

THE ROLE OF MANAGEMENT AND COST ACCOUNTING IN REDUCING EXPENSES IN LIGHT OF CLIMATE CHANGE

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Abstract:

Climate change is the most essential environmental risk for business investment, according to financial institutions, regulators, and analysts. Climate change is considered an environmental risk that has potentially far-reaching effects on the business environment. There is a growing global acknowledgment of the putative dangers of climate change on the ecosystem worldwide. Many organizations perceive climate change as a potential danger to future competitiveness and profitability. (Monasterolo, 2020). Management accounting will be studied in this research in regards to the responses of enterprises to climate change. It is vital to consider how enterprises adopt management responses (such as environmental management accounting (EMA) and greenhouse gas reductions (GHG) tools) to climate change, how they cope with expense management, and what part further management accounting tools, such as activity-based costing (ABC), standard costing, variance analysis, and target costing, have in coping with climate change-related initiatives. Research on the preparation and influence of climate change initiatives from the perspective of management accounting is currently limited, and this issue will be investigated in this research. (Schaltegger et al.2022). Both the academic and practical management accounting fields must respond to the growing environmental issues. A global review shows that several management accounting tools have been created and/or modernized to improve intra-firm resource allocation in light of environmental management systems. More specifically, it has been suggested that management accounting should better accommodate the needs of discrete utilities to track non-financial, environmental effects associated with business processes. Overall, it has been noticed that environmental concerns are beginning to influence management accounting schemes. (Jiao et al.2023). The purpose of this research is to survey both private and public enterprises in Iraq on the use of management accounting tools in climate change initiatives. Specifically, managers are asked whether or not tools presently in use (i.e. management control tools as well as cost accounting tools) have been influenced by climate change initiatives. (Huttunen et al. 2022).

Keywords: Management, Light, Climate Change

1. INTRODUCTION:

Climate change is one of the most serious challenges that humanity and its natural environment face in the 21st century. Global warming is caused by the growth of greenhouse gas emissions resulting from human activities. While carbon dioxide is the most prevalent greenhouse gas, industrial processes release other gases, such as nitrogen oxides, sulfides, refrigerants, etc., in great quantities. As a consequence, the ozone is damaged, thus leading to the greenhouse effect and climate change. (Oreggioni et al.2021)

Climate change influences the entire world and has to do with the past, present, and future situations concerning all human beings who ever lived or will live on Earth. This is also true for businesses that are responsible for industrial activities that release greenhouse gas emissions and subsequently are obliged to account for this. While the concept of climate change possibly can be traced back to the 19th century, awareness about it has largely increased during the last 50 years. Although the awareness of the problem grew slowly, scientific evidence about the increase of emissions and adverse effects gained momentum in the 1980s and onwards, leading to key agreements and treaties in the 1990s and 2000s. (Kemp et al.2022)

The Kyoto Protocol, which was formed in 1997 based on the Framework Convention on Climate Change, was the first internationally accepted treaty with binding agreements. It set substantial greenhouse gas reduction targets for developed nations and specified that they had to account for this. In the spirit of the Kyoto Protocol, trading systems were established to encourage developed nations to finance the reduction of emissions in developing countries. In the European Union (EU), the Emission Trading Scheme was introduced, which is an attempt to cap the total emissions and enable trading. However, while Europe has invested a lot in reducing emissions, it is foreseen that the cap will not be reached. (Mor et al., 2023)

Due to the failure of the "top down" approach, the current approach is that every nation sets its own targets, according to the Bali Action Plan in 2007, which is to be reviewed voluntary actions of developed countries in 2014 and developing countries in 2015. The coffee sector is committed to reducing emissions in developing

countries using the so-called CDM (Clean Development Mechanism) mechanism. However, it is difficult for the coffee business to comply with this. To "reduce" emissions would mean that emissions over a certain period (2002-2004) should be lower than through investments. Subsequently, to compensate for emissions, land would have to be reforested of 50% of the land area. (Groom et al.2022).

