

The interplay between research and care: Performance management in hospitals with scientific purpose in Italy

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Research hospitals are healthcare organizations that deal with clinical treatment and innovative research. While performance frameworks across healthcare settings have been debated by academic and practitioner literature, little has been researched about the relationships between performance management and the dual nature of such organizations. By adopting a multiple case study methodology, this paper broadens the knowledge on the role played by the dual nature of research hospitals in influencing the development of performance management systems, particularly the selection of performance measures.

The research focuses on three Italian Scientific Institutes for Research, Hospitalization, and Healthcare (IRCCS) that have different specializations, sizes, and geography. Findings indicate that the twofold mission of such institutions influences performance management frameworks, but not homogeneously, since it may be influenced by their history.

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L'interazione tra ricerca e assistenza: la gestione della performance negli ospedali con finalità scientifiche in Italia

Gli ospedali di ricerca sono organizzazioni sanitarie che perseguono finalità di ricerca unitamente a prestazioni di ricovero e cura di alta specialità. Nonostante la gestione della performance nei contesti sanitari non rappresenti una novità nella letteratura accademica e professionale, poco si è indagato sulle relazioni tra gestione della performance e la duplice natura degli ospedali di ricerca. Pertanto, attraverso una metodologia per casi studio multipli, questo studio cerca di sviluppare un quadro completo del ruolo svolto dalla duplice natura degli ospedali di ricerca nell'influenzare lo sviluppo di quadri di gestione della performance, in particolare la selezione delle misure di performance.

La ricerca si concentra su tre Istituti Scientifici di Ricovero e Cura a Carattere Scientifico (IRCCS) italiani con diverse specializzazioni, dimensioni e ubicazioni geografiche. I risultati indicano che la natura duale di tali istituti influenza i framework di gestione della performance, ma non in modo uniforme, poiché per esempio può essere influenzata dalla loro storia.

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Parole chiave: sistemi di gestione della performance, Balanced Scorecard, BSC, ospedali di ricerca, organizzazioni sanitarie, settore pubblico.

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1. Introduction

Performance management in healthcare settings is far from being a novelty (Purbey, Mukherjee and Bhar, 2007). Several organizations in this domain have resorted to performance systems such as the well-known balanced scorecard (BSC) framework (Kaplan, 2009; Kaplan and Norton, 2005). The characteristics of performance systems across healthcare settings have largely been debated by academic and practitioner literature. One recurrent finding is that performance systems frequently undergo adaptation to suit specific contexts (Bohm *et al.*, 2021).

Among healthcare organizations, research hospitals, that is health research and care organizations or hospitals with scientific purpose (Catuogno *et al.*, 2017), are, in this respect, a polar case. They are organizations that simultaneously face heterogeneous values, divergent, and, potentially, conflicting goals and logics (Begkos and Antonopoulou, 2022). On the one side, they have to provide clinical care and medical treatment, and, on the other, teach future doctors and foster innovation and highly specialized research, which can be complementary activities and feed into each other, but might also respond to multiple interests and aims following different procedures (Trotta *et al.*, 2013). They are, therefore, a relevant empirical setting to understand how

context shapes the deployment of performance management systems in healthcare (De Waele *et al.*, 2021).

To further explore this issue, this paper addresses the following research question: whether and how does the dual nature of research hospitals influence the deployment of performance management systems? More specifically, how does it affect the selection of performance measures?

The work is carried out through the documental analysis of performance-related information for specific case studies (Yin, 2018), focusing on a selection of Italian research hospitals. Results contribute, first of all, to research on performance management in healthcare, secondly to the research agenda focusing on research hospitals management and governance, and, on the more practical side, they might provide healthcare managers with useful inputs on how to design and deploy useful performance management frameworks in complex contexts.

The remainder of the paper is organized as follows: section 2 offers a brief overview of the main theoretical underpinnings of performance management in healthcare focusing on research hospitals, section 3 illustrates the methodological choices, section 4 presents the benchmark framework for analysis, section 5 outlines the main findings which are discussed in section 6, while some final considerations and future research avenues are highlighted in section 7.

2. Theoretical background

Performance management helps assess and monitor how well an organization is moving towards its stated goals, helps discover areas of strengths and weaknesses, and helps decide on future initiatives. It is a tool for better

management, not a goal in itself, so much that an organization must have a system in place for implementing strategic change and be able to foresee changes that will be required to follow the organization's strategic direction (Purbey, Mukherjee and Bhar, 2007).

2.1. Basic components of performance frameworks: measurement, incorporation, use

According to a well-known taxonomy, the design of performance management systems revolves around three main notions: measurement, incorporation, and use of performance information (Bouckaert and Halligan, 2008). Measurement means the selection of congruent performance measures, that is performance areas, indicators, and related measurement methods that reflect the organization's strategy, and the collection of data to feed such selected measures. Incorporating means intentionally importing performance-related data in plans, documents, and organizational procedures in place within an organization, with the purpose of using them. Incorporation makes it possible to use performance information for decision-making purposes, i.e. managers decide courses of action based on the available performance information. Summing up, it is a logical sequence of selecting the metrics and collecting data to feed them, integrating this performance information into the management systems, and, finally, putting

information at work for decision-making purposes. Hence, such a process serves several functions, such as providing directives, energizing, inducing persistence, and allowing the use of task-relevant knowledge and strategies (Garlatti and Pezzani, 2000; Merchant and Van de Stede, 2017).

Following this perspective, this research focuses on the first step that is the selection of congruent performance measures in research hospitals, which means considering their multiple aims and specific requirements (Fig. 1).

2.2. Multidimensional performance frameworks: general logic and level of analysis

To overcome the recurrent problems of performance systems that lead to choosing measures that may steer towards undesirable outcomes and behaviors (Merchant, 2006), organizations have resorted to multidimensional performance systems that combine summary accounting measures with non-financial measures, along relevant performance dimensions. Numerous stylized combination systems with trade names have been developed and publicized in recent years, however, the best known is surely the BSC (Kaplan, 2009; Kaplan and Norton, 2005). The basic logic of these approaches is to capture the organizational strategy and its causal links and then align the measurement systems to the organizational strategy. This leads to measure performance along a few

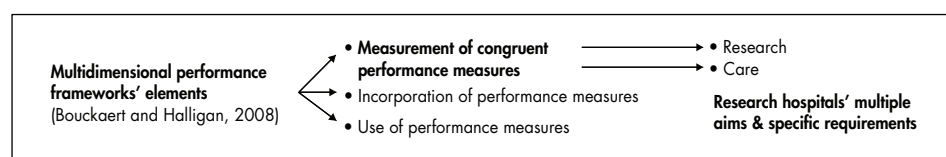
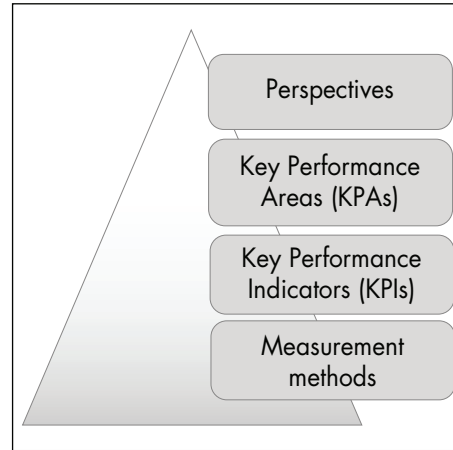


Fig. 1
Research focus

Fig. 2
BSC levels of analysis



selected strategic perspectives and against selected measures, that is key performance areas (KPAs), key performance indicators (KPIs), and measurement methods (Fig. 2).

