

DETERMINING OPTIMAL STRATEGIC PATHS IN PUBLIC COMPANIES

DETERMINAÇÃO DE CAMINHOS ESTRATÉGICOS ÓTIMOS EM EMPRESAS DE CAPITAL ABERTO

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Abstract

A high level of professional qualification in the public sector requires more efficient use of human resources, which can be achieved through monitoring the number of implemented projects and new investments. Linking reward systems to achieved results represents a key factor in increasing productivity. Public companies are obliged to provide adequate products and services that are accessible to all members of the community, meet their needs, and are offered at affordable prices without discrimination against consumers. The protection of these interests is ensured through price control mechanisms, standardization of the quality of essential goods, and other regulatory measures.

Keywords: BSC. Public Companies. FDM. Business Goals.

Resumo

Um alto nível de qualificação profissional no setor público exige uma utilização mais eficiente dos recursos humanos, o que pode ser alcançado através do monitoramento do número de projetos implementados e novos investimentos. Vincular os sistemas de recompensa aos resultados alcançados representa um fator-chave para o aumento da produtividade. As empresas públicas são obrigadas a fornecer produtos e serviços adequados, acessíveis a todos os membros da comunidade, que atendam às suas necessidades e sejam oferecidos a preços acessíveis, sem discriminação contra os consumidores. A proteção desses interesses é assegurada por meio de mecanismos de controle de preços, padronização da qualidade de bens essenciais e outras medidas regulatórias.

Palavras-chave: BSC. Empresas Públicas. FDM. Objetivos Empresariais.

1 INTRODUCTION

In current business environments, corporate governance focuses on establishing a system of objectives that ensures coherence between strategic intentions and operational activities, enables continuous insight into process execution, and highlights domains in which



performance enhancement is required. Improvements at the level of individual objectives contribute directly to strengthening overall organizational efficiency, in line with the principles emphasized by ISO 9000:2015. The formulation and scope of these objectives are defined by managerial and expert teams, most often guided by established best practices and stakeholder expectations.

The Balanced Scorecard (BSC) organizes business objectives into four interconnected perspectives, providing a comprehensive view of organizational performance. The Learning and Growth perspective focuses on improving employee skills, innovation, and organizational capabilities. In public companies, the main goal of this perspective is enhancing the overall organizational level through continuous learning, adoption of new technologies, and strategic management practices that mobilize internal resources effectively.

The Internal Processes perspective emphasizes the efficiency and quality of operational and administrative processes. Public companies aim to improve process quality, maintenance, and innovation under managerial control, ensuring sustainable competitiveness and long-term success. Effective internal processes support the achievement of customer satisfaction and financial objectives.

The Customer perspective measures user satisfaction and the quality of services. Since public companies often operate in monopolistic or dominant positions, they focus on delivering essential public services and protecting user interests at reasonable costs. Key objectives include increasing customer satisfaction, promoting services effectively, and monitoring service delivery to meet societal needs.

The Financial perspective evaluates economic outcomes, such as profitability, liquidity, and investments. While profit is not the primary goal of public companies, financial stability ensures the continuity of operations and enables the achievement of broader social goals. This perspective links all other perspectives, as skilled employees, optimized processes, and satisfied customers collectively drive financial sustainability.

All four perspectives are interconnected through a strategic map, where goals in the Learning and Growth perspective support Internal Processes, which in turn enhance Customer satisfaction, ultimately reflecting in the Financial outcomes of the organization.

Given the inherent ambiguity in assessing both the comparative importance of objectives within individual Balanced Scorecard (BSC) perspectives and the intensity of interconnections between objectives across adjacent perspectives, qualitative evaluations are employed. These qualitative judgments are translated into triangular fuzzy numbers, allowing uncertainty to be formally incorporated into the analysis. Fuzzy logic offers a suitable

methodological framework for capturing human reasoning under conditions of vagueness, incomplete information, and approximation. To quantify the relative significance of objectives, a computational model based on the fuzzy Delphi approach is applied. Within each BSC perspective, priorities are established by combining objective rankings with confidence levels that express the likelihood of an objective occupying the highest priority position, using recognized procedures for ordering triangular fuzzy values.