RESEARCH METHODOLOGY:

Research problem:

Climate change is the most essential environmental risk for business investment, according to financial institutions, regulators, and analysts. Climate change is considered an environmental risk that has potentially far-reaching effects on the business environment. Climate change is one of the most serious challenges that humanity and its natural environment face in the 21st century. Global warming is caused by the growth of greenhouse gas emissions resulting from human activities. The research aims to shed light on reducing costs and expenses in the event of climate change and its impact on industrial companies at present, particularly after the emergence of global warming and the accompanying environmental changes, and the extent of this impact on industrial companies' expenses.

Research objective:

Depending on the research problem, the research objective can be determined. The research aims to shed light on reducing costs and expenses in the event of climate change and its impact on industrial companies at present, particularly after the emergence of global warming and the accompanying environmental changes, and the extent of this impact on industrial companies' expenses.

Research importance:

The phenomenon of global warming and its consequences are considered a result of current climate change and its direct impact on the expenditures of industrial companies to preserve the environment. This study also examines the extent of management's ability to address such important decisions related to global warming and climate change caused by industrial companies' products. It also examines the potential for reducing environmental pollution while reducing the expenditures industrial companies spend to preserve the environment, as well as maintaining the production of environmentally friendly products and mitigating the phenomenon of climate change.

Research Hypothesis:

The research assumes that climate change impacts business performance, which in turn impacts the costs incurred by industrial companies to protect the environment.

2. Understanding Climate Change and Its Impact on Business

Climate change refers to long-term alterations in temperature, precipitation, wind patterns, and other elements of the earth's climate system. Evidence from around the globe indicates that the earth's average temperature is rising. Rising global average temperatures are related to an increase in greenhouse gas (GHG) emissions due to human activities like burning fossil fuels, deforestation and land clearing, industrial processes, agricultural practices, and other activities. As a result of these emissions, heat is trapped in the earth's atmosphere, and the result is global warming. Global warming is impacting other aspects of climate patterns all over the world. Precipitation patterns are also changing. The global average sea level is rising. Climate change is a global problem that cannot be solved by one or a group of countries, as pollutants from one country travel and affect the climate of other countries. It is often said that climate change is the greatest challenge that humanity faces. (Mikhaylov et al.2020)

Another definition of climate change is from the United Nations Framework Convention on Climate Change (UNFCCC), stating that climate change refers to a change of climate, which is attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. The convention focuses on human-induced climate change, consisting of the greenhouse effect, impacts of climate change, and adaptation. (Sun et al.2022)

Climate change is both an opportunity and a threat to the business community. However, it is regarded more as a risk or a social need for action than as an opportunity in most industries. The perception of climate change in the agricultural sector is often defined in relation to drought and temperature increase. Although there may be some positive opportunities in specific regions, climate change is predominantly viewed as a risk throughout the value chain, especially by downstream actors, i.e., food industry and retailers. (Borin et al., 2021) The energy sector faces regulatory and financial direct and indirect risks along with technology and preemption risks. Other barriers are however perceived more deeply than in other sectors. Due to its dependence on extensive infrastructure, the transportation sector is more likely to deal with regulatory indirect risks. However, the shipping sub-sector is expected to encounter fewer risks than other modes. In the forestry and timber sector, climate change is viewed more as an opportunity, but at the same time, there are challenges in the regulatory context and some adaptation-related risks. (Kavussanos et al.2021)

3. Management Accounting Techniques for Cost Reduction

In the light of sustainability objectives, growing efforts are being made by organizations to minimize the environmental footprint of their operations. However, organizations must also consider the effects of climate change on their operations and their environmental strategy. Climate change can result in restrictions on water or energy resources, thereby increasing operational costs and risks. A proactive approach is to focus on resource efficiency initiatives that reduce costs, risks, and resource consumption. The purpose of this paper is to explore the role of management accounting and cost accounting in reducing operational costs in light of climate change and associated regulations. Existing research on the relationship between management and cost accounting and environmental issues is discussed in the context of assessing climatic consequences and possible responses. (Siirila-Woodburn et al.2021)(Schilling et al.2020)

