

Review Paper

From Environmental Accounting to Integrated Reporting: Towards a New Approach to Environmental Disclosure



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ABSTRACT

To pay attention to environmental issues and problems in today's modern economy, especially in academia, is a valuable orientation. Cooperation between related organizations about environmental issues is now more important than before. It has covered environmental reporting in several complementary stages. In addition, it has established its new reporting based on the field of environmental disclosure. The latest version of reporting is the integrated reporting, which is the most important environmental disclosure. Usually, any new version on any topic should cover the limitations of the previous version. This paper is a review study. In this study, environmental accounting and its limitations are first explained. Integrated reporting is then discussed as the newest type of financial and non-financial reporting. Finally, the possibility of covering the environmental accounting constraints is examined through integrated reporting. The results showed that the transparency in environmental accounting figures, democratization and information linkages are likely to be achieved through the implementation of integrated reporting. Therefore, it will be effective in covering the limitations of environmental accounting.

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1. Introduction

For many years, the nature has been at human's disposal and provided him the means of life and well-being [1]. Adjustment for respiratory air and global water cycle, soil protection for agriculture, waste decomposition and uptake has been performed using live systems. The human soul was also nourished by nature. Nowadays, human's activity has a great impact on nature. Existing systems around the world are collapsing. The variation in living species on earth are the result of human activities. Humans have not always had such destructive effects. Since 200,000 years ago, with the advent of modern humans, changes have taken place slowly and on relatively small geographical scales. However, nowadays, with unbridled population growth and technological advances, changes are happening much faster. The entire earth planet should be considered as human-dominated ecosystem not just agricultural land. People in today's advanced world have a huge impact on the environment. The outcome is environmental disorder in the world and biological poverty. However, advanced society has not yet taken action on the variation in the biosphere. So, the environmental protection is negligible [2].

The relationship between economics and the evaluation and design of environmental policies has different aspects. Some are used for environmental decision-making, such as cost-benefit analysis to determine compliance, and others are used as assessment tools (e.g. market-based tools to achieve environmental targets). First, environmental resources, amenities, and quality are economically valuable. Second, markets are generally useful in providing goods and services to society, though, there are serious market failures that justify the governmental intervention to protect the environment. Third, under appropriate circumstances, economics can help evaluating and prioritizing alternative policies to improve the environment in a specific (e.g. reducing air pollution from different sources) or different areas (e.g. air pollution, water pollution and hazardous waste). Fourth, economic offers alternative policy logic to determine whether an environmental problem should be controlled or solved through the use of cost-benefit analysis. It helps us to determine the extent of the issue, as well. Finally, market-based tools are increasingly being promoted as a complement, and sometimes as a replacement for traditional regulatory approaches [3].

In meantime, firms have to specify environmental positions and clarify how to report them. These days, the debate over the complexity of financial and non-financial reporting argues that significant decisions can not be supported by looking at a company's past financial performance alone [4]. Environmental, social and governance issues should be also considered. Using the financial reporting, the stakeholders can review the company's financial situation and performance history. However, the financial reporting is nowadays very limited [5].

Regardless of a firm's activities on non-financial characteristics such as social, environmental, corporate governance, the traditional corporate reporting refers to the use of historical financial information and prepared short-lived financial projections. This is one of the main reasons for disruption of the decision-making process [6]. The "single-minded focus on profit in isolation" has been considered by many researchers [7]. To emphasize the role of maximized profit has been played as a decisive factor for the 2007-2008 global financial crisis. Many experts argue that a financial institution is not able to make decisions about corporate welfare based on shareholder value alone [8]. That is why the issue of environmental accounting was raised.

Environmental accounting is an accounting method that includes environmental costs, effects and outcomes. Environmental accounting affects the organization's economic and environmental strategies in a long time. This includes the social benefit analyzing of the cost of several projects and the company's activities. It involves evaluation of the environmentally produced goods and services, as well. That is the environmental accounting, in addition to human capital stocks, leads to the expansion of knowledge about the cost of future pollution [9].

