

**ACCOUNTING MANAGEMENT AND TECHNOLOGY  
INFORMATION: EMPIRICAL EVIDENCE FROM THE PORT  
AUTHORITY OF VALENCIA**

*TECNOLOGÍAS DE INFORMACIÓN Y CONTABILIDAD DE GESTIÓN:  
EVIDENCIA EMPÍRICA DE LA AUTORIDAD PORTUARIA DE  
VALENCIA*

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**ABSTRACT**

Ports that have good geographical location, efficient management and value-added services have potential for international leadership, as is the case with the Valencia Port Authority, which figures prominently in the international ranking of container ports. Information systems should stimulate the curiosity of organizations, facilitate the process of participatory decision-making and enhance the ability of the organization to cope with changes in the environment. Changes occurring in the environment fully affect the organization and therefore its computer systems. Through the study of the Business Intelligence Systems at the Valencia Port Authority, we seek to reaffirm the assumptions of the various authors analyzed. In summary, we would like to highlight that for accounting information, in both financial accounting and management accounting, to add value to the strategic processes of firms, it must successfully contribute to the strategic processes of the organization, selecting those aspects of accounting management that are relevant to the strategy of the organization (Álvarez-Dardet et al., 1999). The evolution and transformation undergone by firms in recent decades, with regard to technological progress and variation in production methods, suggests the possible obsolescence of so-called conventional cost systems. These traditional systems do not take into account the impact of the production process automation and the changes occurring in the relative importance of the different

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components of the cost of the product. Organizations have to develop accounting information towards a strategic orientation in order to provide support for the strategic business processes, evolving the current information supply of financial accounting and incorporating the information provided by management accounting. In this way the accounting information available to organizations will support their strategic processes more efficiently.

**Keywords:** change, accounting, Information Systems.

## RESUMEN

Los puertos que disponen de una buena localización geográfica, gestión eficiente y servicios de valor añadido, tienen posibilidades de obtener un liderazgo a nivel internacional; como es el caso de la Autoridad Portuaria de Valencia, que ocupa un lugar destacado en el ranking internacional de puertos de contenedores. Los sistemas de información deben estimular la curiosidad de las organizaciones, deben facilitar el proceso de la toma de decisiones participativas y deben incrementar la habilidad de la organización para hacer frente a los cambios en el entorno. Los cambios que se están produciendo en el entorno afectan plenamente a la organización y por lo tanto a sus sistemas de informáticos. A través del estudio de los Sistemas de Business Intelligence en la Autoridad Portuaria de Valencia, se busca reafirmar estas presunciones de los diversos autores analizados. Para finalizar se debe resaltar que para que la información contable, tanto de la contabilidad financiera como de la contabilidad de gestión, el aporte del valor al proceso estratégico de las empresas, deberá contribuir con éxito en los procesos estratégicos de las organizaciones, seleccionando aquellos aspectos de la gestión contable que son relevantes para la estrategia de las organizaciones (Álvarez-Dardet et al., 1999). La evolución y la transformación que han sufrido las empresas en las últimas décadas en cuanto al progreso tecnológico y la variación en los métodos de producción, plantea la posible obsolescencia de los sistemas de costes llamados convencionales. Estos sistemas tradicionales no tienen en cuenta el impacto que supone la automatización de los procesos productivos y el cambio sufrido en el peso específico de los diferentes componentes del coste del producto. Las organizaciones tienen que ir evolucionando la información contable hacia una orientación estratégica, para proporcionar apoyo al proceso estratégico empresarial, evolucionando el suministro actual de información de la contabilidad financiera e incorporando información que proporciona la contabilidad de gestión, de esta forma la información contable de las organizaciones apoyarán más eficientemente los procesos estratégicos de las mismas.

