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**Doctoral School in Management Science and Business Administration**



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**The relationship between organisational culture and strategy and the  
accounting treatment of corporate environmental information –**

**Focus on environmental accounting**

Dissertation – Thesis book

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## **1. Introduction**

*"Our natural environment is in an increasingly degraded state"* (Attenborough – Hughes, 2022, p.12). In terms of the actors in the economic model, companies are the actors that have directly and significantly contributed to the increase in environmental problems and continue to do so today. All companies, by their production and service activities, interact with the natural environment around them. It is companies in the production sector that are constantly in direct contact with the natural environment by the very nature of their activities. From an environmental point of view, this could be interpreted as the environment and the organisation operating in it being interlinked concepts that are closely related. After all, no farmer can exempt himself from environmental impacts, but at the same time, the company also impacts its natural environment. As environmental problems increase and pressures mount, the integration of environmental factors into day-to-day operations has become a key issue (Hart, 1997; Berry – Rondinelli, 1998).

Nowadays, all disciplines have recognised the importance of environmental protection and are trying to respond to the challenges of environmental protection and, more broadly, sustainability and sustainable economic growth. Accounting is one of the disciplines that has responded to these challenges by developing a conceptual framework of social and environmental accounting in response to the growing environmental problems.

My dissertation focuses on the domestic practice of environmental accounting and the so-called "soft" factors within the company related to the development of the system. The practical importance of my work is that the empirical research findings shed light on the extent to which the environmental accounting system in large domestic companies is developed to manage the impacts of environmental/environmental activities and on the relationship between corporate internal management factors such as organisational culture and strategy and the presence and level of detail of environmental accounting. In addition, the research results will also reveal the types of strategy and culture are positively related to the development of companies' environmental accounting systems.

### **1.1 The significance and objectives of the research**

Environmental accounting is an increasingly important and topical issue from a theoretical and practical point of view. Consequently, the literature background of the research is very diverse, and while writing the dissertation, several international and domestic literature was reviewed. Furthermore, to explore the practical application of this field, several doctoral theses and

publications have been written in the last few years, both in Hungary and internationally (Somogyi, 2007; Madarasiné, 2009; Ván, 2012b). Therefore, the central topic of my doctoral research, environmental accounting, can not be considered a new research area. However, it is certainly novel, as I examine the corporate presence of environmental management accounting from a different perspective than before.

The main objective of the doctoral research was to map the environmental financial accounting practices of large companies operating in the domestic area, which are directly related to the natural environment due to their production activities. The other objective was to analyse the development of the environmental management accounting system and its relationship with factors within the organisation.

Based on the above, it will first be explored - taking into account the relevant provisions of the Hungarian Accounting Act - which elements of environmental accounting are included in the disclosed environmental information in the accounts of large companies in the manufacturing sector with the highest turnover and in what form. The results also allow us to analyse whether the companies in the sample can be segmented and, if so, what similar groups of large companies can be identified based on the compliance of their environmental and financial accounting elements with the legal requirements.

The research also aims to explore whether organisational characteristics, internal factors such as organisational culture and strategy are related to the level of detail of environmental management accounting, i.e. its actual practical application and operation. Several technical questions were raised:

- What kind of organisational culture is needed to enable companies to integrate environmental management into their day-to-day operations effectively?
- If there is a statistically significant correlation between the strategy and the development of the environmental accounting system, which strategy best facilitates/supports the operation of this system and does it actually use the information provided by the system to make decisions?

## **1.2 The structure of the dissertation**

In terms of structure, the dissertation is divided into two major logical units. The first part of the dissertation is a review and processing of the literature on the topic. The first part of the paper provides a comprehensive overview of the environmental activities of companies. There are many aspects of environmental protection and, more broadly, of corporate sustainability in

corporate practice. Legal and social aspects play an important role in doctoral research, and these areas have been focused on.

The focus shifted to environmental accounting, reflecting its topicality, theoretical significance and practical importance. Building on the literature on environmental accounting theory, I introduce the concept of environmental accounting with a chronological review of approaches and definitions from different aspects within each level of development. I conclude the sub-chapter by drawing a parallel between companies' environmental and social activities and the stages of development of environmental accounting.

One of the objectives of my doctoral research is to map the environmental financial accounting practices of large domestic companies, and consequently, the examination of the legal environment that determines this is a particularly important part of the dissertation. At the end of the literature review chapter, the aspects of organisational culture and strategy closely related to the present research were explored. Finally, the theoretical review concluded with a description of the types of strategy and culture to be included in the empirical research.

The second major logical unit of the thesis was the practical, empirical part of the research. Within this, the exact methodology of the secondary research to test hypothesis H1 was presented. This was followed by the definition of the research model set up to test hypotheses H2 and H3 and the methodological framework of the primary research that was to be conducted. The operationalisation of the variables, the statistical and econometric methods used in the analyses and the precise definition of the research target group are essential and are also described in detail in the research methodology section of the thesis.

The last major chapter of the dissertation covers the results of the analyses, in which the hypotheses were tested, the theses of the research were formulated, and the results were interpreted and conclusions drawn.