Disclosure of environmental data can be also done through environmental accounting. Depending on risk and environmental impact, spending and debt policies can be audited. The environmental protection strategy is corporate environmental reporting initiatives. This report is essential for sustainable growth. Because this report covers current, past and future costs to control pollution, reduce toxicity and waste from industries. It also covers eliminate costs and environmental benefits. It should be mentioned that the capital costs are carried out in both product and process. Today, the number of corporations that disclose their activities and performance in relation to environmental exercises have been increased, though, but this type of disclosure has some limitations that can be covered by newer reporting [10].

Integrated Reporting (IR) is a new method of reporting that aims to create some values in the future by combining financial and non-financial information [11]. Organizations must customize IR. This is possible through paying attention to strategy, business plan and financial, manufacturing, intellectual, human and social capital [12]. IR is recommended to all organizations by the International Integrated Reporting Council (IIRC). Currently, IR has been accepted by the private and public sectors [13].

The objectives of the integrated report are to combine financial information and sustainability into a single integrated report. According to the IIRC, the investors will be more aware of the information they need, if the combination of financial information and sustainability creates a more comprehensive picture of the company and its performance. In the IIRC's view, an integrated report is a report that incorporate the material information about organization's solutions, governance, performance and prospects in a way that it reflects the business, social and environmental context [14].

The aims of this study were to express the features of environmental accounting, integrated reporting and cover the limitations of environmental accounting through integrated reporting. It should be noted that the limitations mentioned in environmental accounting have been collected by the author from various sources, and the possible solution of these limitations by implementing integrated reporting is merely the opinion of the authors. This approach is a new step in environmental accounting research and integrated reporting that has not been mentioned in other sources. Figure 1 shows the general research process of the study

2. Environmental Accounting

Environmental accounting_ known as green accounting_ is a measure to expand the scope of accounting to evaluate the performance and identify of the items that are not recorded in the company's offices. The reason for the gaps is that the various costs of using nature are neglected. In many cases, they are considered as external factors that can be sent to others or delayed. External positive factors are discharged without being recorded in national accounts whereas it is known as depreciation for firms. Reduction of renewable resources leads to degradation and increase in the non-positive external factors caused by contamination of live and gyrate systems. Degradation - known as financing under no circumstances is considered as a depreciation factor. Thus, the production indicators

named income, consumption, savings, investment and debt might cause mistakes in long time. Despite the fact that national accounting has been an important factor in change, the environmental accounting encompasses all accounting frameworks [15].

When the natural resources became the main elements of a country's wealth by some researchers who designed the first national accounting framework at the end of the 18th century, a model was developed as "government of nature" or agriculture land. Economists pay close attention to soil, forest, water, environmental management and the negative effects of pollution. Nevertheless, the accounts is now being used as economic-environmental accounts since the date of 1972 by Stockholm Conference. Afterwards, other attempts were done at creation and correction of economic-environmental accounts in other parts of the world using different strategies [16]. Until the early 1990s, emphasis was placed on developing and promoting natural resources accounting and environmental economics [17].

Goals and measurement techniques of environmental accounting

Environmental accounting addresses a wide confined issues related to the connection between economy and society with the environment. Its goal is to provide the required policy tools for sustainable development, in order to maintain the income, wealth, environment in our livelihood, and the future generations. Various environmental activities performed in recent years can be measured and described using a set of objectives. Nevertheless, it is possible to explain two important approaches. First, efforts are being made to improve conventional account production methods to better combine the environment and natural resources given the national economic accounting review. Second, it is believed that we are facing economic and natural systems as two reciprocal systems assessing the environmental sustainability that support the economy and social functions. The first approach emphasizes on safeguarding interests. While the second approach mostly emphasizes on preserving the biophysical system. In monetary and physical units, accounts can technically be created by a variety of possible supporting ways. The System of Environmental and Economic Accounting (SEEA) process is an overall effort to simplify the scope. It is a result that has been yet achieved [15].

The number of objectives related to the accounting are many that sometimes can be in opposite directions. Some of them are as following:

To provide more detailed information to policymakers through national accounts data

First, it evaluates the disposing value of assets in resource leases. This is done in order to assess the forecasts for maintaining revenue in the future. To protect and manage the environment, another disentanglement is the separation of real public and private expenditures, that are pervaded in different streams, such as taxes, subsidies and other transfers sectors and activities. This approach is in particular important for public policy and market assessment of environmental services and is applicable to services that are provided by companies in the waste and water management sector. In this way, education or other aspects of public interest and Gross Domestic Product (GDP) are probably made by calculation of the national environmental cost and comparing it to similar collections for health [15].