More specifically, strategic perspectives refer to different angles through which an organization assesses its performance and progress toward its strategic goals. The strategic perspectives to be included in a BSC have undergone revisions over the years (Brignall, 2008); however, traditional perspectives are financial, customer, internal business processes, learning, and growth perspectives (Kaplan and Norton, 1996). KPAs, or macro-objectives, refer to the most important fields within an organization where specific roles, responsibilities, or functions are defined; KPIs are specific and measurable metrics used to evaluate the degree of achievement of performance level defined for each KPA, and lastly, measurement methods are the techniques or approaches employed to gather, analyze, and interpret data related to those KPIs.

Based on this, one assumption concerns the importance of a cause-and-

effect relationship between the proposed perspectives, as it allows non-financial measurements to transform the performance measurement system into a feed-forward control system (de Haas and Kleingeld, 1999), addressing the issue of the historical nature of accounting data (Kaplan and Norton, 1996). However, as Nørreklit (2000) argues, such a cause-and-effect relationship between the perspectives in the BSC may not actually exist, because of the complexities and interdependencies within perspectives which are relevant to a specific organization and context. Hence, a BSC should be tailored to the specific characteristics of an organization rather than replicate a boilerplate solution (Merchant and Van der Stede, 2017).

2.3. Multidimensional performance frameworks in research hospitals

Multidimensional performance systems have been largely in use in the healthcare domain as such organizations are complex and knowledge intensive (Massaro, Dumay and Garlatti, 2015). The BSC, in particular, has been utilized by many healthcare organizations worldwide since its inception (Amer *et al.*, 2022). The tool has been applied to address a variety of challenges that range from the imperative to improve quality and safety of care, guide the administration of public healthcare services, support its financial sustainability, and the competitiveness of private healthcare corporations in market systems (Bohm *et al.*, 2022). Its effects have largely been debated too. For example, differently from what the theory maintains (Longenecker and Fink, 2001), BSC implementation demonstrated a mild impact for effects related to healthcare workers' satisfaction (Amer *et al.*, 2022), but positive

outcomes for patient satisfaction and the financial performance of healthcare organizations.

It is true that the cases under analysis are public healthcare organizations within a National Health Service (NHS), so they have mostly to comply with accountability requirements of financial resources provided by the Ministry of Health: however, this is not meant to imply that financial measures are unimportant to such organizations. In fact, despite their core mission being to deliver research and healthcare services (Baraldi *et al.*, 2005) as well as create public value, research hospitals must be equally concerned about their financial viability, their ability to cover operational costs with revenues, as their private sector counterparts (Moore, 2003). As a consequence, the relationships between the different perspectives of the BSC are more complex and interdependent (Nørreklit, 2000) than the original model suggests (Kaplan and Norton, 1996), thereby requiring the BSC to be more flexible in order to capture the real dynamics of organizations.

The present paper focuses on health institutions that combine clinical and research activities. The coexistence of two institutional aims and the related accountability requirements makes them dual nature organizations. The main feature of such organizations is that they respond to multiple institutional environments with activities and procedures which can be synergic, yet sometimes conflicting because led by opposing logics (Grossi *et al.*, 2017). For example, clinical experience may feed into research making it more relevant, as much as innovative research findings may be deployed in medical treatments. At the same time, the level of privacy, patient and stake-

holder engagement, accountability, varying timeframes, and so on, may all be features which are dealt with differently by care and research, so that a double-up of practices is needed, or they may characterize only one set of activities and impair the other (Trotta *et al.*, 2013). This feature influences several organizational elements and performance systems are one of them (Catuogno *et al.*, 2017), since the multiple accountability systems and the diverse nature of activities call for a complex combination of performance perspectives and related measures (De Waele *et al.*, 2021).

3. Methodology

We carried out a documental analysis on multiple case studies to explore how the dual nature of research hospitals affects the development of the tools used by performance management systems, such as the BSC framework. This approach is considered suitable for the purposes of this study for three main reasons. First, multiple case analysis supports researchers in comparing cases from one or more settings, communities, or groups, thus collecting a broad array of data (Hartley, 1994). Second, it helps researchers accumulate case knowledge, compare cases, and in doing so, generate new knowledge (Khan and VanWynsberghe, 2008). Hence, it provides opportunities to learn from different cases and gather critical evidence. Third, the cases play a supportive role, facilitating the understanding of specific issues, when conducting exploratory research on complex phenomena in real-life contexts (Eisenhardt, 1989). Case study methodology (Yin, 2018) is thus useful in providing an in-depth understanding of a specific

context, with the focus being on analytical rather than statistical generalizations.

The analysis adopted a case-oriented strategy (Miles and Huberman, 2014) to study a small number of cases that are substantively or theoretically significant in an in-depth manner (Ragin, 1999). In case-oriented research, commonalities across multiple instances of a phenomenon may contribute to conditional generalizations (Miles and Huberman, 2014). Researchers can thus highlight that the outcomes in the selected cases are alike enough to be treated as instances of the same thing, with a special emphasis on the case itself (Khan and VanWynsberghe, 2008). More specifically, we focused on three Italian Scientific Institutes for Research, Hospitalization, and Healthcare (“Istituti di Ricovero e Cura a Carattere Scientifico”; IRCCS): the National Cancer Institute of Milan, the Rizzoli Orthopedic Institute of Bologna, and the National Institute for the Study and Treatment of Cancer “Giovanni Pascale Foundation” of Naples.

IRCCS are biomedical institutions of relevant national interest, which drive clinical care in strong relation to training and research activities. The dual nature of such organizations is reflected in their mission, that is to drive innovation and excellence in healthcare, fostering continuous improvement and setting high standards for medical practice and education (Legislative Decree Oct. 16, 2003, no. 288). The IRCCS title is granted by the Italian Ministry of Health to a very limited number of institutes throughout the country, 51 at the time of writing. They are committed to be a benchmark for the whole public health system for both the quality of patient care and the innovative

solutions they propel. Thus, they represent crucial empirical settings to investigate how different contexts shape the development of performance management frameworks (De Waele *et al.*, 2021). In particular, we considered three public IRCCS with multidimensional performance management systems and operating under the same premises and regulatory framework. They all fall under public jurisdiction, but with different specializations (oncology, orthopedics, and traumatology) and from different locations (North, Central, and South Italy), in order to verify whether their institutional profile, that is public organizations with dual nature, prevails on their operational and contextual settings and helps explain their performance management frameworks.

3.1. Benchmark framework and analysis
For each case, we collected the latest performance plans and performance reports. These documents provide fundamental information on how these organizations are coping with the development and further implementation of performance management frameworks. We also relied on the other components of the *Piano Integrato delle Attività e dell’Organizzazione* (PIAO, Integrated Activity and Organisation Plan). This was done to ensure a comprehensive understanding of each organization’s performance context and strategic priorities. Such documents provide additional insights and corroborate performance data, offering a more transparent and complete view of organizations’ performance and strategic alignment.

To appreciate how performance management frameworks were developed in the three IRCCS, we first considered

the literature on the BSC deployment in research hospitals (e.g., Bassani *et al.*, 2022; Catuogno *et al.*, 2017; Lupi *et al.*, 2011; Mauro *et al.*, 2014; Trotta *et al.*, 2013; Verzola *et al.*, 2009) in light of

the original application of the BSC framework in the public sector (Kaplan and Norton, 2001; Modell, 2005).

