

FACTORS INFLUENCING ENVIRONMENTAL ACCOUNTING PRACTICES IN PORTUGUESE LOCAL ENTITIES: A MULTIVARIATE ANALYSIS

1. INTRODUCTION

Interest in the protection of the environment amongst legislators, business, national and international organizations and society in general has grown significantly during the last decades. Thus, the growing external pressures on companies to improve their environmental performance and achieve Sustainable Development, along with their awareness about the potential benefits of improved environmental performance, have led them to integrate environmental issues into their decision-making processes.

In this context, similarly to what has happened in private companies, over the last years there has been a growing emphasis amongst public organizations on the need for addressing environmental management and, consequently, they have gradually tended to develop and implement management practices and tools aimed for improving their environmental performance integrating environmental preservation in their management decision-making and control processes. On the other hand, the use of such as practices poses new environmental informative needs from stakeholders and, therefore, environmental issues have to be included in the public organizations' accounting information systems.

Literature shows there is a lack of empirical research on public environmental accounting (Ribeiro and Monteiro, 2009), and the majority of the studies are focused largely on an Anglo-Saxon context, and more specifically on countries such as Australia, New Zealand and the United Kingdom (Gibson and Guthrie, 1995; Burritt and Welch, 1997b; Frost and Toh 1998b; Frost and Seamer, 2002).

This kind of empirical research does not have a tradition in Portugal, particularly in public sector (Ribeiro and Aibar-Guzmán, 2010). Thus, our study adds to international literature on public environmental accounting in local entities a snapshot of Portugal's situation from which empirical evidence is still relatively unknown.

The objective of this paper is to empirically identify some potential determining factors of the use of a set of environmental accounting practices by Portuguese local entities. We have focused our study on local entities because we believe that, as a result of their close proximity to their municipalities' environmental problems, they can play an important role in the environment conservation. On the other hand, although traditionally local entities' activities have not been considered highly polluting, more and more it is assumed that, directly or

indirectly, their actions have an effect on the environment. Therefore, similarly to private companies, local entities have to assume an environmental commitment and to implement environmental management practices and tools aimed to reduce and prevent pollution. Consequently, they will need environmental information which will be provided by their accounting system.

The rest of the paper is organized as follows: the next section briefly presents the literature review. The research design is described in section, including sample selection, research methodology and the construction of the statistical model to test a set of hypotheses on the influence of several factors on the development of environmental accounting practices by Portuguese local entities. In section 4, we present and discuss our findings. Finally, the last section summarizes the main conclusions of our study.

2 – LITERATURE REVIEW

Concerns about the protection of the environment have increased considerably amongst regulators, environmentalists and society in general. In this context, although companies, particularly those belonging to industrial sectors, have been generally considered one of the major sources of environmental impacts, it cannot be ignored the fact that public organizations also generate a significant amount of pollution (through the use of vehicles, the consumption of paper, electricity and water, etc.). In this sense, they were considered by Taylor *et al.* (1994) “silent destroyers”.

Environmental issues have gained growing visibility worldwide attracting a lot of interest among researchers in different areas, including Social and Environmental accounting and Management.

In fact, as a result of the growing importance attached to environmental concerns and the subsequent need to disclose environmental information to stakeholders, organizations (public and private) have tended to (voluntarily or not) disclose more information about their environmental impacts and, therefore, environmental issues have been included in the organization’ accounting information systems.

On the other hand, the increased use of advanced environmental management practices (e.g. environmental auditing, environmental management systems, product-life-cycle analysis, eco-label systems, etc.) poses the need of more environmental information and, consequently, the organizations’ accounting system will have to respond to such informative needs by providing environmental information.

Although the majority of empirical studies on environmental accounting are focused on private companies¹, in recent years there was a gradual trend towards the study of public entities' environmental accounting practices (Frost and Toh, 1998; Cormier and Gordon, 2001; Frost and Seamer, 2002; Qian *et al.*, 2008; Ribeiro and Aibar-Guzmán, 2010), and conclude that:

- The size of the entity may influence the development of environmental accounting and disclosure.
- There is a relation between the development of environmental management practices and the disclosure of environmental information.
- The political visibility of the entity is associated with the level of disclosure of environmental information.