Disclosure of information about the provision and use of natural resources to assess the reduction of resources as well as resource efficiency for policy makers using additional data in physical units

To evaluate the separation of economic growth from resource use, material flow and emissions by economic sectors and product life cycle information can be used [15].

Estimation of social costs due to environmental damage, modification of the Gross Domestic Product/Gross National Product (GDP/GNP) products and national income that are widely used by policymakers in the field of economics

By eliminating the items such as defense spending that are not consistent with positive welfare values, national accounting concepts are aligned with those used in welfare economics [15].

Expanding the restrictions of production that have been described and measured by national accounts to incorporate the environment and natural resources into economic decision-making

The purpose of having a natural reserve is remote or unused, which is not considered as an economic asset. It is caused by non-compliance with the double standards of ownership and management. Examples of these are pristine forests or fish stocks in international

waters. Increase in productions depends on evaluation of the services provided by the ecosystem. However, because they do not have a sufficient impact on economic exchanges, they are not considered by policy makers. It is important to assess service disruptions due to new activities and their reduce from newly generated revenue. This is to show the success of developed poverty alleviation programs [15].

To combine the natural and economic capitals

Total capital or inclusive capital consists of productive, human, social and natural capital. The purpose is to determine the wealth of nations that is provided through total capital or inclusive capital. According to this issue, the net present value of ecosystem services can be calculated according to the standard capital model. Accordingly, the value of ecosystem capital can be obtained. The aim is explanation or economic justification of saving natural capital as a section of total capital. In terms of strong sustainability, the performance of the ecosystem must be preserved. But due to the ability to move between different types of capital, the outlook for sustainability is weak [15].

From physical assessment to ecosystem degradation calculation for the ecological value of ecosystems measurement

It is also amelioration related to the economy and creation of an environmental financial statement for all parts and economic factors. Given this situation, the perspective is a strong sustainability that is defined by pointing to historical or social goal values. It should be noted that it is possible to convert the physical costs required to maintain or recover ecosystem capital into money. However, they do not permit the monetary wealth of ecosystems to be calculated [15].

Indicator moderation of macroeconomic

Several specific ways have been suggested by proponents of environmentally similar- macroeconomic indicators to improve current national accounting practices: (a) to reduce the discharge of natural resources; (b) a decrease in the value of property destruction due to pollution; (c) to include the flow of environmental goods values and services that have not been marketed; and (d) reduction in defensive costs [18]. In addition to the above historical proposals for environmental accounting, an effort should be made to record the asset value of non-market ecosystem services for the total wealth assessment [19] or inclusive wealth [20].

On the other hand, there is an unpaid cost related to the measurement of ecosystem capital consumption, which is shown by the measurement of ecosystem reconstruction costs. To calculate the final demand at full cost, it should be allocated to the total final demand of the national accounting system [21].

Micro-level environmental accounting including local government, companies and projects

Environmental accounting can not be just a tool to implement macroeconomic policies. It can be also considered as a widely used tool in terms of environmental impact to assess the costs and benefits of projects. It is an assessment element for local governments as well as a tool for evaluating them more broadly. For the nature protection policies, environmental accounts are a necessary tool for evaluating the effectiveness and efficiency of protected area management. Not discovering environmental costs or neglecting and accumulating them can be dangerous for companies. This can increase the interest of companies. Corporate initiatives to promote their assessment of climate change or the destruction of natural capital can also be multiplied [15]. However, these issues have been widely discussed over the years and they are confronting with many challenges [15].

Environmental accounting limitations

Although environmental accounting has many advantages, but it has also some limitations which are discussed below:

- There is a great deal of concern among all sections of society about the disclosure of Environmental Accounting Information (EAI) [22]. The EAI includes environmental expenditures allocated to environmental protection (i.e., environmental costs and investments) and environmental liabilities for disclosure in the financial statements. Because of the specific nature of financial and environmental information, more attention is paid to this information [23] in which its potential content [24] is complied with the European guidelines No. 95 in 2014, making the environmental reporting rules more prominent for better disclosure. However, some researchers believe that the EAI is relatively limited and variable [25]. Therefore, there are some concerns about its figures that will be probably remained unaddressed. To address this concern, some scientists have felt the need for more credible evidence for organizations' environmental figures. This process is seen as a black box - the improvement of which requires

qualitative discovery - and it includes several industries with high sensitivity environments [26].

