

Teittinen, Henri; Männikkö, Janina

**Article**

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# Case-Mix Accounting System Design in Social and Health Care Sector – The Mechanisms of Hybridization

*Henri Teittinen – Janina Männikkö\**

## **Abstract:**

The purpose of this paper is to explore the design process of a case-mix accounting system. Particularly, we focus on hybridization, highlighting how nonfinancial staff became involved and interested in case-mix accounting. This study is a qualitative case study, illustrating the case-mix accounting system design in one case organization. We identified authority, competence, rhetorical, and scoring mechanisms. The authority mechanism provides the basis for the design of the case-mix accounting system; the competence mechanism supports the ability of personnel to participate in service design; the rhetorical mechanism makes things more vernacular; and the scoring mechanism defines and categorizes but also supports management control. Our results support also practical implications in management control in the social and health care sector.

**Keywords:** Case-Mix Accounting; Hybridization; Social and Health Care Sector.

**JEL classification:** M41.

## **1 Introduction**

Public health care has always been one of the main issues in the debate surrounding public finance. This is partly because of the continuous increase of public health expenditure, but also the significant structural changes that have taken place in the public sector in recent decades (see, *e.g.*, Kurunmäki *et al.*, 2003).

OECD (2015) reports that healthcare costs are rising particularly in European countries from around 6% of GDP in 2015 to 9% of GDP in 2030 and 14% by 2060. In the social and health care sector accounting methods serve a crucial role to understand the mechanisms to identify the sources of costs (see, *e.g.*, Tan *et al.*, 2014).

According to Chua and Preston (1994), accounting plays a key role in the reform of public health care. This relates to the development of public sector accounting in the new public management theme (NPM; see, *e.g.*, Kurunmäki, 1999; or Lapsley,

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\* Henri Teittinen; University of Eastern Finland, Faculty of Social Sciences and Business Studies, UEF Business School, Kuopio campus, FI-70211 Kuopio, Finland, <henri.teittinen@uef.fi>, ORCID iD: 0000-0003-4202-0504.

Janina Männikkö; Seinäjoki University of Applied Science, Faculty of Business, Kampusranta 11, FI-60101 Seinäjoki, Finland.

1999) and to the process toward a more cost-oriented and cost-effective approach in the health care sector (see, *e.g.*, Chua and Preston, 1994; or Mättö *et al.*, 2014).

In many forms, accounting is in the middle of that debate. Accounting is a part of different processes, such as the implementation of accounting methods in different management control tasks, and affects the parties in the processes, such as patients and physicians, but it also plays a role in reporting and pricing issues with financiers, for example, in municipalities. Accounting concepts and processes form an entity in which health care and accounting are intertwined and where accounting methods can be used to manage the tensions in the health care sector (Chua and Preston, 1994).

Especially in hospitals, case-mix accounting has been used as a basis for cost accounting and pricing. The aim of case-mix accounting is to provide comprehensive financial information on the costs of individual patients and different patient groups. This information can then be used in the planning, controlling, and pricing of services (see, *e.g.*, Lehtonen, 2007).

Case-mix accounting has been developed to increase the understanding of the performance of hospitals, but also to present the standard costs for services (see, *e.g.*, Coulam and Gaumer, 1991; or Lowe and Doolin, 1999). The ultimate goal is to increase cost awareness and efficiency while contributing to the more efficient use of resources (see, *e.g.*, Covalevski *et al.*, 1993; or Lowe and Doolin, 1999).

Case-mix accounting is one method that can be used to develop management control in the social and health care sector. It has been used to rationalize and harmonize action according to defined patient groups, particularly by diagnostic-related patient groups (DRG; see, *e.g.*, Doolin 1999; or Fetter and Freeman, 1986).

The idea of the DRG system is that the hospital's processes are seen as production processes, including the inputs, processes, and outputs, here aiming to support the management of resources more efficiently with standardized costs (see, *e.g.*, Weiner *et al.*, 1987). According to Fetter and Freeman (1986), DRG classifications allow for more efficient operations in health care because health care processes and their costs become more transparent. According to previous studies, DRG has been widely developed to help hospitals control costs and develop planning and control (see, *e.g.*, Carroll and Lord, 2016; or Chua and Preston, 1994).