Tab. 1 exemplifies the framework concerning perspectives and KPAs. As it

Tab. 1 – BSC perspectives and KPAs

BSC (1 st generation)	Perspectives	Financial	Customer	Internal business process	Learning & growth
Verzola <i>et al.</i> , 2009	Perspectives	Financial resources	Community	Internal procedure	Growth & learning
	KPAs	Ensure financial sustainability	Satisfy healthcare needs; Increase user trust; Ensure equal, appropriate & sustainable services; Safeguard the working environment	Rationalize and innovate products and service structures; Increase attractivity; Accreditation procedure; Improve relationships with users; Improve performance; Improve response capacity; Risk Management; Maintain hygiene and organizational standards	Human assets; Organizational assets
Lupi <i>et al.</i> , 2011	Perspectives	Financial resources	Community	Internal processes	Growth & learning
	KPAs	Ensure financial sustainability	User; Owner; Public Entity	Rationalize and innovative user knowledge and capacity of response; Risk Management; Relationship with user; Accreditation procedure; Improve performance	Human assets; Organizational assets; Information assets
Trotta <i>et al.</i> , 2013	Perspectives	Economic & financial	Customer	Internal processes	Research, education & teaching
	KPAs	/	Patients; General practitioners	Waiting time; Quality; Productivity	Incentive plan; Strategic database
Mauro <i>et al.</i> , 2014	Perspectives	/	/	Internal processes	/
	KPAs	/	/	Improve organization performance in terms of conducting its activities without problems or internal strains	/
Catuogno <i>et al.</i> , 2017	Perspectives	Economic & financial	Stakeholder satisfaction	Care process	Research process
	KPAs	Revenues; Costs	Patient satisfaction; Employees satisfaction	Quality, productivity, and internal efficacy	Scientific research; Innovative process

Source: authors' elaboration from Catuogno *et al.*, 2017; Lupi *et al.*, 2011; Mauro *et al.*, 2014; Trotta *et al.*, 2013; Verzola *et al.*, 2009

can be seen, most of the literature on research hospitals follows the 4 perspectives outlined in the traditional BSC framework (Kaplan and Norton, 2005; Lawrie and Cobbold, 2004), namely financial, customer, internal business process, learning and growth, even if they may use slightly different names for some of those categories and related KPAs differ. The only exception is Mauro *et al.* (2014) which includes only one perspective which can be referred to the traditional BSC, while the other three are of a different nature (rationale; open systems; human relations).

This confirms that the traditional BSC framework provides a solid basis to analyze the three IRCCS under study: its widespread use in research hospitals (Bassani *et al.*, 2022; Catuogno *et al.*, 2017; Lupi *et al.*, 2011) and adaptability to specific needs (Mauro *et al.*, 2014) makes it a suitable framework for structured and comparative performance analysis in public healthcare settings (Kaplan and Norton, 2001; Modell, 2005). Thus, we employed it to appreciate both the levels of analysis, that is the performance perspectives and their related measures (KPAs, KPIs, and measurement methods), and the interplay with the dual nature of the three organizations.

For the analysis, we followed the four-step method by Miles and Huberman (1994): within-case analysis, data reduction, cross-case analysis, and conclusion drawing/verification. First, data from each unit were analyzed separately to offer a picture of the role played by the dual nature of health research and care organizations in influencing the development of performance management frameworks. The same data analysis framework

was used for each unit. Second, the collected data were transcribed into case descriptions to check their correctness, prevent observer bias, and enhance the credibility of the interpretation (Lincoln and Guba, 1985). Third, comparisons of the cases were made to identify similarities and differences and determine the combination of factors explaining them. Fourth, the analyzed data were structured and indexed into separate fields or case categories to interpret the results and derive meaningful insights and conclusions. By applying criteria for scientific trustworthiness such as reliability, credibility, confirmability, and transferability of the inferences made, the last phase not only finalized data analysis but also verified the solidity of conclusions, ensuring they are well-supported by collected evidence.

4. Findings

Data were collected from the National Cancer Institute of Milan, the Rizzoli Orthopedic Institute of Bologna, and the National Institute for the Study and Treatment of Cancer “Giovanni Pascale Foundation” of Naples, allowing us to obtain a comprehensive picture of whether and how the dual nature of research hospitals affects the development of performance management frameworks. For each of them, an analytical description of their BSC is provided, looking at the different perspectives, the KPAs, KPIs, and related measurement methods. These three levels of analysis were used for both data analysis and presentation, and, for each of them, data sources were indicated. Data from internal and public documents were thereby used to form a

detailed and valid understanding of the complexity of research hospitals' performance management frameworks and their main elements.

4.1. Case study 1 – National Cancer Institute of Milan

The National Cancer Institute of Milan is a hospital hub of international significance and high specialization, founded in 1928 to provide specialized care and contribute to the development of new therapies for cancer being a leading light in oncology research. The National Cancer Institute of Milan has a total of 462 beds and a staff of 2,035 people.

The BSC analysis on the performance plan 2023-2025 revealed the presence of two strategic perspectives (Tab. 2), rather than the four of the traditional BSC model (Kaplan and Norton, 2005; Lawrie and Cobbold, 2004). The first one focuses on “strategy programs” and addresses the question “What are the strategic priorities of the National Cancer Institute and how are these priorities expressed into strategic programs?”, while the second one considers “health status” and questions whether the Institute can carry out its activities while ensuring a balanced use of resources, the development of the organization, and the relationships with stakeholders (citizens, users ecc.).

The first strategic perspective is divided into four key performance areas: quality, patient care, efficiency, and research and innovation. The focus of the KPA “quality” is to achieve and constantly monitor quality standards of performance and services, as well as clinical risk prevention measures; “patient care” concerns the development of the supply network throughout the regional area for comprehensive

and personalized patient care; “efficiency” concerns the hospital's accountability mechanisms and “technological and structural modernization” with the aim of ensuring effective resource utilization, enhancing transparency, and supporting streamlined processes through advanced systems, as emerges from the performance report; and the last KPA “research and innovation” plays a key role in fostering interdependence between the two missions of research hospitals, reflecting their ability to invest in their future and to provide clinical staff and researchers with the most advanced technologies to best carry out their tasks. For each of the previous KPAs, specific indicators are matched. However, the nature of such indicators reveals that some of them do not meet the stringent criteria necessary for true KPIs. Instead, they appear to represent broader dimensions or rationales for measurement rather than specific, measurable results (Catuogno *et al.*, 2017; Merchant, 2006). For instance, the indicator proposed for “patient care” as “simplified and protected accessibility to services” embodies a qualitative dimension rather than an assessable KPI. Similarly, the KPIs for “research and innovations,” which include early detection, effectiveness, and international scientific collaborations, describe important areas of focus but do not present concrete metrics.

The second strategic perspective (“health status”) covers three dimensions. First, the “financial health” KPA assesses costs, liquidity, and solvency, and is measured through specific KPIs such as “economic-managerial equilibrium”, “financial equilibrium”, and asset equilibrium”. The second

dimension entails the organizational health of the institution in terms of both the efficiency and effectiveness of motivating and empowering its employees, executives, and management to the improvement of organizational performance. KPIs associated with this dimension look, for example, at the “human capital”, “organizational wellness” as well as at the level of “digitalization of health-care activities” of the organization. Last, its “citizen” and “stakeholder relationships” KPAs aim to verify the impartiality of health and administrative action through continuous dialogue with the community and in collaboration with its entities, associations, and groups of interest. As such, it is mainly measured through the “number of reports and complaints” or the level of “customer satisfaction”. More detailed results of the analysis are specified in Tab. 2.

Thus, the two institutional dimensions of the National Cancer Institute of Milan influence the performance management framework and are addressed in both perspectives, namely “strategy programs” and “health status”. In the first perspective they are depicted in two different KPAs, namely “patient care”, epitomized by a single KPI (“simplified and protected accessibility to services”), and “research and innovation”, measured through three KPIs each represented by three different measurement methods. In the second perspective, they are present respectively, for example, in the “organizational efficiency” and “research” KPAs and they are measured mainly through the number of national and international publications per researcher and the journal annual impact factor.