Under the "let-it-happen" strategy, management accounting is irrelevant. The intention is to wait for political and market developments. Minimizing resource consumption and thus operational costs, irrespective of climate issues, is possible and already dealt with by organizations. The addressing and inclusion of climate change in strategic decisions is tougher. Failing to address these issues will expose organizations to increased risks and expenses. This paper will analyze how management accounting can be used to detect risk in this context, the actions to take, and whether these actions would entail expenses or sources of income. The focus is on analyzing how management accounting can support initiatives to improve resource utilization, in this case energy. This is a first step in a broader investigation of how management accounting can support more general climate change applications. (Barros et al.2021)

The paper discusses three management accounting techniques whose requirements match the objectives of organizations regarding climate change: activity-based costing, target costing, and life cycle costing. Activity-based costing (ABC) complements traditional costing by providing more accurate costs of products and services through understanding the resource consumption of activities. This understanding of how resource costs are incurred facilitates the implementation of activities aimed at improving the productivity of activities, leading to lower resource costs. Organizations are currently facing challenges due to the shrinking availability of water and energy, accompanied by increasing costs. Most organizations do not understand the precise costs of their consumption of these resources. ABC improves resource visibility and allows for the precise identification of the economic effects of resource scarcity on products, customers, and geographical areas. (Messaoud and Mourad2021) (Zamrud and Abu2020).

3.1. Activity-Based Costing

In the wake of climate change, businesses are increasingly exploring ways to improve efficiency and reduce operating expenses, such as energy, labor, and raw material costs. Management accounting involves the process of collection and analysis of cost, revenue, and income information to support organizational-level decision-making. Over the past two decades, a number of management accounting techniques aimed towards cost reduction have evolved. (Sakun et al.2021) This paper focuses on three widely implemented and researched management accounting techniques: activity-based costing (ABC), target costing, and life cycle costing. Each technique is explored through four sections: description, advantages and disadvantages, organizational readiness, and implementation process. Accounting for business activities is vital for managers to understand cost behavior, profitability, and performance measurement. Activity-based costing provides managers with the best understanding of costs related to processes and activities. (Quesado and Silva2021) Cost information obtained through ABC allows managers to control and reengineer their processes and activities. ABC leads to a more sustainable allocation of overhead costs, avoids distortion of product costs, and eliminates non-value-adding activities. ABC is seen as the most effective management accounting technique for organizations wishing to achieve operating cost reduction. (Tran & Thao, 2020).

The complexity of the business environment, challenging competition, increased customer expectations, and advances in information technology have substantially changed how businesses operate and compete. Hence, the need for cost and performance information has also changed for managers. Traditional management accounting techniques, based on volumes and averages, have been found inadequate to meet the evolving information needs of managers. Activity-based costing (ABC) has been proposed as a better alternative. (Quesado and Silva2021) ABC was first introduced in the USA by Cooper and Kaplan in 1988 and is now believed to be the most widely researched and implemented management accounting technique. ABC aims to understand cost behavior by searching for the root causes of costs. It uses this information to provide managers with better insights into profitability and performance measurement. ABC allocates costs to products based on the costs of resources consumed by the products and the activities involved in making the products, thus leading to a more sustainable allocation of overhead costs. (Quesado and Silva2021) ABC avoids distortion of product costs by improving the understanding of how overhead costs are incurred by products. Products that consume more resources than average, such as high volume or complex products, bear higher overhead costs. Thus, proactive managers are able to make better decisions regarding pricing and product mix. ABC uses cost driver analysis to identify non-value-adding activities, which are subsequently eliminated. Non-value-adding activities should not exist, and if they do, they are regarded as waste. Examples of non-value-added activities are moving products from one location to another, product inspection, and excessive record keeping. Finally, cost information obtained through ABC allows managers to control and reengineer their processes and activities. Traditional management accounting techniques are often inadequate for this purpose. (ARORA, 2022) (Baroma & El-feky, 2023).