The selection of objectives that require targeted managerial intervention is further refined through the application of a genetic algorithm, a widely adopted heuristic optimization technique. Such algorithmic solutions reduce the influence of individual subjective preferences, thereby enhancing the objectivity and robustness of the results. The comparative relevance of objectives within each BSC perspective is represented through a fuzzy relational matrix, whose elements consist of linguistically expressed importance levels encoded as triangular fuzzy numbers. The developed software framework integrates the fuzzy Delphi methodology to evaluate objective importance across all perspectives of the Balanced Scorecard. Based on the resulting fuzzy evaluations, objectives are ordered within each layer of the strategic map according to fuzzy number ranking procedures described in the literature. Finally, target values for business objectives are specified as interval ranges rather than fixed points, allowing for greater flexibility under uncertainty.

2 ASSESSING THE EFFECTIVENESS OF BUSINESS OBJECTIVES

By applying Balanced Scorecard (BSC) software, performance levels are quantified as the extent to which each objective is achieved within every perspective of the strategic map of public enterprises. All defined objectives are grouped using ABC analysis, where classification is based on effectiveness scores generated by the software. The outcomes of this classification serve as a foundation for management decisions regarding the prioritization of actions aimed at improving goal performance. The evaluation of both the achievement level and overall effectiveness of objectives across BSC perspectives is conducted through the software tool, as illustrated in Figure 1.

Observed variations within the financial perspective primarily stem from pricing-related factors. Recommendations for enhancing public sector performance emphasize the need for immediate organizational restructuring, adoption of a process-oriented approach to identify activities that do not contribute to value creation, and alignment of incentive and distribution mechanisms with value-added generation. Given the high level of professional qualifications in

the public sector, greater employee utilization efficiency should be ensured by systematically tracking completed projects and new investment initiatives. Linking compensation and rewards to measurable outcomes remains one of the most effective mechanisms for stimulating productivity.

Insights from the customer and internal process perspectives indicate that substantial initial investments in equipment and infrastructure are a key reason why certain activities are unattractive to private enterprises, leaving the state as the primary source of funding. Public enterprises are therefore entrusted with ensuring the provision of essential goods and services that are widely accessible, responsive to societal needs, fairly priced, and delivered without consumer discrimination. These public interests are safeguarded through regulated pricing policies, quality standards for essential products, and similar protective measures.

Within the internal process perspective, the disparity between the highest- and lowest-ranked objectives is more pronounced than the variation observed in financial performance, reinforcing the argument that monopolistic conditions tend to suppress productivity. The analysis demonstrates that improvements in process quality directly enhance both efficiency and effectiveness. Advances in organizational structure, workforce expertise, technological capability, and reinvestment of budgetary savings collectively contribute to performance improvement. Although profit maximization is not the primary objective of public enterprises, enhancing internal process efficiency provides the basis for future investments and service quality enhancement.

Business objectives should be embedded throughout the organizational structure of public enterprises and fully aligned with overall corporate goals, with a clear focus on customer satisfaction and process performance. Strategies for achieving these objectives require consensus among all relevant stakeholders and coordinated implementation. Regular review of objectives is essential to ensure responsiveness to evolving customer expectations. Continuous improvement is sustained through clearly defined goals, skilled and team-oriented personnel, systematic application of managerial tools and techniques, and decision-making grounded in data analysis. Results from the learning and growth perspective further highlight the importance of managerial competence in leveraging accumulated organizational knowledge and experience to guide public enterprises from their current state toward more modern and efficient operational models.

In the examined case of public enterprises, Group C includes two objectives, accounting for approximately 5% of the cumulative value of the classification criterion, yet representing the highest strategic priority for improvement initiatives. These objectives are identified as I3

and C1. Group B encompasses objectives contributing roughly 15% of the cumulative value and holds moderate strategic importance; in this case, Group B consists of objectives LG3 and LG4. The remaining objectives fall under Group A, comprising sixteen objectives and approximately 80% of the cumulative classification value, and are considered lower priority during the implementation of improvement strategies.

Based on this prioritization, key management actions for small and medium-sized public enterprises are identified. Table 1 shows the priority actions, linking each objective to the corresponding BSC perspective, proposed improvement measure and expected effect.

Table 1

Priority Improvement Actions

Priority Objective	BSC Perspective	Key Improvement Action	Expected Impact
I3	Internal Process	Process modernization	Increased Efficiency
C1	Customer	Training & CRM	Improved Satisfaction
LG3	Learning & Growth	R&D investment	Enhanced Innovation
LG4	Learning & Growth	Funding access	Greater Sustainability

The application of these priority measures allows managerial efforts to be focused on goals of the greatest strategic importance and provides a basis for the implementation of effective strategies for improving the performance of public enterprises.

