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# Environmental Accounting: Analysis of Research Trend by Using Content Mining

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**Abstract**

The current research leads a substance mining procedure to dissect the articles dependent on bibliographic coupling investigations to decide the remarkable examination subjects. These natural bookkeeping research subjects are confirmed with those intermediaries by the Environmental Management Accounting system with the absolute 71 articles from 2017 to 2020 were dissected. Regarding subjects came about seventeen subjects. The outcome discovered three EMA's point did exclude from CATAR, for example, emission allowances, environmental shareholder value and corporate eco-efficiency. The aftereffects of this study will help researchers investigate their own field strengths, comprehend the creating patterns in environmental accounting research, demonstrate researchers who have had impact in environmental accounting research, and decide future research subjects.

***Keywords:*** *articles, bibliographic, environmental*

**Abstrak**

*Penelitian ini membahas penambangan artikel berdasarkan metode bibliografi untuk menghasilkan beberapa subjek. Pengelompokan subjek artikel akuntansi lingkungan berdasarkan Environmental Management Accounting System (EMA) dengan menghasilkan 71 artikel dari tahun 2017 sampai 2020. Tujuan dari penenlitian ini untuk melihat tren penelitian di bidang akuntansi lingkungan. Berdasarkan penambangan diperoleh tujuh belas kategori yang telah disesuaikan dengan EMA Terdapat tiga kategori yang tidak pernah dibahas berdasarkan hasil CATAR antara lain; cadangan emisi, nilai pemegang saham di bidang lingkungan dan eko-efisiensi korporasi. Penelitian ini dapat memberikan kontribusi bagi peneliti selanjutnya untuk menentukan subjek penelitian berikutnya.*

***Kata Kunci:*** *artikel, bibliografi, lingkungan*

## 1. Introduction

Content mining alludes to robotized looking, ordering and examination of the digital insightful writing by computer program. Regularly this would involve searching for specific objects to extricate, for case, chemical structures, particular sorts of pictures, scientific formulae, information sets or accession number [1] long these lines, utilizing bibliometric examination can offer assistance with finding plans. In terms of strategy inclination,

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watchwords are not setting free. Comparative words go with setting unequivocal suggestions, and modern suggestions may arise amid different periods [2].

At the point when they fill in as the unit of examination, their implications change with the specific circumstance. Along these lines, watchwords may not precisely mirror the focal point of a given arrangement of articles. Additionally, polysemy and equivalents further decay the present circumstance. Making an explained reference index calls for the application of an assortment of mental aptitudes: brief piece, brief examination, and educated library research. First, find and record citations to books, periodicals, and records that will contain valuable data and concepts on theme. Briefly look at and survey the real things. At that point select those works that give an assortment of point in topic [3]. Be that as it may, the adjustment in the significance of watchwords additionally animates an adjustment in the relatedness among articles. Another procedure is bibliographic coupling which, not at all like the past strategy, employments the number of references shared by two records as a degree of closeness. In other words, a greater overlap between the references of two papers infers a more prominent association between them. [4].

Environmental accounting also called green accounting, alludes to alteration of the Framework of National Accounts to consolidate the utilize or consumption of characteristic assets [5], environmental accounting is a capacity that portrays environmental costs that should be considered by corporate partners in recognizing ways that can lessen or keep away from costs at the time along with endeavors to improve environmental quality. Along these lines, environmental accounting has a similar significance as natural expense accounting, to be specific as the joining of data on benefits and natural expenses into the accounting practices of the organization or government by distinguishing ways that can lessen or maintain a strategic distance from the expense of environmental improvement.

