

*Research Paper***Designing and implementing a hybrid management accounting system in a public sector organization***Submitted in 27, March 2023**Accepted in 28, April 2023**Evaluated by a double-blind review system*

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ABSTRACT

Purpose: Many public entities experience difficulties in designing and implementing a Management Accounting and Control System (MACS). This work aims to design a MACS implementation framework for a public sector organization, constituting a useful tool for other public organizations conducting a similar task.

Design/methodology/approach: Following an interventionist research, a comprehensive case study of the organizational and financial structure of the entity under study, as well as the operational activity was carried out.

Findings: A framework for designing and implementing a MACS in the public sector is proposed, including a list of main practical difficulties and a roadmap for overcoming them.

Research limitations/implications: Since the proposed MACS implementation and cost allocation criteria were developed with the case under investigation in mind, modifying them for use in other organizations is necessary.

Practical implications: Professionals in the field acknowledged the model's validity, enhancing the quality of the available data.

Originality/value: The implementation of MACS in public sector organizations face several challenges, arising from the complexity that characterizes these organizations. This research adopted a very practical approach, seeking to identify tools to support future MACS design and implementation processes in public organizations.

Keywords: Activity-Based Costing (ABC), Costing system; Departmental Method (DM), Framework, Management accounting change, Public administration.

Acknowledgements: *The authors would like to thank to the management head and to all workers from Centro de Medicina Naval, from the Portuguese Navy, for the collaboration and knowledge sharing.*

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1. Introduction

Public sector organizations, while belonging to the organizational structure of the state, should focus their action on providing their citizens with essential goods and services, in the most efficient way. The performance of these organizations that manage public resources is guided by the increased transparency in the use of the available resources. The growing demand from citizens for a rigorous use of public resources increases the pressure on public services. The health sector has earned the special attention of legislators, policymakers, decision-makers and citizens because of its social importance and the budgetary amounts involved, especially in the period after COVID 19 (Liu *et al.*, 2022). Public sector organizations that provide healthcare services are professional bureaucratic organizations that assume a hybrid form, combining elements of institutions with a specialized professional vocation with institutions subject to public bureaucratism (Battilana & Lee, 2014). Because they combine two different realities, hybrid organizations are a focal point of contradiction as they combine different organizational forms (Christensen & Læg Reid, 2008; Kurunmäki & Miller, 2011). Implementing a system to allocate costs and measure performance is particularly challenging in this type of organization, as it is not always easy to reach consensus on goals and how to implement (Ryan *et al.*, 2002). Accounting can assume a mediating role between the different expectations and objectives in the organization and its stakeholders, creating a common information structure (Suomala *et al.*, 2014).

The empirical site of this research is the Portuguese Navy (Navy) medical sector, the Naval Medical Centre (NMC). A public health organization responsible for ensuring the operational medical and health activities of the Navy's military personnel. The NMC was chosen because of its complexity, being a public institution that combines activities related to the health and defense sectors. When selecting and implementing a Management Accounting and Control System (MACS), Portuguese public entities encountered a number of challenges, including: (1) skepticism regarding the validity of accounting standards and their benefit to a more effective managing of the organization's resources; (2) delays in adapting the entity's existing information technologies to the new accounting systems, and vice versa; (3) failure to comply with the criteria for accounting system certification; (4) challenges in developing a communication plan between experts and decision-makers who establish organization policy in order to produce a common change strategy for the entire organization; (5) lack of qualified human resources in the accounting field with expertise in the organization's technical areas, either because it is

difficult to hire them or to teach and educate the existing staff (Tribunal de Contas, 2019). This study aims to design a MACS in this context. In order to achieve this goal, an exhaustive work was carried out to identify the financial structure, the organization internal functional structure, the activity developed, the identification of its cost structure and the needs of information that their managers need for decision making. The MACS designed was a hybrid model based on the departmental method (DM), combining features with the activity-based costing (ABC) technology, thus addressing the complexity of the organization under study.

This article summarizes the experimental case study using an interventionist research method (*cf.* Drury & Tayles, 2020; Bhimani *et al.*, 2019). In addition to this introduction, the article includes a literature review on the DM and ABC methods in section 2. Section 3 describes the adopted methodology and section 4 presents the empirical study and its development. The article ends with the conclusions.