There is an extensive accounting literature relating to the factors that have an influence on the level and/or characteristics of environmental disclosures in private sector (Roberts, 1992; Hackston and Milne, 1996; Bewley and Li, 2000; Ahmad *et al.*, 2003; Holland and Foo, 2003; Ahmad and Sulaiman, 2004; Freedman and Jaggi, 2005; Monteiro and Aibar-Guzmán, 2010). In this respect, traditionally studies have been focused on externally visible features of companies (Monteiro and Aibar-Guzmán, 2010) by including variables such as size, industry membership, foreign ownership, stock exchange listing, profitability, etc..

Mirroring the empirical studies concerning environmental accounting in private sector, some of these studies have investigated the reasons that led public entities to adopt environmental accounting practices as well as their degree of development and the kind and volume of environmental disclosures made by public entities. Overall, several variables were found to influence the level of environmental disclosures by public organizations, namely size (Frost and Toh, 1998), organization's activity sensitivity towards the environment (Frost and Toh, 1998), entity's location (rural or urban) (Mc Elroy *et al.*, 2005), degree of development of environmental management practices (Frost and Seamer, 2002) and financial funds source (specifically, extent to which an entity depends on the State or Country General Budget to obtain financial funds) (Burritt and Welch, 1997b; Frost and Toh, 1998; Frost and Seamer, 2002). On the other hand, the fulfilment of environmental legislation (Mc Elroy *et al.*, 2005) and the imitation of other organizations or units (Marcuccio and Steccolini, 2005) appear to be the main motivations for adopting environmental accounting practices by public organizations.

¹ With regard to research on environmental accounting in private companies, authors as Gray *et al.* (1995); Mathews (1997, 2000, 2003 and 2004); Berthelot *et al.*, (2003) and Parker (2005) have carried out a revision of research on social and environmental accounting.

3. RESEARCH DESIGN

3.1 Sample

With the aim of analysing the degree of development and implantation of environmental accounting practices in the Portuguese Local Public Sector, we have selected a representative sample of the set of Portuguese local entities which consists of the city councils of medium and large size and the municipal companies belonging to these municipalities.

In order to define the city councils' size, we have used as criterion of classification the number of inhabitants, because it is the predominant criterion employed in the studies which analyse local entities (McElroy *et al.*, 2005; Montesinos and Brusca, 2005). Moreover, according to Carvalho *et al.* (2005), grouping the Portuguese city councils considering the number of inhabitants is justified because they are entities of very different dimension which is the main determinant of both their political and functional organization and the amount of funds that they receive from the country's general budget. In addition, this classification is based on one of the criteria defined in the Portuguese Law of Local Finance (Law 42/98 of 6 August). We have employed the typology developed by Carvalho *et al.* (2005) who settled three groups of municipalities: (a) small, with population less than or equal to 20,000 inhabitants, (b) medium, with population over 20,000 and less than or equal to 100,000 inhabitants; and (c) large, with population superior to 100,000 inhabitants.

The choice of large and medium entities is justified by the fact that, as stated above, the literature suggests that the organization's size has an influence on its general attitude towards the environment and accordingly on the development of both environmental management and accounting practices by it. The underlying assumption is that there is a positive relationship between the organization's size and the extent to which such organization develop environmental management and accounting practices. Hence, both in private sector (Hackston and Milne, 1996; Choi, 1999; Archel, 2003) and in public sector (Frost and Toh, 1998, Frost and Seamer, 2002), previous empirical studies have found that greater entities tend to be more forthcoming about the implementation of environmental management and accounting practices than smaller companies.