## **2. Theoretical background of the research**

In the 1960s and 1970s, as environmental problems became more acute, environmental awareness began to increase (Dillard et al., 2005), and the responsibility of companies for these problems became more and more prominent, not only among stakeholders but also among the general public (Eugénio et al., 2010). This has also led to the expectation of all stakeholders to provide adequate information about companies' environmental impacts and activities.

### **2.1 Conceptual changes in environmental accounting**

As environmental problems have increased, the need has arisen simultaneously to develop a field/subsystem within the traditional accounting system that can adequately manage business organisations' social and environmental impacts and provide appropriate information to internal and external stakeholders. These reasons have therefore predetermined the need to define, develop and operate environmental accounting as a subsystem within traditional accounting.

The United Nations Division for Sustainable Development (UNSD) has defined environmental accounting as a combination of financial and management accounting, which aims to increase the company's efficiency in the use of resources and reduce its environmental impact, environmental risk and environmental costs. According to this concept, environmental accounting involves the identification, collection and analysis of physical (raw materials, water, energy) and financial (environmentally related costs, benefits and savings) information used by internal stakeholders (UNSD, 2001).

Reyes (2002) described environmental accounting as a subset of traditional accounting that deals with the activities, methods and systems that record, analyse and present (disclose) the environmental and financial impacts of a particular economic system (a firm or a nation).

Bennett et al. (2003), looking at it from the perspective of sustainable corporate activity, conceptualised environmental accounting as the production, analysis and use of financial and non-financial information to optimise a company's environmental and economic performance to achieve sustainable business operations. This approach already reflected the going concern principle as a general accounting principle.

The most comprehensive definition of environmental accounting is that of the Japanese Ministry of the Environment, which states that environmental accounting supports the achievement of sustainable development, helps to maintain an appropriate relationship between society and the company, and encourages the pursuit of effective environmental sustainability. In addition, environmental accounting helps to identify the costs of maintaining the

environment in the normal course of business, determines the benefits that accrue from this activity, provides an appropriate tool for quantitative assessment, and supports the disclosure of results (Ministry of the Environment, Japan 2005).

As later interpreted by Csutora and Kerekes, the importance of environmental accounting lies, among other things, in the fact that the environmental measures implemented enable the company to realise savings in resource use, find the optimal measures to protect the environment and increase efficiency. Furthermore, this subsystem can help companies to identify and properly allocate their hidden environmental costs, rationally assess planned environmental investments, and implement an environmental management system (Csutora - Kerekes, 2004).

A few years later, Kósi - Valkó (2006) defined environmental accounting as a set of physical or monetarised information about environmental factors obtained during the operation of an organisation within the accounting information system, systematised and presented in a form suitable for decision preparation and control. This approach essentially emphasised the information role of environmental accounting within the enterprise. In other words, it focused on the information role of management and internal stakeholders.

In Ván's (2012a) approach, environmental accounting is intended to reflect environmental challenges. This branch of the accounting system deals with the management of environmental problems at the enterprise level. It can be seen as a complementary subsystem to the traditional accounting system. In addition, environmental accounting helps to measure environmental performance, with which the social role of companies is closely linked.

From a business perspective, there is a growing interest in better understanding, measuring and managing environment-related costs and revenues. Currently, the main challenge for environmental accounting is to enable companies to integrate it into their daily practice (Ván, 2012b). Consequently, the delimitation of environmental accounting within the traditional accounting system has become necessary to enable companies to make informed decisions based on appropriate environmental information. But, on the other hand, the lack of such information can lead to inefficient use of resources, pollution or even disasters.

## **2.2 The relevance of organisational culture for corporate sustainability**

At the time of the emergence of corporate economics, there was a recognition of the importance of cultural factors and corporate culture. While the Taylorist approach, or 'soulless' Taylorism as it is known, focused on the organisation and the system as the focus of scientific analysis,

Nicklisch (1922) emphasised the role of the individual and drew attention to the integrating role of corporate values. Later, in the late 1960s, Ulrich emphasised the dimension of values. In his book, published in 1968, the researcher argued that a company is made up of people, where people act, evaluation problems arise, and it is, therefore, necessary that all circumstances related to the company are evaluated (Borgulya – Barakonyi, 2004).

Cultural orientation came clearly to the fore in the 1980s and 1990s through the work of Peters and Waterman, who came to the fore in their search for the secrets of successful corporate functioning. As culture research evolved, the subject became multidimensional, with a distinction being made between micro-level (company-wide), macro-level (country-wide), cross-cultural (comparing two or more countries) and global (international) analyses. However, the focus of the doctoral research was on corporate culture.

Petrock (1990) argued that corporate culture encompasses the values and standards that guide people's behaviour. Corporate culture determines the purpose for which a company operates, how it uses the resources at its disposal and influences the organisational structure and all the systems used. It also influences who is hired in the company to ensure that everyone is in the best job for their abilities and influences how well the organisation performs. Finally, the culture that is developed determines what is seen as a problem, what is seen as an opportunity and how it is addressed.

A prominent figure in the field of culture research is Edgar H. Schein, who, in his 2004 book, stated that organisational culture is "The patterns of basic assumptions that an organisation has learned in solving its external and internal problems and that have worked well enough to be accepted, valid and workable in the face of similar problems" (Gaál - Szabó, 2008, p. According to this approach, organisational culture can be defined as the set of commonly accepted assumptions that a given group has discovered, recognised or developed through learning in order to be able to deal with problems arising from external adaptation and internal integration. Furthermore, these manifestations must be sufficiently mature to be considered valid by the organisation's members and teachable to new members entering the organisation as the right way to perceive, understand, think about and feel about corporate problems.