2. Management accounting in public organizations

The Academy's interest in management accounting tools and their contribution to supporting decision making and providing transparency through accountability is not new, but has grown throughout the past years (Grossi *et al.*, 2020). From a reality in which accounting was limited to registering and summarizing the organization functioning (Estrin, 1990) or complying with legal obligations, MACS have assumed a significant role in supporting management, improving efficiency and increasing accountability towards citizens, supervisory entities or other interested parties (Carty, 1982; Jackson & Lapsley, 2003). These features encourages the adoption of new accounting methods, adjusted to the reality and needs of each public organization (Pinto *et al.*, 2013; Tran & Nguyen, 2020).

The design and implementation of MACS is a complex and time-consuming task that is fraught with numerous difficulties. Despite the constraints, its implementation is essential because of the benefits derived from the transparency and accuracy of accounting information, which in turn allow for adequate public financing and better decision making (*cf.* Silva *et al.*, 2020). The way in which the accounting system is implemented varies from organization to organization and from country to country. Different levels of economic and social development or cultural characteristics can make a difference (Amirkhani *et al.*, 2020; Villarmois & Levant, 2011). Not all management accounting methods are as effective or as performant as others. Each organization must use the

approach that promotes its objectives and fits its unique situation (Pierce & Brown, 2006). The adoption of MACs involves costs with the collection and processing of information, but it can also mean the decrease of operating costs and the improvement of the efficiency of corporate and public organizations, including non-profit entities, such as hospitals (Lawrence & Parry, 1994). Newer accounting tools are better adapted to the daily functioning of organizations and generally provide better opportunities for performance improvement (Nuhu *et al.*, 2016). The information obtained through accounting is an essential tool for creating a realistic and reliable picture of the organization and its activities, and thus an essential tool for management and decision making.

Indirect costs have increased significantly and are the most important factor in the cost structure of most organizations. This increase is not due to an increase in the volume of production and sales, but to a greater complexity of the organizations' activities. In order to allocate indirect costs that are common to two or more cost objects, it is necessary to determine the allocation criteria to be used (Bhimani *et al.*, 2019; Drury & Tayles, 2020). Depending on the desired degree of accuracy and availability of information, for each particular situation, different allocation criteria can be used, individually or in combination. Among them, the traditional departmental method, which consists of a two-stage allocation process. The entity is divided into organizational segments called sections or cost centers, for which the operating costs are determined and in turn allocated to the cost units (Bhimani *et al.*, 2019; Drury & Tayles, 2020). This method is most recommended when the choice is the least expensive and simplest cost accounting method, taking into account the share of volume-based indirect costs in total indirect costs and the degree of diversity of products and services offered (Drury & Tayles, 2020; Franco *et al.*, 2015). However, traditional attribution bases may not explain the behavior of most indirect costs and may therefore lead to misallocation of these costs to products or services (Drury & Tayles, 2020; Garrison *et al.*, 2018). The weaknesses of traditional methods can be minimized by using more sophisticated methods such as ABC (Kaplan & Cooper, 1987; Cooper, 1990; Cooper & Kaplan, 1992).

Since activities are what lead to the consumption of indirect resources, the ABC method's fundamental objective is to allocate overhead expenses more precisely. As a result, entity costs are accumulated in homogeneous groups of costs and activities called Activity Cost Pools. Then, these costs are allocated to products or services using Activity Cost Drivers (Drury & Tayles, 2020; Garrison *et al.*, 2018). The ABC method is based on the idea that

producing manufactured goods involves the consumption of activities that require resources to be carried out (Lanen *et al.*, 2020). This underlying presumption of the ABS method permits higher homogeneity of the pooled costs than the conventional cost accounting system (Gosselin, 2006; Jones & Dugdale, 2002). The allocation of indirect costs according to the activity carried out by each sector and period under analysis can better explain operations with greater dynamism and flexibility. Despite the advantages it incorporates, the ABC method is not without criticism. Compared to traditional full cost accounting, ABC is considered more difficult, complex and costly to implement. The greater complexity and the need for an efficient data collection system can lead to greater resistance from workers (Major & Hopper, 2005). The choice to adopt one of the methods may be helped or hindered by a variety of reasons (Nassar *et al.*, 2013). Therefore, the advantages and disadvantages of each method must be carefully weighed in each case.