Kantola and Järvinen (2012) find that implementing DRG-based accounting systems is usually carried out because of cost management issues. Hospital services are typically covered on a full-cost basis. This means that the service provider does not make a profit but instead charges the municipality the full cost. Hospitals must cover the costs of their services by charging fees, some of which are based on, for example, patient-specific DRG costing (see also Hyvönen and Järvinen, 2006).

Cost accounting in DRG systems may also differ between hospitals. Kantola and Järvinen (2012) state that some hospitals use their own patient-specific costs, while others use the costs presented by the authorities. There are pricing models and cost accounting methods that are not based on the DRG classification but that are rather based on some other classifications and categorizations developed for various purposes in the health care sector. The World Health Organization (WHO) has identified many international statistical classifications for diseases and diagnoses.

Previous accounting studies on public health care have also examined, for example, the role of hospital staff in financial management and the importance of participation in management control, for example, in the involvement in budgeting (see, *e.g.*, Kurunmäki, 2004; or Lapsley, 2001). Kurunmäki (2004) describes the participation of hospital staff in financial management, for example, in budgeting, as a kind of hybridization that combines financial and nonfinancial forms of control. According to Kurunmäki (2004), the purpose of hybridization is not to transform physicians into financial professionals but to involve physicians in financial planning, thus gaining a better understanding of the interface between management control and health care. Indeed, previous research widely states that physician involvement in resource management and identification is critical to improving hospital efficiency (see, *e.g.*, Abernethy, 1996; Abernethy and Stoelwinder, 1990; Averill and Kalison, 1991; or Doolin, 1999).

According to prior research, the pricing of hospital services is based on what doctors define as the contents of the service packages (see, *e.g.*, Kurunmäki, 2004). Kurunmäki (2004) notes that the definition of the content of hospital services starts from the dismantling of services into smaller areas and from what is behind the cost of that service. In Kurunmäki's (2004) study, costs are determined for service packages based on the average costs and working time used (for each operation). However, Kurunmäki's (2004) research does not describe how this determining process of costs and content of the services has been performed.

Lehtonen (2007) has studied DRG-based pricing and accounting systems on hospital management; she focuses on the mechanisms for implementing new management control systems in the health care sector. The key issue is understanding how these mechanisms will help develop, design, and implement better these management control systems while avoiding the problems associated with implementation. Lehtonen (2007) finds that successful implementation depends strongly on the involvement of physicians in the process. The success of the implementation of DRG costing is crucially influenced by the involvement of hospital staff (especially physicians) in the design work together with the financial staff. However, previous studies also show that hospital staff and physicians have not always been interested in the information provided by case-mix accounting systems, and in some countries, hospitals and physicians have shown considerable

opposition to the use of DRG for funding and control purposes (see, *e.g.*, Doolin, 1999; Lowe and Doolin, 1999; or Weiner *et al.*, 1987).

Ng and Li (2016) examined how the customer can be better integrated into case-mix systems for primary healthcare. In their study, the focus was customer-focused philosophy that recognises patients as co-producers of care, and specifically how customer focus can be embedded into management accounting. They argue that in a hospital context, the case-mix system can be viewed as an “answer machine” that computes a decision, and in primary health care more like an “idea-creation machine” where customers should be identified also as a way to solve complexities.

In summary, the case-mix accounting system consists of the following: a service (mainly expert work, generally that of a working group, as well as materials) that is categorized (usually according to the international general classification); cost accounting, which determines the cost of the service; pricing, which, in most cases, means full cost; and the process by which these are defined.

We can also summarize that the challenges related to designing a case-mix accounting system include the following: (i) the health care sector is strongly regulated by laws aiming to promote the health, well-being, and life management of the client, yet this sector also needs more advanced management control systems; (ii) the staff in the social and health care sector is typically not interested in financial and management control issues, even though the case-mix accounting system could be used for better control of resources; (iii) customers demand more transparent pricing models based on cost accounting; and (iv) the market has evolved into one where there is an open competition, which increases the need for more accurate cost accounting and pricing in the social and health care sector.

Although DRG and case-mix accounting systems could improve hospitals’ financial and management control, there is only little empirical research and empirical evidence on the topic and use of the systems (see, *e.g.*, Coulam and Gaumer, 1991; Fetter and Freeman, 1986; or Lehtonen, 2007). Also, Abernethy and Stoelwinder (1995) emphasize the importance of examining case-mix accounting systems in light of controlling and monitoring the outcomes of the hospital and health care services, suggesting that more research and empirical observations on the effects of case-mix accounting systems in different contexts are needed.