4.2. Case study 2 – Rizzoli Orthopedic Institute of Bologna

The Rizzoli Orthopedic Institute of Bologna is a hospital and research center with a focus on orthopedics and traumatology. It was founded as a care institute in 1896 by Francesco Rizzoli, a famous surgeon. The founder himself wanted innovative methods and treatments to be practiced and tested in the institute thereby promoting the integration of research within the main care tasks.

However, only in 1981 the Italian Ministry of Health recognized the high quality and innovative nature of care achieved by the institute and awarded it the title of IRCCS. Its strength lies in the close integration of care activities (more than 150,000 patients visited annually and 15,000 hospitalizations performed) and the scientific research carried out by 10 research laboratories. In addition, the institute is used as a higher education teaching facility. The Rizzoli Orthopedic Institute is equipped with a total of 344 beds and a staff of more than 1,400 people.

The BSC developed for the 2021-2023 performance plan (the 2023-3025 one was not available at the time of writing), focuses on the following perspectives: users, internal processes, research and innovation, and financial sustainability, which can be traced back to the traditional BSC model (Kaplan and Norton, 2005; Lawrie and Cobbold, 2004). From a user perspective, the institution’s aims concern improving the overall user experience with respect to the delivery of facilities and services. KPIs are detailed in relation to the key areas of improvement and are supported by specific measurement tools (e.g., ER user dropout rate or waiting time

Tab. 2 – Structure of the BSC measures – National Cancer Institute of Milan

Perspectives	KPAs	KPIs	Measurement method
Strategy programs	Quality	Adherence to OECl (Integrated organizational improvement program) quality standards (2022-2025 improvement plan)	Number of OECl sub-standards with improved scores in the current year/total to be improved
		E-HEALTH program	Date of appointment notification
			Startup date of totem self-acceptance
			Telemedicine startup date
	Patient care	Simplified and protected accessibility to services	Projects implemented/planned projects
	Efficiency	Implementation of the anticorruption and transparency measures (2023-2025 Plan for Corruption Prevention and Transparency)	Number of completed prevention measures/number of measures that are planned to be completed by 2025
		Technological and structural modernization	Projects completed within the Investment Plan/planned projects
Research and Innovation		Primary, secondary prevention, and early detection	Increase % of patients enrolled in prevention clinical trials
			Number of scientific publications
			Number of training events
		Precision medicine, therapeutic innovation, and effectiveness of healthcare interventions	Increase % of patients enrolled in clinical trials
			Number of scientific publications
			Increase % of completed fields in (clinical-scientific Datawarehouse)
		Programs and interventions for internationalization and cooperation in biomedical research	Increase % of international projects
			Number of scientific collaborations and partnerships
			Number of incoming and outgoing mobility paths for researchers
Health status	Financial health	Economic-managerial equilibrium	% incidence of direct healthcare costs
			% incidence of direct non-healthcare costs
			% private practice revenues
		Financial equilibrium	% quick ratio
			% current ratio
		Asset equilibrium	Current assets/total assets
			% debt

(segue)

Perspectives	KPAs	KPIs	Measurement method			
Health status Financial health			Average length of debt (days)			
			% of inventory turnover			
			average length of credit (days)			
			% of incoming turnover			
			% of outgoing turnover			
			% organizational flexibility			
			% of organizational capacity			
			% of seniority index			
			% of executive staff composition			
			Incentives allocated/contractual budgets (%)			
			% absenteeism			
			% of female personnel			
			% permissive leave			
			% personnel with disabilities			
			Number of national and international publications			
Annual impact factor						
Standardized impact factor/FTE (Full-time Equivalent Hours) (%)						
Number of active clinical trials						
Number of patients enrolled in active clinical trials						
Number of scientific collaborations with international organizations						
Organizational efficiency	Management structure of beds		Number of beds for ordinary hospitalization			
			Number of Day Hospital (DH) beds			
			Number of saturated beds (ordinary + DH)			
			% business rotation			
			% surgical area rotation			
			% medical area rotation			
			% bed occupancy			
			% of surgical area occupancy			
			% of medical area occupancy			
			Number of hospitalizations per Medical Director (ordinary + DH)			
			% of ambulatory services per Medical Director			
			Rotation index			% business rotation
						% surgical area rotation
						% medical area rotation
			Bed occupancy rate			% bed occupancy
% of surgical area occupancy						
% of medical area occupancy						
Human resources productivity			Number of hospitalizations per Medical Director (ordinary + DH)			
			% of ambulatory services per Medical Director			

(segue)

Perspectives	KPAs	KPIs	Measurement method
Health status	Organizational efficiency	Human resources productivity	Number of visits (first visits + follow-up) per Medical Director
			Beds per Medical Director
			Beds per Department Staff
			Production in euros (hospitalizations, ambulatory)/total Medical Directors in service
		Healthcare activity – case mix complexity	Average corporate weight
			Average surgical area weight
			Average medical area weight
		Digitalization of healthcare activity	% of SISS (Specialist Inclusion Support Service) referrals/total ambulatory referrals
			% of SISS referrals/total radiology referrals
			% of SISS referrals/total analysis laboratory referrals
			% of SISS referrals/total discharge letters
		Citizen relationships	Number of complaints about service communication
			Number of complaints about performances and organizational inadequacies
			Number of praises
		Praises	Number of praises
		Claims	% of disputes resolved within the year/total disputes opened in the year (compensation cases only)
			% of accident compensations opened in the year/total accidents in the year
			% of disputes resolved in the reporting year/total disputes handled in the reporting year and previous year
		Customer satisfaction	Attention from the medical staff in the ambulatory setting (min 1, max 7)
			Clarity and completeness of information (min 1, max 7)
			Overall satisfaction in the ambulatory (min 1, max 7)
			Assistance quality of the medical staff (min 1, max 7)
			Assistance quality of the nursing staff (min 1, max 7)
			Information quality about health status and care (min 1, max 7)
			Overall satisfaction with the hospital (min 1, max 7)
	Stakeholder relationships	Donations	Donations in euros
		Testamentary legacies	Legacies in euros

Source: authors' elaboration of National Cancer Institute of Milan performance plan 2023-2025

before surgery for tibia/fibula fracture).

The “internal processes” perspective is divided into four KPAs and analyses aspects that are not always immediately perceived by the users but are fundamental to ensure that the services are carried out efficiently, effectively, and safely. KPAs refer to the quality and appropriateness of services performed, to clinical risk management, to business organization, and lastly to anti-corruption and transparency measures.

The “research, innovation, and development” perspective is aimed at ensuring the improvement of the services provided and the professional skills of the working staff. This strategic dimension is divided into two KPAs: the first is the area of research and teaching, which looks both at the international scientific impact of the institute and the development of research and teaching activities, and it is measured through the number of average publications per researcher, the Impact Factor, and the number of observational studies or clinical trials. The second area refers to the development within the organization, and it is measured through the number of educational events for the employees.

Lastly, the “financial sustainability” perspective analyses the correct use of available resources, with reference to both costs/revenues and investments. On the one hand, it looks at the objectives of economic-financial sustainability and equilibrium (economic-financial sustainability key area), and on the other hand, it looks at the implementation of planned investments and technological renewal (investments key area). Tab. 3 further illustrates the findings.

In relation to the dual nature of the Rizzoli Orthopedic Institute of Bologna, the BSC framework highlights only the research dimension in the “Research, innovation, and development” perspective”. The clinical care dimension is spread across both the “user” and the “internal processes” perspectives: for example, the “user” perspective addresses a more facilitated access to ambulatory specialists and diagnostic care, in order to provide timely and efficient access to specialized medical care, the mortality rate and waiting time for surgeries while the internal processes dimension concerns the appropriateness and quality of the services provided as well as the clinical risk management.