### **2.2.1 The types of cultures studied in the empirical research**

The various approaches and the many definitions prove that organisational culture is extremely complex and comprehensive. As a result, there is no single good method for measuring it (Fekete, 2011). Cameron and Quinn (2006) followed a two-dimensional logic in their approach

to organisational research. The two poles of the first dimension are flexibility, adaptability to the given situation, and dynamism, while the other pole is stability, order, and control. The second dimension divides the internal and external orientation. While one pole of this dimension is integration and uniformity for the internal orientation, the other pole is differentiation and competition for the external orientation.

Based on the two dimensions, Cameron and Quinn's cultural typology identified four types, which are:

- The Hierarchy Culture shares the characteristics of the mechanistic and role culture and has all the hallmarks of the Wéberian bureaucratic organisation. Accordingly, its main characteristics include over-regulation, specialisation, meritocracy (promotion system based on merit), stability, rationality, respect for formal positions, impersonality, division of labour and accountability. In addition, it provides employees with predictability and a sense of job security. Consequently, this culture is dominant in large organisations.
- The Market Culture: operations are driven by outward-looking traditions. Market economy imperatives set the rules. Employees are also competitive and result oriented. The force that holds the organisation together is winning. Competitiveness and effectiveness are based on strong external control.
- The Clan Culture: named for its similarity to cheating. It is characterised by cohesion and shared values and goals. Teamwork, employee involvement, mutual commitment. The best response to environmental challenges is to develop staff and treat customers as partners. It is a friendly place with a real community atmosphere. Managers are caring parents.
- The Adhocracy Culture: focus on constant innovation, entrepreneurship and creativity. Adaptability and innovation are success factors. The organisation is experienced as a kind of orderly chaos. In this kind of organisation, you have to live with constant uncertainty and information overload; individualism and individual risk-taking play an important role. Future orientation permeates all members of the organisation.

### **2.3 The relevance of strategy for corporate sustainability**

Today, with the complexity of the environment and the turbulence of change in general, integrating sustainability principles into everyday operations, i.e. making business operations truly sustainable, is a major challenge for all business organisations. However, implementing measures, innovations and innovations that reflect environmental challenges often requires

significant investment, and consequently, management commitment to environmental protection and organisational strategy are crucial (Kagan et al., 2003).

March and Simon (1958) are among the forerunners of the so-called descriptive approach to strategy, who were the first to highlight the cognitive limitations of the individual decision-maker. From psychological roots came Lindblom's (1959) early theory that strategic management is "not a simple linear process" but rather a "muddling through" of learning actions due to the complexity of the environment and the organisation, coupled with careful consideration of successive "options" and the need to ensure consensus (Balaton et al., 2016). It can be seen that the relevant role of the environment, and thus of interest groups, was already truly evident in the late 1950s.

The initial development of the new approach, strategic management, dates back to the early 1980s. Then, theorists sought to describe and explain the process of developing corporate strategies, which in many cases were 'organically' formed in Western corporate practice (partly spontaneously or 'assembled' from ex-post insights). For them, the prescriptive mindset, which saw the development of corporate strategy only in a consciously defined, formalised framework, seemed outdated (Balaton et al., 2016).

Perhaps the most general interpretation of the strategy was given by Gaál and Szabó (2008). They defined strategy as "*the set of objectives and the means to achieve them*" (Gaál - Szabó, 2008, p. 9). This means the strategy is developed when the specific objectives are set, and the actions and decisions needed to achieve them are defined. Hence, the strategy answers how the company will achieve its core objectives.

As Marosán (2004) puts it, strategy defines the activities, i.e. what the organisation is to do, and serves to provide a competitive advantage over its competitors, as well as helping it to adapt to the environment. The strategy expresses the values, aspirations and ambitions of the stakeholders. Related to this, Chikán (2008) has pointed out that a company's goals emerge from internal stakeholders' aspirations in a complex organisational-sociological process (Radácsi, 2021). Strategy is essentially about pursuing the interests of the owner, but today it must also take into account other stakeholders and their expectations.

### **2.3.1 The types of strategies examined in the empirical research**

In the strategy literature, there are several types of strategies according to the approach. Of these types, the strategy types according to the direction and dynamics of the operating environment,

the strategy types according to the adaptation to the environment and finally, the strategy types according to the orientation were the focus of my doctoral research.

The typification of the operating environment changes according to direction and dynamics is associated with the authors Glueck (1976) and Hitt - Ireland - Palia (1982). In their approach, they distinguished three types of strategies in terms of responses to environmental change (Gaál - Szabó, 2008; Fekete, 2011):

- The main objective of organisations that adopt a growth strategy is to expand or develop existing product markets, thereby increasing an indicator such as sales. Growth can be driven by internal factors, including product development, but can also come from external factors, acquisitions or mergers. As a result, organisations can remain stable in a dynamic and changing environment.
- Organisations pursuing a stability strategy will continue well-established practices, essentially making minor adjustments and strategic changes. This type of organisation can operate successfully in stable or slowly changing environments where the relationship between the environment and the company is unchanged, the level of achievement of objectives is good, and the outlook for the future is good.
- Companies that adopt a reduction strategy seek to increase efficiency by reducing their operational activities. The means of doing so are cost reduction and increased production efficiency.