3. Methodology

The present study followed a qualitative research strategy, in accordance with the research steps described by Ryan *et al.* (2002). As recommended by Baard and Dumay (2018), an interventionist research methodology was used in which one of the researchers acted as a consultant to the organization. The aim of his work was to provide assistance in solving problems and to produce theoretical and practical results (Baard & Dumay, 2018). The experimental case study (see Yin (2018)) was conducted over the period of one year, from September 2019 to September 2020.

To answer the research question "How can a MACS be designed based on a departmental method in a public organization?" it was necessary to analyze the budget structure that finances the operation of the institution under study, as well as its internal organization. The goods and services produced and the related cost structure were also identified. A comprehensive knowledge of the existing reality on the ground, from the macro to the micro level, proved to be essential for the selection of the cost accounting system and the most appropriate criteria for cost allocation in this particular case.

Data were obtained from a variety of sources, including semi-structured interviews, internal organizational documents, and reports, supplemented by state and regulatory standards and laws. Interviews focused on the financial and operational structure of the facility at the macro level and the tasks and processes at the micro level. Direct observations and several informal contacts were also conducted in person, by email, or by telephone. Informal contacts were particularly useful for data triangulation (Yin, 2018)

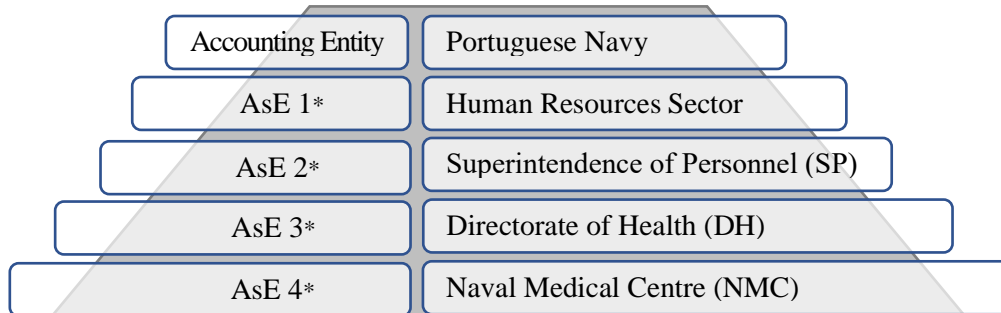
to verify or supplement evidence gathered in formal interviews and documents viewed. The options made throughout the work and the proposed framework were discussed and validated with experts from different fields, ensuring an effective relationship between theory and practice.

4. Case study

4.1 Case presentation

The Navy is part of the central administration of the State and has its own budget and administrative autonomy, being a autonomous accounting entity. Internally, financial and asset management is based on a hierarchical structure of Accounting Sub Entities (AsE), with the first level, the strategic or macro level, closely related to the functional areas of the institution. The lower level, the operational or micro level, has no budgetary expression and very limited independence in financial management. The Navy's personnel branch, headed by the Superintendence of Personnel (SP), is an AsE. It includes several directorates and services, including the Directorate of Health (DH). The NMC is an operational center of the DH and depends on it for administrative, budgetary, financial, and logistical matters. Figure 1 shows the Navy's financial and asset management structure applied to the specific case of the NMC.