As mentioned above, the original intentions of the institute’s founder, Francesco Rizzoli, were to establish a model of integrating research and care. Therefore, as emerged from the performance plan and report, its research essence was given a specific role from the very beginning in the consequent BSC formulation, rather than influencing the performance management framework as in the case of the National Cancer Institute of Milan.

4.3. Case study 3 – National Institute for the Study and Treatment of Cancer “Giovanni Pascale Foundation” of Naples

The National Institute for the Study and Treatment of Cancer “Giovanni Pascale Foundation” founded in 1933 by Senator Giovanni Pascale in Naples, combines research activities (experimental and clinical) and care services of high complexity and quality. It was the first Italian oncology institute with a departmental structure, in which different specialists can work together

Tab. 3 – Structure of the BSC measures – Rizzoli Orthopedic Institute of Bologna

Perspectives	KPIs	Measurement method
User	Facilitated access to ambulatory specialists and diagnostic care	% of accesses with stay < 6+1 hours in ER (Emergency Room)
	ER filter index	% of ER admitted accesses to the same or other regional structures
	Dropouts	% of dropouts from ER
	Waiting times for hip replacement	% of cases within 180 days
Integration between hospital and local care	Patients followed at distance	Number of patients being discharged to Integrated Home Care
Outcomes performance	Mortality rate	30-day mortality after surgery for lung cancer
	Waiting times	Waiting time before surgery for tibia/fibula fracture
	Waiting times in the ordinary regime	% of patients (65+) with femoral neck fracture operated within 2 days
Internal processes	Dependency on population index – same Region	% of dependency
	Dependency on population index – out of the Region	% of dependency
	Dependency on population index – same Province	% of dependency
	Case mix index	% of case mix in ordinary hospitalization
	Comparative performance index	Performance comparison
Appropriateness, quality, security, and clinical risk management	Inappropriateness rate	DRGs (Diagnosis-related Groups) hospitalizations at high risk of inappropriateness/DRGs hospitalizations not at risk
	Post-operative risks	Post-operative sepsis per 1000 surgical discharges Post-operative pulmonary embolism or deep vein thrombosis per 1000 surgical discharges
Organizational performance	Electronic health record	% lab referrals produced according to CDA2 (Clinical Document Architecture) standard and digital signature % specialist and radiology referrals produced according to the CDA2 standard and digital signature % ER referrals produced according to CDA2 standard and digital signature % hospital discharge letters produced according to CDA2 standard and digital signature

(segue)

Perspectives	KPAs	KPIs	Measurement method
		Agile working	% current agile workers/total workers % current agile workers/potential agile workers % agile workdays/total workdays
	Anticorruption and transparency	Transparency duties Contracts and tender procedures	% fulfillment of transparency commitments % of expenditures managed from Intercenter agreements % of expenditures from supra-agency tenders
Research, innovation, and development	Research and education	Research publications Impact Factor Increase clinical trials and observational studies	Average number of publications per researcher Normalized Impact Factor Number of clinical trials approved by the European Commission (EC) Number of observational studies approved by the EC Number of active clinical trials/total active studies Number of active observational studies/total active studies
	Organizational development	Staff training	Number of educational events/planned events
Financial sustainability	Economic-financial sustainability	Timeliness of payments DIME flow stability (Medical Devices) Revenues from extra-regional patients	Days of late or advance payment DIME flow coverage rate on financial statement % cost of healthcare goods on total revenues % cost of healthcare services on total revenues % cost of non-healthcare services on total revenues % personnel cost on total revenues
	Investments	Compliance with the Investment Plan Modernity of technological tools Investments in IT	Value of completed projects/value of planned projects % of large equipment with age < 10 years Value of software investments/average value of software investments in the previous three years

Source: authors' elaboration of Rizzoli Orthopedic Institute of Bologna 2021-2023 performance plan

to assess, follow, and treat, the same disease, to convey the different disciplinary know-how, to improve diagnostic as well as therapeutic results. Nowadays, it has 1,014 staff and represents one of the most important oncological centers in Southern Italy. The Institute proceeds on this path of continuous improvement through the incorporation of national and international best practices into its own operational context and through the transfer of research results and innovation into daily clinical activity. In fact, research projects are strongly interdependent, with a continuous exchange of information between laboratory and clinical activities.

The BSC as shown in the performance plan 2023-2025 focuses on three major perspectives: administration, scientific, and healthcare, which have little to do with the traditional BSC framework (Kaplan and Norton, 2005; Lawrie and Cobbold, 2004). The administrative perspective refers to two KPAs: “performance and process quality”, with KPIs such as “risk management”, “user request handling”, “energy saving”, “website management”, “financial statement informatization”, “agile working”, “organizational well-being”, or “telemedicine”, and “transparency, integrity, and prevention of corruption” with “procurement procedures” and “digital information services”. The “scientific” perspective looks at “efficiency in the use of resources”, “staff engagement and growth”, and “the maintenance stakeholder relationships. Last, the “healthcare” perspective looks again but from a clinical point of view at “process quality and performance” with KPIs such as “hospital care optimization”, “waiting times”, and “implementation

of assisting activities”, and “staff engagement and growth” with the only KPI “dissemination of information”. As such, the key strategic areas are split into a number of over-detailed KPIs. The inclusion of such a variety of indicators may risk diluting focus and effectiveness, potentially leading to difficulties in prioritization and resource allocation.

With respect to the other two BSCs, there is no specific perspective or KPA for financial sustainability, although a few economic and financial KPIs are spread across the framework such as “development of responsibility accounting within individual departments” under the administration perspective and “liquidity ratio” under the scientific perspective and so on. As already highlighted in the literature (Moore, 2003; Nørreklit, 2000), while financial stability and sustainability are crucial for any organization, research hospitals may focus more on their core missions of research and healthcare delivery, thereby leading to a more nuanced and flexible BSC formulation. It should be considered that many research hospitals are public healthcare organizations within the NHS and face no profitability issues, but have mainly to account for the financial resources provided by the Ministry of Health and other funders. Tab. 4 provides more details on the findings.

The dual nature of the organization influences both perspectives and KPAs and is spread across the BSC. There are both a “healthcare” perspective and a “staff engagement and growth” KPA which clearly address respectively clinical and research performance. Based on this, it could be said that, as for the National Cancer

Tab. 4 – Structure of the BSC measures – National Institute for the Study and Treatment of Cancer “Giovanni Pascale Foundation” of Naples

Perspectives	KPAs	KPIs	Measurement method
Administration	Performance and process quality	Updating teleworking regulations	Preparation of the resolution
		Updating jobs regulations	Preparation of the resolution
		Updating managerial jobs regulations	Preparation of the resolution
		Updating cost centers	Updates by March 31st, 2023
		Staff alignment to cost centers	Number of complaints managed within 10 days/complaints received
			Number of positions assigned by March 2023/number of missing positions
		Risk management	
		Optimization of legal aids by in-house lawyers	Number of legal aids by in-house lawyers/total active and passive judicial and extrajudicial cases
		Preliminary inquiries to invoices settlement	Response within 10 days after request for invoice
		Management of IS dashboard	Invoice acceptance within 13 days
		Due date of payments	Average payment period
		Setting up the regulations of management and compartmental areas	Preparation of the resolution
		Implementation of website virtual assistant	Number of responses/number of questions received
		Taking charge of users' requests	Number of instances handled in 2 days/instances received
		Feedback to user	Responses within 30 days of instance receipt
		Updating the Service Charter	Posting on the website
		Website management	Proposing regulation
		User requests management	Identification of internal offices as a reference for external calls
		Identification of internal offices as a reference for external calls	Preparation of an Endo-procedural Act
		Supporting trade union activities	Number of requests processed on time/requests to be processed
		Energy saving	Updating the Code of Behavior
			Submission of proposals aimed at energy saving