This paper outlines are search writing examination on content mining in environmental accounting outlined in the 2017-2020 period. Considering content mining itself possibly holds esteem on the off chance that it is outfit targeting removing shrewd information, examination has arisen as an essential pattern to answer the difficulties of substance mining in environmental accounting. To settle the impediments of environmental accounting, Environmental Management Accounting (EMA) was created. EMA can isolate financial and actual viewpoints in environmental accounting. Actual EMA incorporates the progression of water, energy, while financial EMA estimates the expense of utilization of the organization's normal assets and the expenses of controlling or forestalling ecological harm. The examination found that EMA can assist organizations with recognizing cost saving freedoms and grow more proficient creation measures. By utilizing the EMA indicator, the examination of environmental accounting research becomes clearer. While examination additionally apply to more modest volumes, arising difficulties in regard to enormous volumes have as of late risen, like incorporating a wide number of particular sources, managing both organized and unstructured information, and execution issues. The subject defined from CATAR will be matched from EMA indicator. Subsequently, examination have likewise been incorporated inside this investigation. By and by, it ought to be featured that the fundamental focal point of this research is to see how substance mining is being overseen and handled to use environmental accounting challenges. Moreover, the utilization of mix from content mining and EMA as the structure have not been utilized previously. Along these lines, by examining research directed in this space, the current research gives a general image of the present status of the craftsmanship, adding to a superior comprehension of this subject.

## 2. Literature Review

Some researchers have explored the writing survey in environmental accounting. These specialists focused on specific zones of the bigger subject dependent on EMA point of view. [6] is entitled "Developing maintainability control the case of four Belgian neighborhood governments". This paper experimentally investigates the joins between administration controls, technique and supportability within the setting of the open division. The creators utilize organization hypothesis as a hypothetical focal point and the concept of control bundles as an experimental lattice of examination to investigate how organization impacts empower or compel the improvement of supportability versatility controls in four Belgian neighborhood governments.

Mishelle [7] on the research with the title "The Role of Environmental Management Accounting as a Tool to Calculate Environmental Costs and Identify their Impact on a Company's Environmental Performance" stated EMA is an important management tool that businesses can use to address environmental challenges. However, managers are still reluctant to switch from traditional costing systems to EMAs. Traditional costing systems portray bad values as environmental costs that lead to bad decisions by managers. As a result, many companies have failed to meet their sustainability goals. As a result of the study, it was found that the environmental costs reported in the company's financial statements were inaccurate because environmental costs were previously recorded as operating expenses. Significant losses due to technical inefficiencies and potential savings have been brought to the management's attention

### 2.1 Environmental Accounting

Environmental accounting as indicated by [8] is an overall term worried about environmental costs for each accounting practice both in government organizations and in organizations. These costs are the outcomes from the results of all exercises of the organization being referred to identifying with the climate. Essentially, natural bookkeeping is undoubtedly worried about the expenses of creating or keeping up the climate, particularly for organizations or foundations whose principal center is around their business related to the environment.

### 2.2 Environmental Management Accounting (EMA)

Environmental management accounting (EMA) is characterized as the examination and utilization of monetary and non-monetary data to help the board in maintaining an organization or business. EMA incorporates with the professional workplace and business arrangements and gives direction on practical business improvement. EMA investigates the costs and advantages identified with the climate, adds to the acknowledgment of capital increments and working costs, contamination control devices, and environmental commitments. To expect environmental costs, the management requires environmental management accounting (EMA) in their business measures. EMA gives financial and non-financial data to help inside natural administration measures.

### 2.3 Analysis Tool

The analysis process described in this article follows a typical workflow, just as various data rehearses and follows from [9] research. All means for logical get ready are changed into a product device called Content Analysis Toolkit for Academic Research (CATAR). Asides bunching and gathering diaries for recognizing the sub-field which is the significant explanation behind doing the examination in the work, CATAR is additionally utilized for leading general records to dissect the points from a bunch of free content archive.

## 3. Research Method

### 3.1 Data Collection

The main advance for co-reference analysis is to make an appropriate choice of source articles; all things considered, it is fundamental that a variety of such reports should be huge as conceivable to cover each improvement that have been made on the hypothesis [10]. In order to explore the objective, an efficient information questioning strategy is received to guarantee that the arrangement of natural bookkeeping research was important and delegate for building the underlying paper set. As the co-reference construction can change impressively from one year to another obviously haphazardly in patterns of quite a while [11]. Subsequently, this examination utilizes five years information from 2017 to 2020. All data collected from various journals.