Figure 1. Navy financial and asset management structure

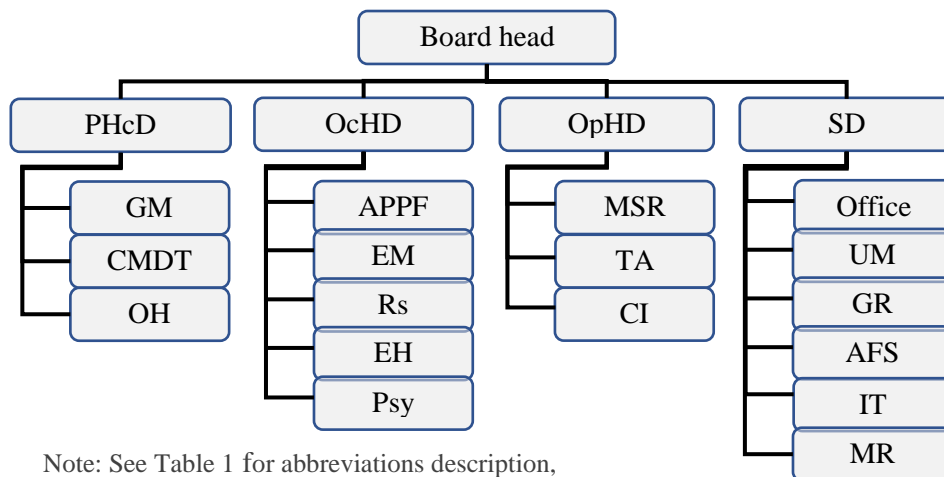


* AsE x = Accounting sub Entity from level x

Source: Own elaboration

The NMC is an organic entity that does not have budgetary expression but have patrimony relevance. Its mission is to provide basic health care in the operational medicine and assistance medical care and to coordinate and control health and medical-sanitary activities. Its activities extend to health inspection, ambulatory care, and operational support to guarantee the operational readiness of the human resources. In its organic form, four departments with numerous subdivisions are present. Figure 2 shows the simplified organic structure of the NMC.

Figure 2. NMC hierarchical organization



Note: See Table 1 for abbreviations description,

Source: Own elaboration

4.2 The conception of the MACS

The NMC provides a range of services, the most important of which are the following: Medical and health status assessment; occupational health examination; medical appointments; provision of nursing services; psychological support; physiotherapy for recovery; complementary diagnostic and therapeutic examinations; analysis of water for human consumption; participation in assessment and training activities; participation in operational activities; medical evacuation. Administrative and financial services staff belong to SP and DH, so the costs to be considered come from financial centers outside the NMC.

Defining cost accounting criteria and methods is a fundamental element in designing a system of MACS. The Manual for the Implementation of Public Administration Accounting Standards in Portugal (CNC, 2017) assumes that the Total Costing System is the one that best adapts to the reality of public administration. Therefore, for the expenses incurred in the NMC, the cost accounting system recommended in the current regulations was adopted. However, for the treatment of the expenses of SP and DH, the Rational Costing System was adopted, since it is already used in these entities.

The cost accounting method to be chosen must be adapted to the characteristics of the entity in which it is applied. In the present case, the activities to be performed and the responsibility for performing them are well defined due to a hierarchical structure with military origins. Since the activities performed in the NMC are based on the existing organic structure, the Departmental Method is the most appropriate costing method. The application of this cost accounting method enables accurate and simple calculation of the

costs of individual cost centers. If the choice of cost accounting method is the traditional cost accounting methods, the Departmental Method is the most suitable due to the share of indirect costs in total costs. Due to the volume and degree of diversity of products or services offered, the Departmental Method is most appropriate (Drury & Tayles, 2020; Franco *et al.*, 2015). Thus, the definition of the cost centers to be used is based on the organic structure of the entity, as shown in Table 1.

Table 1. NMC’s Operational and Auxiliary Cost Centers

Operational cost centers	Auxiliary cost centers
<ul style="list-style-type: none"> • GM - General Medicine section • CMDT - Complementary Means of Diagnosis and Therapeutics section • OH - Oral Health section • APPF - Assessment of Physical and Psychic Fitness section • EM - Exercise Medicine section • Rs - Rehabilitation section • EH - Environmental Health section • Psy - Psychology section • MSR - Medico-Sanitary Readiness section • TA - Training and Assessment section • CI - Crisis Intervention section • NMC-head - NMC Board head 	<ul style="list-style-type: none"> • Office - Central Office • UM - User Management service • GR - General Reception • AFS - Administrative and Financial Support section • IT – Information Technologies section • MR - Material Resources section • PHcD-head - Primary Healthcare Department • OcHD-head - Occupational Health Department • OpHD-head - Operational Health Department • SD-head - Support Department

Note: for hierarchical structure, please see figure 2.

Source: Own elaboration

The cost centers to be considered, whether operational or auxiliary, and the tasks they perform are listed in Table 2. Auxiliary cost centers perform tasks that are divided among several different services; operational cost centers perform activities that are directly integrated into a particular final service. As we looked at the day-to-day routines of the NMC, we realized that the Departmental Method did not cover the full complexity of cost accounting objects and the variety of products or services offered. With this in mind, we supplemented our analysis with an overview of the major activities performed by each cost center, as shown in Table 2.