(segue)

Perspectives	KPIs	Measurement method
Administration Performance and process quality		Number of refrigeration units replaced by July 31st, 2023
		Number of neon light bodies replaced with Led panels
		Number of staff units trained on energy saving topic
		Average working days for Albo Pretorio publications
		Preparation of explanatory circulars
		Implementation of the IT notification procedure
		Adoption of the regulation
		Number of contracts extended/existing contracts
		Number of computerized accounting and budgeting processes
		Approval by July 31st, 2023
		Delivery of the project by December 31st, 2023
		Stipulation of maintenance contract by February 28th, 2023
		Report of acceptance by April 30th, 2023
		Number of employees in agile work being monitored/total number of employees in agile work
		Development of a report about employee agile work satisfaction
		Number of employees being monitored/total number of employees
		Preparation of an organizational well-being report
		Transferring the platform to the institutional cloud and extracting data directly from the dashboard
		Number of new activities on which teleconsultation is implemented
		Implementation of a function to extract data from the dashboard
	Implementation of a function to extract equipment data from the dashboard	
	Implementation of a function to extract equipment data from the dashboard	

(segue)

Perspectives	KPAs	KPIs	Measurement method
Administration	Performance and process quality	Expand the use of smart lockers in all departments	Number of additional departments equipped with smart lockers
		Proper use of lockers	Number of monitored departments/total number of departments
		Integration of the data warehouse with the computerized medical record	Implementation of a function linking the new computerized medical file to the management dashboard
		Activation of ambulatory and departmental medical records	Number of ambulatory clinics activated/total number of ambulatory clinics
		Development of responsibility accounting within individual departments	Number of departments activated/total number of departments
		Modification of the performance measurement and evaluation system	Number of meetings conducted
		Training project on benchmark activities and expenditure data	Activation of the new performance measurement system using the IT platform
		Implementation of management dashboard	Sending the report of the work done
		Increase the effectiveness of anti-corruption and transparency	Creation of a summary report
Transparency, integrity, and prevention of corruption		Transparent administration	Number of new activities in the dashboard
		Anti-corruption and transparency training	Number of procedures for purchasing exclusive and/or non-fungible services/total number of procedures
		Transparency Day	Number of modules completed/total number of modules
		Procurement procedures	Number of checks every six months/total publication duties
		Digital information services	Number of documents published in the Transparent Administration section/number of documents to be published
			Number of training events
			Organization and implementation of the event
			Proposal for resolution by September 30th, 2023
			Report to the Economic and Financial Resources Management Complex Structure by June 30th, 2023
			Number of payments through Pagopa (digital payment for PA)/ number of total payments
			Number of services accessible to citizens through Spid (digital identity)/total number of services
			Adoption of App Io

(segue)

Perspectives	KPIs	Measurement method	
Administration	Performance and process quality	Number of digital signatures delivered to healthcare employees/number of healthcare employees	
Scientific	Efficiency in the use of resources	Number of areas moving to electronic health records	
	Staff engagement and growth	Foreign missions	Number of days between the date of receipt of the invoice and the creation of the settlement decree
		Patents	Approval of the new regulation by December 31st, 2023
		Non-discrimination policies	Number of planned activities
	Non-profit clinical trials	Number of non-profit clinical trials involving staff	
	Scientific production	% of publications in 2023 compared to 2022 (Department of Translational Research)	
	International conferences		% of publications 2023 compared to 2022 (all departments)
			% of scientific publications/total number of publications submitted
			% of national and international conferences attended in 2023 compared with 2022
	Staff training		Number of courses proposed by each department to be included in the Education Plan
Process quality and performance	Research quality assurance		% employees trained in basic life support – early defibrillation/number of total employees
			Clinical trials updated every 4 months
			Number of annual solicitations
			Number of internal audits and checks conducted
			Number of ISO9001 system audits
			Pass the monitoring audit with Certification Authority
	Patient involvement in research		% patients enrolled in 2023/patients enrolled in 2022 by department structures
			% patients enrolled in 2023/patients enrolled in 2022 by their institution
			Number of quarterly reports with data from Multidisciplinary Oncology Group (GOM) and benefit assessment for enrolled patients
	Accreditation procedure		Maintenance of requirements
		Number of simulations conducted for emergency treatment to respect accreditation criteria	
Research funding		Number of simulations conducted for emergency treatment to respect accreditation criteria	
Stakeholder relationships	Scientific collaborations		Number of networks, collaborations, and conventions

(segue)

Perspectives	KPAs	KPIs	Measurement method
Healthcare	Process quality and performance	Hospital Care Optimization	Development of regulations for professional exchanges with universities and research institutions
			Number of projects/clinical studies involving patients
			Number of hospital days prior to surgery/number of discharged patients undergoing surgery
			Hospitalizations at risk of inappropriateness/number of hospitalizations not at risk
			% variation of diagnostic-day hospitalizations (2023-2018)
			% variation of medical accesses (2023-2018)
			Compliance with planned revisions
			Number of reports sent to the Medical Director
			Number SDOs (Hospital Discharge Cards) closed within 30 days of discharge/total SDOs
			Number of services in ALPI (private practice activities)/total services
Reduced accesses			Number of structural and quality requirements met/requirements to be met
			Compliance with environment inspections (with high exposition to ionizing radiation)
			Number of SDOs closed within 30 days of discharge/total SDOs
			Number of judgments transmitted within 15 days/total number of judgments
			Timely transmission of information about pharmaceuticals and medical devices
Timeliness of Information flows			Input of production and hemovigilance data into the SISTRA (Information System and information flows with the Regional Blood Center)
			Ensuring completeness and quality of information flows to Region, Ministry of Health, and other public institutions
			Number of requests fulfilled/requests received
			Number of vascular implants on time/total vascular implants requested
			Average waiting days
Requests for healthcare services			Number of services delivered/services requested
			Number of exams provided/exams requested
			Number of reports sent to the Medical Director
			Number of anatomic pathology requests processed/requests received
			Number of class A services provided within 30 days/class A services to be provided within 30 days
Waiting time			Average waiting time for day-surgeries
			% increase number of patients followed in telemedicine in 2023/patients followed in 2022
Digital information services			Number of online documents available/total documents

(segue)

Perspectives	KPIs	Measurement method
		Number of electronic medical records/total number of medical records
		Implementation of the ambulatory electronic medical record model
	Provision of drugs and medical devices	Number of procurements for drugs and medical devices
		Number of discharges per week
	Implementation of assisting activities	% increase in activity
		PET (emission tomography)/TC (Computed Tomography) installation
		Number of ambulatory openings on a monthly basis
	Innovative diagnostic methodologies	Introduction of new echocardiographic diagnostic methodologies
		Number of innovative methods and/or innovative diagnostic pathways introduced in the year
	Maintaining number of ATOS (experimental oral therapies) ambulatory visits	Difference in the number of visits to ATOS ambulatory compared to 2022
	Appropriateness of service delivery	Number of day-service treatments/number of total treatments
	Appropriateness of the SDO	Number of SDOs checked/number of SDOs to be checked
	Collaborations with ROC (Campania Oncology Network) and GOM	Number of patients initially placed in ROC and directed to GOM/total number of patients
		% of deviation of the number of patients in ROC from the previous year
		Number of sheets entered into the ROC
		% deviation in the number of ambulatory visits from the previous year
		Participation number in GOM
		% increase in the number of patients registered in ROC
		Number of patients placed in the ROC compared with the number of patients undergoing ordinary hospitalization
	% DRG (Diagnosis Related Groups)	Number of surgeries/total number of ordinary hospitalizations
	Urgent blood counts reporting times	Average time, within 40 minutes of check-in, to report urgent blood counts for chemo-patients
	Cardiovascular risk	% of patients to whom cardiovascular risk stratification applies
		% of patients undergoing cancer surgery to whom cardiovascular risk stratification applies
Staff engagement and growth	Dissemination of information	Staff members been informed to environment safety practices/staff members to be informed

Source: authors' elaboration of National Institute for the Study and Treatment of Cancer "Giovanni Pascale Foundation" of Naples performance plan 2023-2025

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Institute of Milan, being born as a research hospital influences the performance management framework of the Foundation in all strategic KPAs, such as the indicators “scientific production” and “international conference” within the strategic area “staff engagement and growth”, or, with regard to clinical activity, the indicator “reduced accesses” within the area “process quality and performance”.

