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How to Analyze the Practical Relevance of Costing Methods? The Example of Hospital Cost Accounting in France

Analyses of the practical relevance of costing methods are based on a narrow range of evaluative factors, progressively distancing themselves from the technical essence of these methods. This article examines how a better understanding of the foundational technical underpinnings can enrich the analysis of the practical relevance of a costing method. To do this, we draw on interventionist research in a French cancer centre, where the costing method, prescribed and transposed from private management methods, is widely criticized by its users and rarely analyzed in-depth. From a theoretical point of view, the results of this article propose a model for analyzing the practical relevance of a costing method. By progressively modifying the calculation techniques of this costing method, the application of this model to the costing method studied highlights four criteria for the technical analysis of the practical relevance of this method, two of which have already been identified in the literature (cost traceability and causality), and two of which have not yet been identified (exhaustiveness of cost centres and cost/value articulation). These four criteria represent the characteristics of this method by which any change in its calculation technique also modifies its practical relevance. From a methodological point of view, this article also shows how a better knowledge of the elements of practical relevance of a costing method can facilitate the success of interventionist research in management accounting. To this end, we propose a three-step interventionist research approach for analyzing the practical relevance of a costing method.

Key words: Costing methods; Healthcare sector; Interventionist research; Management accounting; Practical relevance.

Johnson (1994) and Johnson and Kaplan (1987) were the first to reveal the irrelevance and inadequacy of management accounting techniques (Cooper and Kaplan, 1988, 1991). However, in management accounting and management in general, the definition of relevance remains ambiguous, its measurement imprecise and its meaning complex (Augier and March, 2007, p. 138). Lukka and Suomala (2014) define relevance in management accounting as 'something that is relevant

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to something else' (p. 205). More specifically, the relevance of management accounting knowledge is defined as the ability to help practitioners understand their organizations and improve their practices (Choudhury, 1986).

The management accounting literature has progressively identified and described three dimensions of the relevance of management accounting knowledge: practical, theoretical, and societal (Lukka and Suomala, 2014; Tucker and Parker, 2014; Modell, 2014, 2017). In their work, Rautiainen *et al.* (2017) note that managers remain overwhelmingly preoccupied with the practical relevance of management accounting knowledge.

To date, three forms of the practical relevance of management accounting knowledge have been identified (Van der Meer-Kooistra and Vosselman, 2012): conceptual relevance (impact of knowledge on the implementation of practices); legitimate relevance (impact of knowledge on the legitimacy of practices); and instrumental relevance (impact of knowledge on the selection of practices) (Nicolai and Seidl, 2010). However, the application of this robust definition of the practical relevance of management accounting has progressively and signficantly moved away from the analysis of accounting technique *per se* to focus more on the social (Tucker and Parker, 2014), societal (Modell, 2014, 2017), organizational (Van der Meer and Vosselman, 2012), or conceptual (Lukka and Suomala, 2014) implications of management accounting. The latter approaches provide a comprehensive analysis of the consequences of management accounting's loss of practical relevance (Johnson and Kaplan, 1987). However, they are less concerned with the causes of this loss of practical relevance, which have more to do with accounting techniques (Mitchell, 2002).

Among all management accounting techniques, Hesford *et al.* (2007) distinguish two main categories. The first covers tools for budgeting, organizational control, and performance measurement and evaluation, with the aim of influencing decisions (Moers, 2006). A second category comprises tools for facilitating decisions, most notably costing methods (Moers, 2006). In this latter category, although questions about the practical relevance of costing methods have often been raised since the seminal work of the 1980s (Kaplan, 1984, 1986; Johnson and Kaplan, 1987), these issues are no longer addressed through accounting techniques (Hesford *et al.*, 2006; Wegmann, 2008). Only the criteria of cost causality and traceability (Kaplan, 1984, 1986; Johnson and Kaplan, 1987) are still used today to measure this practical relevance (Cokins, 2019), while costing methods present both strategic and managerial aims that are increasingly visible (ABC,[1] TDABC,[2] target costing, life cycle cost management; Zawawi and Hoque, 2010; Shields, 2018). However, in management accounting, the calculation technique remains highly important (McLaren *et al.* 2016), particularly as it is an essential determinant of the relevance of the methods used (Mundung *et al.*, 2020). An important theoretical gap therefore lies in the absence of works that propose, based on exhaustive criteria, a fine-grained

[1] Activity-based costing

[2] Calculating costs per activity as a function of time

analysis of the procedures used in costing methods to better understand and improve their practical relevance.

The research question of our article is, therefore: how can the practical relevance of costing methods be analyzed on the basis of their underlying technical characteristics, with a view to improving them?

To answer this research question, it therefore seems important to 'reopen' the 'black box' of the accounting techniques used by costing methods (Ahrens *et al*., 2008) in order to participate in the construction of their practical relevance by and for their main users. We propose to reopen this 'black box' using the example of costing methods in hospitals, and more specifically the case of hospital cost accounting in France.

In many countries, with the gradual introduction of pricing logic for hospital services, the question of the practical relevance of healthcare costing methods has become essential (Carroll and Lord, 2016). Until now, most studies indicate that this relevance is mainly linked to the precision of the calculation (Cardinaels *et al*., 2004; Pizzini, 2006; Eldenburg and Krishan, 2007; Demeere *et al*., 2009; Tan *et al*., 2011). Improving this accuracy is strongly correlated with the ability to better understand the origin of costs (causality) and resource consumption patterns (traceability). Although healthcare costing methods have considerably improved their accuracy, notably with the introduction of numerous new costing techniques (ABC, TDABC, Target costing, RCA,[3] RCC,[4] RVU,[5] PEC[6]) (Arredondo, 2014), the volatility of costs expressed by costing methods remains high (Northcott and Llewellyn, 2004; Kuntz *et al*., 2008) and a certain scepticism about the information produced by these methods persists among their users (Chapman, 2015). Thus, the multitude of parties involved in reading and using the information produced by these methods (Naranjo-Gil and Hartmann, 2007) must be able to participate in the analysis of their relevance and provide their own basis for analysis (Cui *et al*., 2019).

The aim of this research is therefore to build an analysis, by its main users, of the practical relevance of a healthcare costing method, starting with the techniques used, and using the example of hospital cost accounting (in French, CAH)[7] in France.

To develop the practical relevance of management accounting, Malmi and Granlund (2009) and Van Helden and Northcott (2010, p. 231) have suggested the application of interventionist research (IVR), as they continually interweave concrete experience and theoretical developments (Dumay and Baard, 2017; Jönsson, 1996). It is therefore through IVR in a cancer diagnosis, treatment, and research centre (CLCC) in France that we analyze the practical relevance of the costing method (CAH) implemented in this establishment. The main objective of the IVR in this institution was to analyze,

[3] Resource consumption accounting

[4] Cost/expenditure ratio

[5] Relative value unit

[6] Cost of meeting the patient

[7] In French *'Comptabilité Analytique Hospitalière'*

with the key players, the practical relevance of the CAH to try to improve it in a second phase.

The research approach of this IVR is constructed as follows. Based on an in-depth analysis of the architecture and objectives of the CAH, we establish, through the construction of a relevance analysis matrix, an initial diagnosis of the practical relevance of this CAH method. Then, by focusing on indirect costs (general and medical logistics), which account for almost 35% of this CLCC's total expenditure, we make several modifications to the accuracy of the CAH method's costing system. In assessing the effects of these modifications, we note that these effects are achieved by four elements of this technique (cost traceability, cost causality, exhaustiveness of cost centres, and cost/value articulation), which appear to be essential criteria for analyzing and improving the practical relevance of costing methods. This theoretical contribution then enables us, from a methodological point of view, to describe a three-stage IVR approach, applied in this study, to analyze and progressively improve the practical relevance of these methods. But first, this IVR approach led us to an in-depth review of the literature on the relevance of costing methods and healthcare cost evaluation methods.

BACKGROUND

The Relevance of Costing Methods

Johnson and Kaplan (1987), then Kaplan and Anderson (2007), have shown that all the technical foundations of the main costing methods used today were developed before the late 1980s. They attribute this stagnation, in part, to the prevailing interest in verifiable and objectifiable financial accounting statements rather than costing, which is often considered less technically relevant. As a result, costing methods have instead led to the development of conservative technical practices that emphasize objectivity and verifiability over relevance (e.g., using historical cost rather than replacement cost) (Cokins, 2013).

To regain the relevance of costing, Johnson and Kaplan (1987) suggested that the emphasis should be placed on long-term performance evaluation rather than short-term results, and that the allocation of costs should be rethought, particularly the indirect costs that have become dominant in costing systems. For Chapman *et al.* (2021), for many years, the quality of the information produced by costing methods has received little attention and, as a result, management accounting techniques have become increasingly irrelevant to management practice.

The development of new management accounting (Kaplan, 1994, 1995; Roslender *et al.*, 2015) has mainly restored the credibility of costing methods as a valuable contribution to the strategic management process. For example, in developing ABC, Cooper and Kaplan (1988, 1991) suggested an improvement in the practical relevance of costing methods through the calculation technique by orienting the calculation towards the cost of processes and activities rather than products in order to improve the allocation of indirect costs. However, by increasing the number of cost centres and

cost drivers, these technical advances have mainly contributed to the complexity of these methods and reduced their practical application (Kaplan and Anderson, 2007).