3.2. Target Costing

Target costing is a management accounting technique that can be employed by companies in their quest to cut costs. Target costing is a backward-looking costing method that starts with the anticipated selling price of a product and then focuses on ensuring that the cost incurred in the production of the same does not exceed the difference between the anticipated selling price and the desired profit margin. Target costing is aimed at ensuring that the product has the desired profit margin after it generates revenue for the company. (Marlina et al.2020) Target costing is a proactive cost management technique since it focuses on the costs that have to be incurred before the product or service is developed, rather than focusing on the costs that have already been incurred. In this manner, target costing works to ensure that the product being developed has the desired profitability, which is a critical concern for most companies. The stages of target costing include the preliminary design of the product, the determination of the target cost, the implementation of an action plan, and a systematic review of the same. A target cost must be arrived at before the product is put into full development. (Stadtherr & Wouters, 2021)

In order to achieve the target cost, the design specifications of the product will generally need to be altered, since achieving the desired cost by revision of the production process, once it has begun, is typically impossible, or at best, very difficult and expensive to achieve. Companies seeking to implement target costing must be aware of certain prerequisites. (Awasthi et al., 2021) These prerequisites include a commitment from top management to ensure that members of other functions have regard for the whole company's objectives, a strong emphasis on cross-functional teams, openness in the sharing of information, a strong customer focus, a rigorous approach to setting target values, a willingness to act relatively quickly on the results of analysis of market intelligence, the readiness to take quick control actions against competitors, an acceptance that external factors (such as financial market expectations) can influence competitiveness, and having a number of people employed in functions such as market research or strategic planning, who can identify 'long shot' opportunities. (Huang et al.2022) Target costing plays a key role in encouraging products to be designed to make optimal use of manufacturing resources. Target costing systems encourage production engineers to focus on the product side of their job. Achievement of target costs is generally seen as more important than the achievement of production budgets. (Sheppard et al., 2023)

3.3. Life Cycle Costing

In this context, management accounting techniques play a crucial role in determining the costs associated with the entire life cycle of the product before its purchase, as well as in reducing these costs. Life cycle costing relates to earlier phases in the life cycle of the product, i.e. development phase and design and manufacturing phase. Due to the connection between life cycle costing and climate change, consequently global warming, EC has requested that the product development process should take the global warming potential into account. In order to support the engineers, there is a need for a method which estimates the cost and global warming potential of different concepts already in the product development stage. (Rush & Roy, 2023) Furthermore, as there is a desire to reduce these costs, there is a need for methods which support finding cheaper alternatives. Simple methods treating the main costs will make the approach more accepted and utilized in the early phases (cooperating with engineers and other designers), and more data will be collected to enable more detailed calculations in later phases. (Bux & Amicarelli, 2022)

Life cycle costing relates to the sum of all manufacturer and consumer costs for a product during its entire life cycle. The manufacturer costs can be divided into design, manufacturing, distribution, production, and final disposal costs. From the consumer point of view, there are costs associated with purchase, operation and maintenance, and final disposal. (Rush & Roy, 2023) The purpose of life cycle costing is twofold. First, by considering the entire life cycle, costs are more predictably assessed, enabling manufacturers to better adapt their bids to contracts. This enhances the competitiveness of the industry. Second, costs associated with a product can be defined in order to avoid that polluting products are less affordable than the environmentally friendly, but more expensive alternatives. In this case, life cycle inventory calculations are needed for different products. By calculating the costs and setting the charges accordingly, the environmentally friendly product gains an economical advantage. (Lingegård et al., 2021) (Suwanto et al., 2024).

Life cycle costing is an easy to use, simple and reasonable consistent method for reducing costs. A framework for life cycle costing including accounting items and methods for cost estimates is proposed. The accounting items can easily be fitted into existing management accounting systems, facilitating the introduction of life cycle costing. It also provides a structured approach for following the life cycle costing. The purpose of life cycle costing methods is to facilitate finding alternative components which decrease the total costs of the product, or the disposal costs associated with disassembly or recovery of components in the end-of-life phase. From the cost estimates, rough but adequate knowledge of the cost structure of the product can be obtained. Also, by means of simple rules, concept alternatives can be found and the product cost can be influenced at an earlier point in time. (Figueiredo et al.2021) (Lai et al.2022).