Our sample also includes the municipal companies operating in the selected city councils' geographic area. The inclusion of this type of entities is justified by two reasons. Firstly, there is a strong relationship between city councils and municipal companies which is based on the following aspects: (a) city councils owned, totally or mostly, the municipal companies' capital, (b) similarly to city councils, municipal companies develop activities that pursue aims of public interest; and (c) a city council can delegate powers with regard to the provision of public services to the municipal companies owned by it. Secondly, as stated previously, in contrast to

city councils, which are subjected to the Local Government Official Accounting Plan (POCAL), municipal companies must follow the Official Accounting Plan (POC) applicable to private business as well as the accounting standards issued by the Portuguese Accounting Standard Commission, including the Accounting Standard 29. Thus, contrary to the city councils, municipal companies have the obligation to disclose environmental information in their financial statements following the criteria for environmental issues' recognition, valuation and disclosure established by the Accounting Standard 29. Accordingly, we consider that the inclusion of municipal companies within our sample will allow us to obtain some interesting conclusions regarding the impact of accounting regulation on the development of environmental accounting practices.

The settled criteria for the selection of the population allow us to limit our study to the public domain, comparing two kinds of entities of municipal scope but subjected to different accounting frameworks. Thus, our population is composed of 205 entities, 129 of them are city councils and 76 are municipal companies. We sent a letter to each selected entity in which we explained the purpose of the study and requested its participation in our study. Of the 205 initially selected entities we obtained a positive answer from 62 entities. Thus, our final sample consists of 62 entities, which represents 30.2% of the initial population.

Table 1 summarizes the distribution of the population and the final sample by type of entity and it shows the proportion of population represented by the final sample.

Table 1: Distribution by type of entity

Type of entity	Number of entities (population)	%	Number of entities (sample)	%	% Sample over population
City Councils	129	62.9	51	82.3	39.5
Municipal Companies	76	37.1	11	17.7	14.5
Total	205	100.0	62	100.0	30.2

In broader terms, our final sample can be characterized by the following features:

- Regardless of the type of entity, the majority of entities are concentrated mainly in the regions of North, Lisbon and Tagus Valley. Moreover, the majority of entities (72.6%) are located on the coast of the country.
- In relation to the size of the sample's entities, the majority of city councils included in the final sample (84.3%) are characterized as medium according to their numbers of inhabitants. On the other hand, using the annual turnover to measure the municipal

companies' size, we have obtained that the majority of the municipal companies from our sample has a turnover lesser than 3.000.000 €.

- With regard to the control of the municipal companies' capital, most of them are controlled by city councils of medium size (54.5%), although there are a significant percentage of municipal companies owned by large city councils (45.5%).

3.2. Methodology

The data was collected by sending a postal questionnaire. We have chosen this method because it allows us to obtain a large amount of information which can be measured. The questionnaires were composed by two groups of questions: the first group of questions was related to entities' features and the second group of questions was related to both the environmental management and accounting practices developed by the sample's entities.

Once the first draft of questionnaire was designed, and before its sending, it was tested with some managers in order to evaluate its understanding by the potential respondents. As a result, some corrections were made to obtain the final version. The questionnaires were sent to selected entities in April 2006, enclosing a letter in which we explained that they have to be completed by the person who was in charge of the entity's environmental issues. In the majority of cases, the questionnaires were completed by top managers belonging to the entity's area or department responsible for the environmental management. We made a second sending in December of 2006 to those entities from which we had not received answer. We were able to obtain a total of 62 answers. Once the questionnaires were received, they were sequentially numbered in order to facilitate their analysis.

3.3. Hypotheses and variables

Dependent variable: Environmental Accounting Practices (EAPI)

Following the approach adopted by some authors who have carried out a similar analysis in the Australian public sector (Frost and Toh, 1998), in order to asses the extent to which the sample's entities have developed environmental accounting practices we have developed an index that measures the breadth of environmental accounting practices developed by the analysed entities. We consider this index (which was named Environmental Accounting Practices Index – EAPI) as the dependent variable in our study.

The starting point for constructing the index was the development of a checklist comprising a number of environmental accounting practices mainly used by organizations in order to

elaborate and disclose environmental information. Based on the literature, a checklist was developed including a set of eight environmental accounting practices analysed in earlier studies (Frost and Toh, 1998; Fill, 1999). Table 2 shows the environmental accounting practices considered in our index. Thus, we have included in the questionnaire a number of questions directly connected with these practices in order to know the extent to which the sample's entities have implemented them.