3 ESTABLISHING THE OPTIMAL STRATEGIC PATH FOR PUBLIC COMPANIES

The intensity of interdependencies among business objectives located across different perspectives of the strategic map for the analyzed public enterprises was evaluated based on the collective expertise and practical experience of a management team established at the group level. The judgments provided by this team were expressed in the form of fuzzy evaluations, as presented below.

$LG1:I1=\tilde{\Omega}_2$	$I15:C1=\tilde{\Omega}_3$	$I3:C2=\tilde{\Omega}_1$	$C2:F4=\tilde{\Omega}_6$
$LG1:I2=\tilde{\Omega}_1$	$I1:C2=\tilde{\Omega}_4$	$I3:C3=\tilde{\Omega}_4$	$C3:F1=\tilde{\Omega}_7$
$LG1:I3=\tilde{\Omega}_3$	$I1:C3=\tilde{\Omega}_4$	$I3:C4=\tilde{\Omega}_7$	$C3:F2=\tilde{\Omega}_4$
$LG2:I1=\tilde{\Omega}_4$	$I1:C4=\tilde{\Omega}_5$	$I3:C5=\tilde{\Omega}_7$	$C3:F3=\tilde{\Omega}_5$
$LG2:I2=\tilde{\Omega}_4$	$I1:C5=\tilde{\Omega}_3$	$I3:C5=\tilde{\Omega}_5$	$C3:F4=\tilde{\Omega}_6$

$LG2:I3=\tilde{\Omega}_5$	$LG5:I6=\tilde{\Omega}_2$	$C1:F1=\tilde{\Omega}_5$	$C4:F1=\tilde{\Omega}_6$
$LG3:I1=\tilde{\Omega}_2$	$I2:C1=\tilde{\Omega}_7$	$C1:F2=\tilde{\Omega}_6$	$C4:F2=\tilde{\Omega}_5$
$LG3:I2=\tilde{\Omega}_4$	$I2:C2=\tilde{\Omega}_5$	$C1:F3=\tilde{\Omega}_5$	$C4:F3=\tilde{\Omega}_6$
$LG3:I3=\tilde{\Omega}_5$	$I2:C3=\tilde{\Omega}_3$	$C1:F4=\tilde{\Omega}_7$	$C4:F4=\tilde{\Omega}_4$
$LG4:I1=\tilde{\Omega}_6$	$I2:C4=\tilde{\Omega}_4$	$C2:F1=\tilde{\Omega}_4$	$C5:F1=\tilde{\Omega}_5$
$LG4:I2=\tilde{\Omega}_5$	$I2:C5=\tilde{\Omega}_4$	$C2:F2=\tilde{\Omega}_5$	$C5:F2=\tilde{\Omega}_7$
$LG4:I3=\tilde{\Omega}_7$	$I3:C1=\tilde{\Omega}_2$	$C2:F3=\tilde{\Omega}_6$	$C5:F3=\tilde{\Omega}_6$
			$C5:F4=\tilde{\Omega}_7$

Below, we describe the procedure for evaluating the overall relationship strength between a pair of business objectives.

$$w(LG1) = (0.37, 0.45, 0.57) \quad (1)$$

$$w(I1) = (0.64, 0.75, 1) \quad (2)$$

$$\tilde{\Omega}_2 = (0, 0, 0.4) \quad (3)$$

$$LG1/I1\tilde{\Omega}_2 = 0.399 \quad (4)$$

The results indicate that the optimal trajectory in the strategic map includes the following business objectives: Increasing the availability of financial resources (LG4), Improving the quality of the production process (I3), Reducing customer complaints (C5), and Enhancing company liquidity (F3).

Interestingly, this optimal path is somewhat unexpected, as all the objectives along this trajectory are relatively low-ranked, and none are among the top priorities within their respective perspectives. This suggests that the management team should continue to monitor and enhance the achievement of the high-priority goals within each perspective, while

simultaneously implementing targeted actions to improve the performance of the objectives that form the optimal path. Specific measures for advancing LG4 and I3 have been outlined previously.

Regarding Reducing customer complaints (C5), additional actions that the management team could undertake include: developing new services and business models, establishing national and international standards for customer relations, providing support for problem resolution, improving communication with customers, and ensuring timely information flow.

To enhance the achievement of Increasing company liquidity (F3), the management team may consider several measures: encouraging commercial banks to provide loans to public enterprises, subsidizing interest rates to lower costs and improve outcomes, rationalizing public expenditures (indirectly boosting liquidity), legally limiting deferred payment periods to suppliers in large trade systems, reducing tax and administrative burdens through comprehensive regulatory reform, rescheduling tax payments, and partially writing off unpaid state taxes.