However, simply allocating a KPA for each dimension or a few related indicators may not sufficiently demonstrate the depth of such integration. While the presence of these KPAs and indicators is expected, their current representation may not convincingly depict the pervasive influence of the Foundation’s research orientation throughout its performance management framework. This raises questions about the comprehensiveness and effectiveness of the BSC in reflecting and driving the organization’s dual mission.

5. Discussion

The research revealed that the dual nature of research hospitals influences the performance management frameworks developed by such organizations. Besides fostering a multidimensional approach to performance measures with multiple perspectives, KPAs, and so on, as already highlighted by the literature (Bohm *et al.*, 2021; Verzola *et al.*, 2009), the dual nature can either influence the whole performance management framework or it can interest only one measure, which can be a perspective or a KPA. Hence, in the first instance, as the National Cancer Institute of Milan and the Giovanni Pascale Foundation in Naples, the dual nature of such organi-

zations impacts the set-up and is present in perspectives, KPAs, and related measurement methods. On the contrary, at the Rizzoli Orthopedic Institute of Bologna hybridity influences the core structure of the framework from its inception and has dedicated perspectives that reflect the different dimensions which characterize it. As already mentioned, this could be due to the history of such organizations as the first two were born hybrid, while the latter became a research hospital only at a later stage since its establishment.

For this reason, the dual nature of such an institute doesn’t influence the entire BSC framework, but only an *ad hoc* perspective, “Research, innovation, and development,” was added and given a specific role. However, research hospitals often balance research objectives with healthcare delivery goals, and thus, the presence of research-related indicators in their performance measurement systems may reflect the need to maintain balance and coherence between these crucial perspectives. Yet, assessing the extent to which these perspectives are integrated and managed synergistically requires a deeper study of operational and strategic practices within these organizations. It is, indeed, plausible that research hospitals incorporate research and care indicators because these perspectives are both endemic to their nature, not necessarily for performance related purposes. Moreover, the analysis unveiled some other traits of performance management systems in research hospitals, in particular that: i) there is a misalignment with the traditional BSC framework; ii) that some empirical findings are in line with results from the

literature on performance management, while others contradict it requiring a more flexible approach to tools such as the BSC; iii) strategic maps which would illustrate value creation are missing from performance management plans, and iv) considering too many dimensions risks making performance management frameworks a redundant rather than a strategic tool.

5.1. Misalignment with the traditional BSC framework

The central tenet of the BSC involves linking performance measures across four distinct areas – organizational learning and growth, internal business processes, customer perspective, and financial measures – in a causal chain. Kaplan and Norton (1996) posit a hierarchical relationship where organizational learning and growth drive internal business processes, which in turn drive customer perspectives, ultimately influencing financial outcomes. However, this assertion of unidirectional causality has been contested. Critics argue that the relationships among these areas are not strictly causal but rather interdependent and dynamic (Nørreklit, 2000).

Based on this, our findings show that only the Rizzoli Orthopedic Institute of Bologna retained the original BSC structure outlined in the literature (Kaplan and Norton, 2005; Lawrie and Cobbold, 2004). On the contrary, neither the National Cancer Institute of Milan nor the Giovanni Pascale Foundation in Naples incorporate the strategic BSC perspectives, but rather operationalize them into sub-categories, adapted in relation to the goals stated in their performance plans. On the one hand, this contrasts with

the long-standing practice of using the BSC in the healthcare sector (Catuogno *et al.*, 2017; Purbey, Mukherjee and Bhar, 2007) and makes it difficult to benchmark organizations against traditional models, compare them to each other, and communicate performance to stakeholders. On the other hand, the BSC should be seen as a strategic management tool for applying operational terms to an organization's strategic plans (Behrouzi, Shahrour and Ma'aram, 2014; Sasse, 2005). Hence, it is essential to employ performance strategic perspectives in line with strategic plans and, therefore, the traditional four perspectives can be modified in a more flexible approach and adapted to specific contexts as emphasized by some scholars (Bassani *et al.*, 2022; Kaplan and Norton, 1996; Lupi *et al.*, 2011). However, this leaves the door open to the recurrent problem of choosing measures that may steer towards undesirable outcomes and behaviors (Merchant, 2006) which developing standard performance frameworks had tried to address.

5.2. Convergence and divergence from the literature on performance management

Besides confirming the BSC's ability to fit the complexity of dual nature organizations such as research hospitals with a multidimensional approach (Catuogno *et al.*, 2017; Trotta *et al.*, 2013), empirical results stress the importance of a stakeholder perspective in all three organizations, whether it concerns external stakeholders such as patients or internal stakeholders such as employees (see Tab. 2, 3, and 4). This corroborates the view that the principal concern of healthcare orga-

nizations should be providing services to external and internal stakeholders, i.e. the community of reference (Baldi *et al.*, 2005; Trotta *et al.*, 2013), ensuring satisfaction to them, as well as prioritizing creating public value (Moore, 2003) rather than first fulfilling economic and financial aims, as formulated in the BSC model which positions them at the top of the perspective hierarchy (Catuogno *et al.*, 2017).

Moreover, alongside stakeholder satisfaction in the performance management frameworks there is a focus on the quality of internal processes and procedures, which produce value for customers as well as improve operations and minimize costs as emphasized in the literature, with the BSC fostering the enhancement of process efficiencies, the optimization of resource allocation, continuous improvement, and the reduction of waste to achieve lower operational costs (Kaplan and Norton, 2001). Indeed, an inspection of the three BSCs (see Tab. 2, 3, and 4) confirmed the presence of outcome indicators, such as the mortality rate, reflecting the effectiveness of clinical care, and the waiting time for a performance/service, measuring service efficiency. Yet, the inclusion of process and activity indicators such as “technological implementation” as an outcome indicator raises concerns about the correct application and classification of metrics within the BSC framework. This misclassification exemplifies a broader issue in performance measurement where metrics intended to measure processes or activities are mistakenly categorized as outcome indicators. Such confusion can lead to distorted assessments of organization-

al performance and misalignment with strategic objectives.

However, results also revealed departures from some of the suggestions from the literature on research hospitals. As for the strategic perspective of research and innovation, Tab. 2, 3, and 4 present some general-purpose indicators, such as the number of annual publications or the value of the Impact Factor, not specifically intended for the healthcare sector and not able to completely catch the twofold institutional aims of these organizations. In addition, since IRCCSs are hospitals with scientific purpose, their core mission should focus on pursuing a continuous improvement in healthcare research, which would need specific indicators to be monitored such as benchmarks for cooperation and competition at international levels with distinctive measures for the healthcare sector (Catuogno *et al.*, 2017). Yet, such issues are missing in the perspectives, KPAs, KPIs, and related measurement methods in the three cases under study.