Today, analyses of the relevance of costing methods are not receiving sufficient attention from management accounting researchers (Johnson, 1994; Otley, 2008, Chapman *et al.*, 2021). Management by numbers has increasingly led companies to lose sight of the relevance of costing techniques and their ability to describe the processes by which people, that is, employees and customers, make a company competitive (Johnson, 1994; Roslender *et al.*, 2015). These companies follow processes in terms of financial results rather than in terms of practice-oriented costing techniques. Thus, relevance has been lost (Johnson, 1994).

Many of the 'new costing techniques' turn out to be not so new. For example, ABC (Cooper and Kaplan, 1988, 1991) or TDABC (Kaplan and Anderson, 2007), in many respects, bear a strong resemblance to the costing methods Kaplan and Johnson criticized as being irrelevant (Otley, 2008). The selling point of these new methods, namely 'more accurate product costs', while initially appealing to many managers, was quickly challenged by them as these methods did not prevent soaring overheads nor the difficulty in identifying profitable and unprofitable products and services (Otley, 2008; Chapman *et al.*, 2021).

To analyze the relevance of these costing methods, management accounting practitioners and researchers still mainly use the traceability and causality of costs proposed by Johnson and Kaplan (1987). Few works have been concerned with defining new criteria, while new costing methods have appeared. Traceability tracks the allocation of resources to objects and units of analysis and the units of analysis to objects. Causality is concerned with understanding and explaining the consumption of external resources within units of analysis or objects (Cokins, 2013). The search for the causality principle requires tracking the movement of resources from upstream to downstream. The principle of traceability, on the other hand, decodes the consumption of resources from downstream to upstream. The main purpose of respecting these two principles is to improve the accuracy of costs (Cokins, 2015), which is seen as a key element in the relevance of a costing method.

Over the last 30 years, a significant transition from cost accounting to strategic costing has taken place. Berliner and Brimson (1988) and Shank and Govindarajan (1989) have explored several new and more strategic paths from accounting to management, including the concern with value-adding processes, life-cycle costing, market-driven costing, lean accounting systems, or combining strategic planning and management accounting. This move to strategic costing was presented as a way of costing products more accurately. Strategic costing methods would therefore more accurately reflect the cost traceability and causality of increasingly diverse product types, services, channels, and customers (Cokins, 2013). However, the study of cost traceability and causality is not sufficient to validate the hypothesis of the relevance of calculated costs (Cokins, 2013). This analysis mainly enables the development of a larger direct expenditure structure to manage the growing complexity of organizations (Cokins, 2013), but it provides little information on the relevance of costs to managers, employees, customers, and other internal and external stakeholders (Mevellec, 2021).

As a result, most managers consider that most of the benefits of costing methods are not derived from their calculation technique but from their view of the processes and activities of a company (Geri and Ronen 2005; Anthony *et al.*, 2014). Reflection on the practical relevance of these methods has therefore focused less on the development of new techniques (Johnson, 1994) and more on organizational forms, the degree of decentralization, and the empowerment of employees (Otley, 2008).

Developments in new costing methods are therefore appearing in areas where costing techniques are seen as adding little value (Otley, 2008). Yet the underlying techniques of these methods continues to influence decision making, but often in a less visible way (Otley, 2008). Indeed, the development of these techniques is now often taken on by line managers who have become experts in the use of spreadsheets and other IT methods to support their own decision making (Otley, 2008). There is an urgent need for management accounting researchers to take an increased interest in the technique of calculating costing methods (Otley, 2008). Other specialists, including consultants, have entered this field of research, and management accounting researchers have not been able to address the relevance issues raised by costing techniques (Otley, 2008).

To regain this relevance, it is important to steadily accumulate knowledge about calculation techniques and their influence on strategic decisions (Hopper and Armstrong, 1991). Particularly in the healthcare environment, one of the most important challenges remains the analysis and improvement of the practical relevance of calculated costs to produce not only data for external reporting, but also to enable the strategic management of business processes and costs (Chapman *et al.*, 2014, p. 362). Current analyses of healthcare costing methods are very much focused on the accounting technique used. A detailed analysis of the technical fundamentals of these methods should enable us to develop a much more precise understanding of their practical relevance.

The Relevance of Healthcare Costing Methods

The implementation of costing models in hospitals has been made possible by the development of a conceptual model that provides a representation of the hospital product that can support costing. The DRG model[8] (Jackson, 2001; Chapman *et al.*, 2014; Keel *et al.*, 2017) was developed in the early 1980s to describe medical care activities in the United States and has been widely exported to many OECD countries (Tan *et al.*, 2011).

Since then, the majority of studies on hospital costing have focused on the issues of cost savings and efficiency. Most studies have tried to show that hospitals can significantly reduce their costs by adjusting their level and mix of input use, thereby reducing costs without sacrificing access (Giancotti *et al.*, 2017).

These studies are largely economic in nature (Jackson, 2001; Negrini *et al.*, 2004; Mogyorosy and Smith, 2005; Finkler *et al.*, 2007; Chapko *et al.*, 2009; Hrifach *et al.*, 2016), and have mostly been interested in the accuracy of costing models to

[8] Diagnosis-related groups

identify their relevance (Duckett, 1998; Rosen and Gayer, 2008; Raulinajtys-Grzybek, 2014). This accuracy is mainly measured by the exhaustiveness of the information produced (Tan *et al.*, 2009), which is characterized by the degree of accuracy of the resource consumed (traceability) and the detail of the origin of the unit costs calculated (causality) (Raulinajtys-Grzybek, 2014). The process of identifying consumed resources can be global or detailed, while the process of assessing the origin of costs is top-down or bottom-up (Figure 1).

The combination of these two dimensions gives rise to four theoretical approaches to cost assessment: top-down gross assessment; top-down micro assessment; bottom-up gross assessment; and bottom-up micro assessment (Tan *et al.*, 2009).

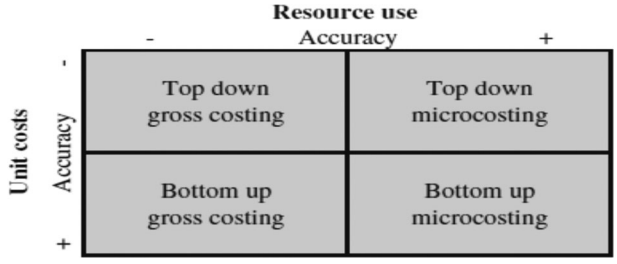
Gross-costing is a method of allocating the total amount of costs incurred by a health facility to a particular service on the basis of a limited number of resources consumed (e.g., length of hospital stays or total number of patient visits). In the top-down approach, the gross cost is estimated based on the average consumption per patient of this limited number of resources found in different hospitals or over different periods (Drummond *et al.*, 2015). In the bottom-up approach, the gross cost is estimated according to the actual consumption per patient of these resources.

The micro-costing method consists of identifying all resources consumed in as much detail as possible (Or and Bellanger, 2011; Hrifach *et al.*, 2016). Top-down micro-costing means that the average cost of each cost item is calculated from average data found in different establishments or over different periods (Chapko *et al.*, 2009). Bottom-up micro-costing implies that each cost item is counted individually for a patient episode (Kobel and Pfeiffer, 2011). For example, the cost of the operating room will be allocated according to one of the following factors: the actual duration of the operation (for medical staff or infrastructure) or its actual consumption (of drugs and equipment).

Accuracy remains the main measure of the relevance of healthcare costing methods (Pizzini, 2006) and attempts to improve relevance focus on developing accuracy. From the 1980s and 1990s onwards, applications of ABC in the healthcare sector (Baker, 1998; Arnaboldi and Lapsley, 2004) and, more recently, TDABC (Deal *et al.*, 2016; Porter *et al.*, 2017) reflect a desire to further improve the accuracy

FIGURE 1

METHODOLOGICAL MATRIX FOR CALCULATING THE COST OF HEALTH SERVICES



Source: Tan *et al.*, 2009, p. 40

of costing processes (da Silva Etges *et al*., 2019). However, the implementation of these costing models requires the collection of data that is often not readily available in institutions (Yun *et al*., 2016). Arnaboldi and Lapsley (2004) then note that the underlying complexity of public health organizations often compromises the transfer of costing ideas and methods, such as ABC, from the private to the public sector.

Traditional hospital cost accounting allocates all costs of a care delivery unit (e.g., the inpatient department) to the patients seen in that unit. These methods are most often top-down gross-costing methods or micro-costing methods. They have the advantage of being easy to implement and are often more widely used internationally (Raulinajtys-Grzybek, 2014). However, they produce incorrect results in terms of calculation and provide little incentive for organizational innovation in hospitals (Slutzman, 2017). This cost accounting method remains very supply-side oriented, aggregating costs at the level of service units and resource types (Eriksson, 2017). To address these shortcomings, demand-side cost accounting has emerged to aggregate costs at the patient and disease level (Eriksson, 2017).