In conclusion, case-mix accounting systems have been studied, but there are challenges in the design, implementation, and use of these systems that need further consideration. Therefore, more comprehensive research is needed on case-mix accounting systems. The main goal of this study is to contribute to the design process of case-mix accounting systems.

Based on the research gaps identified in previous studies, we examine the design of a case-mix accounting system, particularly the mechanisms used in the process. The main focus is on how the hybridization, that is, cooperation between different professions, works in the design process of a case-mix accounting system, according to a categorization other than DRG.

Our paper is structured as follows: In this section, we have introduced the field of our research topic. Section 2 provides an overview of the previous literature on case-mix accounting. In Sections 3 and 4, we present our research approach and case study findings. Sections 5 and 6 present the results and conclude and discuss our theoretical contribution.

## **2 Basics of Case-Mix Accounting**

The starting point of case-mix accounting is to combine accounting data with categorized data (see, *e.g.*, Raulinajtyś-Grzybek, 2014; or Vogl, 2012). Categorized data refer to the process outputs and combination of these into final services and products. The issue is not only the definition of services but also the management's control of the production of the whole service and its costs (see, *e.g.*, Lehtonen 2007). Categorized data and specific cost accounting data, here in the form of a case-mix accounting system, can then support management in decision-making in the health care sector, for example, in resource allocation (see, *e.g.*, Chapman *et al.*, 2014).

The purpose of a case-mix accounting system is to provide information for planning, budgeting, and evaluating the performance of service activities (see, *e.g.*, Mikkola *et al.*, 2002). The information can be used in a target setting for assessing the need for funding, defining, and evaluating performance indicators and price services. In particular, human resources and the allocation of their time use play a key role in the financial success of social and health care organizations.

Product and service design (hereafter service design) is a key issue in case-mix accounting (see, *e.g.*, Fetter and Freeman, 1986). In the social and health care sector, service design is a development process in which management and personnel learn to better understand the structure of their services (see also Kurunmäki, 2004). In this process, various methods can be utilized, for example, finding out how much resources are in use, gathering data from production and fixed assets, and analysing what kind of services will be provided to specified clients and customers (see, *e.g.*, Carroll and Lord, 2016; or Vogl, 2012).

One of the end results of case-mix accounting is service pricing (*e.g.* DRG pricing). In this way, service design improves the transparency of pricing. This also makes it possible to present the customer the information about which parts the given service

consists of, as well as the costs and prices of services (see, *e.g.*, Mikkola *et al.*, 2002). This enables customers to better prioritize things (see also Lehtonen, 2007).

In the public social and health care sector, pricing is typically based on the full cost, market prices, or prices given by authorities. The full-cost basis is based on the costs of producing the service, while the market price results from negotiations between the producer and client. Prices given by authorities mean that the authority (*e.g.* parliament) determines the prices. Typically, when set by authorities, the prices are fixed for a certain time period, for example, for the next budget period or year.

Case-mix accounting also enables cost comparisons, for example, between district hospitals (see also Raulinajtyś-Grzybek, 2014). Underlying this is the idea that all financial information should be reported according to common specifications, for example, in XBRL (eXtensible Business Reporting Language) format. This means that the methods used should be consistent across different users to achieve the most uniform and comparable outcome possible in cost accounting.

Hence, the starting point for designing the case-mix accounting system is the design of services and this design's integration with accounting data. Unfortunately, there are only limited studies exploring how this process progresses in social and health care organizations. Consequently, we examine the design process of a case-mix accounting system, particularly focusing on the mechanisms that influence this process. We pay special attention to hybridization, that is, how cooperation between different professions works in this design process.

In the current study, we examine the design process of a case-mix accounting system according to the ICF classification (International Classification of Functioning, Disability, and Health). The ICF is an international classification for describing functional health status and health-related functional status by the WHO (World Health Organization, 2001).

### **3 Research Design**

We were aware of the ICF-based case-mix accounting system design process in EPS, and according to prior studies, we were interested in how this complex and challenging process progressed in EPS.

We use a qualitative case methodology (see, *e.g.*, Ahrens and Dent, 1998; Kakkuri-Knuuttila *et al.*, 2008; or Vaivio, 2008) because we aim to provide new perspectives from practical situations and connect our findings and results to a wider context and previous research findings.