**Palabras Clave:** cambio, contabilidad, sistemas de información

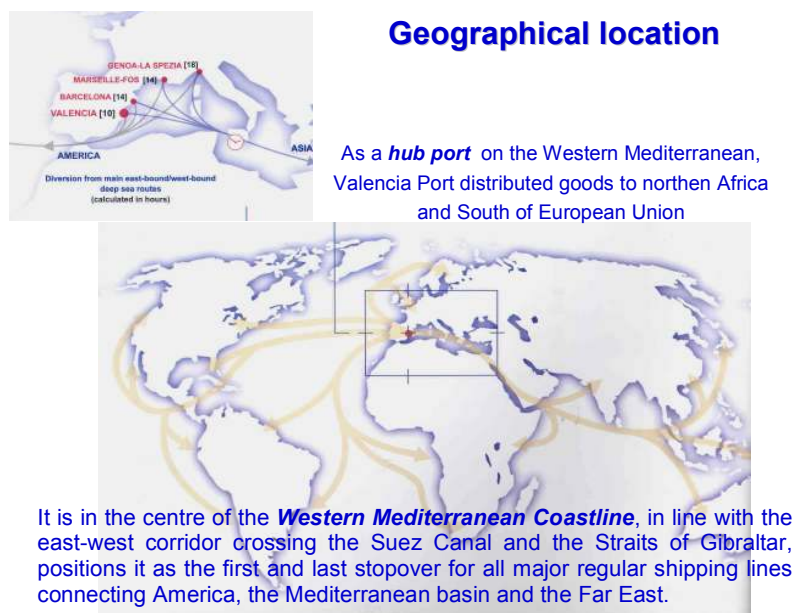
## 1 - INTRODUCTION

Development and progressive economic globalisation at an international level are giving rise to new challenges in the maritime sector, with significant increases in maritime traffic in “Other merchandise” in recent decades. This increase is enhancing the growth of containerised goods port traffic worldwide, in which the Valencia Port Authority (VPA) occupies a leading position at the international level. Thus, Spain’s State–Owned Ports System (SPS) holds an outstanding place in mercantile traffic in Europe, especially in container traffic.

The Valencia Region in Spain is where the VPA, which manages the ports of Valencia, Sagunto and Gandia, stands out as a privileged meeting point for international commercial interchanges.

Ports that have good geographical location, port characteristics, management and value added services have the ability to attain a leadership standing at the international level (Malchow & Kanafani, 2004); as is the case with the VPA, which occupies a prominent place in the international ranking of ports.

The VPA manages the ports of Valencia, Gandia and Sagunto, whose installations cover more than 645 hectares of operational area and 14 kilometres of wharves, with depths of up to 17 metres, for the berthing of vessels. The geo-strategic position of the Port of Valencia configures it as a hub port, as we show in graphic 1. It is located in the centre of the Western Mediterranean coast, in line with the east-west maritime corridor that passes through the Suez Canal and the Strait of Gibraltar, making it the first and last port of call for principal shipping companies with regular lines between America, the Mediterranean-Black Sea, and the Middle and Far East.



**Graphic 1. Geographical Position of the Port Authority of Valencia on the Suez – Gibraltar axis of the inter-oceanic maritime routes.**

Containerised goods form quite a significant proportion of the VPA's total traffic. In 2007 it handled 3,042,000 TEU carrying 53.3 million Tonnes, with a turnover of 112 million euros. In the year 2006, the VPA occupied a prominent position in the ranking of container ports, placing 37th worldwide and the 8th in Europe (Cargo System, 2007).

, It is necessary to follow the example of the port community of Hong-Kong in order to be a leading port at an international level (2nd in 2005 in the world ranking of container ports). In this sense, Mongelluzzo (2004) points out that in order to maintain

its position as one of the largest container ports in the world, greater attention will have to be paid to the cost of its services.

## **2 - IMPORTANCE OF THE COST OF TRANSPORT**

Koo, *et al.* (1988) and Sánchez, *et al.* (2003), highlight the importance of transport costs and of their impact on the calls made by vessels at ports, emphasising that the efficiency of a port is one of the determining factors in the costs of maritime transport. Likewise, according to Pontet (2002), efficient utilisation of the various modes of transport will significantly reduce the final cost of the goods transported, hence the importance of efficiency and effectiveness in port services, because of their influence on international transport.

In this sense, the first studies that analysed ports from an economic perspective date from the 1960s. The initial interest of the researchers centred on aspects such as pricing of installations, capacity and investment policies (Goss, 1990a; Goss, 1990b). These are economic impact studies, in which port services are valued in terms of number of jobs created or of reduction of cost and of their impact on the port community and on transport itself (Chang, 1978).