Table 2. Intermediate and final activities

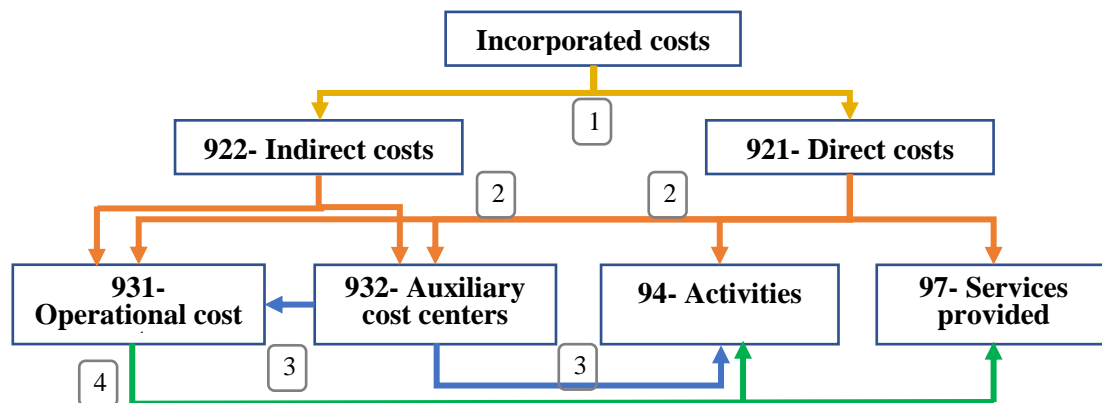
Cost center	Activities
Office	Perform tasks related to human resources management
Office	Management of correspondence – postal services
Office	Organize messages
UM	Assist health technicians with administrative procedures
UM	Organization of clinical documentation
UM	Process statistical data
UM	Prepare records to the <i>Naval Health Board</i>
GR	Managing phone contacts
GR	Registering users’ requests
GR	Support users’ needs

AFS	Propose the acquisition of goods and services
AFS	Receive the material
AFS	Replace consumable goods
AFS	Support management and maintenance of facilities and equipment
IT	Propose the acquisition of IT goods and services
IT	Maintain equipment and software
IT	Ensure the protection of programs and databases
MSR	Repair facilities and equipment
MSR	Manage the NMC's fleet of vehicles
MSR	Support the maintenance of electromedical equipment
PHcD/OcHD/OpHD/SD head	Supervise and coordinate
GMs, OH, APPF, EM, Rs e Psy	Provide appointments
MSR, GM e APPF	Ensure nursing care
GMs	Perform evacuations
CMDT	Perform complementary diagnostic and therapeutic examinations
Rs	Carry out rehabilitation treatments
AFS	Inspect physical fitness
Psy e CI	Carry out preventive and mental health promotion measures
EH	Monitor and control of water quality for human consumption
MSR	Prepare medical-sanitary conditions
TA	Support healthcare training and evaluation

Source: Own elaboration

In order to design a MACS adapted to the specificities of the NMC, it was considered appropriate to divide the cost allocation task into four stages, as shown in Figure 3. The different stages contribute to the calculation and allocate direct and indirect costs to the final activities and services.

Figure 3. Process to determine costs



Source: Own elaboration

In each stage, different criteria and procedures have been applied for cost allocation. The first stage identifies the costs to be included, such as: Salaries, acquisition of goods and services, purchase of medications, disposable medical supplies, depreciation of equipment, or SP and DH expenses.

In the second stage, direct costs are allocated (e.g.: Purchase of goods, drugs, disposable medical supplies, and services; personal salaries). Indirect costs are allocated to user cost centers (operational or auxiliary) based on various allocation criteria. Multiple allocation criteria should be employed, according to accounting standards, thus, for each

expenditure group, the allocation criterion that best explains the behavior of that cost was chosen. For example, for office supplies, cafeteria, laundry, water, communications, or administrative costs, the number of employees was chosen as the allocation criterion. For equipment purchases, electricity, cleaning and hygiene and equipment depreciation, occupied space was considered. For depreciation of fixed assets, such as the building, it was not possible to obtain values for depreciation, so they were not included.

The third stage involves moving the costs assigned to the auxiliary cost centers to the operational cost centers using various allocation criteria. For the AFS, IT and Office cost centers, the costs were transferred to the operating cost centers using the number of employees per cost center as the allocation criterion. All individuals who develop their activity in the operational cost centers employ the services of these auxiliary cost centers, which is how this criterion was allocated. The volume of clinical actions offered to users by the operating cost centers, with the exception of the management board, was taken into consideration with regard to the GR and UM cost centers. These centers develop tasks to support clinical activities. The physical occupied space for the MSR was designed. There is a clear correlation between the amount of space the cost centers occupy and the presence of equipment; this correlation holds true for the requirements for equipment preservation. Since there were no appreciable weight differences among the division subunits of the PHcD, OcHD, and OpHD-head, the number of subunits was taken into account. Except for the NMC-head, the SD-head supports the work created by the operational cost centers by performing coordination and supervisory activities for the auxiliary cost centers (AFS, GR, IT, MSR, Office, and UM). The costs were distributed equitably since its action is cross-cutting and consistent across all divisions of the company.

