristics of the Heavy-Duty Maintenance Market for Public Sector Organizations

The contracting of automotive maintenance services by public sector organizations follows specific regulatory requirements established by Brazilian legislation, particularly Law No. 14.133/2021, which regulates public procurement procedures and administrative contracts.

This legal framework is essential to ensuring transparency, competitiveness, and service quality in public-sector contracting processes.

High Technical Complexity of Services

Heavy-duty vehicles operate under severe conditions, requiring robust repairs, specialized components, qualified labor, and advanced knowledge of mechanical, electrical, hydraulic, and pneumatic systems.

Many public organizations operate modern equipment incorporating advanced technologies, requiring continuous professional development and technical updating.

Furthermore, the increasing adoption of embedded technologies, advanced telematics, and remote electronic diagnostic systems expands the need for specialized technical capabilities.

Operational Responsibility

A heavy-duty vehicle out of service may cause significant disruptions to essential public services, including waste collection, school transportation, road maintenance, and public transportation operations.

Therefore, entrepreneurs operating in this sector must ensure agility, accurate diagnostics, and reliability in repair processes.

Companies that implement 24-hour emergency assistance plans, mobile maintenance solutions, and strategic inventories of critical components establish competitive advantages over other market participants.

Formal Requirements and Competitiveness

Participation in public procurement processes is a fundamental requirement for companies seeking to operate in this sector. This process demands extensive document preparation, careful analysis of public tenders, financial planning, and proven technical capabilities.

Companies that lack expertise in public procurement procedures often face significant barriers when attempting to enter this market.

Increasingly, public tenders include requirements related to technical qualifications, proof of operational capacity, certifications, minimum infrastructure standards, and professional teams with specific technical expertise.

Technical Methodologies for Heavy-Duty Service Provision

Technical performance in heavy-duty automotive services depends on structured, standardized, and auditable methodologies capable of ensuring reliability, efficiency, and operational continuity.

Technical Diagnostic Methodology

Technical diagnosis represents the core of the maintenance process and involves:

- systematic vehicle analysis;
- the use of specialized scanners and diagnostic software;
- functional testing and analysis of stored fault codes;
- standardized visual inspections;
- preparation of technical reports.

Companies that adopt international protocols, such as the SAE J1939 communication standard, enhance diagnostic accuracy and increase the credibility of their technical procedures.

This process must follow a logical and documented sequence to ensure traceability, reliability, and precision throughout the maintenance operation.

Preventive and Corrective Maintenance

Preventive maintenance plays a fundamental role in reducing failures and extending fleet service life, while corrective maintenance requires rapid response capabilities to restore the operation of essential vehicles.

Preventive maintenance programs should include:

- scheduled replacement of lubricants and filters;
- inspection of braking, suspension, and steering systems;
- monitoring of tire wear;
- periodic testing of electronic systems;
- structural inspections of chassis and vehicle bodies.

Public organizations have increasingly adopted performance-based maintenance models, which demand higher levels of technical efficiency, operational control, and service reliability.

Quality Control and Traceability

Technical reports, complete service orders, component records, responsible personnel signatures, maintenance histories, and photographic documentation represent essential records in public-sector contracts.

Proper documentation ensures transparency, facilitates audits, and provides evidence of compliance with contractual requirements.

Performance Indicators (KPIs)

Among the most relevant performance indicators are:

- MTBF (Mean Time Between Failures);
- MTTR (Mean Time To Repair);

- fleet operational availability;
- labor efficiency;
- cost per kilometer;
- rework rate.

The digitalization of Key Performance Indicators (KPIs) strengthens transparency, improves decision-making processes, and increases confidence between service providers and public-sector contractors.

Entrepreneurship Applied to the Heavy-Duty Automotive Sector

Entrepreneurship in this specialized market requires technical expertise, managerial vision, and strategic business structuring.

The main pillars of entrepreneurial development in this sector include:

Business Structure Development

A competitive company should have:

- facilities prepared for large vehicles;
- specialized tools and heavy-duty equipment;
- management software systems;
- inventory management for critical components;
- trained and certified technical teams.

Standard Operating Procedures (SOPs) and maintenance routines based on Maintenance Planning and Control (PCM) methodologies strengthen internal organization, operational consistency, and service quality.