- The issue of more or less compliance with existing regulations has been an important topic in environmental accounting research [27]). Although there are some laws, but improved environmental reporting is not seen in companies' annual financial statements, [28]. In some experts' view, the normativity is the degree in which the actors believe that the rules must be enforced and are not necessarily imperative by the law. In fact, non-binding force systems can also be used to achieve this goal [29]. Like private sectors, public organizations can reach agreements using governmental and non-governmental actors. But accounting practices must be pressured by different actors to publish and enforce "binding" norms over time [30]. This strategy is considered and emphasized for new governance and accountability systems [31].

- The sensitivity of stand-alone reports on environmental activities is that they give non-financial data that is non-integrated and branched. Thus, they can not provide the links and connections needed by stakeholders that are essential for impressive business performance assessment, procedure, and potential created value in future [32].

3. Integrated Reporting

Integrated Reporting (IR) is an interesting combination of the different nature of financial reporting and sustainability reporting. Its goal is to show a fair and equitable view of the company and sustainability measures value [33]. IR has been created as a result of the natural evolution of the corporate reporting movement. Integrated thinking plays an essential role in integrated reporting. By the thinking the implementation of a sustainable strategy is supported which is the goal of IR. It is necessary to show the organization's business model and how to create the values. It emphasizes the use and impact of different types of resources or capital which enables stakeholders to better evaluate the company's ability in order to create current and future value. It also allows the users to assess the longevity of companies and allocate scarce resources more effectively using the performance information. IR can aggregate financial and sustainability information in a document, as well [34].

To compensate these shortcomings, the IR has been created. In 2010, integrated reporting received a lot of attention. IR presents financial and non-financial reports in a concise and comprehensible manner. The two principles in IR guideline are the importance and relevance of information; Managers should express the relationships between sustainability and financial performance and a complete range of material factors affecting the organization to generate values [35]. Therefore, IR's goal is to generate the values for a business over time.

Most IR users are shareholders and investors who are financial capital providers. The IIRC recommends that the report should be social or environmental disclosure and be able to create the value for the company and its shareholders in the long term [36]. IR advocators have mentioned several advantages for shareholders, that emphasize the material and relevant information as well as a platform to be provided for investors to increase the quality of information [37]. Therefore, IR aims to minimize information asymmetries between insiders and outsiders of a company. Investors can obtain the information they need by reducing cost and time, while they can use their capital more efficiently [38].

Advantages of integrated reporting

There are some important advantages of integrated reporting that can cover the fundamental problems of reporting:

More clarity

Most of the time, companies publish a lot of statements for shareholders about how to be sustainable, though, but they do not say much about the accuracy of the statements. To establish a sustainable plan it requires transactions review, and difficult decisions must be made. This may upset or disappoint some stakeholders. For instance, cash flows and dividends are damaged in the short term by investing in renewable energy or reducing carbon emissions, although it may show a positive return on investment. Management has a key role to describe defensibly of connection between financial and non-financial information in the integrated reporting center. The relationship between sustainability risks and opportunities can be useful for financial statement items. Do green products attract more customers and thus more revenue? Does an event like Black Swan discredit a reputable company and reduce its revenue? The relationship between financial and non-financial performance is an important issue. To know more about it will improve monitoring and review controls. It will also

increase the efficiency and effectiveness of business systems and processes. The above successes are effective in modeling and re-evaluating risks. They are also useful to improve the ability of management to develop and implement sustainable strategies [39].

Better decision making

There is some evidence and thoughtful arguments from previous researches, showing the impact of better information and measurement on better decision making. If the relationship between financial and non-financial performance is understood more deeply, decisions will become more rational and lead to the efficient and effective use of capital and other resources. However, managers have concluded that it is difficult to determine the relationship between financial and non-financial results in practice. Since there is currently no universally accepted standard for integrated reporting, firms have found that most of the appropriate criteria do not exist or are very difficult to be improved. One of the reasons for not doing the analysis and activity required for the above relationships is its difficulty. A few companies provided analytical charts to identify relationships between various components, including corporate governance and risk. Nevertheless, fixing poor measurement methods and developing new methods for useful criteria that have not yet been developed is a better answer. To implement a sustainable strategy is not easy to show management's understanding about the survival of business as well as economic and financial issues that requires a thorough study of environmental and social issues. This includes an interesting cultural shift to establish collaboration between accounting, finance, communications, investor relations, public policy, legal and regulatory affairs, sustainability, safety, marketing, and line operations teams. A better understanding of each unit's performance as a result of its decisions in other parts of the organization is one of the benefits from this improved collaboration [40].