Together with this, there exists a high degree of consensus as to the importance of the research being carried out in the field of management accounting (management, operational analysis, cost analysis, etc.), which has undergone substantial development in the last two decades. The literature on Cost and Management Accounting has shown great interest in varying the ways of calculating costs and managing firms. Not until a few years ago did Management Accounting include the environment in its analyses. This late incorporation is due to the fact that in the 1980s, a suitable role had not yet been developed for a management accountant to support Top Management. This led to problems in the making of business decisions, derived from the information facilitated by Cost and Management Systems (Coad, & Cullen, 2006). In that decade, it was observed that managers wanted to abandon apparently profitable lines of products or services, because profit margins were difficult to explain, the products that were most complex in their production generated huge profits, departments of the firm resorted to their own systems of calculating costs, accounting departments spent a lot of time on specific projects, and competitors' prices were incomprehensibly low (Gammell & McNair, 1994).

This situation demonstrated the need for organisations to adapt Management Accounting Systems to the new environment, otherwise they could not be efficient and effective global competitors (Geiger & Ittner, 1996).

The last decade of the last century and the years so far in this new century have served to detect a substantial qualitative and quantitative change. This evolution has focussed fundamentally on a change from planning and control processes and expansion in the reduction of business processes cost to questions with a greater strategic emphasis on the organisation's creation of value (Otley, 2003, 2001) through the identification, measurement and management of customer value indicators and above all, shareholder profitability (Ittner & Larcker, 2001).

### **3 - NEED FOR AN ADEQUATE MANAGEMENT INFORMATION SYSTEM**

#### **3.1.- Evolution of management systems.**

One of the information systems that has been developing parallel to the evolution of the management of organisations has been internal, or cost, accounting. Its evolution has taken place independently from financial accounting and is directly related to the internal information needs voiced by the firms themselves. Cost Accounting is directly related to the development path followed by management accounting itself. For Kaplan (1991), cost accounting and management accounting cannot be understood without each other; cost accounting being the most highly developed part of management accounting.

There is no unanimity among the various authors who have studied the origins of cost accounting, as becomes apparent below. The emergence of cost accounting can be traced to the ancient civilisations of the Middle East. For Vámosi (2005), the beginnings of cost accounting are found with the Florentine manufacturers of silk and woollen cloth in the 12th century, thanks to the groupings of guilds or brotherhoods that occurred in the Italy of the Middle Ages. At that time, manufacturing processes were already being independently monitored, by means of a registration and bookkeeping system. Also, for Dicenta (1949), the development of Italian, English and Flemish commerce that occurred in the 14th century led to a need for increased control of transactions and the cost of production in order to be able to establish prices. The birth of competition among the different manufacturers in that period gave birth to an acceleration of the development of cost accounting, which on one hand would permit more detailed knowledge of the cost price of the product they were manufacturing and on the other, the registration of the process that enabled them to report to their superiors.

The Industrial Revolution gave a clear boost to cost accounting, as significant changes occurred in the production process. James Watt invented the steam engine in 1764 and as a result Matthew Boulton subsequently made and perfected the first calculations of the costs of products and of the machines used in their fabrication, which are conventionally attributed to the sons of these inventors (Rosana, 1994:24). The introduction of machinery into industry led firms to invest in their own workshops and hire their own labour, dispensing with the multiple external transactions of artisan workshops that supplied the products. The productive system underwent major changes; productive activity took place within the firm itself, requiring heavy investments that had to be hierarchified and a division of labour was imposed on a large permanent labour force. This concentration of production in factories would have had major consequences in the development of internal or cost accounting as it was no longer as easy as when the firm did not carry out any productive activity itself, but bought its product from workshops at known prices.

However, the evolution experienced in recent years by the management outlook towards ever more sophisticated systems of organisation has led to the budget no longer being the only system of control, but one among many, complemented by systems of

information of both formal and informal types. In this respect, as noted by Cyert (1963), organisations nowadays present a large number of qualitative variables that cannot be measured. For this reason the use of accounting methods for the good management of organisations is questioned. Hopwood (1983:158) argued that *“normally it is possible to improve the accounting systems that measure the management of the organisation; however, it is hardly ever possible to attain the ideal system of control”*. Likewise, Merchandt (1982:44) stated that one should not be so ambitious, as *“the perfect control implied by being convinced that the current achievement of the objectives will adjust to those planned, is never possible because probably always there are unforeseeable events. Anyway, good control should mean that an informed person could reasonably trust in the non-appearance of unpleasant surprises”*. Thus, authors such as McNair (1991:56) criticise accounting systems as tools of management, declaring that there is a huge volume of research into accounting systems that offers information for the control of management and it is forgotten that managers need a wide range of other types of information; accounting analyses and reports being only a small part of this. They also note that even these traditional systems may have failed.