4. Environmental Management Accounting

Environmental Management Accounting (EMA) is usually defined as the identification, collection, analysis and use of two types of information for internal decision-making: physical information on the use, flows and destiny of energy, water and materials; and monetary information on the costs, earnings and savings related to environmental and resource issues. EMA encompasses both traditional cost accounting systems (e.g. material accounting, energy accounting) as well as externally oriented systems (e.g. life cycle costing, material flow costs

accounting). EMA is here presented as the link between the environmental management system (EMS) and the management accounting system (MAS) of the organization. (Gunarathne et al.2023) (Elhossade et al.2021).

One of the most important objectives in an organization is to use energy, water and materials in a proper way and therefore minimize environmental disturbance connected to these activities. The increasing demands for cleaner production from customers and governmental institutions and the high costs related to energy, water and materials are also factors that urge organizations to manage the use of these resources properly. (Zahoor et al.2022)

Traditionally, the responsibility for the improvement of environmental performance was considered to be in the hands of the operational units. Today, top management sees this as a board task together with other business issues. Organizations are beginning to understand that cleaner production impacts the whole organization and has to be treated as a strategic matter. It is also widely accepted that on the way to cleaner production, investments have to be made. This means that organizations have to consider cleaner production investments in their processes for capital allocation and investment follow-up, instead of looking at them as a "good-will" activity. These processes are usually within the scope of the management accounting systems, which aim to provide decision-relevant information. A management accounting system that provides information relevant for the identification, evaluation, selection, financial follow-up and ranking of cleaner production investments could therefore be a link between the environmental management system and the management accounting system of the organization. (Aguilera et al.2021) (Lu and Wang2021) (Nadeem et al.2020).

Environmental issues are becoming increasingly important in many organizations. Customers and communities are asking for documentation of the environmental impacts of the products produced. Countries are beginning to impose taxes on waste, energy use, and raw material use. These taxes can heavily influence an organization's competitive position. Environmental management accounting (EMA) provides tools for management accountants to assess and record environmental performance in monetary terms. These tools can be valuable in supporting decision-making in the face of increasing external pressure relating to environmental issues. (Appannan et al.2023) (Gunarathne et al.2023).

5. Integration of Environmental and Cost Management Systems

The integration of environmental management systems (EMS) and cost management systems (CMS) is acknowledged as one of the most progressive avenues to professionalize management accounting, fulfilling one of its traditional roles. Several studies have shown that EMS are mostly installed in either an integrated or stand-alone fashion with little influence or support from other management systems (Jamal et al., 2021). As a consequence, the potential of synergy from such an integration is arguably substantial. This paper aims to shed light on the different facets of such integration. An action-oriented perspective is adopted whereby the integration of EMS and CMS is treated as a division of a possible set of steps, forming a pro-active course of action. A framework consisting of four facets or sub-steps is developed and tested: Complementary information, use in decision-making and performance measurement, procedural integration, and strategic integration. (Burgess et al., 2024) Questions used to evaluate the different facets are fully validated and shown to cover the expected range. Their application as a tool to assess and possibly steer integration is illustrated for a case study at a large multinational company. Previous studies on EMS, CMS, and integration thereof mainly take a static perspective. Here, a framework is developed to assess the division of integration as a possible set of steps or facets. The integration of EMS and CMS sheds light on different aspects or ways of how the integration can be realized, thereby making it more comprehensive and clearer what is meant by integration. (Li et al., 2021).

An explorative case study at a large multinational company provides empirical support for the framework. Looking at the different facets of the integration reveals interesting issues, providing a more complete picture. The paper finds that there are clear areas for improvement in all four facets. In particular, procedural integration is in its infancy and there is little scope for avoiding double work and ensuring consistency. This is especially relevant in the light of integrated reporting and possibly the adoption of broad, qualitative environmental objectives in the Mediterranean region. The findings give guidance to companies looking to pro-actively integrate EMS and CMS. Moreover, the framework developed can serve as a basis to assess other types of management system integration. The framework provides a more complete picture of what is meant by the integration of the two systems and how integration can be viewed as a division of possible steps or facets. Treating these facets as pro-active sub-steps makes them less ambiguous and provides more concrete entry points for companies attempting to realize the integration. (Hoang et al., 2021) (Teitelbaum, 2022) (Flehsig et al.2022).