The cost of the auxiliary cost centers is transferred to the associated activities using the chosen allocation criteria in order to offer information on the costs of the intermediate activities. The most appropriate metric for allocating resources across all cost centers was determined to be the proportion of hours spent on each activity.

According to the chosen allocation criteria, the total cost of the operational cost centers is transferred to the services and the final activities for the fourth stage. Since the association of employees to each performed service is known, the number of employees per service was taken into consideration for the APPF, GMs, MSR, Psy, and RS. Since the services offered are uniform, the number of medical and nursing tasks was selected

for the remaining cost centers. The sum of direct expenses and the costs of operational cost centers to which they contribute is then used to calculate the costs of final activities and rendered services. Therefore, the identical allocation criteria that were used to allocate the operating cost centers' expenses to the final activities were applied to the services were used.

4.3 The implementation roadmap

The costing methodology and the cost allocation system that best suit the internal characteristics of the organization as well as its external context must be defined in order to establish a MACS, taking into account the specificities of each organization. It is crucial to conduct interviews at various levels of the organization in order to identify the implemented organizational and financial structure, comprehend the current work processes, identify costs and comprehend how they relate to one another, and find available information and services provided at the different levels of management. In a public organization, a MACS implementation framework was offered.

The four phases of the framework are as follows: The first step is to choose the costs that should be included in the specified costing method. The value of direct and indirect costs is then allocated to the cost centers and activities in the second step. The third step is to move the costs associated with auxiliary cost centers to operational cost centers and activities. The final stage is to allocate the overall operating cost centers to the final services and activities offered. It is vital to specify the expense allocation criteria since they are directly related to how the organization is set up and runs in order to complete the three final stages.

A MACS's implementation faces several challenges. These challenges can take different forms and origins, namely in public organizations. Although each MACS design and implementation process assumes different challenges, it is possible to identify factors common to most of them. From our case, it is possible to identify some of them.

The need for efficiency in most organizations, whether to ensure a competitive advantage over their competitors, thus guaranteeing their survival, or, in the case of public non-profit organizations, to justify to citizens the legitimate use of public resources, means that employees have all their working time dedicated to their main functions. The existence of additional tasks related to the collection and processing of accounting data represents an additional workload, which is often no longer possible to include in their normal working hours. Frequently, accounting is seen as an increase in workload that does not

result in an enhancement of organizational performance. To reverse this situation, it is necessary for employees to realize that accounting information can help in making better decisions, and, consequently, that it represents improvements in the organization's efficiency. At NMC, like most health organizations and other activities with a strong technical focus, obtaining information for the accounting activity depends mostly on non-accounting professionals, who are not very motivated to spend their time managerial tasks. To prevent resistance, it will be necessary to carry out internal training actions, where employees from different technical areas are explained the potential for future improvement that accounting information can bring to their daily activity and to the efficiency of the organization as a whole.

A thorough understanding of the organization and its many operations is necessary to determine the internal cost structure and select criteria for allocating indirect costs. Due to the necessary detail and the difficulty that, most of the times, learning about the reality of the organization represents, mapping of current activities is a very time-consuming procedure and involves a cross-sectional view of the different services. In order to carry out this work, we felt the need to know the organization's work processes, either at the macro level, related to the government structure or the administrative and financial upstream support, or at the micro level, with the details of the activities carried out in each activity sector. In this sense, we were integrated into the organization's daily work for a period of about a year, where we toured the different services and had the opportunity to contact employees from different levels of the organization.

Jackson and Lapsley (2003) argue that the implementation of a MACS must have the participation of non-accounting and non-financial managers. This need derives from the fact that the accounting activity requires the collection of data in all sectors of the organization, in a precise, detailed and continuous way. If this access is only partial, the analyses and conclusions to be drawn from the accounting tools will necessarily be incomplete and potentially biased, not reflecting the organization's reality. The way to get the participation of all sectors of the organization is to demonstrate to the different non-financial managers the advantages that the accounting activity can bring to the sectors they lead. A successful and efficient mapping is only possible with teamwork and collaboration between the organization different areas.