Table 2: Environmental Accounting Practices

<ul style="list-style-type: none"> - Elaboration of Environmental budgets - Calculation of Environmental costs - Elaboration of Environmental accounting indicators - Allocation of budgetary funds to environmental projects or initiatives - Accounting recognition of environmental issues - Disclosure of environmental information in Annual Report - Direct participation of the Accounting Department in the elaboration and disclosure of the environmental report or the Sustainability Report - Disclosure of environmental financial information in reports and publications other than Annual Report (environmental statement, sustainability report, the media, brochures, organization's web-page, etc.)
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Our Environmental Accounting Practices Index (EAPI) consists of the eight environmentally-related accounting practices listed in Table 2. We have assigned to each one a value which oscillates between zero and one, according to the following criterion: we assigned the value of one if the analysed entity has developed the practice in question and we assigned the value zero if the entity has not developed the practice under consideration. Thus, we have calculated the value of the Environmental Accounting Practices Index (EAPI) of each entity as the ratio of the computed total score (which can range from zero to eight) to the maximum number of points that it is possible to obtain (which corresponds to the total expected number of practices to be developed by the entities, that is, the eight practices included in the checklist), according to the following expression:

$EAPI_i = \sum_j C_j / C$	
where:	
EAPI_i	Environmental Accounting Practices Index of Entity i
C_j	Environmental accounting practice j. Dummy variable, whose value is 1 if the entity develops that practice and 0 if the entity does not develop it
C	Maximum number of environmental accounting practices (8)

Obviously, our index cannot be considered representative of all the accounting procedures that can be developed by an entity in order to elaborate and disclose environmental information. However, in our opinion, it constitutes a good indicator of the extent to which the sample's entities have developed environmental accounting practices.

Independent variables

Based on the extant literature, we have included in our model three plausible independent variables, which can be considered as possible factors that drive the development of environmental accounting practices in the local public sector. The following discussion is concerned with the generation of the hypotheses on the influence of these variables on the use of environmental accounting practices by Portuguese local entities.

a) Size (SIZE): The organization's size has been broadly used in the studies that analyse the extent to which environmental accounting practices are used by private companies (Theyel, 2000) as much as by public entities (Frost and Toh, 1998). These studies posit that the organizational size affects positively the degree of development of environmental accounting (Hackston and Milne, 1996; Frost and Toh, 1998, Frost and Seamer, 2002) because, in general, large entities can afford to assign more financial and human resources to programs aimed to reduce the environmental impacts caused by their activity and, consequently, it is more likely that their accounting system has to prepare and disclose more environmental information compared to the smaller entities' accounting system. On the other hand, large entities face usually greater exposure to public pressures than smaller organizations in relation to the way in which public funds are used in pollution prevention and environmental conservation activities (Deegan and Gordon, 1996).

Therefore, a positive relation is predicted between organization's size and the development of environmental accounting practices. This hypothesis is formally stated as follows:

H1 The degree of development of environmental accounting practices is positively related to the entity's size.

The organization's size can be defined using a number of measures such as sales, number of employees, turnover, total assets, revenues, etc. In this study, we have used the natural logarithm of the entities' turnover for 2005 as the size variable (SIZE).

b) Accounting Regulation (ACC): The influence of the legal and regulatory accounting framework on the type of environmental disclosures made by companies has received attention

by researchers in recent years (Holland and Foo, 2003; Larrinaga *et al.*, 2002; Llenda *et al.*, 2007; Criado-Jiménez *et al.*, 2008). In this sense, many authors have pointed out that disclosures are notably influenced by the country's accounting regulation and, accordingly, they consider that the existence of accounting standards on environmental issues could increase and improve the disclosure of environmental information. As a result, there could be a link between the existence of environmental accounting regulation and the use of environmental accounting practices by the organizations that are subjected to such regulation. In order to examine this proposition, it is worth explaining some features from the Portuguese accounting regulatory framework.