In the environment in which organisations exist, it is necessary to use more open accounting information systems that will allow strategy monitoring. For this, as indicated by Palmer (1992:180), accounting systems must be modernised and adapted to the changes occurring in firms, markets, products, technologies and in quality. Altogether, from the decision making point of view, the traditional systems of information used on a cost accounting basis have become, if not obsolete, insufficient in providing the ample flow of information that is now needed. As a consequence of the above observations, several studies were published with the objective of tackling the problem. Thus, Gurd (2007) defends the use of accounting systems, always provided that they are adapted to the changes caused by society, even commenting on and defining *“social accounting”*. Another author who also focussed on the problem of the use of accounting systems was Guimerá (2005), declaring that such systems should stimulate the curiosity of organisations, facilitate the participatory decision making process and increase the ability of the organisation to cope with changes in the environment. The changes that were occurring in the environment greatly affected the organisation and therefore its information systems. The organisational structure formed by people must accommodate itself to these changes and to the new information systems demanded by the organisation. For this purpose, sufficient resources must be dedicated for the different managers to learn to use these information systems, as developed by Child (1984).

### **3.2. The Management Systems of Spain’s State-Owned Ports System (SPS).**

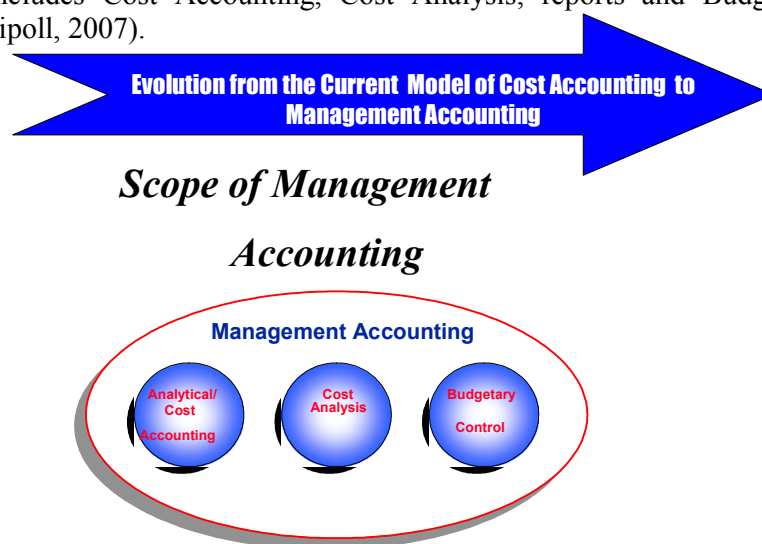
Spain’s SPS uses a model of cost accounting (AECA, 2006), which is aimed at supporting the Port Authorities’ (PAs) improvement of the management, effectiveness and efficiency of resources in the short, medium and long term.

The objective of the SPS’s cost accounting model, known as a minimum model (AECA, 2006), is to know the costs and the profitability of the Portfolio of Products (the different Rates and Tariffs collected and invoiced by the PAs) of the SPS as a

whole and of each individual Port Authority (PA). This model seeks information related to the costs or resources consumed in the private occupation and exploitation of the public domain of the port and the special use of the port installations. It also intends that in the performance of services, whether commercial or not, that form the Product Portfolio of the PAs, the costs system should be used as the basis for the settlement and invoicing of the different port fees and tariffs.

An extension of this costs model, which is called a maximum model (AECA, 2006), has been designed to provide the PAs with a management tool for decision making, on the basis of general or fragmentary information on any object of cost, whether wharves, installations, customers, traffic, or relating to the areas or lines of business that can be considered common to all the PAs or to those that the PAs may consider.