6. Case Studies of Successful Cost Reduction Strategies

There are numerous case studies that provide examples of organizations that have successfully implemented cost reduction strategies. Some examples that involve management accounting and cost accounting systems include: (Pedroso et al.2020) (Namazi & Rezaei, 2024) (Venkataraman & Pinto, 2023).

- Unilever: In 2010, Unilever launched its Sustainable Living Plan, which aimed to reduce the company's environmental footprint while still growing the business. A key part of the plan was the goal to halve the CO₂ emissions of Unilever's products by 2020. The company achieved this by working with suppliers to reduce CO₂ emissions in the supply chain, as well as improving the energy efficiency of factories and switching to renewable energy sources. Unilever estimates that its Sustainable Living Plan has saved the company €1 billion in costs.

- General Electric: In 2011, General Electric launched the Ecoimagination program, which aimed to provide customers with ecomagination approved products that deliver significant environmental and economic benefits. A key part of the program was Goal 1, which established a goal to reduce the greenhouse gas (GHG) emissions of GE's product portfolio by 20% by 2015 (compared to 2010 levels). General Electric achieved this by using zero-carbon technologies in manufacturing and product design. The company estimates that it has saved more than \$2 billion in costs since 2010.
- Walmart: In 2005, Walmart launched its Sustainability 360 program, which aimed to create a ripple effect through the economy by working with suppliers to reduce environmental impact. A key part of the program was the goal to reduce greenhouse gases at Walmart's global supply chain by 20 million metric tons by 2015 (compared to 2005 levels). The company achieved this by working with suppliers to increase energy efficiency in the supply chain, as well as switching to renewable energy sources. Walmart estimates that its Sustainability 360 program has saved the company \$1 billion in costs.

7. Challenges and Limitations of Implementing Cost Reduction Strategies

The implementation of cost reductions to climate change is associated with several challenges and limitations: (Creutzig et al.2022)(Sharifi, 2021)(Seddon et al.2020)(1) Complexities of the calculation models, (2) Geographical and systematic unevenness of the climate change impact and the cost reduction potentials, (3) The interdependence between climate change risks and the economic future and cost reduction success, (4) Lack of demand for climate risk calculations and cost reduction measures from companies and investors, (5) Reservations that companies, banks, and investors have regarding taking climate change risks into account in their decision models. Each of these challenges has been discussed more widely in publications by Hay et al. and shares the perspectives of practitioners and decision makers. A potential way out is proposed, the general understanding that the new financial risk provides, of how economic systems work and what decision models they usually rely on. There emerges a strong argument that cost reductions would not only be economically sound but should be seen as an obligation of companies and investors that would have a major financial and economic impact. To this end, competition would be in the rights business and the one that acts first would have a preferred business position. Seven types of challenges and limitations can be distinguished in implementing cost reductions. (Areeeda et al., 2021) (Hannan et al.2021) The implementation of cost reductions to climate change is associated with several challenges and limitations. Most of these are acknowledged in the academic and business common understanding of how the economic systems generally work and the decision models used. More importantly, they all represent a huge cost to the overall economy and to the business space, and they all are considered to be ethically questionable and immoral since they jeopardize the economic future of sovereign states and are detrimental to many of the world's citizens. These challenges and limitations are not discussed in relation to Hay et al.'s publication on the cost reductions to climate change scenario.