The accounting standards are established by the Portuguese Accounting Standard Commission (*Comissão de Normalização Contabilística* – CNC). The general accounting principles to be followed by Portuguese private companies as well as the detailed rules about valuation and the content of annual accounts are contained in the Official Accounting Plan (*Plano Oficial de Contabilidade* – POC). The POC currently in force was issued in 1989 (Law-decree 410/89 of 21 November). On the other hand, the Portuguese public entities' accounting principles, valuation rules and mandatory models of financial statements are established in the Official Public Accounting Plan (*Plano Oficial de Contabilidade Pública* - POCP) which was issued in 1997 (Law-decree 232/97 of 3 September). Moreover, there been issued several adapted Official Accounting Plans considering the specific characteristics of different industries and organizations (health care entities, universities, etc.). In what concerns Portuguese local councils, there is a specific accounting framework: the Local Government Official Accounting Plan (*Plano Oficial de Contabilidade das Autarquias Locais* – POCAL) passed in 1999 (Law-decree 54A/99 of 22 February). However, some public entities, such as municipal companies, have to follow the same accounting principles than private business, that is, the accounting rules contained in the Official Accounting Plan (POC).

Portuguese accounting legislation is completed by the issuance of focused standards (*directrices*) dealing with particular matters. As regards environmental information, following the European Commission's *Recommendation of 30 May 2001 on the recognition, measurement and disclosure of environmental issues in the annual accounts and annual reports of companies* (2001/453/EC), the Portugal's government approved in 2002 the first Portuguese accounting standard on such issues: the *Accounting Standard 29: Environmental Matters (2002)* which enacts the obligation for Portuguese companies to disclose environmental information and regulates the required disclosures that they have to include in their annual reports (Monteiro and

Aibar-Guzmán, 2005)². The Accounting Standard 29 affects the annual accounts of all Portuguese companies which are subjected to the Official Accounting Plan (POC).

In our opinion, the kind of accounting framework which is applicable to an organization may influence on the development of environmental accounting practices by it. Specifically, we believe that the degree of development of such practices will be higher in municipal companies (as they have to comply with the specific compulsory disclosure requirements derived from the new regulatory accounting framework for environmental reporting established by the Accounting Standard 29) than in city councils (which do not have any mandatory standard on the accounting treatment of environmental matters and, accordingly, their environmental disclosures will be voluntary and without obeying explicit rules).

Thus, we consider that the applicable accounting framework (ACC) to an organization, public or private, can be a potential determining factor of its degree of development of environmental accounting practices. In this sense, we expect that the organizations that are subjected to the Official Accounting Plan (POC) and, accordingly, have to fulfil the regulatory disclosure requirements set by the Accounting Standard 29 will disclose more environmental information than those organizations subjected to the Official Public Accounting Plan (POCP). Therefore, the following hypothesis was formally stated:

H2 The degree of development of environmental accounting practices is related to the kind of accounting framework (public or private) which is applicable to the entity.

We have defined this variable (ACC) as a dummy variable which assumes the value of one if the analysed entity is subjected to the Official Accounting Plan (POC) and the Accounting Standard 29 and the value of zero if it is subjected to the Local Government Official Accounting Plan (POCAL).

c) Degree of development of environmental management practices (EMPI): Both in the private sector (Bouma and Wolters, 1999b) and in the public sector (Frost and Seamer, 2002) there is evidence of the existence of a link between the extent to which an organization has developed and implemented environmental management practices and the level of environmental disclosures made by it. Thus, it is considered that the degree of development of environmental management practices may be a possible explanatory factor of the level of

² In spite that it was initially intended to come into force for financial years beginning on or after January 2003, the Accounting Standard 29 was ratified by Portuguese Government and passed into law on June 25th 2004. Accordingly, the Secretary of State established that the Accounting Standard 29 is mandatory from January 2006.

environmental disclosures and, consequently, a potential determinant of the degree of development of environmental accounting practices.

