

AN ANALYSIS OF SOME CONCEPTS RELATED TO ENVIRONMENTAL ISSUES AND DEVELOPMENT BY N-GRAM
ÇEVRESEL SORUNLAR VE KALKINMA İLE İLİŞKİLİ BAZI KAVRAMLARIN N-GRAM İLE ANALİZİ

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ABSTRACT

In this study, the historical course of some concepts related to development and environmental issues was investigated using n-gram analysis, which functions as a kind of literature review and started to have beneficial results in scientific studies, especially in the phase of hypothesis creation. In the study, the concepts of environment (environment, environmental factors, environmental issues, environmental policies, environmental conditions, environmental impact, environmental problems, environmental protection, environmental quality)- especially development and environment associated "mining", "economic development" and "sustainable development" - selected as keywords and were analyzed using N-grams. According to the results of the n-gram analysis, although the concept of mining was used in the literature before the 1800s, its use increased rapidly with the Industrial Revolution and peaked in the 1900s. The concept of economic development entered the literature in the 1900s, and its use in parallel with the growth rates of the Capitalist system and Industrialized countries peaked in the 1970s. The 1970s were the years when economic growth was at its highest.

Again, according to the results of the n-gram analysis, it was concluded that the concepts related to the environment have increased noticeably since the 1900s, and the concept of sustainable development has been included in the literature since the 1980s and has gradually reached high usage. This has developed in parallel with the ecological balance sensitivity to environmental pollution resulting from rapid industrialization.

Keywords: Sustainable/economic development, mining, environmental issues, environmental problems, environmental impact, N-gram analysis

ÖZET

Bu çalışmada, çevresel konular ve kalkınma ile ilişkili bazı kavramların tarihi seyri, bir çeşit literatür tarama fonksiyonu olan ve bilimsel çalışmalarda, özellikle de hipotez sorusu geliştirilmesi aşamasında yararlı sonuçlar veren N-gram metodu ile analiz edilmiştir. Çalışmada, çevre kavramları (çevre, çevresel faktörler, çevresel konular, çevre politikaları, çevresel koşullar, çevresel etki, çevresel problemler, çevresel korumu, çevresel kalite)-özellikle çevre ve kalkınma ile doğrudan ilişkili olan “madencilik”, “ekonomik kalkınma” ve “sürdürülebilir kalkınma”-anahtar kelime olarak seçilmiş ve N-gram ile analiz edilmiştir. N-gram analiz sonuçlarına göre, madencilik kavramı literatürde 1800’lerden önce de kullanılmasına rağmen, bu kavramın kullanımı Endüstri Devrimi sonrasında hızlı bir şekilde artış göstermekte ve 1900’lerde zirve yapmaktadır. Ekonomik kalkınma literatüre 1900’lerde girmiş ve kavramın kullanım sıklığı Kapitalist sistemin büyümesi ile paralel olarak artmış ve Endüstrileşmiş ülkelerde 1970’lerde zirve yapmıştır. 1970’ler ekonomik büyümenin zirve yaptığı yıllardır.

N-gram analizlerinden elde edilen bir diğer sonuç da çevre ile ilişkili kavramların 1900’lerden sonra dikkat çekici şekilde artış göstermesidir. Sürdürülebilir kalkınma kavramı literatüre 1980’lerde girmiştir ve gitgide kullanım sıklığı zaman içinde artmıştır. Kavramın kullanımındaki artışı, hızlı sanayileşme kaynaklı çevresel kirliliğe karşı ekolojik denge duyarlılığı ile paralel olarak gelişmiştir.

Anahtar Kelimeler: Sürdürülebilir/Ekonomik Kalkınma, Madencilik, Çevresel Konular, Çevresel Problemler, Çevresel Etki, N-Gram Analizi

1. INTRODUCTION

Unlimited access to the big data needed in scientific research and studies in the digital environment makes it easier to access information and also allows a very comprehensive analysis of this information. Nowadays, access to information is no longer a problem, the problem of focusing on how to evaluate so much and comprehensive information in the most efficient way and methodological developments to solve it have started to take an important place (Çiftçi et al., 2019; Çiftçi et al., 2020c, 2020b, 2020a; Ural et al., 2019, 2020c, 2020d, 2020a, 2020b; Vural et al., 2019, 2020c, 2020f, 2020a, 2020g, 2020b, 2020e, 2020d; Vural and Çiftçi, 2021).