### 3.2 Analysis Tool

The analysis process described in this article is tied to a variety of data as well as general workflows. All scientific collaboration is built into a device called the Content Analysis Toolkit for Academic Research (CATAR). In addition to clustering and grouping logs to isolate subfields, an important goal of completing analysis in a job, CATAR is further used to maintain a general archive for analyzing topics in a set of free text records.

## 4. Results and Discussion

Mining method analysis, seventeen classifications of environmental accounting arose out of the "environmental accounting" keyword during years 2017 to 2020. The group descriptors remembered for each theme classes are recorded classes in Table 1 dependent on the CATAR, the fourteen topics were then physically changed by the environmental accounting intermediary dependent on EMA structure for simplicity of conversation. These labels and their sub-effective descriptors, were (1) variable costing (VC); (1) *variable costing* (VC); (2) *absorption costing* (AC); (3) *activity based costing* (ABC); (4) *environmental disclosure* (ED); (5) *profitability* (F); (6) *green accounting* (GA); (7) *carbon trading* (CT); (8) *deforestation* (D); (9) *sustainability development* (SD); (10) *corporate social responsibility* (CSR); (11) *green manufacturing* (GM); (12) *carbon emission disclosure* (CED); (13) *voluntary social* (VS); (14) *environmental audit* (EA); (15) *managerial performance* (MP); (16) *waste management* (WM); (17) *environmental budgeting* (EB).

**Table 1**. **Sub-Topical Descriptors**

| Topics | Documents |
|---|---|
| Topic 1<br>**Variable Costing (VC)** | 2 |
| Topic 2<br>**Absorption Costing (AC)** | 3 |
| Topic 3<br>**Activity Based Costing (ABC)** | 2 |
| Topic 4<br>**Environmental Disclosure (ED)** | 5 |
| Topic 5<br>**Profitability (F)** | 2 |
| Topic 6<br>**Green Accounting (GA)** | 6 |
| Topic 7<br>**Carbon Trading (CT)** | 7 |

| Topics | Documents |
|---|---|
| Topic 8<br>**Deforestation (D)** | 2 |
| Topic 9<br>**Sustainability Development (SD)** | 5 |
| Topic 10<br>**Corporate Social Responsibility (CSR)** | 6 |
| Topic 11<br>**Green Manufacturing (GM)** | 4 |
| Topic 12<br>**Carbon Emission Disclosure (CED)** | 7 |
| Topic 13<br>**Voluntary Social (VS)** | 3 |
| Topic 14<br>**Environmental Audit (EA)** | 2 |
| Topic 15<br>**Managerial Performance (MP)** | 13 |
| Topic 16<br>**Waste Management (WM)** | 4 |
| **Topic 17**<br>**Environmental Budgeting (EB)** | 5 |
| **Total Documents** | 78 |

The seventeen topics cover 78 articles of the original 78 (because of the anomaly evacuation during the MSC). As portrayed by [9], anomalies are articles 'managing free and most likely less-saw issues. It could likewise be there are little bunches address articles with reference design that don't coordinate reference shows in review environmental accounting research and hence do not plan onto the remarkable theme spaces. In this manner, there would be distinctive absolute of articles dependent on diary dispersion, yearly dissemination, and major contribute nations.

As far as naming on the topic map, CATAR has its own code for simple naming of groups as depicted in technique segment. In light of the MDS method, the spatial relations among these points are planned in figure 1, where a circle indicates a theme, and the size of the circle is intended to mirror the quantity of articles in it. As can be seen, the exploration subject of MP arose as the most well-known theme in the field of environmental accounting research. There are 13 articles under this subject, adding up to 16% of the 78 arranged research from 2017 to 2020. As indicated by subject guide appeared in figure 1, the examination subjects of MP, CSR and CED have generally nearer relations. There are a few issues inside the three points overstretched to one another. Then again, the environmental accounting research on themes among GA, CT and SD are nearer to one another. Figure 1 additionally shows that WM and GM are situated in closeness on the guide, trailed by F and AC which indicates similarity in their citation patterns.