Specifically, those organizations that have implemented advanced environmental management practices (e.g. environmental auditing, environmental management systems, product-life-cycle analysis, eco-label systems, etc.) in order to improve their environmental performance will need more environmental information compared to the remaining entities and, therefore, their accounting system will have to respond to such informative needs by providing more environmental information. The underlying assumption is that accounting information can contribute to improve the environmental management process (a view shared by several authors, such as Wilmshurt and Frost, 1998; Bouma and Wolters, 1999a).

In this sense, we predict that the level of development of environmental accounting practices will be higher in those entities that are more forthcoming about the implementation of environmental management practices. Thus, we put forward a hypothesis concerning the influence of the degree of development of environmental management practices of an organization on the extent to which such organization develop environmental accounting practices. Therefore, the following hypothesis was formally stated:

- H3 The degree of development of environmental accounting practices is positively related to the degree of development of environmental management practices

We have developed an index (which was named Environmental Management Practices Index – EMPI) to measure the extent to which the sample’s entities have implemented a set of environmental management practices which were selected from the analysis of the practices mostly considered by the literature as the main practices developed by both private companies and public entities in order to improve their environmental performance. Our Environmental Management Practices Index (EMPI) consists of the 16 environmentally-related management practices showed in Table 3.

Table 3: Environmental Management Practices

- Existence of an Environmental department	- Elaboration of environmental indicators
- Definition of the Environmental Policy	- Disclosure of environmental indicators
- Definition of plans of Environmental Actions to be undertaken	- Elaboration of environmental information
- Implementation of an Environmental Management System	- Disclosure of environmental information
- Environmental diagnosis	- Elaboration of the Environmental report and/or the Sustainability Report
- Development of documentation to support environmental management	- Disclosure of the Environmental report and/or the Sustainability Report
- Training actions on environmental protection	- Elaboration of environmental information of general scope to be disclosed through the media,

- Development of environmental control mechanisms	brochures, internet, etc.
- Disclosure of environmental information of general scope through the media, the organization's web-page, brochures, etc.	

EMPI_i = $\sum_j G_j / G$	
where:	
EMPI_i	Environmental Management Practices Index of Entity i
G_j	Environmental management practice j. Dummy variable whose value is 1 if the entity develops the practice and 0 if the entity does not develop the practice
G	Maximum number of environmental management practices (16)

Following the same procedure used to calculate the Environmental Accounting Practices Index (EAPI), we have included in the questionnaire several questions in order to know the extent to which the sample's entities have developed the environmental management practices that compose our Environmental Management Practices Index (EMPI). We have assigned to each practice a value oscillating between zero and one, according to the following criterion: we assigned the value of one if the analysed entity has implemented the practice under consideration and the value of zero in the opposite case. Thus, the value of the Environmental Management Practices Index (EAPI) of each entity was calculated as the ratio of the computed total score (which can range from zero to 16) to the maximum number of points that an entity can obtain (that is, the 16 practices that compose the index), according to the following expression:

With the aim to identify what factors have a significant influence on the local entities' environmental accounting practices, we have carried out a multivariate analysis through the following regression model:

EAPI = $\alpha_0 + \beta_1 \text{SIZE} + \beta_2 \text{ACC} + \beta_3 \text{EMPI} + \epsilon_i$	
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EAPI:	Environmental Accounting Practices
SIZE:	Entity size, measured as the log of turnover for 2005
ACC:	Accounting Regulation, variable <i>dummy</i> whose value is 1 if the entity is subjected to POC and zero if the entity is subjected to POCAL
EMPI:	Environmental Management Practices Index

α_0	Constant
ϵ_i	Residual

As can be seen, a positive relationship is predicted between the Environmental Accounting Practices (EAPI) and all independent variables.

4. RESULTS AND DISCUSSION

A descriptive analysis of our results are presented in Table 4, concerning to the average and the minimum and maximum values obtained by the Environmental Accounting Practices Index (EAPI), both globally and by type of entity (city council or municipal company).