Adaptation to the environment, or adaptation strategy types, was defined by Miles and Snow (1978) in terms of appropriateness to environmental challenges. At the centre of their model was the question of whether the firm was behaving actively or passively and how this behaviour was reflected in the strategy. Miles and Snow's results thus suggest that organisations can reflect and adapt to changes in the environment in different ways:

- Organisations in the reactive group are not able to reflect adequately on environmental challenges but merely try to react to changes in their operating environment in hindsight. Their fundamental weakness is their inability to develop a viable strategy or their adherence to an outdated strategy that is no longer relevant in a dynamically changing environment. As a result, these types of organisations are almost constantly in a state of instability and are often close to bankruptcy.
- Defenders are organisations that operate in a stable environment and a narrow product-market segment. Their basic objective is to maintain and improve their market position

in their segment. Their strategy is not focused on products but on improving processes and procedures. Their strength lies in the efficiency of their technology, as they use a single, capital-intensive technology to produce a given product. Strict management and continuous control are essential for maximum efficiency. One of their main weaknesses is their low environmental responsiveness.

- Analysts simultaneously seek to minimise risk and maximise profit. They do this by looking for new market opportunities while also focusing on continuously improving their existing products and technologies. Their operations, therefore, have both stable and changing elements. This type of organisation is both responsive and efficient. Consequently, their development is stable and steady. A matrix structure characterises their structure.
- Organisations pursuing a research strategy operate in a very broad and varied field of activity in a dynamic environment where they are constantly searching for new products and new market opportunities. Consequently, their competitiveness in the market lies in their ability to generate change. Consequently, their operations are characterised by frequent change, variation and experimentation, which on the one hand, implies a high-risk factor for the organisation, and on the other hand, requires a flexible technological and management system.

The typology of strategy by orientation is attributed to Ohmae (1991). In his view, the strategy method is merely a contestation of prevailing assumptions by asking a simple question, namely: why? In terms of strategy orientation, the researcher distinguished the following three main types with respect to the three most important actors in market processes (Fekete, 2011):

- The consumer-oriented strategy aims to satisfy consumers' needs as much as possible. To achieve this goal, companies segment consumers.
- In order to achieve this goal, organisations pursuing a company-oriented strategy focus on the company's activities and functions that give them the greatest competitive advantage in the market. The objective is to maximise the strength of the company.
- The competitor-oriented strategy is almost identical to Porter's distinctive strategy. Indeed, these strategies aim to differentiate from competitors.

In his empirical research, Fekete (2011) added the actor to the orientation typology, the group of owners, arguing that the company was created to meet the owners' expectations. I used Ohmae's orientation typology in the empirical part of my doctoral research. However, besides the owner-oriented type, I also considered it appropriate to include the natural environment as

an additional stakeholder. As a result of the increasing consumer values and expectations, as well as sustainability issues and global environmental problems, the role of these interest groups has - according to my assumption - become more important in practice, including among large domestic companies. Thus they consider the natural environment as an important factor in developing and implementing their strategies. In addition, as shown above, the role of government, public authorities and the legal environment they create are also of particular importance for the subject of my doctoral research. Therefore I also examined the strategic rating of public authorities among the target group of large domestic companies.

### **3. Research questions and hypotheses**

In relation to the research objectives, my dissertation focused on answering the following research questions:

**Q1. Can large domestic manufacturing companies be homogeneously grouped according to the compliance of environmental and financial accounting elements presented in their reports with legal requirements?**

**Q2. Is there a statistically significant relationship between the organisational culture and the level of detail of environmental management accounting?**

**Q3. Is there a statistically significant relationship between the organisational strategy and the level of detail of environmental management accounting?**

The first research question (Q1) leads to the second and third research questions (Q2, Q3), which aimed to find out whether it is indeed the deficiencies in accounting, internal records, evaluations and analyses that are the reason why the large companies under study cannot fully comply with the relevant requirements of the Accounting Act. An examination of the environmental management accounting system may provide an answer to this question. I hypothesise that environmental accounting elements are effectively separated in accounting when the company is truly committed to environmental protection. This commitment is reflected in the organisational culture and the set of objectives, i.e. the strategy.

The hypotheses concerning the research questions are as follows, and their validity was tested during the analyses:

**H1.** Large domestic manufacturing companies can be homogeneously grouped according to the compliance of environmental and financial accounting elements presented in their reports with legal requirements.

**H2.** There is a statistically significant relationship between the organisational culture and the level of details in environmental management accounting.

**H3.** There is a statistically significant relationship between the organisational strategy and the level of details in environmental management accounting.

**H1.** Large domestic manufacturing companies can be homogeneously grouped according to the compliance of environmental and financial accounting elements presented in their reports with legal requirements.