Deeper interaction

Last network and technology development have always been important in development of electronic content in various fields. The new media challenges and opportunities have greatly made communications to evolve in the contemporary era. The democratization of information through online technologies has forced individuals and organizations to share contents, such as images, photos, news, videos and podcasts, by cyberspace. Interactive technologies enable people and orga-

nizations to create and manipulate electronic content. Indeed, they support people to have a free conversation with other online users in a virtual platform [40].

The most important factor of integrated report is the relationship between a company's financial, social, environmental and governance issues. Unfortunately, the limitations of the presentation make the integrated report available only by paper. They also make the use of the internet in the process to be confronted with some challenges. The internet is a good tool for the companies which want to provide more relevant information about financial and non-financial results and their relationships to the users. An integrated report should not be seen as a paper document or a PDF file only that does not provide meaningful interaction for evaluations. In addition, the internet and related tools and technologies help us to maintain a continuous, two-way communication between the company and shareholders. So, it is not just the flow of dense information from the company to shareholders. In this regard, the source of information in the institutions, including their website, should provide the information in the clearest form so that the visitors can draw conclusions from the information provided. Social media platforms can also cause a stronger interaction between stakeholders and user-generated content, comments and suggestions. The management's efforts about the interaction process will give shareholders a more comprehensive view of the company [40].

Reduction of reputational risk

In addition to being an integrated report, it accelerates the integration of economic, environmental, financial and social fields in business strategy. It also makes integrated risk management processes to be more serious in a company. For example, the more importance of corporate social responsibility and sustainability, the higher focus on reputation risk. The application and non-application form of the integrated report must be clearly identified. An example of the close relationship between government, strategy and sustainability is the oil rig explosion in the Gulf of Mexico. Nonetheless, integrated reporting alone can not prevent such catastrophes. Integrated reporting creates sequential events that makes companies to be more focused on risk. Impact of the company's strategic and tactical choices on society can be understood through integrated reporting, as well [40].

The companies that have strategies and practices for sustainable business by an agenda create the values through some ways including:

- Growing income with new products and services;
- Costs reduction by increasing efficiency;
- More effective operational and regulatory risk management;
- Creation of intangible assets [40].

A single and coherent document

The integrated reporting is primarily focused on the stakeholders. In the meantime, due to the high quantity and quality of the information provided in the document, investors are the ones who mostly benefit from the publication of the integrated report. Greater transparency in integrated reporting allows investors to make a better choice on investment using more awareness of the firm's performance. From this point of view and according to the perspective of external users, the most important positive factor of this document is disclosing the financial and non-financial information to investors about the process of creating value over time in a single document. Sustainability integration and financial accounting into integrated reporting, as a single document, overcomes the ambiguities of stand-alone reports and provides a better view for users. As a result, it enables stakeholders to provide the necessary links and connections that are essential for effectively evaluating business performance, strategy and potentially for future's value creation [41].

4. Discussion

In the following, we discuss the possibility of covering the above-mentioned limitations for environmental accounting through integrated reporting:

- To make an environmental accounting figure, named corporate black box discovery, a qualitative process can be applied. Management is able to explain the relationship between financial and non-financial information through integrated reporting. By implementing integrated reporting, managers can obtain a better understanding of the relationship between financial and non-financial performance in the company. It can improve oversight controls, business systems and processes as well. They are likely to see an increase in efficiency and effectiveness. These developments

