Issues Relating To Waste Management: Construction Industry

Dr. Erjola Barbullushi

University of Shkodra, Albania, erjola.barbullushi@unishk.edu.al

Denisa Domni, Msc, CFA

Accounting Office, Shkoder, Albania, denisadomni@yhaoo.it

Abstract: This study aims to explore and draw attention to the issue of sustainability, with an emphasis on Waste Management, the possibility of applying Environmental Management Accounting (EMA) and its impact on Financial and Environmental performance, through examinations in a business, in the industry of construction in Albania. Environmental Accounting techniques vary in conception, perception and development, from one business to another, from sector to sector, in order to accurately identify environmental costs and provide the appropriate decision-making orientation for the economic entity. Meanwhile, the construction industry, especially in the last decade, inevitably connected with the environment, has great importance for the economy of our country.

Accounting is a key element in financial and managerial planning, therefore, as such, it must be reorganized and updated to include the effect of environmental considerations in relation to company performance. Accountants must work in relation to raw material, its treatment, capital, financial indicators and at the same time they must observe, recognize, measure, receive, control and report emissions and losses from traditional business activity. Environmental Accounting, which consists of the financial reporting of environmental costs in quantitative parameters, is closely related to Environmental Management Accounting, as well as to Financial and Cost Accounting and is referred to in various manuals and directives, depending on local and global policies, such as manuals of the European Commission, the United Nations or the European Union.

The research work in this paper, focused on the International Federation of Accountants approach and financial/accounting standards, is carried out through primary sources, which consists of a case study, undertaken in a business operating in the construction industry, in a building under reconstruction. Information is selected through the triangulation method. It includes financial information from construction estimates/construction assessment and periodic reports of work situations, management information obtained through site inspections and interviews with the facility engineer and CFO respectively.

The results of the study show that adapting the Environmental Management Accounting system can increase business reliability, financial information quality and management efficiency. Moreover, it can influence the decision-making process regarding investments related to the improvement of the production process. It can be a starting point for the complex total value chain should be re-organized in Albanian businesses.

Keywords: Environmental Accounting, Environmental Management Accounting, Environmental Impact, Construction and demolition waste.

1 Introduction

Waste management is a crucial aspect of any industry, including construction. When it comes to construction companies, effective waste management is essential for various reasons. It not only helps in reducing environmental impact but also contributes to cost savings and regulatory compliance. Construction projects generate a significant amount of waste, including materials, debris, and hazardous substances. Proper waste management practices ensure that these wastes are handled, treated, and disposed of responsibly and sustainably. By implementing efficient waste management strategies, construction companies can minimize their ecological footprint and promote a cleaner and healthier environment for everyone.

One of the key benefits of effective waste management in construction is the reduction of environmental impact. Construction activities can have a significant impact on land, air, and water quality. By implementing waste management practices such as recycling, reusing, and proper disposal, construction companies can minimize the amount of waste that ends up in landfills or gets released into the environment. This helps in conserving natural resources, reducing pollution, and preserving ecosystems.

In addition to environmental benefits, proper waste management can also result in cost savings for construction companies. By implementing recycling programs and reusing materials, companies can reduce their procurement costs. Instead of purchasing new materials, they can utilize recycled or reclaimed materials, which are often more cost-effective. Moreover, by properly managing hazardous waste, construction companies can avoid potential fines and penalties associated with non-compliance with environmental regulations.

Efficient waste management also plays a crucial role in ensuring the health and safety of workers and the general public. Construction sites can be hazardous environments, and improper waste management can increase the risk of accidents, injuries, and exposure to harmful substances. By implementing proper waste handling and disposal procedures, construction companies can minimize these risks and create a safer working environment for their employees. This includes providing appropriate training and personal protective equipment to workers involved in waste management activities.

Furthermore, effective waste management practices can enhance the reputation and credibility of construction companies. In today's environmentally conscious world, customers, investors, and stakeholders are increasingly concerned about sustainability and responsible business practices. By demonstrating a commitment to proper waste management, construction companies can improve their brand image, attract environmentally conscious clients, and gain a competitive edge in the

market. Additionally, construction companies can leverage their waste management efforts to showcase their social and environmental responsibility through marketing and public relations initiatives.

This study aims to explore and draw attention to the issue of sustainability, with an emphasis on Waste Management, the possibility of applying Environmental Management Accounting (EMA) and its impact on Financial and Environmental performance, through examinations in a business, in the industry of construction in Albania. Referring to the Fig.1, gross fixed capital formation due to construction knew an increase during the last decade. The data refer to residential buildings, non-residential buildings and public engineering projects from 1996-2021. The pandemic COVID-19 decreased the trend slightly, which is recuperated after it till nowadays. This shows that in Albania construction industry contributes not only in the GDP of the country but at the same time generates high amount of waste.