Our empirical design follows the next steps: (i) identifying the research gap in prior literature; (ii) access to the case organization; (iii) understanding the context of the

case organization (including the documentary material); (iv) interviewing personnel involved in the case-mix accounting system design process; (v) analysing the findings (including highlighting the main findings, as presented in the following sections); and (vi) summarizing the findings in discussions with prior literature.

Our empirical data consist of both theme interviews and internal organizational documents (documents, presentation materials, scoring templates, price lists, financial reports, and strategy documents). The main data collection method – theme interviews – was based on semi-structured interviews, with key themes being the product and service design process, financial, and management control, and organizational topics. We interviewed personnel involved in the design process of case-mix accounting, including nurses, human resource managers, and accounting managers. The interviews were conducted in 2019.

In collecting and analysing the material, we have followed Denzin's (1978) principles. We have collected material from a variety of sources, with interviews being the main source of our material, but we have also used written and documented material. The material is encoded by two researchers. Consequently, discussions have been ongoing with the research team. In this way, we have triangulated our empirical material.

The first step in our analysis is to identify the process in which the case-mix accounting system has been designed. In the second step, we have tried to identify the different mechanisms used in this case-mix accounting system design process. Finally, in the third phase, we analyse and discuss with prior literature how these mechanisms were used in this case-mix accounting system design process.

#### **4 Designing a Case-Mix Accounting System in EPS**

EPS is an organization that provides statutory social and health care services to its member organizations (municipalities) in Finland. EPS has about 400 permanent employees in 15 health care units. Clients are typically long-term patients. EPS is governed by laws imposed on organizations providing social and health services.

In the following, we are using the same terminology as the case organization, and we are referring to the clients as patients (persons with disabilities), and as customers those who will pay the bills (*e.g.* municipalities).

##### **4.1 Starting points for the case-mix accounting system**

The starting point for EPS's case-mix accounting system was redefining services and making pricing more transparent. The requirements for the transparency of costs came under pressure from certain sources, including customers' demands, employee



uncertainty about services and prices, the problems of the current pricing model, and open competition.

Customer consultations were conducted with the member organizations. In addition, workshops were organized with the participation of customers, users, and employees of the services. The biggest criticism was related to pricing methods and costs.

The main criticism at that point was specifically related to the pricing method and unclear cost transparency (Nurse 1).

On the other hand, there was also pressure within the organization to reform pricing to be more transparent. The issue was precisely a reform of the cost accounting of services.

The services we sell to municipalities are not entirely defined and do not tell us about the content we sell to any customer (Nurse 2).

The resource calculation, according to the public authorities, on the other hand, is very general and does not give a true picture of the quality of the service. This refinement of quality and service was also underlying.

The volume of nurses (a public measure) is but a purely computational formula for allocating nurses to patients to see how much the measure per patient or resident is (HR manager).

The design of services and pricing was also fostered by the open competitive situation.

We are in a competitive situation. Municipalities think very carefully about where they buy their services. And there is, of course, the situation that the municipal budget is there and that the euro is driving it (Accounting manager).

Finally, EPS decided to take advantage of the internationally used ICF framework for defining its services, hence allowing for a comprehensive assessment of the customer's performance and related components. Evaluation forms based on the ICF framework were planned to be used for service design. According to these, the ICF framework can be evaluated, for example, how the patient is able to move, communicate (talk), and take care of themselves.

## **4.2 Working groups**

EPS was visited in March–April 2018 by an expert from the consultancy firm who presented alternative tools for product and service design. Based on this, the so-called pizza model was chosen for the service design process. Pizza (as rhetoric) was easy to understand. Thus, the service was understood as a whole pizza, and its

various parts and elements were broken down into separate slices to illustrate what part of the service they formed.

We worked in groups to make pizzas. We also thought about what is included in any service (Nurse 4).

We made such pizzas out of the services, and we started to calculate what, for example, the number of staff for that, what medical services are included, running costs, so everything was completely broken down (Nurse 2).

The working groups (the personnel who were involved in this process) started to work with the pizza models right after the sparring days. Among other things, they considered the amount of help needed and what it means in person years. It was also discussed what the daily price of the service consists of and what is included in any service at its possible different hierarchical levels. Various additional services change as service levels go up or down, meaning that the need for patient support increases or decreases. Different levels of service were always formed into their own pizzas.

After the pizza models, the working groups set out to create evaluation forms for the services. In the future, they would be used as tools to determine the amount of patient support needed and the type of service each patient would need.