Moreover, the literature on performance management suggests that measurement systems need to be sensitive to changes in the external environment of an organization, reviewing and reprioritizing internal objectives when the changes are significant enough (Bititcti, Turner and Begemann, 2000). However, none of the three cases showed any influence of the Covid-19 pandemic and consequent health emergency in their performance management frameworks (see Tab. 2, 3, and 4), while many scholars had emphasized the impact such events have also had on management practices (Leoni *et al.*, 2021).

5.3. Lack of a linkage between the BSC and value creation

In all three cases, the BSCs only describe the mission but do not create a real strategy map. A strategy map should be the foundation of the BSC because it depicts an organization's business model, emphasizing the linkage between measures and strategic objectives (Speckbacher, Bischof and Pfeiffer, 2003) and showing how these strategic objectives connect tangible and intangible assets to value-creating activities (Lueg, 2015; Kaplan and Norton, 2005).

The concept of value is relevant since it incorporates a broader understanding of stakeholders' needs and consequent accountability and transparency issues (Campanale, Cinquini and Grossi, 2021; De Waele *et al.*, 2021), making research hospitals accountable and responsible for fulfilling their obligations toward the entire community (Trotta *et al.*, 2013). Indeed, the literature on the application of the BSC to research hospitals (Catuogno *et al.*, 2017; Trotta *et al.*, 2013), as well as to healthcare organizations (Baraldi, 2005) and to the whole public sector (Grossi *et al.*, 2017), suggests that the stakeholder perspective of the traditional BSC model should be substituted by a more general term such as "community", as the accountability of public institutions extends beyond the sole internal and external stakeholders to the whole society (Grossi, Vakkuri and Sargiacomo, 2022).

Yet, strategic maps with a model that explains what leads to value creation, let alone with reference to the whole community, do not emerge from the strategic planning documents of the three organizations with potential impacts on accountability, transparen-

cy, and stakeholder trust (Trotta *et al.*, 2013).

5.4. Over-multidimensionality issue

According to the literature, the BSC approach seeks to offer a multidimensional assessment of an organization's economic performance (Kaplan, 2009). The main concept is to focus not only on an organization's economic and financial indicators but also on other factors (Amer *et al.*, 2022; Kaplan and Norton, 2005; Otley, 2002), which are summarized in the four perspectives of the traditional BSC model, namely financial, customer, internal business processes, and learning and growth (Kaplan and Norton, 2005; Lawrie and Cobbold, 2004). This strategy emphasized the BSC's supporting role in decision-making involving the multidimensionality of evaluation processes, the determination of individual, group, and community objectives, and the implementation of strategies pertaining to operational and organizational activities.

However, this may result in an "over-multidimensionality" issue, which means an over-representation of performance data of different kinds. Empirical findings from our case studies seem to confirm this hypothesis, with an over-detailed presence of information handled separately and not integrated into a consolidated view, proving difficult to understand the congruence and contribution of each KPAs and KPIs to the whole BSC (see Tab. 2, 3, and 4).

According to Kaplan and Norton (1996), a tailored BSC should be able to represent all strategies by using the fewest KPIs necessary that are meaningful, strategic, and evidence-based

(Catuogno *et al.*, 2017; Kaplan and Norton, 1996). However, dual nature organizations, such as research hospitals, notably necessitate the use of a significant number of KPIs to assess their overall performance, making it challenging to analyze and comprehend the data collected (Carbone *et al.*, 2007). Hence, while the “over-multidimensionality” issue is valid at the general level, in such organizations it has further implications as their performance systems are themselves multidimensional. As a result, the BSC in research hospitals, and in dual nature organizations in general, is caught in the middle between a rock and a hard place: if it uses the fewest KPIs it faces the risk of becoming irrelevant; if it satisfies all the interests and stakeholders involved it faces the risk of becoming a redundant tool, because of congruence issues. In both cases this causes a loss of strength both in terms of internal direction – namely, the ability to provide directional paths for staff to follow – and in terms of motivation and engagement (Merchant, 2006).

Based on this, it would be advisable to strive for a balance between including a wide array of performance data and maintaining a focused strategic approach. However, on the one hand, this might appear somewhat self-evident, while on the other hand, the current discourse on the trade-offs between utilizing numerous versus minimal KPIs lacks specificity and fails to directly correlate with the previously mentioned complexities. To mitigate these risks, it is essential to move beyond the binary discourse of “too many” versus “too few” KPIs. Instead, a nuanced approach is required, one that systematically pri-

oritizes KPIs based on their strategic alignment and evidential impact while ensuring representational adequacies for all critical stakeholder groups (Bardi *et al.*, 2005). The development of strategic maps plays a pivotal role in this context, offering a visual framework that aligns organizational activities with overarching strategic objectives (Kaplan and Norton, 1996; Lueg, 2015). By anchoring the selection and integration of KPIs within these strategic maps, research hospitals can better navigate the inherent complexity of their performance management systems (Trotta *et al.*, 2013), achieving a BSC that is both strategically coherent and comprehensively inclusive.

6. Conclusions, limitations, and future research

This paper has described a cross-case analysis of three Italian IRCCS with the aim of investigating how the coexistence of clinical and research activities and the related dual processes and requirements affect the development of performance frameworks based on complex combinations of performance dimensions and metrics (Catuogno *et al.*, 2017; De Waele *et al.*, 2021).

The analysis has revealed that the dual nature of research hospitals has an impact on their performance management frameworks since it promotes a multidimensional approach to performance measures which can influence either their entire setup or specific measures, according to when the two-fold mission was formally established. The research also revealed some additional characteristics of performance management frameworks in research hospitals, including a misalignment

with the traditional BSC framework and some of the literature on performance management, the absence of strategic maps in performance management plans, and the risk of performance management frameworks becoming redundant.

However, it should be considered that this study focused only on the measurement phase of performance frameworks (Bouckaert and Halligan, 2008). When coming to the incorporation and use of non-financial performance information, further issues could emerge as emphasized by research and practice (Merchant, 2006). For example, organizations might adopt boilerplate frameworks of measures without developing a customized causal model, they might find it difficult to define what is the proper weighting to achieve a “balance”, they have to update non-financial performance measures which might become obsolete as conditions change, and they may find hard to consider the trade-offs between financial and non-financial impacts, and end up focusing on more traditional sets of measures. Therefore, further research is needed to explore the deployment of performance management frameworks and BSCs in particular in dual nature organizations beyond the selection of congruent performance measures.

This research not only sought to deepen scholarly understanding of the interplay between research hospitals and performance management but also provided research hospital managers with evidence-based recommendations for enhancing the effectiveness and sustainability of research

hospitals within the evolving healthcare landscape. In a nutshell, research hospital managers should develop customized, multidimensional performance frameworks that balance clinical and research goals. Incorporating strategic maps and regularly updating measures can ensure relevance. Engaging diverse stakeholders and participating in benchmarking can identify best practices. Continuous evaluation and staff training on performance management principles can enhance organizational performance and outcomes.

Moreover, a limitation of this study is that it focuses on a limited number of cases from a single country. This choice allowed us to conduct a more in-depth analysis and gain a nuanced understanding of how the dual nature of research hospitals influences the development of performance management frameworks in these three organizations and the integration of research and healthcare objectives within these organizations. However, we recognize that it may limit the generalizability of our findings. Therefore, future research is needed to investigate whether similar effects characterize other entities in other national and organizational contexts. What is more, we believe that further research needs to be conducted to examine if and how contrasting voices and experiences in the measurement, incorporation, and use of performance information, illustrated by the cases reported above, do evolve over time and lead to an improved understanding of the effects of performance frameworks across healthcare settings.

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