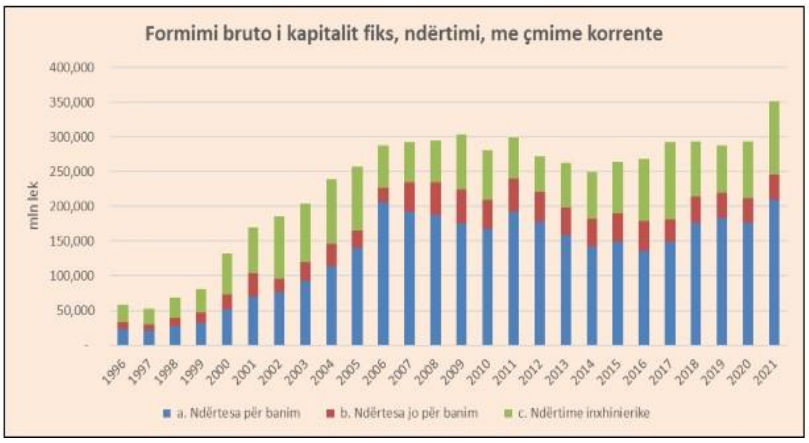

Figure 1.
Gross fixed capital formation, construction (INSTAT, 2021)

If we compare the building permits issued by authorities, compared to the EU, Italy, Croatia, or even other Western Balkan Countries, we can see that for Albania there is an exponential increase. So, if we consider, construction and reconstruction's effect on the environment, it’s more than an immediate issue to investigate to what extent Albanian Companies deal with waste management.

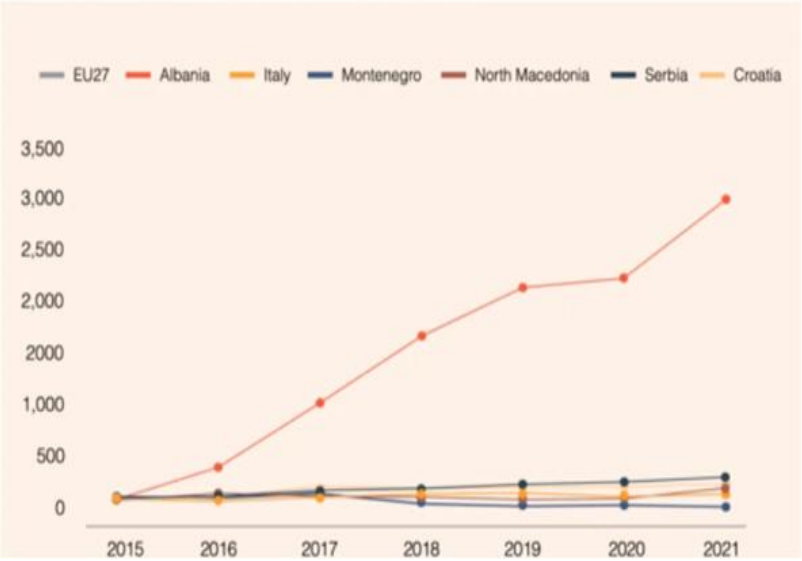

Figure 2.
Building permits- m^2 Useful Floor Area (Index 2015=100) (UNDP, 2022)

To reinforce the extent to which construction is an immediate issue relating to waste in Albania, let's have a look at EUROSTAT data referring to production in construction for a large number of countries, EU member states and non-member states. These data refer to 2023, and it shows clearly that Albania has an increase in construction sites and projects.

