Proposal for a Prospective Strategic Planning Model for Research Institutes: A Case Study on Innovation Management Within the Health Economic-Industrial Complex

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The healthcare industry plays a significant role in national GDP and is heavily invested in frontier technologies. Health innovations are closely tied to the scientific sector, which generates evidence for the development of new drugs, medical equipment, and clinical procedures. However, transforming research outcomes into products has been a persistent bottleneck in Brazil. Given this challenge, the study aims to propose a prospective strategic planning model for managing research, development, and innovation (RDI). This is a case study based on the Design Science Research (DSR) methodology, focusing on the production of an artifact. The study will follow five stages to construct the theoretical framework, assess the state of the art in prospective strategic planning for R&D, conduct content analysis of interviews, and validate the model through a focus group. The expected contribution is to enhance RDI management within the Health Economic-Industrial Complex (HEIC).
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The health industry is recognized for its dynamism, knowledge absorption, and balance between economic development and social well-being, with Brazil's Unified Health System (SUS) among the largest consumers of innovation [1,2]. Health-related activities and services, both public and private, account for around 9 million jobs, 10% of the GDP, and one-third of national investment in research and innovation [3].

In Brazil, the productive health system, comprising both industrial and service sectors, exhibits high innovation intensity and is one of the most dynamic areas of the knowledge economy. It is referred to as the Health Economic-Industrial Complex (HEIC) [2,3]. The incorporation of innovation and technological development has been key to achieving competitive advantage in various industries [4]. However, despite the growing generation of scientific knowledge, this has not translated effectively into innovation [5]. Thus, universities and research institutes must move forward with the transfer of technologies under development to generate tangible products for society. Technological foresight emerges as a valuable tool for identifying opportunities by leveraging scenarios and trends to guide strategic decision-making in innovation management for the healthcare sector [6].

Therefore, an in-depth analysis of prospective planning methods and the identification of those most suited to the empirical reality of health research institutes (HRI) can enhance the scientific and technological capacity of these organizations and promote the integration of new products, services, and processes within the HEIC [7].

The objective of this study is to propose a methodological model for prospective strategic planning applied to HRI in Brazil, focusing on the introduction of innovations in the chemical-biotechnological and information-connectivity subsystems of the HEIC.

Materials and Methods

This exploratory research is grounded in the Design Science Research (DSR) methodology, which seeks to produce a viable artifact—whether a construct, model, method, or instantiation—

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utilizing rigorous methods for both construction and evaluation [8].

The study will proceed through five main stages: Narrative literature review on health innovation, prospective strategic planning methods, and the HEIC, including aspects related to the State's role in regulation and innovation policy.

Documentary research, based on secondary administrative data from an HRI project portfolio, to identify competencies in RDI. This stage aims to detect PDI projects capable of generating innovation in: The chemical and biotechnological subsystem (e.g., medicines, active pharmaceutical ingredients, vaccines, reagents, and diagnostics), and the information and connectivity subsystem (e.g., Health 4.0 enabling technologies such as Big Data, IoT, cloud computing, AI, and additive manufacturing).

Qualitative research, using content analysis [9] of semi-structured interviews with researchers and managers at the selected HRI, to assess perceptions about foresight methods that enhance strategic planning for RDI.

Development of the methodological model, structured according to results from the previous stages, integrating theoretical, empirical, and technological insights.

Validation of the model through a focus group composed of actors from the health innovation ecosystem identified in earlier phases, to evaluate and refine the artifact's effectiveness in strengthening HRI innovation role within the HEIC.

Theorethical Foundation

The transformations in global production and innovation since the 2000s have been largely driven by the strategies of transnational corporations (TNCs) and national governments. In the health sector, major TNCs dominate the global pharmaceutical market, and their home countries actively promote the maximization of intellectual property rights through TRIPS, thereby consolidating monopolies in frontier knowledge sectors [10,11].

The innovation ecosystem in health comprises a complex institutional arrangement involving industrial firms, health service providers, academic and research institutions, funding agencies, civil society, and regulatory and policy bodies for science, technology, industry, health, and intellectual property [3].

In this context, technological foresight is understood as any activity that enhances the understanding of the future consequences of current developments and decisions. It adopts a systemic approach, considering all interrelated factors and actors to identify possible, desirable, and achievable futures [12].

Technological foresight enables evaluation of the current landscape in the health sector, identifying how technologies have been developed and incorporated into the market, their competitiveness, and potential areas for improvement [13]. Its ultimate goal is to uncover strategic research areas and emerging technologies capable of generating scalable economic and social benefits [14].

Understanding innovation processes and their ecosystem is therefore crucial for designing public policies and organizational strategies that can identify and address bottlenecks limiting health innovation [15].

Conclusion

This study aims to enhance innovation management processes within health research institutions by proposing a prospective strategic planning model for innovation, grounded in business intelligence tools. The model is expected to generate reliable, actionable information to support decision-making in HRI enabling a more refined vision of the future and strengthening their role in the HEIC innovation ecosystem. Once validated, the model will be made available for application in other HRI institutions interested in adopting prospective methodologies for managing technological and industrial innovation. The proposed methodological model aims to

foster research, development, and innovation in technologies and services that promote health, prevention, diagnosis, treatment, and rehabilitation, thereby contributing to reducing vulnerabilities in the SUS and expanding universal health access in Brazil.

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