The ratio of costs to expenses (RCE) and relative value unit (RVU) methods attempt to accurately estimate the specific costs of a patient visit or stay (Slutzman, 2017). However, they are still based on top-down approaches that calculate national average costs that may not reflect the actual costs of a stay in a particular care delivery unit (Yun *et al*., 2016). Patient encounter costing (PEC), based on the TDABC method (Kaplan and Anderson, 2007), uses data from hospital information systems to allocate costs based on actual resource use (Slutzman, 2017). However, as with the TDABC method, its implementation is often complicated at the facility level (Yun *et al*., 2016; Slutzman, 2017).

Currently, bottom-up micro-costing is the approach that seems to be the most satisfactory in terms of accuracy and relevance (Vogl and Leidl, 2016). However, its practical implementation is often partial (Špacírová *et al*., 2020). Therefore, the top-down method becomes necessary to trace the overheads to the cost object (Špacírová *et al*., 2020).

In France, the CAH combines a bottom-up and a top-down approach to assessing gross costs (Hrifach *et al*., 2016). However, in practice, the French hospital governance system, based on regular reporting to the supervisory authority (ARS),[9] often relies more on top-down information that can meet the expectations of the ARS than on bottom-up information that can contradict it. Consequently, the practical relevance of the information transmitted deserves to be questioned.

Conceptual Framework

To study the practical relevance of the CAH, the literature provides us with a robust and proven definition of the practical relevance of management accounting. Following Nicolai and Seidl (2010), Van der Meer-Kooistra and Vosselman (2012)

[9] Regional Health Agency (in French, *Agence Régionale de Santé*)

TABLE 1

MATRIX FOR ANALYZING THE PRACTICAL RELEVANCE OF A COSTING METHOD

Objectives applied / Dimensions of the CAH		Conceptual relevance		
		Technical substratum	Representations of organizational interconnections	Management philosophy
Legitimative relevance	Manage resources		Analysis of technological rules	
	Dialogue with the environment			
	Influence behaviour		Instrumental relevance	

identify three main forms of practical relevance of management accounting knowledge (legitimative, conceptual, and instrumental relevance).

Legitimate relevance refers to the influence of academic knowledge on the legitimacy of practices and decisions (Nicolai and Seidl, 2010, p. 1264). It is built through the reputation of researchers ('credentialization') and the credibility of the academic language they use ('rhetorical devices') (Van der Meer-Kooistra and Vosselman, 2012, p. 249). Conceptual relevance measures the impact of management accounting knowledge on the implementation of these practices and decisions. It is achieved through the 'linguistic constructs' used by the researcher to present their results and help managers uncover new lines of action ('uncovering contingencies') or new causal relationships ('uncovering causal relationships') (Van der Meer-Kooistra and Vosselman, 2012, p. 249). Instrumental relevance concerns the impact of management accounting knowledge on the choice of managerial practices and decisions (Nicolai and Seidl, 2010). It is measured by the ability of management accounting knowledge to provide managers with development scenarios ('schemes'), decision rules linked to these scenarios ('technological rules'), and trends or predictions about future developments ('effects and forecasts') (Nicolai and Seidl, 2010, p. 1267).

Taking as our starting point the definition of practical relevance in management accounting, we propose a matrix for analyzing the practical relevance of a costing method (Mevellec, 2021) (Table 1). In order to study the practical relevance of costing methods, Johnson and Kaplan (1987) were the first to distinguish three dimensions: control of operations; product cost; and performance evaluation. Malmi and Granlund (2009) refer to a relevant costing method as one that leads to decisions that are consistent with these objectives, increases goal congruence, and produces financial gains (p. 601).

Mevellec (2009) combines these approaches by proposing to measure this relevance by the capacity of a calculation to achieve three objectives: managing resources; influencing behaviour, and interacting with the environment. In the case of costing methods, it appears that these three objectives can be linked to legitimative relevance (Van der Meer-Kooistra and Vosselman, 2012) (Table 1). Indeed, the definition of legitimative relevance was constructed to analyze research in management accounting. It remains only partially adapted to costing methods that are not necessarily derived from research work and for which 'credentialism' and 'rhetorical devices' are non-existent or not particulary influential. However, by extending the analysis of the practical relevance of management accounting knowledge to the internal and external environment of organizations, these three objectives allow the accounting technique to be placed at the centre of a vast system of interpretations and interpreters of accounting information that range from its conceptualizers to its internal and external users. These three objectives contribute to the legitimacy of the costing method by the broader goals they assign, which go far beyond the economic and financial domains.

In addition, as the main analyses of the relevance of an accounting tool focus on its technical substrate (Jönsson and Lukka, 2006; Lukka and Suomala, 2014), in a more developed way, Hatchuel and Weil (1995) show that its relevance can be measured from the three dimensions of a management tool, namely: its technical substrate; its representation of organizational interconnections; and its management philosophy. This three-dimensional study extends the definition of the relevance of the management tool to its conceptual characteristics as proposed by Van der Meer-Kooistra and Vosselman (2012). These three dimensions make it possible, through the impact of the design principles of the costing method on its implementation and decisions, to measure the conceptual relevance of these methods (Van der Meer-Kooistra and Vosselman, 2012) (Table 1).

Finally, in the management literature, instrumental relevance is the form of relevance most often put forward to justify practical implications (Nicolai and Seidl, 2010, p. 1267). By distinguishing between schemes, technological rules, and effects, instrumental relevance allows for a precise description of how these computational techniques can gradually produce effects on management practices and decisions. Effects are forecasts of the future development of certain management indicators (e.g., the selling price of a product, its cost, or the level of its sales) (Nicolai and Seidl, 2010). Diagrams help to identify different scenarios or possible choices in a decision-making situation. They are often presented in the form of flowcharts or matrices. Technological rules define how, from the possible choices (schemes), effects can be achieved in the practice of organizations. In their pure form, they are algorithmic or heuristic rules ('if you want to achieve this prediction in this situation, then do something close to this action'). They explain how one or more possible choices (schemes) will produce the effects that have been predicted.

Therefore, our knowledge of the practical relevance of costing methods requires a better understanding of how instrumental, conceptual, and legitimative relevance fit together to build this practical relevance. The first two forms of relevance (conceptual and legitimative) highlight the systems of domination produced by the ideology,

language, or reputation of researchers. Domination is first exposed (conceptual relevance) and then it can be changed (legitimative relevance) (Van der Meer-Kooistra and Vosselman, 2012). The articulations between these two forms of relevance and instrumental relevance are not well described in the literature, although they can inform us about how the practical relevance of a costing method is constructed.

In this study, because it crosses the three dimensions of a management tool (Hatchuel and Weil (1995) (equivalent to conceptual relevance) with the objectives of a costing method (Mevellec, 2009) (equivalent to legitimative relevance), the analysis matrix of practical relevance (Table 1) should allow us to measure, with its main users, the effects of a costing method on its practical relevance based on a progressive modification of its technological rules (instrumental relevance). It is with this latter approach that we have chosen to analyze the practical relevance of hospital cost accounting (CAH) in France.

METHODS AND MATERIALS

We report on our observations and analyses in the context of interventionist research conducted in a French Cancer Diagnostic, Treatment and Research Centre (CLCC) with 750 employees (including 180 doctors or interns) and an average of 7,000 hospitalizations per year for a total annual cost of 80 million euros.

CLCCs are private, not-for-profit health establishments that participate in the public hospital service in France. They belong to the field of Public Health Establishments of Collective Interest (ESPIC).[10] Created in October 1945, they are financed by the national health insurance scheme and are controlled by the Ministry of Health under the same conditions as public hospitals.

Each year, under the same conditions as other French public hospitals, CLCCs sign financial contracts with the ARS. They must respect the volumes and rates of medical activity set out in the annual contract, which is based on the National Health Insurance Expenditure Target (ONDAM)[11] voted each year by the French Parliament. In order to do so, these establishments must scrupulously follow the CAH's guidelines for calculating their hospital costs without being certain of the relevance of this costing method.

Since 2004, with the introduction of activity-based pricing (T2A),[12] French hospitals have undergone a radical management paradigm change (Georgescu and Hartmann, 2013). This new pricing system, inspired by the DRG model,

[10] Public Health Establishment with Collective Interest (in French, *Etablissement de Santé Public d'Intérêt Collectif)*

[11] In French, *Objectif National de Dépenses d'Assurance Maladie*

[12] In French, *Tarification à l'Activité* (T2A)

has radically altered the way French hospitals are financed. Their funding is now based on activity, rather than on lump-sum allocations. To this end, a prime rate for each hospital activity is now calculated annually by the Technical Agency for Hospital Information (ATIH).[13] Based on CAH, French hospitals are now required to calculate the costs of each of these activities, so as to compare them with the tariffs calculated by the ATIH and reimbursed by the National Health Insurance. This has led to a reorganization of clinical and medico-technical services into activity clusters, giving management accounting a strategic role in hospitals (Georgescu and Hartmann, 2013). However, few questions have been asked about the practical relevance of the CAH accounting technique.