Management Accounting, understood as a wider vision of Cost Accounting, is therefore a dynamic instrument that must adapt to the characteristics of organisations, and for this reason the VPA has been working on its evolution (Giner & Ripoll, 2005). The VPA relies on Cost Accounting as a management and decision-making tool for the purpose of improving management information (Giner et al., 2006). Cost Accounting in the VPA is evolving towards an advanced system of Management Accounting, (see graphic 2) which includes Cost Accounting, Cost Analysis, reports and Budgetary Control (Giner & Ripoll, 2007).



**Graphic 2. Scope of Management accounting**

#### **4 - EVOLUTION OF THE VPA**

In recent years the VPA has been dealing with huge amounts of information, both internal and external, which complicate decision-making. Proper processing of the information from the relevant data for those who make the decisions permits them to recognise problems and act more rapidly (Fernández-Alles & Valle-Cabrera, 2006).

Effective real time information for those who have to make decisions leads to better understanding of the information, and gives them a significant advantage over their environment.

The VPA has evolved in the improvement of information processing through the implementation of the latest generation of applications of “*Business Intelligence*” (BI), which can be configured by users themselves. BI applications are enabling the VPA to develop a single information system capable of integrating data in any format, which may come from different sources, and in this way obtain swifter, simpler and more useful information.

We have evolved from static reports where it was not possible to navigate to obtain total traceability of the information, to dynamic reports where information is available in real time and through which it is possible to navigate to obtain the greatest detail. In the evolution of its Cost Accounting, the VPA, as indicated by Neumann *et al.* (2004), has worked with cost centres as elements that combine economic and statistical information, also incorporating information related to personnel assigned to the cost centre, works units, etc.

Cost centres incorporate economic information on the direct costs of the centre, classified according to their nature (personnel costs, amortizations of fixed assets, outside services and other current costs). They also provide direct cost information related to the different attributions of costs that the centres have received from the auxiliary cost centres.

The cost centre manager thus has available economic information on both the direct and the indirect costs of the cost centre. The cost centre manager also has available information on the number of people assigned, and other non-economic information (Baines & Langfield-Smith, 2003), as well as information on actual and budgeted unit costs of the cost centre per person. Information on the budgeted costs of the cost centre is also incorporated, with details of the deviations.

Cost centres are serving the VPA by providing the economic information and that on other variables of analysis to the different managers, and for these reports to serve managers as a support for improving in operative and daily management (Jermias, 2006). The VPA is currently coping with the large amounts of information produced and which make decision-making difficult. For Tsamenyi *et al.* (2006), it is important that firms properly integrate information technologies into their basic processes.

Strategic decision-making requires a large and diverse quantity of information, implicating different levels of the organisation in the process, which influence diverse organisational functions. Competitiveness requires organisations to have available internal and external information, with a certain orientation that will permit it to support any phase of the strategic process of the organisations (Álvarez-Dardet, *et al.* 1999).

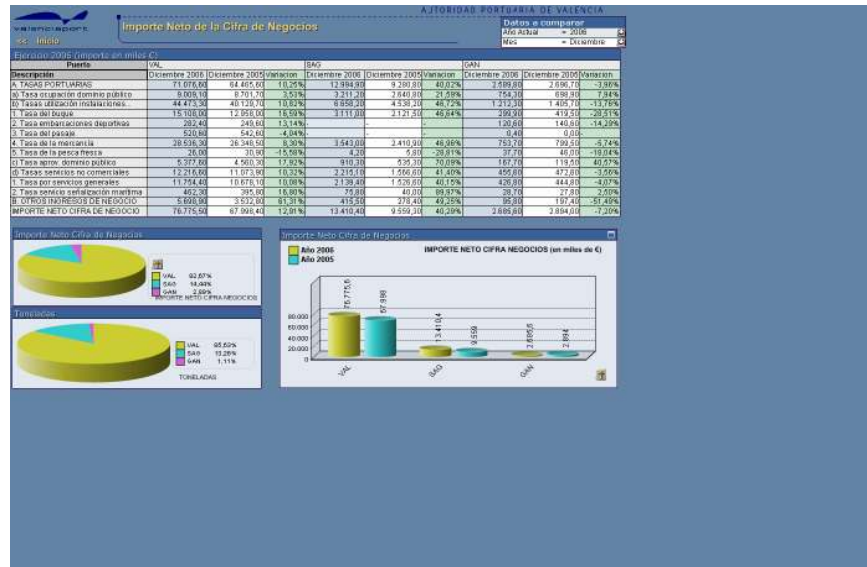
Authors such as Shank & Govindarajan (1992:179) have attempted to test the difference between applying traditional cost accounting and applying a modern approach to value projects that affect the strategy of the firm. For this they used the case of a bicycle manufacturer, the Baldwin Bicycle Company, starting from the prior analysis by Anthony & Dearden (1976).