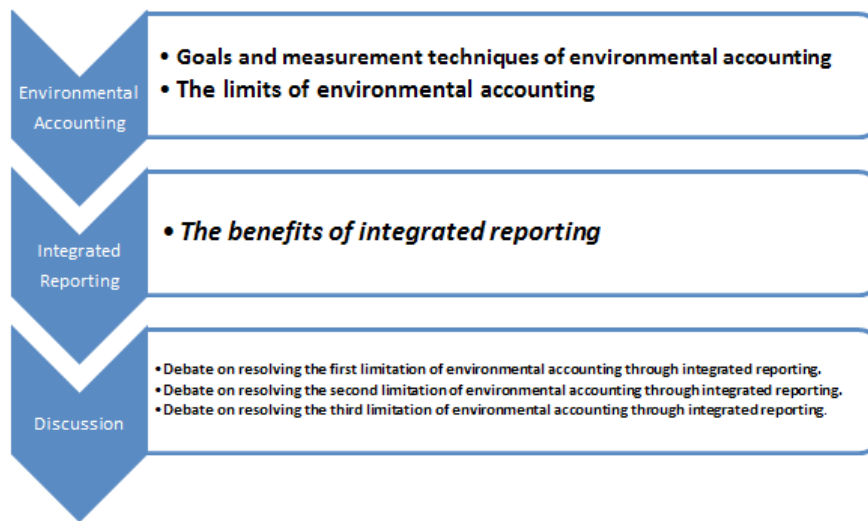


Figure 1. General research process

are the basis for modeling and analysis in order to re-evaluate the classification of risks, opportunities and options. Given the managing achievement of this ability, the development and implement of sustainable strategies can be also improved. To coherently describe the relationship between financial and non-financial information and the above developments in integrated reporting, it is necessary to clearly disclose how environmental figures are prepared. It should be also mentioned that there is no way to hide how these figures are prepared.

- It seems that using the democratization of information as a capability of integrated reporting -- known as centralized information center -- the limitation of compliance in environmental accounting can be removed. Democratization of information means that we extend the power of business information that is created by the people themselves. By democratizing of information, people learn more about abuse, especially in the societies where the behavior of institutions is more important. This can increase compliance costs and penalties in the sustainability guidelines. Given these interpretations, compliance and non-compliance make the companies to incur costs. They also affect the risk and cash flow in the future. Given that the material issues in accounting must be disclosed, and social and environmental issues are likely to affect cash flows in the future, these issues are considered important and are likely to be included in company's reports as a normal disclosure [42]. In addition, due to accepted responsibilities, the organizations do the required disclosure. Disclosure of sustainability issues has been mandatory in several lawsuits, so far. In fact, the disclosure of the

integrated report in various ways (democratization) prevents organizations from colluding with governmental and non-governmental actors and forces them to comply with regulations.

- In integrated reporting, financial and sustainability information, (presented separately) are disclosed in a single and comprehensive document [43]. The IIRC believes that display of the broad image of a company and its performance which is done by the integration of financial information and sustainability, make the investors to be better satisfied. IR reflects the business, social and environmental context of an organization. This reflection is done through important information collected about the strategy, sovereignty, performance and vision of the organization. To combine the sustainability and financial information in a report may encourage professional investors to analyze these two types of information. It also helps the investors to continuously communicate with the processing of this information [44].

According to what we discussed, the results of this study show the usefulness and effectiveness of integrated reporting. Also, the results of many studies show the usefulness of integrated reporting. For example, a study conducted by Landau et al. [45] found that integrated reporting provides a better view of a company's value creation. Also, the interpretation in the study conducted by Abhayawansa et al. [46] shows that integrated reporting provides many opportunities to strengthen the field of intellectual capital accounting. However, in the study conducted by Flower [47], the abandonment of sustainability accounting in integrated reporting was mentioned, and the reasons for this were the goals and composition of the International Integrated Reporting Council.

5. Conclusion

Given the increased disclosure of sustainability issues, it has been very important for stakeholders and their attention to organizations. Organizations have also found it necessary to explain the activities and causes of adverse events as well as dealing ways with them. Environmental accounting can, to some extent, meet the needs for environmental information users, though, but it has some limitations. This is the reason that disclosure frameworks are improving, and organizations claim that they are following the latest and increased disclosure practices. One of the new methods of disclosure is integrated reporting. Integrated reporting includes financial and non-financial information, which may be considered the most important reason for the company's environmental reporting. Based on the literature review and the conclusions in this study, it seems that the integrated reporting as a single report can overcome some of the limitations of environmental accounting. It helps the users to be more satisfied with this type of reporting.

Ethical Considerations

Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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