However, the management of the CLCC in which our IVR takes place faced a demand for information from internal operational services to manage expenditure and activities. The current structure of the CAH does not allow for a satisfactory response to these demands. To provide an initial response to these issues, management launched an IVR to analyze and then improve the practical relevance of this management accounting approach.

To this end, it set up a task force composed of management accountants, heads of unit, and a teacher-researcher in management chosen for their knowledge of the functioning of cost systems in other public or private organizations. The composition of this task force (Table 2) was carefully considered to include representatives of the main actors in this institution using CAH information. The task force comprises 13 members (Table 2) representing the four medical worlds (Glouberman and Mintzberg, 2001): cure (medical staff); care (care staff); control (executives and managers); and trustees (patients). These members are confronted with CAH accounting information either in their professional activities or their other roles and thus constitute a representative panel, from which we can collect their perceptions of the practical relevance of the information provided by the CAH in the context of the task force discussions.

Interventionist research is particularly useful in providing relevant management solutions (Cullen *et al*., 2013), and Malmi (2016) also encouraged researchers to refine the relationship of interventionist research to theory. Researchers' intervention enables practical innovation, either by applying existing accounting concepts or developing new ones. For these 'practice-oriented interventions to be theoretically interesting and "generalizable" beyond the organizations studied, a researcher must articulate what is new in relation to existing knowledge' (Malmi, 2016, p. 39). To do this, interventionist researchers must attempt to analyze 'necessary changes to well-known accounting concepts or to the definition of the boundaries of these practices' (Malmi, 2016, p. 39).

Lukka and Suomala (2014) see interventionist research (IVR) as a valuable, but underused, means of linking management accounting techniques to complex evolving practices. Because it is rooted in both theory and practice (Lukka and Suomala, 2014), it allows for multiple interests to be considered (Modell, 2017). A characteristic of IVR is that the researcher is an active participant, who must therefore be able to take

[13] In French, *Agence Technique d'Information Hospitalière* (*ATIH*)

TABLE 2

COMPOSITION OF THE IVR TASK FORCE

Members	Members Functions	Fields of use of the CAH
M1	Administrative Director of the CLCC	Analysis of cost information for strategic decision-making purposes
M2	Head of hospital department	Analysis of cost information for operational decision-making purposes
M3	President of the Establishment Medical Committee	Analysis of cost information for strategic decision-making purposes
M4	Head of Department Surgery	Analysis of cost information for operational decision-making purposes
M5	Trade union delegate (medical-technical staff)	Analysis of cost information for staff information
M6	Head of the Imaging Department (medical-technical service)	Analysis of cost information for operational decision-making purposes
M7	Director of Care of the CLCC	Analysis of cost information for operational decision-making purposes
M8	Assistant Director of Human Resources	Analysis of cost information for operational decision-making purposes
M9	Patient representative on the Medical Committee of the CLCC	Analysis of cost information for patient information
M10	Care Staff Representative Board of Directors	Analysis of cost information for staff information
M11	Chief Financial Officer of the CLCC	Analysis of cost information for operational decision-making purposes
M12	Management Controller of the CLCC	Construction of information, animation of the cost architecture
M13	Teacher-researcher in management accounting	Analysis of the architecture of the costing method and the perceptions of the information produced

an insider's view of practical issues (the emic perspective) in order to produce a theoretical contribution (the etic perspective) (Lukka and Suoamala, 2014).

Given the characteristics of the CAH, which is a method specifically designed for French hospitals, IVR is particularly well suited to the mission entrusted to this working group as it requires a thorough internal (emic) and external (etic) approach (Jönsson and Lukka, 2006; Dumay and Baard, 2017). Indeed, in IVR, the researcher first participates in organizational change and faces practical challenges (emic) with the organization's staff (Jönsson and Lukka 2006). However, theory is also essential in IVR, as the academics involved need to draw on and reflect on different theories (etic) to develop and test interventions (Dumay, 2010).

Bias in IVR is nevertheless present and Lukka and Vinnari (2017) identified two types: the overly emic positioning of the researcher and the loss of neutrality. One response to these biases lies in the collection and use of research materials (Lukka and Vinnari, 2017). Jönsson and Lukka (2006) recommended the use of an intervention plan to collect the data of interest and a field diary to keep track of the events and deliberations of the intervention team in action. In this study, the research materials collected by the interventionist researcher were collected in these ways (Table 3).

TABLE 3

RESEARCH MATERIALS

Data collected from the intervention plan	Data collected from the field diary
Methodological guide to hospital cost accounting*	Reports of task-force meetings
Indirect cost allocation method (source CLCC)	Reports of monthly meetings to present results to heads of department
Calculation of overhead allocations and service costs for the year 2017/2018/2019 (source CLCC)	Logbook of the interventionist researcher

**Guide méthodologique de la comptabilité analytique hospitalière*, Direction Générale de l'Offre de Soins, Ministry of Health, France 2011

A balance has to be found between the emic (by triangulating, among other things, the interpretations of practitioners and researchers) and the etic (by maintaining flexibility in the formulation of research questions) domains (Lukka and Suomala, 2014). This balance must also be found between these two domains, as choices made in one intrinsically affect the other (Lukka and Suomala, 2014). In the IVR in this study, this emic/etic balance is based on the analysis of the practitioners' and researcher's interpretations of the fundamental technical aspects of the costing method studied.

In particular, in IVR in management accounting, the researcher is an active actor who needs to take an emic perspective on the issues raised by the field study (Jönsson and Lukka, 2006). However, a balanced use of emic and etic perspectives is crucial to justify the use of this research method (Jönsson and Lukka, 2006, p. 391). Therefore, the interventionist researcher also needs to link their findings to a theoretical framework (Jönsson and Lukka, 2006).

To bring empirical findings (emic perspective) closer to theoretical knowledge (etic perspective), Jansen (2018) identifies three complementary ways of using theoretical knowledge in a management accounting IVR: (1) shaping the intervention on the basis of a theoretical framework; (2) analyzing the effects of the intervention using an adjusted theoretical framework; and (3) bridging the gap between the theory that is used to shape and that is used to analyze the intervention. These three ways were progressively undertaken in the course of this IVR on the basis of the proposed conceptual matrix (Table 1). Thus, this matrix seems particularly compatible with IVR as it reinforces the neutrality of the interventionist researcher by helping them 'to ask new questions and find new perspectives on accounting phenomena' (Lukka and Vinnari, 2017, p. 722) such as the practical relevance of costing methods.

The IVR at this CLCC started in 2017. Its objective was to first carry out a collective analysis of the practical relevance of the CAH, and second to construct measures for improving this management accounting method. The first stage, the results of which we present in this article, took place over 24 months during 2017 and 2019. The research approach was built longitudinally around phases of immersion and personalized distancing.

During the immersion phases, the interventionist researcher gradually became familiar with the workings of the CLCC and the use of the CAH in this establishment. No funds were received for this IVR from the CLCC and therefore, in agreement with the CLCC management, the research activities were undertaken completely independently, particularly during the distancing phases. During the latter phases, the interventionist researcher tried to transcribe and analyze the task force's discussions as objectively as possible, especially as the CLCC did not provide any particular recommendations or requirements.

The task force met five times during the IVR period as follows:

- first meeting, collect the perceptions of the working group members on the current CAH;
- second meeting, presentation of the new cost architecture and collection of perceptions from task force members;
- third meeting, presentation to members of a practical relevance analysis tool (relevance analysis matrix) and discussion of the results;
- fourth meeting, presentation of the final version of the new CAH tool and the highlighting of the changes made compared with the first method;
- fifth meeting, during 2019, we looked at the impact of the new method on the management of services.

The construction of this study, with distinct levels of distance from the institution, makes it possible to meet the requirements of interventionist research. Indeed, based on both induction and deduction, interventionist research alternates phases of immersion and phases of distancing (Berlin and Smith, 2004).

Here, the CLCC management accountant guided the immersion of the task force members. At the first meeting, they were informed about the functioning of the CAH and the information produced. With the help of the researcher, at the third meeting, the CLCC management accountant contributed to the second immersion phase by presenting working group members with the functioning of the relevance analysis matrix. This made it possible to anticipate the distancing and stepping back phase in order to guarantee the exhaustiveness of the proposals formulated, and then to validate them, or not, by a new immersion phase (Miles and Huberman, 1994). The distancing phases were carried out between the immersion meetings and the meetings for the construction of the socio-technical analysis (2nd and 4th meetings). During these phases, the members of the task force had the opportunity to formulate new questions and proposals concerning the functioning of the CAH and the practical relevance analysis matrix. The interpretations were co-constructed by the task force and theoretically analyzed by the author, based on the field diary and the second and fourth meetings. The fifth meeting allowed for a final restitution of the socio-technical analysis of practical relevance co-constructed by the members of the task force and the opportunity to make final adjustments.