Ván (2012a) argued a decade ago that the level of regulation in Hungary is low with respect to environmental accounting. In Hungary, there is still no specific regulation in the field of environmental accounting. The Act C of 2000 on Accounting provides for the environmental activities of companies, but it basically refers to the minimum content of certain accounting documents. The legislators have set out disclosure requirements for certain elements of environmental accounting (Bosnyák-Simon, 2018), but the provisions contain references back to other legislation and are therefore not always clear. (A detailed overview of the legislative background is presented in Chapter 3 of this thesis.)

In my view, entities are trying to comply with the relevant requirements of the Accounting Act, but this is not always fully achieved due to regulatory deficiencies. For these reasons, I believe that the compliance of environmental financial accounting elements with the legal requirements is not uniform across domestic companies and that, consequently, distinct groups can be identified among the companies included in the research sample.

**H2.** There is a statistically significant relationship between the organisational culture and the level of details in environmental management accounting.

In my view, a commitment to protecting the natural environment in all dimensions of business operations is a key factor in becoming a truly responsible and sustainable business. Whether or not the manager has developed, among other things, organisational values and acceptance of the principles of sustainable development within the company - and hence whether the organisation takes responsibility for protecting the natural environment - can be seen in examining the organisational culture. I hypothesise that the organisational culture, the way employees do their job (Marvin Bower, McKinsey&Co. cited in Gaál - Szabó, 2008), has a significant influence on the level of detail of the environmental accounting system.

**H3.** There is a statistically significant relationship between the organisational strategy and the level of details in environmental management accounting.

However, the effective integration of environmental sustainability can be achieved if the preservation of the natural environment and the integration of sustainability principles are not

only a priority in the organisational culture but also in the organisation's strategy. In the business world, companies use a so-called strategy mix (Fekete, 2011), which also predisposes companies to a mix of strategic features in their practices. I hypothesise that the strategy developed by management, and more specifically, the different strategic characteristics, impact the level of detail of environmental management accounting in different ways.

## **4. Methodology**

### **4.1 Methods for testing H1**

In the face of increasing pressure from external stakeholders on business organisations, all organisations have recognised that a systematic, accurate and consistent presentation of the impacts of their activities on the natural environment can be a relevant factor in increasing their competitiveness. Consequently, presumably, the organisation concerned will seek to provide sufficient quantity and quality of information on the impacts of its activities on the natural environment and to reassure users of the information reported that its operations are sustainable in the long term. However, in my opinion, companies cannot always fully comply with this obligation precisely because of the shortcomings of separate records and assessments.

In the review of the supplementary annexes, each environmental financial accounting element is assessed on a scale of 1 to 3. These scores reflect the degree of compliance with legal requirements as follows:

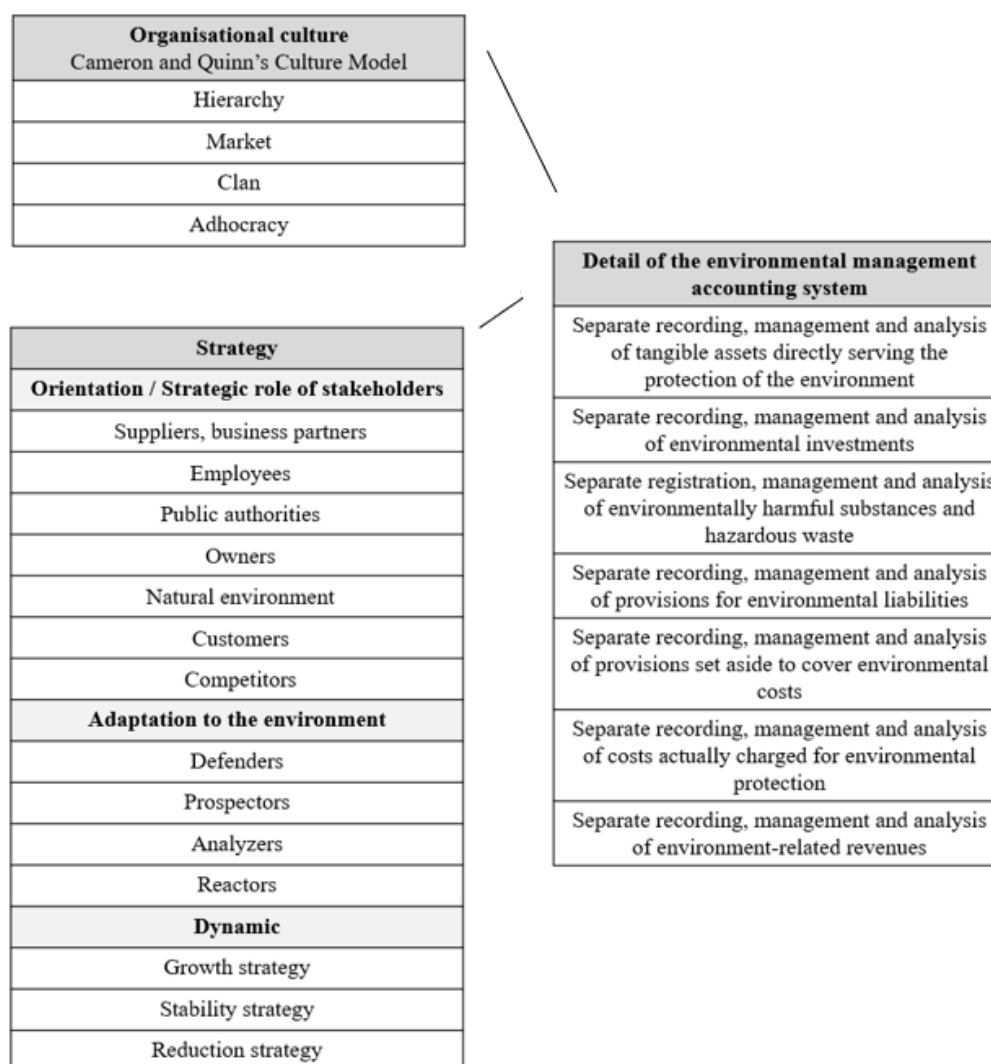
- Score 3: the information displayed fully complies with the relevant requirements, OR the enterprise does not have the relevant item but displays/identifies it in the supplementary annexe. In the latter case, clearly describe that it does not have the item (e.g. it does not make an environmental provision because it has environmental liability insurance, and, importantly, it should specifically mention and describe this).
- Score 2: the disclosed environmental accounting item only partially complies with the provisions of the Accounting Act.
- Score 1: the level of detail presented is minimally compliant with the relevant requirements, OR this element is not presented at all in the supplementary annexe.