Table 4: Environmental Accounting Practices Index

Entity Type	n	Environmental Accounting Practices Index (EAPI)
City Council	51	0.4379 (Minimum: 0; Maximum: 0.88)
Municipal Company	11	0.1818 (Minimum: 0; Maximum: 0.75)
Total	62	0.3448 (Minimum: 0; Maximum: 0.88)

From the analysis of Table 4 we can point out that:

- The average value of the Environmental Accounting Practices Index (EAPI = 0.3448) is relatively low, both at global level and for each type of entity. However, these results are consistent with some previous studies' findings (Frost and Toh, 1998; Llana, 1999) which have found that, both in private and public organizations, the extent to which the environmental issues are integrated in the accounting system is low.
- The degree of development of environmental accounting practices is higher in city councils compared to municipal companies (EAPI city councils = 0.4379; EAPI municipal companies = 0.1818). However, these differences can be attributed to the sample's composition, in particular considering that our sample is mostly composed by city councils (therefore, we will try to confirm if these differences are or are not significant).

We have considered three plausible variables as possible factors that drive the development of environmental accounting practices in the local public entities and we have analysed the

influence of these variables on the use of environmental accounting practices by the Portuguese local entities that compose our sample.

Table 5 reports the results of the Pearson correlation analysis among the variables included in our regression model and their significance level.

Table 5: Pearson Correlation Matrix

	EAPI	SIZE	ACC	EMPI
EAPI	1,000	0,277 (0,029)	0,372 (0,003)	0,440 (0,000)
SIZE		1,000	0,626 (0,000)	0,354 (0,005)
ACC			1,000	0,248 (0,052)
EMPI				1,000

As can be seen, the independent variables which are more correlated to the Environmental Accounting Practices (EAIP) are Environmental Management Practices (EMPI) and Accounting Regulation (ACC) (their Pearson correlations are equal to 0.440 and 0.372, respectively). Although Size has a low correlation to EAIP (Pearson correlation is equal to 0.277 it is statistically significant (p-value < 0.05).

The Stepwise method was used to estimate the regression model and to determine the independent variables that better explain the Environmental Accounting Practices Index's value³.

Following this process, we present in Table 6 the results the stepwise regression of the EAIP on the independent variables included in our model. The Environmental Management Practices variable (EMPI) is the first independent variable to be introduced in the regression model. The next (and the last) variable that according to the Stepwise method can be introduced in the regression model is the Accounting Regulation (ACC). In other words, only these two variables provide a statistically significant explanation of the dependent variable. The adjusted R-squared

³ According to the Stepwise method, the first independent variable to be introduced in the model is the variable which is most correlated to the dependent variable. The remaining independent variables are introduced one by one, on the basis of their correlation coefficients. Every time a new variable is included in the model, the significance of all variables has to be analysed in order to eliminate those variables which do not have a significant explanatory power. The decision rule about the inclusion of a new explanatory variable in the model is that its t-statistic must not be smaller than a critical value and, at the same time, its inclusion in the model cannot diminish the t-statistics of the variables that have already been introduced in the model below such critical value. This process has to be repeated until all independent variables which are included in the model have a significant explanatory power, while the variables which have not been introduced in the model lack such explanatory power.

of 0.366 suggests that our final model explains 36.6% of the total variance of the Environmental Accounting Practices Index (EAIP).

Table 6: Results of Regression Analysis

Model		Non-standardized Coefficient		Standardized Coefficient	<i>t</i> -statistic	n.s.
		B	Std dev			
1	Constant	0,149	0,044		3,391	0,001
	EMPI	0,461	0,089	0,557	5,195	0,000
2	Constant	0,059	0,058		1,026	0,309
	EMPI	0,414	0,088	0,500	4,685	0,000
	ACC	0,133	0,059	0,242	2,268	0,027

Model		ANOVA	Squared Sum	<i>g.l.</i>	F-statistic	n.s.
1	R-squared = 0,310	Regression	0,850	1	26,993	0,000
	Adjusted R-squared = 0,299	Residual	1,890	60		
	Std dev. = 0,17748	Total	2,740	61		
2	R-squared = 0,366	Regression	1,002	2	17,000	0,000
	Adjusted R-squared = 0,344	Residual	1,738	59		
	Std dev. = 0,17165	Total	2,740	61		

These results are consistent with the Pearson correlations that appeared in Table 5 which provided indications that these variables (EMPI and ACC) would be the potential explanatory variables in our model, because they had the highest Pearson correlation values.