RESULTS

Presentation of French Hospital Cost Accounting (CAH)
Under the term CAH, four complementary tools are used:

- the *common analytical table* (TAC);[14]
- the accounting adjustment table, which provides the total cost of clinical centres at an aggregate level on a pre-determined national basis;
- activity-based costing;
- the overall cost scale (*National Common Methodology Cost Scale*—ENCC).[15]

The current architecture of the cost system of the CLCC studied is almost entirely based on the recommendations of the CAH. The common analytical table lists all of the establishment's expenses. It leads to the construction of the CLCC's net result, which is equal to the sum of the revenues of the clinical cost centres, not including the non-clinical cost centres. Final cost centres are directly involved in the provision of patient care while support cost centres provide medical and logistical services that support the operation of the former, such as accommodation, catering, laundry services, and so on (Tan *et al.*, 2009).

In the current CAH system, direct costs are allocated directly to clinical (surgery, hospitalization, etc.) and medico-technical (laboratories, radiology, etc.) cost centres. Indirect costs for general and medical logistics are allocated to the clinical and medico-technical cost centres via an overall consumption percentage of direct costs that is identical for all cost centres. Chapman and Kern (2010) raise a similar point in the National Health Service (NHS) costing system in the UK where, rather than following a logical definition of costs based on cost behaviour, overheads are most often explained by reference to their likely source at organizational or departmental level.

In the case of CAH, the matrix for analyzing the practical relevance of a cost calculation technique (Table 1), proposed as a conceptual framework for this study, would seem to make sense for assessing and improving the practical relevance of this method, particularly with regard to the allocation of its indirect general logistics costs.

A First Analysis of the Practical Relevance of the CAH
A technical substrate with little traceability and little causality The practical relevance analysis matrix was presented to the task force in mid-2017. The content of the discussions on the practical relevance of the current CAH allowed the matrix to be progressively completed. With regard to the rules for allocating indirect costs, the willingness of the users of the CAH to allocate

[14] In French, *Tableau d'Analyse Commun*

[15] In French, *Echelle Nationale des Coûts à méthodologie Commune*

costs using a direct cost system is striking. This desire to allocate indirect costs directly to the costs of health services particularly relates to logistics costs (medical and general logistics), which are directly allocated to the costs of services on the basis of an average percentage of direct clinical costs. But as M6 states, 'they are directly charged to us on the basis of an average percentage of direct clinical costs even if we do not consume them in full'. Clinical costs are themselves allocated to health service costs on the basis of an annual or weekly hourly statement. The head of in-patient services (M2) said that 'this greatly penalizes wards like ours where patients spend the majority of their time in the CLCC'.

This situation is characteristic of the CAH, which is based on a bottom-up identification (Tan *et al.*, 2009) of direct resources from intermediate products (in this case, labour) and then an allocation of indirect costs on this basis. This is a transposition to the medical world of the notion of costs related to the volume of work or production characteristic of the mass production industry. This practice is no longer relevant and, as such, is being abandoned. Mass production has given way to increasingly personalized production. In this context, the allocation of overheads can no longer be derived from the analysis of the volume of work or production but rather, from the analysis of the actual use of resources. 'What is important in our clinical services is not the volume of work but its quality and the comfort of the patient' (M5). By ignoring this principle, for its main users, the CAH reduces cost traceability, being the ability to attribute a cost to a cost object through a causal relationship (Hansen *et al.*, 2007) (Table 4). It also limits cost causality, which indicates the behaviour of a cost in relation to its cause (Bjøornenak and Olson, 1999) (Table 4). Thus, far from contributing to the management of resources, especially the scarcest, the CAH penalizes the production of meaning (influence on behaviour) and strategic thinking (dialogue with the environment).

A compartmentalized representation of organizational interconnections By selecting its cost centres and their interactions, the CAH establishes a pattern of organizational interconnections. The logistics cost centres (general and medical logistics) are auxiliary cost centres. Their costs are allocated to the main cost centres (clinical and medico-technical cost centres) in a top-down manner using allocation keys (their weight in total expenses). 'Logistics costs represent more than 30% of my department's expenses and I have no idea what my consumption is' (M2). As a result, the clinical and medico-technical cost centres appear *de facto* to be the only value producers for the CLCC.

In the end, the representation of organizational interconnections by the CAH system is largely determined by the supervisory authority and cannot support either the medical staff or the technical and administrative staff. The exhaustiveness of cost centres is greatly reduced by the poor representation of organizational interconnections (Table 4). They are two parallel worlds with their own logics (managerial and medical), where collaboration is nevertheless necessary to influence the behaviour and performance of the institution.

TABLE 4

CAH PRACTICAL RELEVANCE ANALYSIS MATRIX

TDimensions of the CAH Objectives applied	Technical substratum	Representations of organizational interconnections	Management philosophy
Manage resources	Reduced informational traceability and low causality	Representation of organizational interconnections reduce exhaustiveness of cost centres	Value is created only in the main cost centres
Dialogue with the environment	Binding standardization of the regulatory authority	Representation is largely dictated by guardianship	The organization must comply with the standard
Influence behaviour	Lack of production of meaning	Segregated vision of activities	No process vision of performance

A standardized management philosophy The very strong link that the CAH establishes between the structuring of cost centres and the hospital's method of finance underlines its designer's concern to control the creation of value within the structure. 'The current calculation of costs is essentially constructed to meet the needs of the ARS's activity-based pricing system, and it is difficult to escape it' (M2). In the absence of a market to inform value through prices, the pricing system and public funding arrangements play this role. The latter reflects, in concrete terms, the mainly economic value produced by the hospital structure. This approach induces assumtions and leads to behavioural phenomena.

The assumption made is of the ability of the funder to assess *a priori* the economic value of the mission and the means to be used to achieve it. Compliance with the standard therefore becomes the main task of hospital managers (Table 4), rather than the achievement of any other desired value.

The behavioural phenomenon is a weak incentive to improve performance, for example, social, societal, medical (Table 4). As soon as the use of resources is justified, it is assumed that value is produced. The CLCC has no interest in improving its medical, social, or societal performance because the architecture of the CAH is simply based on an articulation between cost and economic value. 'With the current allocation of indirect costs of general and medical logistics to my department, via an overall percentage of consumption of direct costs, department heads have no incentive to worry about medical performance, on the contrary, it could increase the indirect costs of their departments' (M7). In the CAH calculation logic, value is only created in the main cost centres (Table 4).

As the matrix in Table 4 shows, the CAH's contribution to performance appears to be very low and its contribution to strategic thinking very limited. There are certainly internal reasons for this situation, but what is of interest here are the causes inherent in the technical nature of the CAH.

However, as with any management tool, CAH's relevance stems from three main characteristics (technical substrate, representation of organizational interconnections, management philosophy) (Hatchuel and Weil, 1995). It is with these three dimensions in mind that, on the initiative of the task force, technical changes have been made to the CAH to determine how these changes may affect the practical relevance of this method.

Internal Reconfiguration of the CAH Within the CLCC

A new costing architecture A need to adapt the system was initially identified by the task force in the first half of 2017. This need specifically concerned the allocation of indirect medical and general logistics costs (35% of the total expenditure of this CLCC). In the current system, these are allocated top-down to the cost centres according to their percentages of the overall expenditure. On the basis of the analysis of this distribution, the task force proposed a new cost architecture more in line with the operation of the institution. As the analysis of the evolution of the allocation of indirect costs for general logistics and medical logistics gave very similar final results, only the evolution of the allocation of indirect costs for general logistics (25% of the total expenditure of this CLCC) are presented and analyzed below.

In the new cost architecture proposed by the working group, the direct expenses of the services remain assigned directly to the clinical and medico-technical cost centres. Indirect costs are allocated to two types of general logistics cost centres:

- four ancillary cost centres (building provisions, general administration services, human resources, IT services division) broken down into all other centres by progressive distribution. 'These are the services that support the main general logistics centres' (M12);
- five main cost centres that provide a direct service to patients (medical information department, reception, transport, catering services, laundry) distributed among the other centres on the basis of their consumption of cost factors. 'They correspond to the consumption that I can actually follow in my department' (M2).

First, each of the nine cost centres was examined in depth in order to define, with its users, its cost drivers and the methods for collecting its volumes (see Appendix). For example, on the one hand, the introduction of cost drivers such as the 'number of MUS'[16] or the 'number of admissions' (Table 5) makes it possible to observe the problems of patient readmission and to try to eliminate them, whereas on the other hand, newly defined cost drivers such as 'number of FTEs', 'number of kg's of linen', or 'number of m^2 occupied' can link the search for economic value to the medical value and the quality of patient care. 'In my department I think that we can find management indicators that limit the concentration of our activities on economic value alone' (M6). Indeed, it is possible to think that the dialogue around

[16] Medical unit summary (in French, *Résumé d'Unité Médicale*)

TABLE 5

REDEFINITION OF CLCC'S GENERAL LOGISTICS

General Logistics Function									
	Auxiliary cost centres (CC)				Main cost centres (CC)				
	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9
Cost centres	Building Provisions	General Admin. Services	Human Resources	IT Services Division	Laundry Facilities	Catering Services	Department of Medical Information	Transport	Admissions
Direct expenses	4 857 612 €	3 276 744 €	1 515 312 €	1 143 792 €	421 062 €	720 956 €	278 167 €	371 235 €	1 027 764 €
Cost drivers	Surface area sqm	€ direct expenses	Number of FTEs[2]	Number of computers	Kg Linen	Number of meals	Number of MUSs	Number of transfers	Number of admissions
Total cost drivers	35 750 m^2	80 115 657 €	630 FTEs	623 PCs	200 136 kg	130 208 Meals	55 206 MUSs	25 379	86 404
Costs per cost driver of CAH	135.88 €	0.04 €	2 406.26 €	1 835.94 €	2.10 €	5.54 €	5.04 €	14.63 €	11.89 €
Number of cost drivers consumed by other cost centres	16 475 m^2	67 026 715 €	551 FTEs	545 PCs	184 482 kg	69 623 Meals	55 206 MUSs	25 379 transfers	85 540 admi.
Costs per cost driver after stepwise distribution	284.85 €	0.06 €	3 580.60 €	2 477.56 €	2.74 €	16.17 €	6.09 €	17.39 €	17.20 €

these new cost drivers could allow not only healthcare staff but also patient representatives to show the influence of FTEs per department, kg of linen processed, or the number of m2 occupied by the departments on the quality of medical care. This development has also allowed the calculation of the cost of general logistics in this hospital to move from a top-down approach to a bottom-up approach, which has been the dominant approach to this calculation until now.