In addition to being an important web provider and search engine, Google continues to be one of the most important organizational elements of the digital age with its other services. In this respect, Google contributes to the facilitation of life with many services it provides. Google nowadays offers serious infrastructure in scientific studies. Especially scientific studies, articles, books, etc. opportunities are available through Google. N-gram analysis is also one of the useful applications used in screening these databases. In the n-gram analysis method used with Google infrastructure, it provides the opportunity to do keyword-based research within a large book corpus in the "Google Books" database. On this occasion, the concepts, events, and facts planned to be researched can be evaluated both numerically and graphically as a percentage of the usage frequency covering the last 250-300 years with this analysis method and the relevant application interface.

With the development of national states, the phenomenon of economic growth and development has become an important factor for societies and states. However, before that, it is necessary to first look at the development stages of Capitalism because of its triggering feature of development.

The first stage of capitalism is Commercial Capitalism, and its doctrine is Mercantilism. The period of Commercial Capitalism covers a period of three centuries from the middle of the 15th century, when Feudalism began to dissolve, to the middle of the 18th century, when the Industrial Revolution occurred. Mercantilism can be described as the doctrine (Hamitoğulları, 1986, p. 43) framing all of the economic policies followed by the Western European countries in the transition from the feudal mode of production to the first mode of production of Capitalism in this period. The emergence of mercantilism is in the 15th century and is an issue related to the conquest of Istanbul by the Turks in 1453. When Fatih Sultan Mehmet, with his attitude towards Christian traders after conquering Istanbul, restricted the goods flowing to Europe through the Ottoman country, the prices of these goods increased considerably in Europe. Thereupon, European traders sought other searches to bring these goods. The discovery of the compass that paved the way for geographical discoveries in the maritime field and the development of map knowledge combined with the economic-commercial needs, pushed the adventurous sailors and merchants to the feeling of discovering new countries and bringing precious metals to their countries. In a short time, with the efforts of Portuguese, Spanish and French colonialists, precious metals, especially gold and silver, from Asia, Africa, and the Americas, began to flow to Europe. According to (Hamitoğulları, 1986, p. 43), the amount of gold and silver money in Europe increased 5 times in the century between 1520 and 1620.

With the effect of mercantilism in the economic development process, the mining sector has been a driving force. Because, as it can be understood, in the mercantilist doctrine that was effective in the period of existence of Commercial Capitalism, owning precious metals, especially gold and silver, was seen as a source of wealth and wealth (Aydemir and Güneş, 2006, p. 145). Therefore, trade, which provides the opportunity to own precious metals, has come to the fore.

Mercantilism, which sees the real source of wealth as the possession of gold and silver because of their intact and longevity, is in this respect a doctrine based on money or metal. The struggle to obtain gold and silver is a nationalist doctrine, as it also involves competition between states and there is a field of struggle and war. Every nation will want to have a strong state. In addition, in the Mercantilist doctrine, instead of individualism and liberalism that will develop in later years, there is still state interventionism. Because in the struggle to obtain precious metals, the role and power of states is important, so the existence and power of the state power gain importance in the management of the market for the benefit of the people and the nation. In the mercantilist era, individualistic actions are not encouraged.

Due to the development of technological methods in industrial production, the acceleration of the production mechanism has revealed the need for raw materials. The mining industry has become an important raw material supplier in industrial production. After the Industrial Revolution, the big production increase and the growth of the country's economies have gradually brought the idea of development to the forefront with modernization. Besides the quantitative growth of economic indicators, the concept of development, which expresses the qualitative development of social indicators and standards such as education, health, population and culture, continues to be discussed with its various dimensions today.