The applications of BI access in the different databases of the VPA and

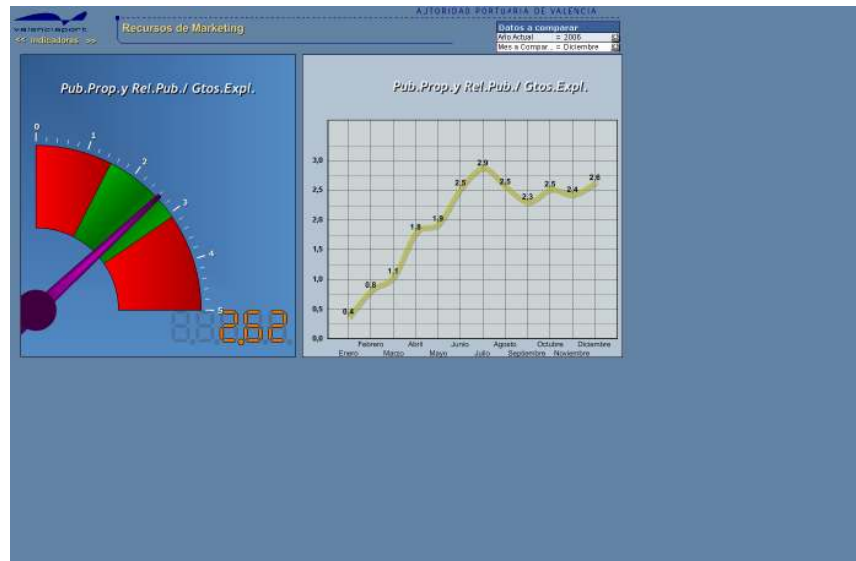


extraction of selected information, offers a simple and end-user-friendly presentation of the information, and permits easy navigation, achieving total traceability of the information.

Graphics 3 and 4 show examples of the final presentation for the end user.



Graphic 3: Report of sales and income using Business Intelligence applications (Source: VPA)



Graphic 4: Expenditure and costs of advertising and public relations over running costs report, using Business Intelligence applications (Source: VPA)

The VPA's Top Management team is analysing economic and financial

information and non-financial information totally independently and without needing to request reports from the Economic and Financial Department or from other Departments of the port.

The new information technologies are helping the VPA to evolve towards “advanced reporting systems”, which are more efficient than the traditional systems. These reporting systems are capable of offering solutions to the information needs of the port at lower transaction costs than the old systems. B.I. applications are enabling the port to develop a single information system capable of grouping together a series of data, which may be from different sources, obtaining in this way swifter, simpler and more useful information.

BI applications have allowed the VPA a better allocation of human resources, as well as permitting information to be obtained more flexibly, simply and accurately, improving information capture and have served as a support system for manager decision making. Advances in Information and Communication Technologies are permitting the use of information systems to improve the capture and processing of information. The Economic and Financial Department of the VPA can thus devote more time to analysis of information and to other tasks with higher added value as a consequence of devoting less time to the processing of information and reports.

## 5 - CONCLUSIONS

In closing, we would like to highlight that for accounting information, in both financial accounting and management accounting, to add value to the strategic processes of firms, it must successfully contribute to the strategic processes of organisations, selecting those aspects of accounting management that are relevant to the strategy of organisations (Álvarez-Dardet *et al.*, 1999).

The evolution and transformation experienced by firms in recent decades, in regard to technological progress and variation in production methods, suggests the possible obsolescence of so-called conventional cost systems. These traditional systems do not take into account the impact of production process automation and the changes occurring in the relative importance of the different components of the cost of the product.

Organisations have to develop accounting information towards a strategic orientation in order to provide support for the strategic processes of business, evolving the current information supply of financial accounting and incorporating the information provided by management accounting. In this way, the accounting information available to organisations will support their strategic processes more efficiently.

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