Second, the stepwise distribution of auxiliary cost centres to the main cost centres of general logistics adds a level of micro-costing to the CAH method and highlights two cost drivers per cost centre (Table 6). The first shows a pre-stage cost distribution, representative of the cost per cost driver consumed by the logistics department itself and derived from the current CAH. The second describes a post-stage cost distribution, representative of the cost consumed by the other departments, and which is representative of the new indirect cost allocation system that is being proposed.

By taking the actual consumption of each logistics department as a starting point, the new calculation architecture makes the cost driver an instrument both for internal management of the general logistics department and for dialogue with the consuming departments and external stakeholders (patients and external medicine).

Basic changes have significant effects on the practical relevance of the CAH: The example of the surgery cost centre The analysis of the practical relevance analysis matrix (Table 4) clearly shows that the CAH was not fulfilling its role in this CLCC. By making changes to the method of allocating indirect costs, some encouraging developments in practical relevance can be highlighted. As an illustration, the work done on the surgery cost centre can be examined (Table 6).

This method, based on the redistribution of cost centre families, produces information that allows facility managers and heads of department to know their detailed consumption of general logistics, which is not possible with the method adopted by the CAH (old method, Table 6). 'For my surgery department, it is now possible to know the cost and consumption level of the nine cost centres of general logistics costs according to the area, the amount of direct expenditure, the number of employees, the kg's of linen, etc. consumed' (M4). The old method only presented an overall allocation of general logistics without distinguishing between forms of consumption.

The bottom-up micro-costing introduced in this part of the CAH, significantly changed the information produced. Thus, in this example, 'the introduction of the new method divided by three the deficit result of my surgical department as defined by the old method' (M4). This new information could have significantly changed the decisions made by the management of this department. The old method's global allocation attributed expenses such as storage, administration, or patient admission to the surgery cost centre, whereas the surgery cost centre is a relatively small consumer of these services (Table 6). The new final result is probably more in line with the real logistical consumption of the services and, above all, it allows the visualization of the levers for managing this consumption (Table 6).

TABLE 6

IMPACT OF THE TWO METHODS ON THE 'SURGERY' COST CENTRE

Former CAH Method

Cost Centre	SURGICAL SPECIALITIES	% Assignment
Revenue activity	12 224 752 €	
Public interest mission receipts	152 792 €	
Anticancer drugs	58 352 €	
Other income	397 741 €	
DIRECT REVENUE	12 833 637 €	
Medical logistic expenses		
Operating blocks expenses	5 607 189 €	
Laboratory expenses	1 596 466 €	
Imaging expenses		
TOTAL MEDICAL EXPENSES	11 865 914 €	100%
Revenue before general logistic & building provisions allocation	967 723 €	
General logistic allocation	–2 322 048 €	19.57%
Building provisions allocation	–495 150 €	4.17%
END RESULT	–1 849 476 €	

New Method

Cost centre	Quantity	SURGICAL SPECIALITIES	Unit cost
Direct revenues		12 833 637 €	
Direct expenses		11 865 914 €	
Revenue before general logistic allocation		967 723 €	
Surface area	1 111 sqm^2	327 571 €	294.84 €
Direct charges	3 866 130 €	240 750 €	0.06 €
Number of FTEs	55.3 FTEs	197 951 €	3 581,80 €
Number of computers	36 PCs	89 192 €	2 497.56 €
Number of MUSs	3 250 MUSs	19 780 €	6.09 €
Number of transfers	5 947	103 402 €	17.38 €
Number of admissions	3 365 admin.	57 864 €	17.20 €
Number of kg linen	74 880 kg	205 454 €	2.74 €
Number of meals	26 069 Meals	421 422 €	16.17 €
Total cost of general logistics (general logistics and building provisions)		–1 663 385 €	
END RESULT		–695 662 €	

A new practical relevance for the CAH The first calculation simulations resulting from the new cost architecture were presented to the task force members and further discussions took place on the influence of the changes obtained on the practical relevance of the CAH. The feedback from the task force members was used to construct the new matrix (Table 7) and then to progressively amend it according to the changes made to this costing methodology during our intervention.

M4 notes that 'department heads now know their general logistics consumption (surface area, direct costs, number of FTEs, number of computers, number of MUS, etc.)'. For their part, M6 mentions that 'it is now possible to manage general logistics

TABLE 7

MODIFICATIONS TO THE CAH PRACTICAL RELEVANCE ANALYSIS MATRIX

The dimensions of the CAH / Objectives applied	Technical substratum	Representation of organizational interconnections	Management philosophy
Manage resources	Traceability and cost causality increased	Exhaustiveness of cost centres reinforced	Development of the cost/value articulation
Dialogue with the environment	An external dialogue that is always constrained	Representation still oriented towards dialogue with the supervisory authorities	Beginning of the affirmation of the institution's strategic autonomy
Influence behaviour	Accountability and management of general logistics consumption	Process grouping of general logistics cost centres	Evolution towards a collective performance measure

consumption and make strategic choices in terms of consumption and resource allocation'. These verbatim comments show that the changes made to the technical substrate, by introducing a certain level of bottom-up costing in the allocation of general logistics costs, improve the traceability of consumed resources (Table 7, first column).

Furthermore, M12 emphasizes that 'To take the example of property provisions alone, the introduction of a single indicator makes it possible to calculate and identify the cost of providing a functional square meter (equipped, heated, lit, maintained, insured, depreciated, property tax paid …)'. M11 adds that 'now a department manager knows the overall cost of general logistics for his department, but above all he can identify the origin and determinants of this cost'. 'This enables him to move from a simple knowledge of costs to a genuine management of general logistics costs' (M2). The changes made to CAH, therefore make cost causality much more visible in the eyes of the method's main users (Table 7).

Since the introduction of this new method of sharing the costs of construction provisions, M1 reports that although policy dialogue remains limited by the regulator, internally two important decisions have been implemented:

- the decision to relocate several departments to more appropriate premises;
- reallocation of practices according to intensity of resource use.

Changes to the CAH make managers responsible for their general logistics consumption. Traceability and cost causality appear to be the two main elements

impacted by these changes. In the eyes of the CAH's main users, this makes it essential to analyze these two elements to assess and improve the practical relevance of this cost calculation method.

In the second dimension of management tools (second column), we see some evolution in the representation of organizational interconnections. M11 mentions that 'There are now nine general logistics cost centres that provide a direct service to patients but also support in managing their flows'. M2 states that 'thanks to these changes, we know the general logistics consumption of each department and can intervene on it'. The bottom-up identification of the use of resources has made it possible to decompartmentalize the cost centres of general logistics and increase their exhaustiveness (Table 7). For M3, 'external dialogue has so far been limited. The system is still calibrated for dialogue with the supervisory authorities'. In terms of influencing behaviour, 'the new division into nine general logistics cost centres now enables managers to manage a comprehensive general logistics process' (M12). According to its main users, the changes made to the CAH have a strong impact on the exhaustiveness of cost centres, and also make this exhaustiveness an important criterion in assessing the practical relevance of this cost calculation method.

If we turn to the column 'Management philosophy' (third column), we also see significant changes (Table 7). Due to the development of bottom-up identification of resource use, a new cost/value articulation appears and changes the way indirect logistics costs are managed. Resource management is now managed both by general logistics costs and by the value they create within each department. 'The proposed cost drivers must allow us to know our consumption but also the volume of this consumption adapted to the satisfaction of patients and health professionals' (M2). The intervention of the task force on the choice of cost drivers means that this value created is no longer defined solely in economic and financial terms but also in medical and social terms. It is now linked to costs on the basis of, for example, the 'cost of a meal' or the 'cost of an FTE', which make it possible to measure the cost/value ratio and to determine how the value created for the patient is impacted by a variation in costs, either upwards or downwards. 'If I know the exact cost of a meal in my department, I can anticipate the value created for the patient' (M6).