In this context, it is important to emphasise that this evaluation criterion does not qualify how environmentally conscious a company is, to what extent it has actually put the principles of sustainable development into practice, but only refers to whether the annual/simplified annual accounts published by the company include environmental, financial accounting elements at all and, if so, to what extent their presentation complies with the relevant provisions of the Accounting Act.

Following the development of an evaluation criteria system for the information and data presented, and after reviewing the reports and carrying out the evaluation, the large companies examined were grouped together using a clustering procedure.

## 4.2 Methods for testing H2 and H3

Hypotheses H2 and H3 refer to the existence and evaluation of the relationship between organisational culture, organisational strategy and the elaboration and detail of the environmental accounting system. In order to answer the research questions described above and to prove the hypotheses defined, I have set up the research model shown in Figure 1:



**Figure 1: Research model set up to test H2 and H3**

*Source: Author's own editing*

In order to obtain an accurate picture of the characteristics of the environmental management accounting system actually operating in the companies in question and the internal factors

influencing it, I used a primary research technique, including a questionnaire survey as one of the survey methods (Majoros, 2011).

To test these hypotheses, it was first necessary to examine the elaboration and detail of the environmental accounting system. Thus, the primary objective of the questionnaire survey was to explore the elaboration and detail of the environmental accounting system. Accordingly, the first major part of the questionnaire focused on whether the companies kept the accounting elements separately and whether their development was analysed and monitored.

The related variables, i.e. the environmental accounting elements examined in the questionnaire, were:

- tangible fixed assets that directly protect the environment;
- investments for environmental purposes;
- environmentally harmful substances, hazardous waste;
- provisions for environmental liabilities;
- provisions to cover environmental costs;
- expenditure actually charged for environmental protection;
- the separate recording, management and analysis of revenue relating to environmental protection.

It can be seen that these accounting elements are the same as those referred to in the Accounting Act, The scope of the variables examined has been extended to include the accounting treatment of environmental investments and environmental revenue.

The operationalization of organizational culture and organizational strategy as explanatory variables was based on the relevant literature sources. I selected and used in my research a set of questions from Cameron and Quinn (2006), which is a reliable and valid tool for the analysis and identification of organizational culture (Bognár, 2013).

In relation to organisational strategy, the focus was on the adaptation to the environment, the dynamics of strategy and the strategic relevance of stakeholders, given the subject of the research. Accordingly, interaction with the environment was defined based on Miles and Snow's typification model. In examining strategy dynamics, the Glueck and Hitt–Ireland–Palia model was used to determine whether the company was seeking growth, stability or reduction. In addition, the stakeholders (suppliers, business partners, employees, public authorities, owners, the natural environment, customers and competitors) were analysed strategically.

H2 and H3 were thus formulated to explore the relationships between the variables included in the model. When analysing the elaboration of the environmental accounting information system operated by the companies completing the questionnaire, large companies were clustered, again with the aim of data reduction, i.e. reducing the number of units observed; in this case, the companies completing the questionnaire and grouping them according to their similar characteristics. Both the clusters created according to the level of detail of the environmental accounting system and the types of organisational culture and strategy are nominal level criteria. The relationship between nominal, i.e. non-metric, measurement-level variables is called association (Molnár, 2015). Association measures are statistical indicators in the field of cross-tabulation analysis that express the closeness of the relationship between nominal, ordinal, and metric variables expressed in terms of categories. This method is one of the simplest bivariate analyses, which shows whether the two variables under study are related (Sajtos – Mitev, 2007). Accordingly, I have used cross-tabulation analysis to investigate the relationship between the given criteria.

The operationalisation of organisational culture and organisational strategy as explanatory variables was based on the relevant literature. I selected a set of questions from the literature on culture diagnosis methods, as compiled by Cameron and Quinn, and used them in my research.