According to the findings displayed in Table 6, our estimated final model can be expressed as follows:

$$EAIP = 0,059 + 0,414 EMPI + 0,133 ACC$$

In consequence, these results suggest that: the level of Environmental Accounting Practices is higher for entities that have higher values of the Environmental Management Practices Index; the degree of development of environmental accounting practices of an entity is related to the kind of accounting framework (public or private) which is applicable to such entity. Specifically, our findings suggest that the existence of compulsory environmental accounting standards is positively associated with the development of environmental accounting practices⁴.

⁴ Mann-Whitney Test results indicate that the entities subjected to the Official Accounting Plan (POC) show a greater degree of development of environmental accounting practices compared to the entities which have to follow the public accounting standards (POCAL).

These results are consistent with the t-test results and the F statistic (whose values are reported in Table 7). We conducted a t-test to evaluate the statistical significance of the hypothesized relations between the Environmental Accounting Practices (EAIP) and these independent variables. The t-test results indicate that the differences are statistically significant both for the EMPI and ACC at the level of 0.05. Additionally, the F statistic is significant, validating the model in general terms. The model's explanatory power is relatively high with an adjusted R-square measure of 0.366. Therefore, we might affirm that they are important factors in explaining environmental accounting practices.

According to the findings obtained through the regression analysis, the hypothesis concerning accounting regulation (H2) and environmental management practices (H3) provide an acceptable basis for explaining the extent to which Portuguese companies develop environmental accounting practices. Nevertheless, the remaining hypotheses, relating to organizational size (H1) was rejected by the analysis.

5. CONCLUSION

As stated previously, little evidence is available relating to public environmental accounting in Portugal. Thus, our study contributes to the existing literature by providing knowledge concerning the Portuguese local entities setting, extending the scope of the current understanding of the environmental accounting practices and their determinants.

Overall, we have found evidence indicating that the degree of development of environmental accounting practices (as measured by the EAPI) in Portuguese local entities is low. However, although, as can be seen when it is considered the EAPI's value by type of entity (city councils or municipal companies), city councils present a higher degree of development of such practices compared to municipal companies, this fact can be attributed to the composition of our sample which is mostly composed by city councils.

Indeed, the multivariate regression analysis' findings indicate that accounting regulation and degree of development of environmental management practices are positively and statistically related to the level of development of environmental accounting practices (as measured by the EAPI) supporting two of the three advanced hypotheses. Therefore, it can be said that they are important factors explaining the degree of development of such practices in Portuguese local entities.

Overall, our results are consistent with some previous studies' findings which found that development of environmental management accounting practices (Bruma and Wolters, 1999b;

Frost and Seamer, 2002) can be considered as potential determinant of the level of development of environmental accounting practices.

Like all empirical studies, there are a number of limitations which should be taken into consideration in interpreting our findings and conclusions. With regard to the method used to gather the data, we are aware that questionnaires have some limitations related to subjective interpretation both of the questions and the provided answers. In order to minimize these problems, we carried out a pilot test of the questionnaire and we also included a space in which respondents could express their opinions or to make clarifications. On the other hand, questionnaires were anonymously applied.

Despite the afore-mentioned limitations, we consider that this study has contributed to the literature on environmental accounting in public sector because it has provided a first view of the current state of the environmental accounting practices in Portuguese local entities and their determinants factors. Additionally, we believe that our findings could be considered as starting point for future investigations including new explanatory variables.

Specifically, other potential determining factors can be considered both external factors (e.g. environmental regulations, stakeholders' pressures, etc.) and organizational characteristics (the Environmental strategic positioning by the entity, the existence of an Environmental Management System and the registration for the ISO 14001 or EMAS). Finally, we considered that this study could be repeated using personal interviews as research method as a research method in order to deepen our understanding of the factors that motivate Portuguese local entities to developed environmental accounting practices.

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