The working groups decided on the most important factors for the service, which are emphasized in the evaluation forms and given the highest weight. For example, self-care may be emphasized and considered one of the most important factors for a service. In this case, even if the patient faces challenges with communication or mobility, they would not accrue as many points as possible when it came to taking care of themselves. Points were obtained from the various sections of the evaluation forms, and when the points were added together, the final result would indicate the level at which the patient would be placed. The more points the patient earned from the evaluation, the more support and resources the patient needed and the higher he or she ranked.

### **4.3 Evaluation form and scoring**

The evaluation form worked as a key tool in the service design process. According to the ICF classifications and pizza templates, it was decided how many different hierarchical levels the service would need to have, what their contents would be, and what the service needed to be so that it could be of high quality. As the level rises, so does the need for support. At the lowest levels, support may be needed on a temporary or seasonal basis, and at the middle levels, support may be needed on a targeted basis for specific issues. At the highest levels, additional resources would be required from the beginning until the end of the day or around the clock.

Many patients have been known for years, and over time, experience has given an idea of how much support everyone needs. They were scaled to assess whether to test scoring at each level that would meet their need for support. In this way, the aim was to get the score in proportion to the correct starting points.

First, they were scored pretty much to estimate those points to what they could be in every function. And as we did those scores, we began to define those words, whether that word has that kind of weight (for points) or that kind of weight, and what it wants to say then in relation to the total score [...] The greatest emphasis was in the discussions we had about those texts, about those text boxes at every function, whether or not this is in relation to that next level box. It was precisely, therefore, a complete defining and redefining of the content of that text, resulting in us all seeing and understanding the text in the same way in our working group (Nurse 3).

As the evaluation forms were defined, a variety of issues emerged.

For example, if the patient is unable to move on their own. Do I put the patient at this level or at this level, and then, you have to start thinking about how much that immobility really prevents. Can he or she do one's tasks well, for example, if there is a wheelchair available, or is there some other thing supporting mobility of the person, but then, there might be some such limitations, for example, mental disability (Nurse 3).

At various stages in the process of developing the evaluation forms, the forms were tested by evaluating patients. Words and their weights were edited and redefined while observing what the change meant in relation to the total scores. The evaluation forms were presented to the staff of the different units at meetings and were implemented and tested in the units and between shifts.

The staff of the units carried out the assessments in pairs, and in some units, there was an additional staff member who made sure that there was a common line in how things were looked at. The results obtained were compared, and it was looked at why a group had been evaluated as it was; if there were big variations, the reasons for different estimates were sought. As a result, we were able to fine-tune the words and how a sentence should be interpreted.

It was precisely the complete biting of the content of that text and how we will all see it in the same way. That was the job. Although it sounds like a little non-existent thing here, it did play a really central role, and when it was done well, the end result was pretty good (Nurse 3).

Finally, real patient groups were selected and simulated twice regarding how patient scoring would materialize.

#### **4.4 Cost accounting**

In the past, the units may have had several different services. Now, the goal was to produce a service of the same heading in any unit so as to determine its cost and compare it with the cost level of a similar service in different units.

The cost accounting of the new services started with pizza models. The working groups assessed service-specific resource needs when creating pizzas. Based on the pizzas of the working groups, they could simulate what it meant to implement the pizza in terms of cost.

For example, the basic level of housing service is at this level, and here, in this case, it is more because of the included activities, which makes the daily price even more expensive. All of these activities have their own pizzas. And then, there is the doctor's visit, the home visit, the nurse's visit, and the weekly consultations, for example, counted on this pizza (Nurse 2).

The pizzas were originally introduced because they were thought to make it easier to take control of how the service is managed over time and what it primarily consists of.

The pizza model was clearly such that it was easy to understand, and everyone was able to participate in it. That was the basis to open up financial planning in some rational way and with a common logic (Nurse 1).

The pizzas were abandoned as the calculation progressed to Excel.

The task of the pizzas was to try to open up the extent to which each service requires human resources and how much it costs making that pizza. But that pizza was left when cost accounting progressed into using Excel. The importance of pizza was at the general level, adding understanding for staff and supervisors to calculate the time and what services primarily consist of (Nurse 1).

The actual costs used in the previous year were used in the cost accounting. Based on that information, personnel costs, purchasing external services and goods, and how internal items will be allocated to each service were assigned. For example, the personnel data and costs incurred were taken from the previous year's reports.