Plainly speaking, the cost reductions to climate change idea is to actively strive for climate stabilization, instead of only hoping that it will somehow happen, and to move from thinking only about the costs of acting to thinking also about the financial gains that will come with acting. This requires and enables a new approach in establishing the cost-effective and ethic argument for acting to the achievement of climate stabilization. Namely, to emphasize the business perspective, the potential business opportunities offered by the coming fundamental change in the market space, the desiring position being a front-runner of the change. It is the hope and the urgent need that the coming economic space offer some means for a thought of the economic future - a knowledge space, a discussion forum, an institution, etc., where these challenges and limitations can be collectively worked on and gradually overcome - so that humanity can move forward. (Khoruzhy et al.2023) (Senkl & Cooper, 2023).

8. Future Trends in Management and Cost Accounting in the Context of Climate Change

Climate change has emerged as one of the greatest threats to the planet and humanity, prompting businesses to shift their focus toward sustainable practices. Prioritizing the environment calls for changes in goals, processes, and systems within organizations, as the mere offering of green products cannot yield success in a global economy. Management and cost accounting have a pivotal role in executing these changes, as they significantly influence decision-making regarding resource utilization and investments. However, climate change and its future impact on management and cost accounting remain under-researched topics, particularly in aspects like technical change and its consequences, alternative climate change scenarios, and the role of institutions and societal perceptions. (Olayinka2022) (Bondarenko et al.2021).

In light of these concerns, this investigation aims to identify current trends in management and cost accounting related to climate change, as well as potential future role in mitigating its negative impact. Semi-structured interviews were conducted at organizations that participated in a seminar presenting research work on management and cost accounting for climate change adaptation. Analysis of the interviews revealed that climate change is a corporate social responsibility (CSR) goal but lacks structured treatment within agencies. Trends in management accounting include the establishment of a carbon reduction team and presentation of carbon footprint reports. Trends in cost accounting involve seeking carbon reduction capital through business case projects and investment requests. (Peinado-Vara2022) (Fallah et al.2022).

A future key role envisioned for management accounting is the development of management accounting systems integrating climate change goals as part of the green goal decision-making system. Management accounting will

quantify the impact of these climate change goals and the associated risks. For cost accounting, it is expected that price modeling on products and services will include the cost of carbon emissions. Annual carbon emissions reports aligned with the financial accounts are anticipated. These reports will include non-technical adjustments that account for a fossil-free surplus after each product sold. Furthermore, carbon taxes on raw material purchases will incentivize sustainable suppliers. (Schaltegger et al.2022) (Keith et al.2021).

9.CONCLUSION AND SUGGESTING

The world faces significant challenges related to global warming and its effects on the environment. Various causes and side effects are becoming increasingly evident on the location. A company's survival may depend on adapting necessary steps to mitigate the impacts of climate change. Here, management accounting can play a pivotal role in evaluating significant expenses and their reduction according to local conditions. Management and cost accounting can provide a variety of tools that ensure effective decisions are made. Although climatic changes and global warming happen slowly, their effects can become visible very quickly. Such effects may be commercially rewarding after being adjusted, and management accounting can pave the way for significant increases in profit. Identifying which direct and indirect expenses could be reduced contributes to circling this opportunity. Not all expenses are clearly visible, and inspection records for each flight and the times of significant clouds, precipitation, and wind could be necessary. Seasonal and longer-term business planning could help discover which route would be the most beneficial based on expected weather conditions.

While management accounting can help reduce expenses, cost accounting can reveal which changes are financially sensible. These changes might involve purchasing a new airplane and changing routes, awaiting the weather to improve, or investing in other possible adaptations to the environment. Not all expensive airlines, companies, or local businesses located in high-wind zones are unable to adapt, but they might face challenges selling their items locally. Analysis of cost accounting and market rules is needed to help profit growers form groups of partners who can pool purchased items to offer to a larger market. Some airlines have already diversified their transport businesses, indicating that adjusted conditions can be very profitable, such as applying heavy fuel jet jets. Model coordination among competitive airlines should be encouraged, as it may pave the way to adapt to emerging problems. Companies that exhaust resources in a hurry and add to the problem of climatic changes should be identified. Fiscal authorities and the state should act to mitigate this problem and could work with a competent architect to establish conditions that would allow for aeronautical needs appropriate to each construction and its course.

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