Additional costs related to data collection and registration may arise. These costs may relate to additional working hours or the acquisition of materials, tools or equipment,

directly allocated to data collection and processing tasks. These direct costs are easily identified by different employees as an additional cost to the organization, while the potential benefits arising from the improvement of accounting information manifest themselves indirectly and over time, so they are hardly perceived.

The accounting activity is often seen as an activity that consumes the organization's resources and does not contribute to the final product offered to the customer. For the majority of employees, it is not always easy to identify the contribution of the accounting activity to the final product and to understand how the expenses borne by their activity are an investment and not a cost without return. Often, the resistance to implementing a MACS arises from the difficulty of perceiving the potential advantages arising from its implementation (Liem, 2021).

In most organizations, the accounting department has a residual dimension in the entire organization. It is seen as a support service for the operations, whose existence justification is in compliance with established legal obligations. The majority of employees are from the technical area in which the organization develops its activity, without training in accounting. There is insufficient technical preparation of human resources in the management accounting area, increasing their resistance to implementing a new MACS or to applying changes in an existing one.

The way organizations are established and structured influence the implementation of a MACS. Highly hierarchical organizations, such as the public and military organizations, pose an additional challenge for the implementation of MACS and management accounting changes, demanding the involvement of those responsible for different levels of management, from top managers to technical professionals. The speed of decisions tends to take longer, which may lead to greater delay in the adoption of new procedures.

The existence of an information system aligned with the accounting requirements, constitutes an element that simplifies the process of gathering information from the macro (strategic) to the micro (operational) level. The availability of IT staff to adjust the IT system to the organization's reality and accounting requirements is an essential factor in obtaining good quality data and a faster implementation of a MACS.

The organization size and the technical complexity of the activities carried out are factors to be considered when designing a MACS and planning the activities for its implementation. These factors must be considered when defining the work team and the

time required to carry out the task. The existence of accounting technicians who know the organization and the proactive collaboration of the different technical services will be facilitating factors.

Finally, in some cases, the demands imposed by the implementation of a MACS forces for changing the organization’s structure and its way of working. The processes of change in organizations always bring added challenges, which can be seen as an opportunity to improve the existing processes or, as a factor of uncertainty and increased costs. Organizational change must always be carried out in a thoughtful and informed manner, and with the participation of all hierarchical levels. The changes imposed by the adoption of a MACS must be carefully identified, and the direct and indirect consequences for the functioning of the organization analyzed.

Table 3 summarizes the main perceived difficulties to implement a management accounting framework in a public service.

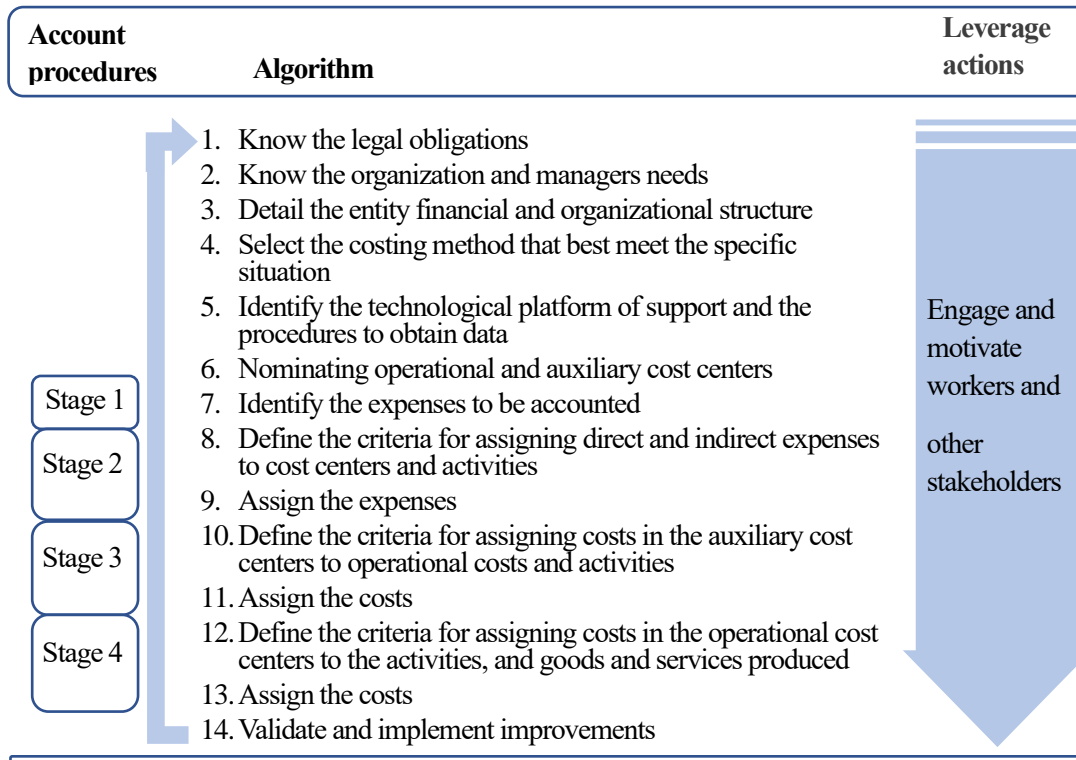
Table 3. The main perceived difficulties in the design and implementation of a MACS