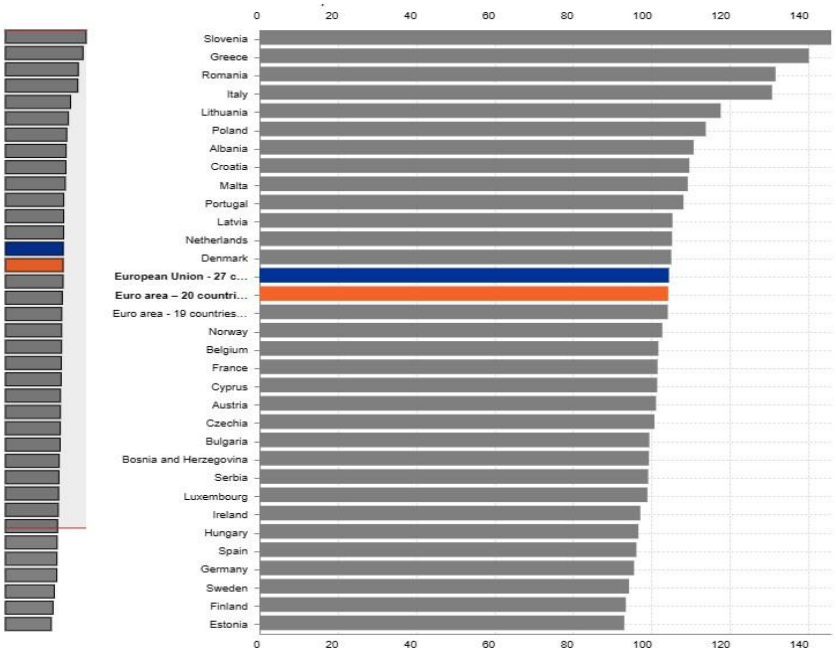

Figure. 3
Production in construction, annual data, (2021=100) (EUROSTAT, 2024)

Due to the above analysis and background, we aim to explore to what extent waste management is implemented through Environmental Management Accounting in the construction enterprise.
Furthermore, can waste management be inducted into accounting in the construction industry in our environment and what is its impact on a business?
The following paper is organized as follows: a literature review of waste management, methodology, and results and conclusions.

2 Literature Review

Effective waste management in construction requires a proactive approach throughout the project lifecycle. This includes careful planning, efficient procurement and inventory management, accurate estimation of materials, and effective communication among project stakeholders. By implementing waste management strategies, construction companies can reduce costs, improve project timelines, and enhance overall project performance.

(Baloi, 2003) The issues relating to developing countries are more complex compared to developed countries. Since the signing of the Paris Agreement in 2015, greenhouse gas emissions from the buildings and construction sector have peaked

(in 2019) and subsequently fallen to 2007 levels. This current decline is due mostly to the COVID-19 pandemic, whereas transformative, long-term progress in sector decarbonizing remains limited.(Environment, 2021).

Built environment has a significant impact on resources where it accounts for one-sixth of the world's freshwater withdrawals, one-quarter of its wood, and two-fifths of its material and energy flows. (Hussin et al., 2013)

Excessive resource and energy use and a growing demand for raw materials are largely responsible for the depletion of natural resources worldwide and the acceleration of global warming. About 40% of the world's resource and energy used is lined to the construction and maintenance of buildings (Global Green, USA).

In this context the industry should be revised, had to be taken in consideration what impact it has on overall sustainability. The entire process of a product, from the beginning to the end should be assessed from a cost point of view and by end it is eant when it is discarded and has to be disposed of.(Kartam et al., 2004).

To address waste in construction, various strategies can be employed.

To achieve effective waste management in construction, companies can implement several strategies. These include:

- Lean Construction which is a philosophy that aims to minimize waste and maximize value in construction processes. It focuses on eliminating activities that don't add value, optimizing workflows, and improving overall efficiency.
- Prefabrication and Modular Construction techniques can help reduce waste by allowing for more precise material planning, minimizing on-site construction waste, and improving overall productivity.
- Proper material planning and inventory management can help minimize waste by ensuring that materials are ordered in the right quantities, reducing excess inventory, and preventing material spoilage or damage.
- Recycling and Reusing Materials: Construction projects generate a significant amount of waste, but many materials can be recycled or reused. Implementing recycling programs and finding opportunities to reuse materials can help reduce waste and save costs.
- Waste Segregation and On-Site Sorting: Implementing proper waste segregation practices on construction sites can make it easier to recycle and dispose of different types of waste appropriately. On-site sorting stations can help ensure that waste is properly categorized and disposed of.
- Collaboration and Communication: Effective waste management in construction requires collaboration and communication among all stakeholders, including contractors, suppliers, and waste management companies. Clear communication channels and regular coordination can help optimize waste management efforts.

Furthermore, waste management in construction can be enhanced through the use of digital technologies. Building Information Modeling (BIM) and construction

management software can improve project planning, resource allocation, and waste tracking. These technologies enable real-time monitoring and analysis, allowing for timely interventions to minimize waste.

One key aspect of waste management is the identification and categorization of waste types. This helps in understanding the sources and causes of waste, allowing for targeted interventions. Common waste categories in construction include material waste, time waste, energy waste, and waste generated from inefficient processes.

In conclusion, waste management is a critical aspect of construction projects. By implementing effective waste management strategies, construction companies can reduce costs, improve project efficiency, and minimize their environmental footprint. Emphasizing waste management in construction can lead to more sustainable and successful projects.