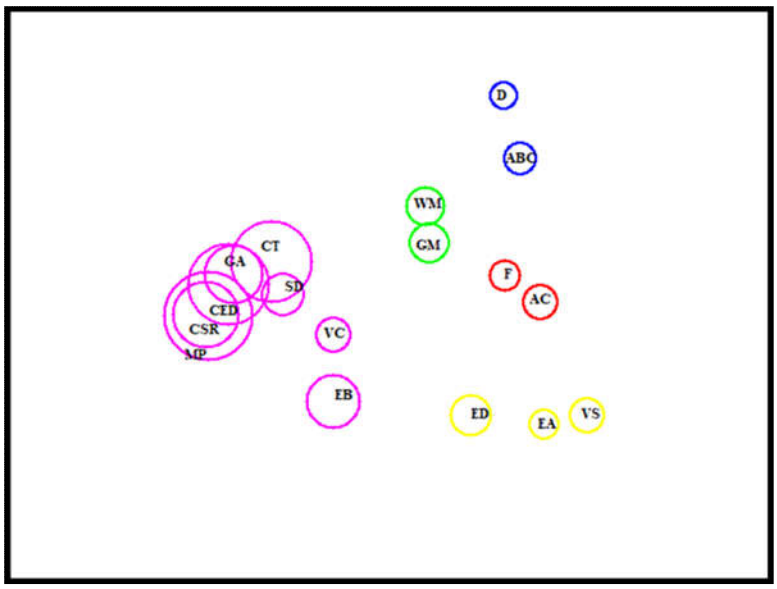


**Figure 1. Topic Distribution for Each Topic**

### 4.1 CATAR Unclassified Category

The discoveries on the improvement pattern in this examination repeated the advancement of exploration point distinguished in past audits. Simnett [11] noticed pattern in natural bookkeeping examination and utilize the EMA system to gathering the sub-subject. The EMA is an autonomous standard-setting body that serves the public interest by setting excellent worldwide norms for reviewing is the more significant center norm. Its subject arrangement structure depends on estimation of past research.

This investigation tracked down those computerized apparatuses could not dissect classification points that remembered for EMA structure, for example, emission allowances, environmental shareholder value and corporate eco-effectiveness. Perhaps in view of the themes that are not notable, thusly it didn't draw in much consideration from scientists. In accordance with this discovering, [11] recognized discharge remittances and corporate eco-productivity frameworks were the subjects that get lower number in term of conversation review quality during 2017 to 2020.

**Table 2. CATAR Unclassified Category**

| EMA Topic Name | Subtopic |
|---|---|
| Emission Allowances | Tradable emission |
| Environmental shareholder value | Standardization of financial reporting |
| Corporate eco-efficiency | Stakeholders regulations and incentives |

## 5. Conclusion and Suggestion

The content mining methodologies performed in this study were valuable and differ from related studies previously presented. First, EMA proxies have been used to define different categories of topics in environmental accounting studies, but early research work may not have used standards defining all of them (see Review of the EMA Framework [12]). This study interpreted commonly used proxies analyzed by researchers in previous studies.

Second, research topics in the field of environmental accounting are constantly evolving because they are influenced by accounting standards. Therefore, regular subject analysis with international accounting standards is very important to help researchers understand past, present and future research directions. Content mining techniques can also improve the efficiency of manual analytics [13]. As an extension of the study [12], this study analyzed articles related to environmental accounting for the year 2017-2020. The research trends on subjects, methods, as well as the most highlighted issues in this study, to some extent illustrate the development of research in the field of environmental accounting in past,and may also suggest possible directions for the development of future research in this area. It is hoped that this study will benefit researchers and educators in conducting their research on environmental accounting and publishing the results of their research.

The study also aims to enable researchers to conduct research on environmental accounting topics that do not attract much research interest, such as emission quotas, environmental shareholder value, and corporate environmental efficiency. Another is that research notes, conference reports, monographs, papers, course curriculum chapters, or editorial commentaries should also be included for comprehensive research, as journal articles are not the only source of ideas or knowledge to analyze.

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