Main perceived difficulties
Management accounting procedures are considered an increase in work.
A detailed knowledge of the entity organization and its different activities is needed.
Mapping existing reality can be a very time-consuming process.
Lack of teamwork and collaboration between different areas of activity within the organization.
Must have the participation of non-accounting and non-financial managers.
Additional costs related to data collection and record may arise.
Difficulty in perceiving the advantage taken from management accounting.
Insufficient technical preparation of human resources in the scope of management accounting.
Organization specific design and work structure influence the process.
The size and complexity of the organization and its processes.
The existence of an information system aligned with the accounting requirements is needed.
Organization size and the technical complexity of the activities carried out must be considered.
The existence of an adverse to change culture in the organization.

Source: Own elaboration

In order to implement a MACS, in addition to the four preconized stages of the aforementioned accounting literature, the obstacles we had at our empirical site required us to carry out some preparation work and the effective involvement of all managers and technical personnel (Drury & Tayles, 2020; Franco *et al.*, 2015). The proposed effort that makes up our suggestion for a MACS implementation framework is shown in Figure 4.

Figure 4. MACS implementation framework



Source: Own elaboration

In order to validate the cost calculation process, the accounting information to be presented and the procedure for designing and implementing the new MACS, based on the existing one and in this work proposals, it was presented to the management team and technicians of the NMC. From these presentations, very positive feedback was collected in relation to the carried-out work and some opportunities for improvement were identified, which were integrated.

5. Conclusion

The successful implementation of a MACS can produce data to assist managers of civil and public organizations in making decisions, enhancing the performance of the organization as well as its accountability and transparency. For a successful MACS implementation, it is essential to have a thorough understanding of the organization and access to detailed information regarding all processes and activities. This will make it possible to determine the cost center structure and the allocation method.

There is no single solution for identifying cost centers. Knowing the organization's objectives, existing resources and decision-makers' information needs is essential. The solution found is the result of a set of more or less reasoned decisions, so the proposed model may suffer from biases. The choices taken were discussed with the professionals, thus seeking to unite academic and professional knowledge in the solution found. All

models must be subject to a continuous improvement process. A list of the main challenges experienced in implementing the MACS is provided.

A framework is suggested to aid in the efficient use of management accounting in a public organization. As a result of its implementation and analysis of the outcomes, the organization as a whole and the various cost centers operate more effectively and efficiently, which promotes the adoption of continuous improvement techniques. Although a departmental approach is an alternative, the ability to identify activities (using the ABC method) and determine their costs is a benefit that enables review and critical analysis of the undertaken activities.

The extensive and complicated variety of duties that are part of the NMC mission, along with a significant weight placed on indirect costs, are related to the constraints of the current study. Since part of the allocation criteria and data analysis are subjective because they are based on the author's empirical understanding of the phenomenon, the value of the costs that are to be determined may be skewed.

In order to validate the suggested framework, we suggest that future research replicate the model's deployment in other public organizations from various sectors after making the necessary adjustments for each organization's particular realities.

Funding statement

This work was supported by Navy Research Center (CINAV) and FCT, the Portuguese national funding agency for science, research and technology, Portugal, under the Project UIDB/04521/2020.

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