As environmental management has evolved, interest has grown in developing a better understanding of environment-related financial costs and benefits as an input to conventional management accounting.(Bartolomeo et al., 2000).

3 Methodology

The study was pursued through a multimethod qualitative and quantitative case study approach conducted in a construction company that operates in different geographical areas of the country with a large scale of construction sites.

Case study methodologies encourage the triangulation of sources of information to increase the internal validity of data and the accuracy of observations. The main sources of information and data are as follows;

- Observations on construction sites through regular visits,
- Documentation of operational reports,
- In-depth interviews with engineers, workers, contractors, managers, accountants and CFO.

The research work is carried out through primary sources, which consists of a case study, undertaken in a business operating in the construction industry, in a building under reconstruction. Information is provided through the triangulation method.

We considered the framework of Houvila and Leinonen (2000) approach in preparing the questions for interviews and estimation of documentation and data available.

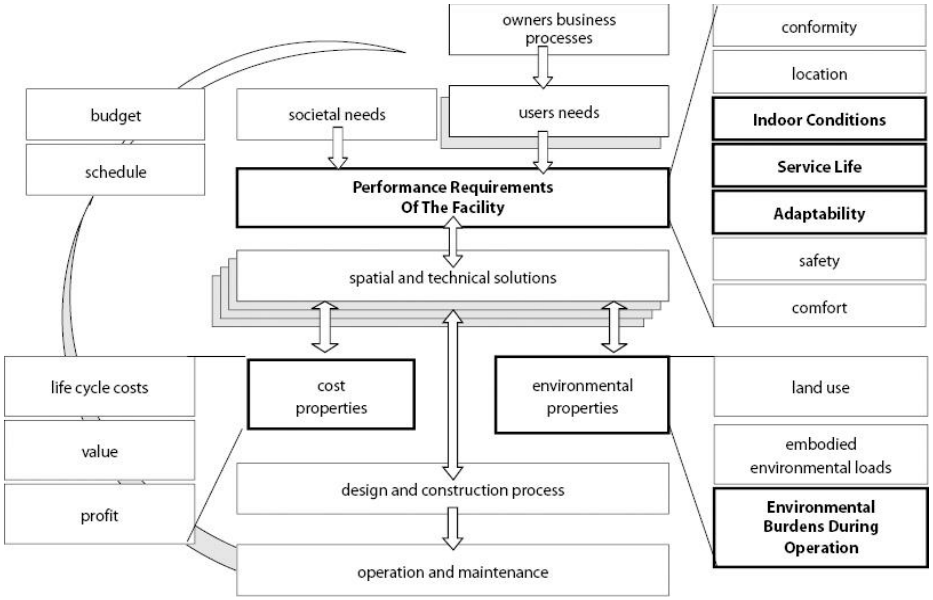

Figure 4.
Approach for Environmental Management in Construction , *Huovila, P. & Leinonen, J. (2000)*

The evaluation is done with a focus on the Deposition of Construction and Demolition Waste, in processes such as:

- Complete demolition of the non-load-bearing exterior cladding.
- Complete demolition of the internal non-load-bearing partition walls.
- Complete demolition of internal stairs and lift shafts.
- Increasing the depth of the foundation slab because of the installation of new lift shafts and escalators.
- Demolition of a part of the roof because of the construction of a new roof structure.
- Reduction of the wooden roof truss overlap around the perimeter of the building.
- Drilling holes in slabs because of the new communication system.

4 Results and Discussion

For the case study, recycling and waste management can be less expensive than landfilling.
The main findings referring to the construction case study are:

- Misrecognition of the concept of Environmental Accounting in practice by the sector.

- Inefficiency of accurate measurement of services and operations in relation to environmental impact.
- Unavailable software program for statistical data processing.
- Lack of protocol documentation.

Despite this, the most important conclusions from this research work, applying an Environmental Accounting method in business, treated as a case study, are as follows:

- Technological and environmental waste are very important in the production process.
- Their cost tends to increase proportionally with the purchase of materials and processing, resulting in rather inefficient production.
- The adopted technology of financial information processing is an important concern for the environmental accounting system.

Adapting Environmental Accounting and Environmental Management Accounting, as well as finding the appropriate cost measurement method, can increase business reliability, financial information quality and management efficiency.
The results of the study show that adapting the Environmental Management Accounting system can lead the business to operations that avoid high production costs. Moreover, it can influence the decision-making process regarding investments related to the improvement of the production process. It can be a starting point of the long study of the implementation of Environmental Management Accounting, by accountants, managers and environmental regulatory institutions.

At the end of the research, it could be said that the concept of Environmental Accounting is not known and adopted by local businesses.