The financial administration then took care of cost accounting and allocating costs. The scoring already gives us information about what kind of and how much human resources the services of such a patient require. In financial administration, it is then converted into euros to show how much each service will cost (Nurse 3).

Finally, a calculation was made to summarize how all the costs were justifiable. Once patients were placed at different service levels, the process returned to the origins of the basics of service design and discussed that evaluations were at the same level with another group of evaluators.

## 4.5 Pricing

In the past, pricing was not so accurate at the service level. Now, the goal was to determine and compare the costs and prices between the units. Pricing criteria and fees would be the same for each municipality for each service. Municipalities can also buy similar services from private service providers. Thus, EPS was in a completely competitive situation.

The evaluation form plays a key role in presenting prices.

That evaluation form is good in discussions with customers so that we can say that the patient has these challenges, which means this need for the service. Hence, that is the basis also for euros (pricing). Yes, that is the case, so we can talk with the customer in the same language, and we have the evaluation form we're talking. It's kind of like being a translator (Nurse 3).

The evaluation form has been a really great relief for us here because it is the municipalities to whom I have often had to answer the question about the price. Yes, now we have a commonly used evaluation form and scoring (Nurse 4).

The customers (municipalities) have also been involved in the piloting, and when turning to pricing, it was agreed to review the pricing in the near future. The last step was to "sell" the services to the municipalities.

All the services and prices were simulated twice before patients switched to it. Right from the beginning of September, a new price list took place, and then, it was already agreed with the municipalities that those tariffs would be revised at the end of the year (Nurse 1).

The challenge with the new pricing is that the new price list would be even slightly in line with what those customers have been priced for so far. They did not want to present that they have, in the past, judged patients by the very wrong criteria so that those prices would not rise or fall radically. Editing the price list is a constantly evolving process.

This is work that does not end here, but will continue from now on and so on so that some small fine-tuning of their levels can be made, and those points can still be moved a little in one direction and another (Nurse 3).

## 4.6 Management control effects in the organization

Once the service design was completed, it was possible to simulate and find out how much basic staffing was needed in the unit to keep the operation running. Several simulations were conducted in the units to see what the outcome would look like. For example, if there were service changes or a new patient arrived at the unit, the changes could be entered into counters that resulted in the amount of needed vacancy rates. In this way, the units would be able to plan the personnel situation

for up to six months or a year ahead. The service design made it possible to develop a method by which the personnel resources of services could be examined in advance. At the same time, it became possible to monitor whether the operation was still cost-effective.

Now, we are able to plan six months ahead, for example, that we will need there two people. We can say to our temporary employees that we can offer a half-year contract. And yet we will not overestimate our resources there; thus, there will be no extra cost, but we will be able to recruit and use labour wisely and as needed (HR manager).

The new case-mix accounting system also affected customers equally. The new service prices were based on the case-mix accounting system, and the prices were transparent and the same for all customers.

Our board of directors will set the prices to be used next year, and these will then be the same for each municipality and outside customers (Accounting manager).

In addition, the control effects of a case-mix accounting system were reflected at the organizational level, in that when a new service model was developed, the language in which services are defined was harmonized, and things were spoken and understood in the organization in the same way.

That is, although we have created a new method of assessing performance, we will teach all staff to speak the same way on each activity (Nurse 2).

## **5 Results and Discussion**

There were several reasons for EPS to carry out the process of reforming the case-mix accounting system. There was pressure on cost and price transparency both inside and outside the organization. In addition, the old pricing model was perceived as ineffective in the current open-market situation. In addition, the harmonization and comparability of financial data also underpinned the reform process because the old service package was perceived as confusing.

The case-mix accounting system design process at EPS progressed through the working groups to the preparation of an evaluation form to cost accounting before ending with a new pricing model. The working groups consisted of different experts, both financial and nonfinancial professionals. These findings are similar to the studies of Kurunmäki (2004) and Lehtonen (2007) as they argue, that the purpose is to involve a different kind of professionals in developing the case-mix accounting systems in the health care sector (see also Abernethy, 1996; Abernethy and Stoelwinder, 1990; Averill and Kalison, 1991; or Doolin, 1999).

Our research shows that different kinds of mechanisms exist in the design process of the case-mix accounting system: authority, competence, scoring, and rhetoric mechanisms.

The authority mechanism can exist in different forms, for example, in authorities, standards, or a combination of these. Of the authorities, financiers or legislators represent institutional authority. This is represented in our study by legislation (compliance with laws), statistical authorities (reporting requirements in a certain form), and financiers (such as municipalities). These authority mechanisms can be coercive in nature.