Given the research subject, the focus was on the adaptation to the environment, the dynamics of strategy and the strategic relevance of stakeholders in relation to organisational strategy. Accordingly, interaction with the environment was defined on the basis of Miles and Snow's typification model. In examining strategy dynamics, the Glueck and Hitt – Ireland – Palia model was used to determine whether the company was seeking growth, stability or reduction. Lastly, the stakeholders (suppliers, business partners, employees, public authorities, owners, the natural environment, customers and competitors) were analysed strategically.

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association (Molnár, 2015). Association measures are statistical indicators in the field of cross-tabulation analysis that express the closeness of the relationship between nominal, ordinal, and metric variables expressed in terms of categories. This method is one of the simplest bivariate analyses, which shows whether the two variables under study are related (Sajtos – Mitev, 2007). Accordingly, I have used cross-tabulation analysis to investigate the relationship between the given criteria.

### **4.3 Defining the target group**

Research by Forcadell et al. (2019) has shown that firm size has a significant and positive effect on sustainability. In light of this, the doctoral research focuses on large domestic companies, also assuming that some emphasis is already placed on the delineation of environmental accounting. In line with the research objectives, the first step in defining the target group was based on all large companies included in the HVG Top 500 list compiled by Céginformáció.hu Kft. in November 2021. A defined set of companies included in the list, those that are actually engaged in productive activities in the industrial sector, were included in the research. After the list was narrowed down, the final number of elements in the research was 199 (N=199). My analyses to test hypothesis H1 were carried out on a sample of these 199 large companies. I conducted a questionnaire survey to test hypotheses H2 and H3. The questionnaire was completed by a total of 74 managers of large firms, thus I was able to conduct my empirical research to test these hypotheses on a sample of 74 large firms (N=74)

## **Presentation of the theses**

The first aim of my empirical research among large companies operating in Hungary was to find out - taking into account the relevant provisions of the Hungarian Accounting Act - to what extent the environmental and financial accounting elements presented in the reports of large manufacturing companies included in the HVG Top 500 (2021) list comply with the legal requirements. Based on previous research results, I formulated the following hypothesis in this regard:

**H1. Large domestic manufacturing companies can be homogeneously grouped according to the compliance of environmental and financial accounting elements presented in their reports with legal requirements.**

In testing hypothesis H1, i.e. in reviewing the reports, I found that the situation is much more nuanced than whether or not environmental accounting elements are reflected in these documents of the companies, referring to the assumptions presented earlier. Consequently, each environmental financial accounting element is assessed on a scale of 1 to 3 in the review of the Supplementary Annexes. Furthermore, a cluster analysis resulted in four distinct groups (*Active, Forerunners, Starters, Passive*) of the 199 large companies examined. On this basis, my hypothesis H1 proved to be true.

My analyses have confirmed my earlier hypothesis that although the group of companies under study is trying to comply with the relevant legal requirements, the information provided to the stakeholders is incomplete, and the presentation of environmental and financial accounting elements only partially complies with the requirements of the Accounting Act. Therefore, based on the results obtained, I formulated the following thesis:

**T1. Four distinct homogeneous clusters (*Active, Forerunners, Starters, Passive*) of large domestic manufacturing companies can be identified based on the compliance of their environmental and financial accounting elements with legal requirements.**

The analyses that answer the K1 and are also related to the testing of H1 provide other results that I consider relevant. The research results show that the majority of the companies in the sample have deficiencies, which can be assumed to be due to shortcomings in the regulatory environment. As it was shown, the legal framework for environmental accounting in Hungary is set by the Accounting Act, but the Act makes minimal reference to the environmental impacts of economic activity and the environmental activities of enterprises. The provisions formulated

by the legislators prescribe data reporting obligations and, in some cases, contain references back to other legislation.

Based on empirical experience, one of these gaps relates to presenting hazardous waste and environmentally harmful substances. In addition, a weakness has become apparent in the presentation of environmental costs accounted for in the year under review. Costs are defined, as presented in the literature review section of this thesis, as the monetary value of the resources used in the activity. However, in my view, the legislation should not be limited to the presentation of environmental costs alone but should also cover the presentation of environmental expenditure. An example of the latter could be the expenditure accounting for a damaging event affecting the natural environment. Other examples of expenditures closely related to the environment include environmental taxes, environmental product charges and pollution charges.

Although the role of non-financial reporting is becoming increasingly important today, and the legislators are currently pushing for the mandatory preparation of non-financial reports, I believe that the report, with its supplementary annexe, can provide an appropriate solution for communicating and disseminating environmental information. Again, referring back to King's resolution, I believe that environmental accounting, as a limited subsystem of the traditional accounting information system, can provide a solution to the challenges of companies' environmental performance since all market economy actors, including external and internal stakeholders, are still informed by the 'product' of accounting, i.e. the accounts.

If environmental information were to be included in the text of the accounts, it would provide not only a reliable and true picture of the company's assets, income and financial situation but also information on the efforts and activities undertaken to achieve environmental sustainability and their impact on performance. This would ensure that environmental impacts, revenues/revenues, and costs/expenditures are effectively quantified, managed and traceable and that companies are comparable from an environmental and sustainability perspective.