Conclusion

It is well recognized that construction waste has residual value and its generation can be avoided.

The environmentally suitable recommended solution for the case study was more cost-effective than landfilling, even though the landfill was closer than the recycling facility, anyway as the methodology is a case study, the result cannot be generalized.

The general conclusion anytime is that Environmental Costs increase when more materials are purchased, processed, and produced as non-products (Cost of loss)

Environmental Management Accounting can get implemented in a business, if:

- The production stages get well-examined and measured
- The costs are well identified and allocated.

Environmental Management Accounting can lead the business through operations that avoid the high costs of production.

Environmental Management Accounting can influence the decision-making process related to investments linked to the improvement of production.

The total value chain should be re-organized in Albanian businesses.

This study can be a starting point for the long study of the implementation of Environmental Management Accounting, by accountants, managers, and environmental regulative institutions

References

[1] Baloi, D. (2003.). Sustainable construction: challenges and opportunities. Sustainable Construction.

[2] Bartolomeo, M., Bennett, M., Bouma, J., Heydkamp, P., James, P., & Wolters, T. (2000). Environmental Management Accounting in Europe: Current Practice and Future Potential. European Accounting Review, 9, pp. 31–52. https://doi.org/10.1080/096381800407932

[3] Cheremisinoff, N. P. (2003). Handbook of Solid Waste Management and Waste Minimization Technologies. Butterworth-Heinemann.

[4] Colangelo, F., Gómez, T., Farina, I., & Petrillo, A. (n.d.). Comparative LCA of concrete with recycled aggregates: A circular economy mindset in Europe. Int J Life Cycle Assess.

[5] Environment, U. N. (2021, October 19). 2021 Global Status Report for Buildings and Construction. UNEP - UN Environment Programme. http://www.unep.org/resources/report/2021-global-status-report-buildings-and-construction

[6] Gálvez-Martos, J.-L., Styles, D., Schoenberger, H., & Zeschmar-Lahl, B. (2018). Construction and demolition waste best management practice in Europe. Resources, Conservation and Recycling, 136, pp. 166–178. https://doi.org/10.1016/j.resconrec.2018.04.016

[7] Hussin, J., Abdul Rahman, I., & Memon, A. (2013). The Way Forward in Sustainable Construction: Issues and Challenges. International Journal of Advances in Applied Sciences (IJAAS), 2, pp. 31–42. https://doi.org/10.11591/ijaas.v2i1.1321

[8] Kartam, N., Al-Mutairi, N., Al-Ghusain, I., & Al-Humoud, J. (2004). Environmental management of construction and demolition waste in Kuwait. Waste Management (New York, N.Y.), 24, pp. 1049–1059. https://doi.org/10.1016/j.wasman.2004.06.003

[9] Latan, H., Chiappetta Jabbour, C. J., Lopes De Sousa Jabbour, A. B., Wamba, S. F., & Shahbaz, M. (2018). Effects of environmental strategy, environmental uncertainty and top management's commitment on corporate environmental performance: The role of environmental management

accounting. Journal of Cleaner Production, 180, pp. 297–306. https://doi.org/10.1016/j.jclepro.2018.01.106

[10] Pongrácz, E., Phillips, P., & Keiski, R. (2004). Evolving the Theory of Waste Management-Implications to waste minimization.

[11] Raghu, S. J., & Rodrigues, L. L. R. (2020). Behavioral aspects of solid waste management: A systematic review. Journal of the Air & Waste Management Association, 70(12), pp. 1268–1302. https://doi.org/10.1080/10962247.2020.1823524

[12] Rose, C. M., & Stegemann, J. A. (2018). From Waste Management to Component Management in the Construction Industry. Sustainability, 10(1), Article 1. https://doi.org/10.3390/su10010229

[13] Spišáková, M., Mésároš, P., & Mandičák, T. (2021). Construction Waste Audit in the Framework of Sustainable Waste Management in Construction Projects—Case Study. Buildings, 11(2), Article 2. https://doi.org/10.3390/buildings11020061

[14] Yeheyis, M., Hewage, K., Alam, M. S., Eskicioglu, C., & Sadiq, R. (2012). An overview of construction and demolition waste management in Canada: A lifecycle analysis approach to sustainability. Clean Technologies and Environmental Policy, 15. https://doi.org/10.1007/s10098-012-0481-6

[15] Zhang, C., Hu, M., Di Maio, F., Sprecher, B., Yang, X., & Tukker, A. (2022). An overview of the waste hierarchy framework for analyzing the circularity in construction and demolition waste management in Europe. Science of The Total Environment, 803, 149892. https://doi.org/10.1016/j.scitotenv.2021.149892