Standards form the second group of authority mechanisms, for example, international standards to guide operations. These can be either voluntary or mandatory. In the current study, the so-called mandatory standard was the national recommendation (national authority's recommendation for cost accounting reporting). Accordingly, there was an obligation to report both operational and financial results. The ICF classification is an example of an international standard chosen by the organization itself to develop operational control.

Previous studies have also presented that standards may support financial planning and control (see, *e.g.*, Carroll and Lord, 2016; Chua and Preston, 1994; Doolin 1999; or Fetter and Freeman, 1986). This can be seen, for example, as standard costs or different kinds of classifications (see, *e.g.*, Coulam and Gaumer, 1991; or Lowe and Doolin, 1999).

The competence mechanism describes a situation in which competence is increased and supported. This can happen at the individual level or in groups. In our study, supervisors were educated, and external educators visited the unit. Competence allowed personnel to work systematically and effectively with content to define service levels.

The rhetorical mechanism made accounting visible. The service was thought of as pizza, here consisting of various slices and fillings. Especially at the beginning of the design process, the pizzas made the service definition process visible. Once the services had been defined, management decided to get rid of the “pizzas” and move to services and service costs and price lists.

Easy-to-understand rhetoric – pizza in this context – relates to getting nonaccountants involved in the design process. Pizza was concretely related to the nonfinancial people's own job descriptions and the services they do daily. The role of this mechanism is also seen in how pizzas were later abandoned and switched to the euro.

Based on our findings, we can say that these kinds of rhetorical mechanisms support the involvement of nonfinancial professionals in financial planning, thus gaining a better understanding of the interface between management control and health care (see also Kurunmäki, 2004).

The scoring mechanism illustrates that: (i) service is determined by points; (ii) resources are allocated based on points; (iii) capacity is controlled based on points; and (iv) behind the scores and points are wordings on how the level of difficulty is determined.

From the perspective of resources, the use of points is a clear way to express resource consumption. This holds true for the health care services presented in the current study, which include the input of several different professionals, a potential purchasing service, and other resources. The points can be used to determine the level of difficulty of the service, which indicates the consumption of resources but includes several different types of costs. On the other hand, scoring gives information to the customer about the content of the service (along with the volume of resources consumed, the service description). Points have made it easier to indicate changes in the content of a service (*e.g.* changes in the level of service). These points can serve as a justification for the increase or decrease in the demand for the service. The scoring mechanism can be seen as an alternative cost allocation method, compared to cost allocation based on the average costs and working time used in activity-based costing.

The scoring mechanism also supports management control purposes. Scoring tells the level of service, and when looking at the total number of services, it shows the number of people needed to provide the services. Scoring can be used as an aid in personnel planning. In the health care sector, specifically in the current study, staff costs were found to be the largest expense item; here, the scoring mechanism supported the organization's resource planning, thus also serving as a method for management control. In this way, the scoring mechanism supports financial planning, increases cost awareness, and supports controlling and monitoring the outcomes of the hospital and health care services (see also Abernethy and Stoelwinder, 1995; Covalevski *et al.*, 1993; Lehtonen 2004; or Lowe and Doolin, 1999).

The scoring behind the euros is related to the involvement of nonaccountants. The content of the services was defined in points, which made it easy to structure and organize the different levels of services in order of difficulty.

We can also say that determining the content of the service level has been essential in the scoring mechanism. In the present study, the content of the services was determined literally, that is, which services belong to which service level. This has been the way in which the services have been determined, here utilizing points to determine the levels of service based on the complexity of the service.

In conclusion, we can say that in this study, we have shown how the mechanisms described above work both independently, but especially together. The authority mechanism provides the basis for the design of the case-mix accounting system; the



competence mechanism supports the ability of personnel to participate in service design; the rhetorical mechanism makes things more vernacular; and the scoring mechanism defines and categorizes but also supports management control.

Whereas previous studies have shown that nonfinancials may even consciously oppose participation in financial planning in the social and health care sector (see, *e.g.*, Doolin, 1999; Lowe and Doolin, 1999; or Weiner *et al.*, 1987), our study presents, that the above mechanisms may even help to get nonfinancials involved in financial planning.