As for the dialogue with the environment, it is starting to change. At the fifth meeting, M1 said 'with the new system, we are no longer trying to meet a standard (an average percentage of logistics consumption), we have some strategic autonomy over our actual logistics consumption'. The discussion of the relevance analysis matrix with the members of the task force allowed the consideration of several forms of value creation, not only financial but also medical, ethical, social and societal. At this fifth meeting, M7 stated that 'it allowed us to see more precisely how the new distribution of general logistics costs affected the way these costs are perceived by the heads of department, the doctors and the staff of the department'. The link between calculated costs and created values is becoming much more visible due to the changes made to the CAH. The development of this cost/value linkage is furthering the idea that 'performance is collective and not just financial, but also social, medical and societal' (M8).

Therefore, the main users of the CAH demonstrate the importance they attach to this cost/value articulation in their ways of analyzing and assessing the practical relevance of this cost calculation method (Table 7).

DISCUSSION

By placing costing at the centre of a set of instrumental and human interactions, the matrix for analyzing the practical relevance of a costing method tends to complement work that focuses solely on the accuracy of health costing methods. It provides a basis for critical analysis of the CAH, enabling modifications of its calculation to be implemented by the main users. The identification of deficiencies/limitations in existing management accounting methods is an important element in improving their relevance (Jones, 2012). The analysis matrix proposed in this work starts from these deficiencies and limitations to try to reinforce the practical relevance of the cost calculation studied.

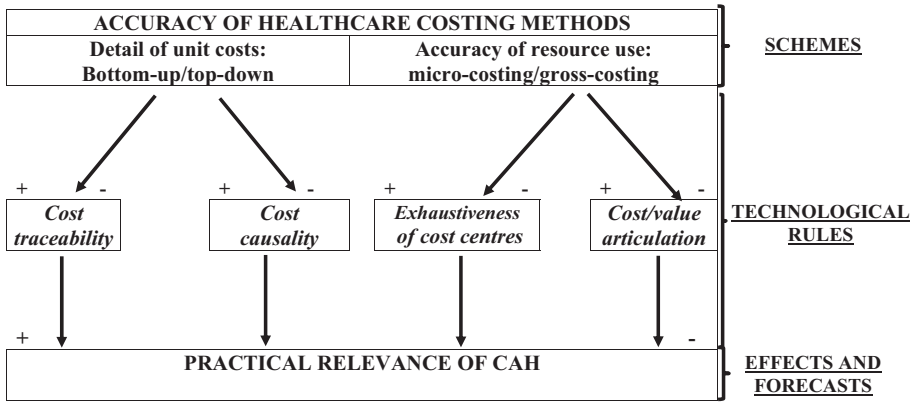
Through the changes made to the way indirect costs are allocated in the CAH, this matrix allows us to identify four characteristics of this management accounting method (cost traceability, cost causality, exhaustiveness of cost centres, and cost/value articulation) by which its practical relevance, as perceived by a range of stakeholders, is modified (Figure 2). These four characteristics of the CAH constitute the elements by which any modification to the calculation technique of this method modifies its practical relevance. Using the CAH as an example, these four characteristics therefore are the main criteria to be analyzed in order to assess the practical relevance of CAH.

Criteria for Analyzing the Practical Relevance of a Costing Method

In the CAH case study, the first two criteria (cost traceability and causality) are activated by changes in the detail of unit costs. Through the construction of the new matrix (Table 7), we have seen that by incorporating bottom-up micro-costing in the CAH calculation architecture (Table 5), cost traceability and causality are modified (Table 7). These first two features therefore work on the same principle. A bottom-up calculation of unit costs increases the traceability and/or causality of costs as well as the practical relevance of the healthcare costing method (Figure 2). Conversely, top-down unit costing tends to reduce the traceability and/or causality of costs, which does not improve the practical relevance of the costing method (Figure 2). In the management accounting literature, the identification of these two criteria for analysis is not new. Our study allows the relationships between these two criteria and the accuracy of healthcare costing methods to be explored. The illustration of these relationships then enables the identification of the respective influences of the gross-costing/micro-costing and top down/bottom up approaches of healthcare costing methods on the traceability and causality of costs (Figure 2).

FIGURE 2

THE FOUR CRITERIA FOR THE TECHNICAL ANALYSIS OF THE PRACTICAL RELEVANCE OF CAH



The influences and variations they generate on the practical relevance of the CAH, as observed by its main users, make cost traceability and causality two essential criteria for analyzing the relevance of this.

The other two criteria for analysis of practical relevance (exhaustiveness of cost centres and cost/value articulation) are observed as a result of the changes initiated on resource use identification (Figure 2). Using the CAH as an example, we observed that by incorporating a level of micro-costing to identify resource use (Table 5), exhaustiveness of cost centres and cost/value articulation was developed (Table 7). Both criteria operate on similar principles. Micro-costing identification of resource use by a healthcare service increases cost exhaustiveness and/or cost/value articulation, thus improving the practical relevance of the healthcare costing method. Conversely, gross-costing of these resources by reducing the comprehensiveness of costs and/or cost/value articulation reduces the practical relevance of the method (Figure 2). The identification of these last two criteria significantly strengthens our knowledge of the practical relevance of costing methods and the ways in which they can be analyzed. From a theoretical point of view, the use of the practical relevance analysis matrix (Table 1) highlights these two criteria for analyzing the practical relevance of a costing method, not previously illustrated in the literature, but particularly cited by the members of our IVR task force.

So, combined with the analysis of changes in the CAH (Tables 5 and 6), the resource management line of the analysis matrix first identified these four criteria through which these changes generated effects on the practical relevance of this method (Table 7). Subsequently, the lines of the matrix—dialogue with the environment and influence of behaviour—allow us to observe and analyze the effects of changes in these four elements on the external and internal actors of the institution themselves. The identification of these four criteria was made possible in particular by

the intersection of theoretical knowledge and practical relevance (Nicolai and Seidl, 2010; Van der Meer-Kooistra and Vosselman, 2012) and the perceptions of users of this method enabled by IVR in management accounting.

IVR: A Useful Approach to Analyzing the Practical Relevance of a Costing Method

IVR in management accounting has the potential to play an imortant role in developing theoretical knowledge from new practical questions (Jansen, 2018). While IVR in management accounting is often based on an interpretive approach to theory use (Granlund and Lukka, 2017), Jansen (2018), as described above, identifies three different ways of using theoretical knowledge in an IVR (shaping the IVR, analyzing the effects of the IVR, bridging the gap between the theory that is used to shape the IVR and that is used to analyze it). Applying these three ways of using theoretical knowledge in our IVR allows us to define a three-step IVR approach that progressively analyzes the practical relevance of a costing method based on a thorough study of its fundamental calculation technique (Figure 3).

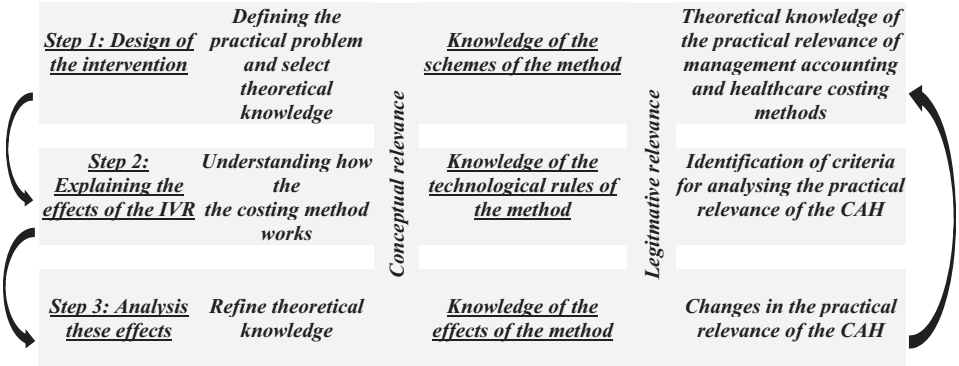
In the first step, theoretical knowledge is used to shape the intervention by first focusing on the practical problem of the organization (Jansen, 2018, p. 1503). In the IVR presented in this article, theoretical knowledge of practical relevance in management accounting, combined with knowledge of healthcare costing methods ('schemes'), enabled us, first, to identify a practical problem linked to the way in which the practical relevance of a healthcare costing method should be analyzed (Figure 3).

Further, in the second step, theoretical knowledge is needed to interpret and explain the effects of the intervention. Indeed, the processes of defining the practical problem and selecting theoretical knowledge to shape the intervention often remain subjective (Jansen, 2018). In our example, we show that theoretical knowledge related to the three forms of practical relevance in management accounting research (conceptual, legitimative, and instrumental relevance) (Nicolai and Seidl, 2010; Van der Meer-Kooistra and Vosselman, 2012) allow us to identify the 'technological rules' of CAH, which are based on the four criteria for analyzing practical relevance that have been highlighted (Figure 2). Previous work has shown that the practical relevance of a costing method is mainly analyzed on the basis of a small number of criteria that are not completely exhaustive (causality and cost traceability). On the basis of the IVR carried out in this hospital, we have refined this theoretical knowledge by specifying, in the case of CAHs, how these two criteria can be supplemented by two new criteria (exhaustiveness of cost centres and cost/value articulation), which significantly deepens the analysis of the practical relevance of a costing method (Figure 3).