Financial Management and Pricing Strategies

Service pricing must consider qualified labor costs, equipment investment, spare parts, operational supplies, indirect costs, contractual guarantees, and sustainable profit margins.

Financial feasibility analysis is essential for companies engaged in long-term public-sector contracts, where operational stability and cost control directly influence competitiveness.

Participation in Public Procurement Processes

Operating within the public sector requires:

- research and analysis of public tender opportunities;
- preparation of compliance documentation;

- development of technical and financial proposals;
- participation in public bidding procedures;
- strict execution of contractual obligations.

Competitive companies increasingly invest in specialized procurement teams and compliance structures to improve their ability to manage public contracts effectively.

Competitive Differentiation

Key competitive advantages include:

- rapid response services;
- technical certifications;
- complete digital service reports;
- extended warranty programs;
- mobile maintenance solutions;
- telematics applications;
- transparency and effective communication.

Tracking technologies and real-time monitoring platforms are increasingly valued as tools for improving operational visibility and strengthening relationships with public-sector clients.

Operational Management in Public Contracts

Operational management in public-sector contracts must be guided by regulatory compliance, efficiency, transparency, and continuous performance improvement.

Legal Compliance

Companies operating under public contracts must comply with technical standards, safety regulations, contractual requirements, and all specifications established in public procurement documents.

Audits, inspections, and performance evaluations are frequent components of public-sector contract management, requiring organizations to maintain accurate documentation and structured operational procedures.

Execution Planning

Effective contract execution requires detailed planning, including maintenance schedules, prioritization of critical vehicles, minimum inventory levels, and contingency strategies to ensure operational continuity.

Mature organizations adopt structured maintenance management methodologies, such as Maintenance Planning and Control (PCM), to improve resource allocation, reduce downtime, and optimize fleet availability.

Communication with Contracting Organizations

Communication between service providers and public-sector contractors must be formal, transparent, and properly documented.

Periodic reports, technical records, meeting minutes, and professional assessments contribute to reducing conflicts, improving contract management, and strengthening legal and operational security.

Sector Challenges

Despite significant opportunities, companies operating in the heavy-duty automotive service sector face several challenges, including:

- bureaucratic public procurement procedures;
- high initial investment requirements;
- shortage of specialized technical labor;
- continuous need for technological updating;
- competition with large established companies;
- strict documentation requirements;
- budget fluctuations and delays in payments.

Despite these challenges, the sector presents considerable market potential due to increasing demand and the shortage of highly qualified service providers capable of meeting public-sector requirements.

Market Opportunities and Emerging Trends

The main trends shaping the future of heavy-duty automotive services include:

- process digitalization;
- telematics and remote diagnostics;
- predictive maintenance;
- performance-based contracts;

- expansion of municipal vehicle fleets;
- growth in public infrastructure projects;
- increasing adoption of electric and hybrid vehicles within public-sector fleets.

Organizations that invest in innovation, technological modernization, and continuous professional development are more likely to achieve sustainable competitive advantages.

CONCLUSION

Technical entrepreneurship applied to heavy-duty automotive maintenance services for public-sector organizations requires a combination of specialized technical knowledge, robust management structures, detailed understanding of regulatory requirements, and a high level of professionalization.

Accurate diagnostics, efficient preventive maintenance programs, rigorous quality control, and competent contract management constitute the foundation for delivering reliable services aligned with public-sector operational needs.

Although challenging, this sector provides significant opportunities for companies that invest in technology, workforce development, and strategic organizational structures.

The integration of technical excellence and entrepreneurial management strengthens competitiveness, promotes operational sustainability, and contributes to the improvement of essential public services.

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Author's biography

Paulo José Raulino Nascimento Filho is an entrepreneur and executive director with more than 15 years of experience in the automotive and heavy equipment sectors. His professional background includes strategic management, business development, heavy-duty vehicle maintenance, fleet management, public-sector contracts, and operational

process improvement. As a founder and business leader in the automotive services sector, he has contributed to organizational expansion, team management, and the implementation of strategies focused on competitiveness and operational efficiency. His areas of interest include technical entrepreneurship, maintenance management, applied innovation, and the professionalization of specialized automotive services.