In addition to mapping environmental accounting practices, my analysis in the present research also aimed to explore whether organisational characteristics, internal factors such as organisational culture and organisational strategy are related to the level of detail of environmental management accounting, i.e. its actual practical application and operation. In this context, I formulated the following hypotheses:

**H2. There is a statistically significant relationship between the organisational culture and the level of details in environmental management accounting.**

**H3. There is a statistically significant relationship between the organisational strategy and the level of details in environmental management accounting.**

In order to get an accurate picture of the characteristics of the environmental accounting system actually operating in the companies in question, as well as the internal factors related to it, I conducted a questionnaire survey. A total of 74 managers of large companies completed the questionnaire, which enabled me to conduct my analysis to test hypotheses H2 and H3 on a sample of 74 large companies.

In my study, I first analysed the elaboration and detail of the environmental management accounting system based on the responses to the returned questionnaires. In this case, I also carried out a cluster analysis, on the basis of which three distinct groups (Laggards, Progressives, Active) emerged among the companies surveyed on the basis of the level of detail of their environmental management accounting systems. Subsequently, it was possible to test hypothesis H2, i.e. to explore the relationship between dominant organisational culture and cluster membership based on the level of detail of environmental management accounting. Based on the results of the association study to explore the relationship between organizational culture and environmental management accounting system, I formulated the following thesis:

**T2. There is a statistically proved relationship between organisational culture and the level of detail in environmental management accounting for the large companies under investigation. The clan and hierarchy culture type has a moderately strong positive relationship with the level of detail of environmental management accounting among the large manufacturing firms under study.**

Based on the results obtained, I could partially accept the H2, as there was no strong relationship between the variables in the model. However, the result that the clan culture type has a positive effect on the elaboration of environmental accounting supports the need for the company's full commitment, in my opinion. Furthermore, this result also proves that employee involvement, working as a family, and shared values and goals play a significant role in making the organisation a truly sustainable and responsible company so that, in addition to the assessment of the assets, financial and income situation, the integration of environmental aspects into the accounting information system is effectively achieved.

As shown in this thesis's theoretical overview section, the hierarchy culture type is dominant in large organisations. Hence, the dominance of this culture type is not surprising in the companies studied. The fact that the results showed an influential positive role of hierarchy culture on the level of detail of environmental management accounting, in my opinion, highlights the relevance of regularity and accountability. Although the design of managerial accounting is not subject to legislation and is only informative for management, the results suggest that internal regularity and accountability are also paramount for environmental managerial accounting.

Subsequently, the next step of my investigation was to test H3, i.e. to explore the relationship between the strategic characteristics of the organisation and the cluster affiliation based on the detail of environmental management accounting. Then, based on the results of the association study conducted, I formulated the following thesis:

**T3. There is a statistically proved relationship between the orientation and dynamics of strategy and adaptation to the environment and the level of detail of the environmental management accounting system for the companies studied. The authority-oriented strategy shows a strong, whereas the supplier- and natural environment-oriented strategies show a moderate strong positive correlation with the detail of environmental management accounting; for adaptation to the environment, the research-type strategy shows a moderate strong positive correlation, whereas for dynamics, the reduction-type strategy shows a moderate strong negative correlation with the detail of environmental management accounting in the companies surveyed.**

The research results demonstrated the influential role of public authorities and the key role that government and public enforcement play in the functioning of companies.

On the one hand, the results of the analysis also reflect that frequent changes and experimentation are a characteristic of the companies under study, reflecting the dynamically changing environmental factors. The fact that the researcher type strategy showed a positive correlation with the level of detail of environmental management accounting suggests that companies strive to keep the impact of innovations on the natural environment under control at all times, going further, and trying to implement change and continuous renewal/renewal in a sustainable way. Ultimately, I believe that this is evidence of the importance that companies implementing environmental innovations attach to the accounting treatment of environmental information and, consequently, to the detail of the environmental management accounting system.

Ultimately, the analyses carried out on the dynamics of strategy have shown that companies that are forced to react by cutting costs in response to current dynamic environmental factors, and consequently do not innovate or innovate in environmental or other ways, do not attach importance to the management of environmental information and consequently their environmental management accounting systems are not well developed.

### **Summary**

Overall, the results of my doctoral research confirmed my earlier view that environmental accounting is an increasingly important subsystem of traditional accounting, focusing on the measurement and analysis of the impact of economic activity on the natural environment and the environmental information to be disclosed in the notes to the financial statements. I, therefore, see the content and structure of the supplementary annexe as an appropriate solution for the presentation and disclosure of environmental information, thus ensuring - in addition to providing a true and fair view of the overall financial, asset and income situation - the presentation of efforts and activities undertaken to achieve environmental sustainability and their impact on performance, and the comparability of business organisations from this aspect.

In summarising my research, the biggest challenge facing environmental accounting today is for companies to integrate it into their everyday practice. Consequently, I do not consider my empirical research to be complete at this point. However, building on the results of my doctoral research, I see further potential in identifying best practices that have already been implemented to further help overcome environmental accounting challenges, currently supporting organisations in the *Laggards* and *Progressors* groups. One possible way of doing this is to further investigate large companies in the Active cluster, which have well-developed and detailed environmental accounting systems. In narrowing down the sample, I assume it would be possible to select at least one company whose environmental activities are truly significant and whose environmental accounting system is outstanding among large domestic companies. My main future objective is, therefore, to present this company as a good practice in a case study.

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