## **6 Conclusion**

The aim of the current study was to increase our understanding of case-mix accounting system design. Our research extends previous studies on case-mix accounting (Abernethy and Stoelwinder, 1995; Kantola and Järvinen, 2012; Kurunmäki, 2004; and Lehtonen, 2007) by presenting how the design of case-mix accounting systems takes place in the classification environment of ICF. Special attention was paid to the mechanisms related to the design process between different professions – hybridization (see, *e.g.*, Kurunmäki, 2004; or Lapsley, 2001).

In previous studies, special attention has been paid, for example, to the role and participation of hospital staff in financial management (see, *e.g.*, Abernethy, 1996; Abernethy and Stoelwinder, 1990; Averill and Kalison, 1991; Doolin, 1999; Kurunmäki, 2004; or Lapsley, 2001). Kurunmäki (2004) describes the involvement of hospital staff in financial management as a kind of hybridization combining financial and nonfinancial forms of management. In the current study, we have specifically shown how staff (not physicians) has been involved in the design of a case-mix accounting system. Thus, the present research has focused in particular on how hybridization, that is, the cooperation between different professions, is made to work in the design of a case-mix accounting system.

Case-mix accounting systems have been designed to increase understanding of the financial implications of health care (see, *e.g.*, Chapman *et al.*, 2014; Fetter and Freeman, 1986; or Lehtonen 2007). Previous studies have examined how case-mix accounting seeks to rationalize and harmonize operations in health care, particularly in hospitals, according to defined patient groups (see, *e.g.*, Doolin 1999). However, previous studies have not highlighted how the design process of a case-mix accounting system is progressing.

Our research has shown that different mechanisms can be utilized in the design of a case-mix accounting system (see also Lehtonen, 2007), which, in the current study, are the mechanisms of authority, competence, rhetoric, and scoring.

In the present study, scoring served as a key mechanism in designing a case-mix accounting system: the service was determined based on points; resources were allocated based on points; and capacity was controlled based on points. From a financial management and leadership perspective, scoring helped determine the level of demand for services, resource capacity, and present levels and changes in service content and, thus, in pricing.

The scoring mechanism is not a cost accounting method as such (though it can be used, *e.g.*, in activity-based costing). Rather, it is a mechanism that supports resource planning, hence enabling the allocation of costs (*e.g.* payroll costs) to the services. In addition, we are not saying that scoring a service would be a better solution than tracking customer-specific hourly time usage, but the scoring mechanism highlights resource consumption and its allocation differently. One of the good things about the scoring mechanism as seen in the results is that it tied employees to determine the services.

Our study has also highlighted findings on different levels and dimensions of hybridization in the case-mix accounting system (see also Kurunmäki, 2004). Our findings show that the design of a case-mix accounting system involves cost and data classification (*e.g.* diagnostic or patient groups and services) and interaction between financial and nonfinancial personnel. In the case-mix accounting system, these are combined. However, very little has been written about this, so the current study will increase our knowledge of the case-mix calculation system design process.

The present study has also revealed that there may be several starting points (internal and external pressures) for the design of a case-mix accounting system, and they may also be interconnected. One of the starting points was the pressure from customers on cost transparency. Customers were not happy with the old pricing model, which was confusing and at too general a level. Second, the pressure came from the market. Customers have the freedom to purchase services in an open, competitive market, where EPS had to be able to show the prices (and costs) of services transparently and, on the other hand, show that its services were efficiently organized. Third, pressure can also be seen in the dissatisfaction of EPS's own staff with the uncertainty of costs. This was particularly the case when customers had to justify their pricing criteria. One premise in the present study was also the obligation of the authorities to reform financial reporting; this required a reform of reporting at the general level. Taken as a whole, the design of the case-mix accounting system was initiated by the existence of different kinds of tensions, and the current study has shown how the above-mentioned tensions can be solved with a case-mix accounting system.

Our research focused on the activities of only one unit. The research material was comprehensive to describe the development design process of the case-mix accounting system in EPS, but in order to achieve broader generalizability and understanding, the research should be conducted in more organizations.

In addition, this study is one of the first studies that look at case-mix accounting system design according to non-DRG standardization. This study does not provide a definitive understanding of the development of a non-DRG-based case-mix accounting system and more similar studies are needed.

Our research opens up numerous potential research opportunities. We have presented observations of different mechanisms in designing a case-mix accounting system, but it would be justified to look further at the multidisciplinary nature of these mechanisms. For example, it would be prudent to further explore the role of rhetoric and scoring in future accounting research.

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