In the third step, the post-intervention evaluation of these effects can serve as a basis for refining the theoretical knowledge used to develop the intervention in order to bridge the gap between theory and practice (Jansen, 2018). In the example of our study, through the use of our practical relevance analysis matrix (line dialogue with the environment and influence of behaviour, see Table 7), we can thus measure the 'effects' of technical modifications to the CAH (Figure 3).

FIGURE 3

ANALYSIS OF THE PRACTICAL RELEVANCE OF A COSTING METHOD IN AN IVR



Furthermore, at a later stage, these three steps of the IVR approach can be repeated in order to progressively measure the impact on the practical relevance of costing methods of changes made to their technical calculation and application (Figure 3). The CAH example thus allowed us to define a dynamic three-step IVR approach to analyze the practical relevance of costing methods by linking their conceptual, legitimative, and instrumental relevance (Figure 3). In our IVR, theoretical knowledge of the practical relevance of management accounting and healthcare costing methods (schemes) enables us to analyze the other two forms of instrumental relevance (technological rules and effects) that affect the practical relevance of CAH (Figure 3).

This is an important contribution of our work which respects the three forms of theoretical knowledge articulation described above (Jansen, 2018, p. 1503). Through the proposed IVR approach (Figure 3), we thus show that the identification of the elements of instrumental relevance of costing methods, from their conceptual and legitimative relevance, is an effective research approach that allows IVR to define, with its main users, the limits of costing methods and the modifications to be made to their practices (Malmi, 2016, p. 39). As Lukka and Suomala (2014) point out, the interventionist research process is a 'battleground' of various competing agendas and interests, which an interventionist researcher has to balance theoretically (etic) and empirically (emic). The results of this work show that in a management accounting IVR, this balance can be achieved by bringing together the empirical objectives of relevance of a management accounting method with the elements of the theoretical framework of practical relevance to management accounting knowledge (Nicolai and Seidl, 2010; Van der Meer-Kooistra and Vosselman, 2012).

Until now, there have been several gaps in IVR practice (Baard, 2010). First, in terms of research methodology, there are few IVR frameworks or methodologies that can be used to stimulate a structured approach to this type of research, which would bring more rigour and legitimacy to IVR (Baard, 2010). Second, IVRs are widely used in specific fields (e.g., nursing, education, public health, social work, etc.) and the

knowledge gained in these fields does not always allow for analysis and improvement of the practical relevance of the knowledge built by IVRs in management accounting (Baard, 2010). The three-step approach of IVRs to analyze the practical relevance of costing methods based on the analysis of their technical calculation and application (Figure 3) contributes to the consolidation of management accounting IVR methodologies, particularly by specifying these IVRs according to their research objectives (e.g., here, the objective of improving practical relevance).

CONCLUSION

By 'reopening' the 'black box' of accounting technique, this article identifies the main theoretical, practical, and methodological features of an approach to analyzing the practical relevance of costing methods, starting from their fundamental construction and application, which is often suggested and utilized (Mitchell, 2002; Baldvinsdottir, *et al*., 2010; McLaren *et al*. 2016) but lacks concrete results (Parker, 2012).

We answer our research question—how can the practical relevance of costing methods be analyzed on the basis of their technical characteristics, with a view to improving them?— through three important contributions concerning both the approach and the criteria for analyzing the practical relevance of a costing method.

First, at the theoretical level, we propose a model for analyzing the practical relevance of a costing method, based on an analysis of its calculation technique. We thus propose a matrix for analyzing the practical relevance of costing methods (Table 1), which allows us to cross-reference, in a dynamic way, the three forms of practical relevance retained in the literature (conceptual, legitimative, and instrumental relevance) and to highlight their links. This matrix makes it possible to adapt and contextualize these three forms of practical relevance in management accounting research to the practical relevance of costing methods.

Second, at the practical level, with the help of the managers and executives of the hospital studied, we refine our knowledge of how the accuracy of health costing methods affects their practical relevance. The example of the CAH and the modifications made to it enable us to identify four criteria for analyzing the practical relevance of a costing method (cost traceability, cost causality, exhaustiveness of cost centres, and cost/value articulation), which lie at the interface of the calculation technique and the practical relevance of this costing method (Figure 2). From a theoretical point of view, two of its criteria (cost traceability and cost causality) have been particularly illustrated in the management accounting literature. Two others (exhaustiveness of cost centres and cost/value articulation) are identified from our matrix and from the technical analysis of practical relevance. These four criteria for the analysis of the practical relevance of a costing method represent an important theoretical development for improving the analysis of the practical relevance of a costing method. Future studies may tests these outside the healthcare field.

Third, from a methodological point of view, our work shows that IVR allows us to analyze the relevance of management accounting techniques by building a bridge between theoretical and practical knowledge in management accounting (Malmi, 2016; Jansen, 2018). The CAH example allows us to construct and propose a three-step IVR approach to analyze the practical relevance of costing methods based on the study of different forms of relevance (instrumental, conceptual, and legitimative) of management accounting knowledge (Nicolai and Seidl, 2010; Van der Meer-Kooistra and Vosselman, 2012) (Figure 3). Whilst work on the practical relevance of costing methods has been underdeveloped over the past 30 years, this contribution is an effective basis for responding to the need to develop tools to analyze the practical relevance of management accounting tools (Hesford *et al*., 2006).

In terms of managerial implications, our work, through its practical and interventionist dimensions, begins to respond to the desire for improvements in cost measurement in institutions, a need which is strongly expressed by hospital managers. By proposing a practical relevance analysis matrix that can be mobilized in hospitals and by identifying the main criteria for analyzing this relevance, our work makes it possible to respond significantly to the practical needs of managers to develop and improve their costing methods. Similarly, the IVR approach to analyzing the practical relevance of costing methods that we propose constitutes an initial methodological basis for analyzing this relevance, which can be perfected in future work, but which significantly guides the analysis of costing methods in health care institutions and organizations in general.

That being said, our approach has certain limitations that can be overcome in future work. A first limitation of this work is related to the exhaustiveness of our results. Through this interventionist research, we have highlighted the role of the knowledge of technological rules in analyzing and improving the practical relevance of a costing method. Although the implementation of this IVR builds on and complements the results of previous analyses (Jansen, 2018), our results are limited to this particular interventionist research. In the future, the application of our model and approach to analyzing the practical relevance of a costing method should therefore be replicable on other methods and in other contexts. Indeed, when it comes to the generalization of interpretative results in management, rather than generalization, Argyris (1996) speaks of newly exploitable knowledge and Ulrich (1983) of critical methods for seeking or thinking about solutions to defined problems. In other words, empirical methodologies that managers can use to solve apparent problems. Our proposal for an IVR in management accounting is therefore primarily a proposal for an empirical method for analyzing the practical relevance of a costing method in the healthcare sector, as in all sectors where costing methods are used.

A second limitation of our study concerns the very important role we attribute in this study to the instrumental relevance of costing methods. We posit that accounting techniques play an important role in the construction of the practical relevance of a costing method. Although these techniques are integrated into our approach through the composition of a stakeholder task force, it will also be important to link the study of practical relevance even more broadly to the study of other more social and societal forms of practical relevance (Modell, 2017). Future

research should attempt, as we have done with practical relevance, to determine how these other forms of relevance can also be used to analyze the relevance of health costing methods and more generally of management accounting methods.

Immediately, the three contributions in this article first provide a *matrix* for analyzing the practical relevance of a costing method (Table 1), then identify four criteria for analyzing the practical relevance of a costing method (Figure 2), and finally propose a *three-stage IVR approach* for analyzing the practical relevance of costing methods (Figure 3). These three original contributions offer interesting theoretical and managerial perspectives for studying the practical relevance of costing methods in even greater depth.

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APPENDIX

GENERAL LOGISTICS COST DRIVERS

Cost centres	Cost drivers	Details of work unit calculation
IT Services Division	Number of computers	This is the number of computer workstations—fixed screens, laptops and stations—installed in all departments.
Patient Transport	Number of transfers	A transfer corresponds to a one-way journey, not there and back, which is to be allocated to the Service receiving the patient.
Admissions	Number of admissions	This is the number of initial admissions. If a patient goes to another department, this second admission will not be counted.
Department of Medical Information (DMI)	Number of Medical Unit Summaries (MUSs)	The production of a Medical Unit Summary (MUS) is triggered by any stay leading to the administrative registration in a medical unit of hospitalisation of MCO.
Laundry Facilities	Kg of linen	The kg of linen is defined as the kilo of linen weighed on arrival at the laundry.
General Administrative Services	€ direct expenses	Direct analytical assignment of expenses.
Human Resources	Number of FTEs	Full-time or equivalent staff as at 31/12.
Building Provisions	Surface area sqm	The usable surface area (sqm)—equipped, heated, lit, maintained, insured, depreciated, property tax paid, etc.
Catering Services	Number of meals	These are meals served to patients, excluding snacks and breakfast.

S*ource*: CLCC