Overall, these recommendations highlight the dual focus required for public enterprise management: addressing the lower-ranked objectives that form the optimal path, while maintaining attention to the leading goals in each strategic perspective to drive overall performance and efficiency

4 CONCLUSION

Determining the relative significance of business objectives for each company, or group of companies, within each Balanced Scorecard (BSC) perspective is approached as a group decision-making problem. This can be addressed using the fuzzy Delphi method supported by appropriate software. Within each BSC perspective, the management team identifies business objectives and also defines the links between objectives across different perspectives.

Each management team member evaluates the relative importance of the objectives, and these assessments are compiled into matrices similar to those used in the Analytic Hierarchy Process (AHP). The elements of these matrices are expressed as linguistic statements and modeled using triangular fuzzy numbers. Individual evaluations are then aggregated through the fuzzy Delphi process to achieve consensus on the relative importance of each objective. Based on the resulting effectiveness scores, objectives are further classified using the ABC method, which establishes priorities for management actions aimed at their improvement.

Small and medium-sized enterprises (SMEs) play a central role in economic growth, representing the most dynamic and efficient segment of the economy. Achieving optimal economic and social outcomes requires a balanced mix of small, medium, and large enterprises, which interact both competitively and complementarily to create synergistic effects. Consequently, fostering the growth and expansion of existing companies, along with supporting the development and commercialization of entrepreneurial initiatives, is critical for sustainable economic development.

Management actions - such as revenue enhancement, asset reduction, cost optimization, or combinations thereof - depend largely on a company's available resources and its distance from a turning point. During crisis situations, all options must be systematically evaluated, considering tax and balance sheet implications as well as operational outcomes. Decisions are guided by both the company's current and future strategy and the capabilities of top management. Initial measures that successfully motivate employees and generate short-term improvements increase the likelihood of overcoming crises. Additionally, thorough value analysis is necessary to identify and eliminate unnecessary costs, particularly in products or services that do not add value.

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APPENDICES

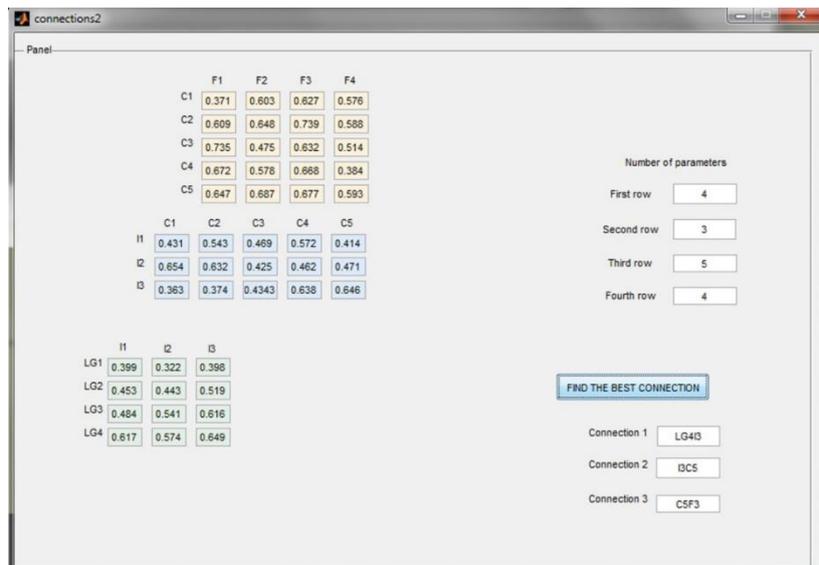
Figure 1

Evaluation of the achievement and effectiveness of business objectives across each perspective for public companies

Name	Progress
Balanced Scorecard	63,47 %
Financial Perspective	68,34 %
F1	70,45 %
F2	68,35 %
F3	70,27 %
F4	60,2 %
Customer Perspective	63,21 %
C1	50,67 %
C2	68,75 %
C3	63,16 %
C4	63,2 %
C5	70,3 %
Internal Processes Perspective	59,33 %
I1	58,9 %
I2	61,45 %
I3	57,65 %
Learn and Growth Perspective	60,69 %
LG1	60,53 %
LG2	65,79 %
LG3	58,23 %
LG4	58,2 %

Figure 2

Optimal strategy path in the strategic map of a public organization



Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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