It has been observed that the economic theories developed by classical economic theorists such as Adam Smith, David Ricardo, and Thomas Robert Malthus without considering the environmental factors caused various problems in practice in the 20th century. Until the 1970s, the concepts of development and growth were addressed only with economic concepts such as increasing income per capita and increasing the level of welfare. It is possible to see the Second World War as a breaking point in terms of economic development. After the war, the rapidly increasing production and consumption caused the rapid consumption of natural resources and the rapid destruction of the environment. The global warming accompanying the process has been accelerated by the increasing carbon emissions (Tiryakioğlu and Tuna, 2016).

In the following years, it has begun to be accepted that development and economic growth are also a complex issue that concerns nature, environment, human qualities, and most importantly, not only people living today, but also future generations. For this reason, a sustainable development model has been put forward against the traditional model, which knows no boundaries in economic development. The emergence of large cities due to the rapid development of industry has also been effective in the widespread use of the concept of sustainable development as a model. Because rapid and uncontrolled industrialization not only reveals natural balances, but also large cities, negatively affecting human and public health in many ways. This caused development to be debatable by affecting human factors as well as environmental factors negatively. The sustainable development model is defined as a model that handles ecological balance and economic growth together, ensures the efficient use of natural resources and attaches importance to environmental quality, and can meet the needs of present generations without jeopardizing the ability of future generations to meet their own needs (Alagöz, 2004, p. 7). Therefore, countries will take into account the use of natural resources, protection of the environment and the needs of future generations while realizing their economic development (Vural et al., 2009).

2. CONCEPTUAL FRAMEWORK

2.1. N-gram

N-gram analysis is an analysis method in which the repetition frequency of a certain number of subsequences in a character string is investigated. This method is increasingly used in areas such as sequence analysis in linguistics, probability, communication theory, natural language processing or computational biology, and in determining the frequency of use of malware, which is a fearful element of digital environments. It is used in the development of counter-software in the fight against malicious software as auxiliary analysis methods (Aleahmad et al., 2007; Huang et al., 2012; Reddy and Pujari, 2006; Tuna and Ural, 2017; Ural et al., 2020c; Vural et al., 2020e). N-gram analysis method has started to be used in social sciences, especially in the research of political, military and economic phenomena for the purpose of literature review and in the evaluation of temporal change (Çiftçi et al., 2019; Çiftçi et al., 2020a; Ural et al., 2019, 2020a; Vural et al., 2019, 2020g)

Google company has become a company that brings innovations in different areas of the industry to the digital world and has become an important element of the digital society with its new services every day. The company has developed the n-gram interface application so that researchers can perform n-gram statistical analysis on more than 1.500.000 digital books registered in its database. This application allows for meaningful and in-depth analysis of digital data.

In this study, only the most basic form of Google's n-gram analysis interface was used. "Environment", "environmental factors" "environmental conditions", "environmental protection", "environmental issues", "environmental problems" "environmental policies", "environmental quality", "environmental impact", especially development and the concepts of mining directly related to the environment, "economic

development" and "sustainable development" are selected as keywords and the evolution of these keywords in history has been discussed. The frequency of occurrence of the aforementioned concepts in the literature was determined with N-gram analysis, and the relationships between the usage frequencies of these concepts and their changes in history were examined. Frequency of usage of a concept in the literature is an indication of the importance attached to that concept by those with a scientific interest. In addition, factors such as the emergence period of the concepts subject to the study, the increase and decrease in the frequency of use over the years, the co-change of the frequency of use of related concepts were also examined.

The n-gram analysis is expected to provide a different perspective on the keywords examined and to inspire more detailed studies using this analysis method.

3. FINDINGS AND CONCLUSIONS

In the N-gram analysis, the keywords "mining", "economic development", "sustainable development" were analyzed within themselves (Fig. 1 a, b, c), the concepts of "environment", "environmental factors", "environmental conditions", "environmental protection", "environmental issues", "environmental problems", "environmental policies", "environmental quality", and "environmental impact" were analyzed within themselves (Fig. 2a, b) in order to eliminate the complexities.

When the n-gram analysis chart of the first group keywords is examined;

In Figure 1 a, it is seen that the concept of mining has been used since the 1800s. However, the concept was mostly used after the 1800s and changes in the frequency of use are observed after this date. In fact, mining has found a place in human and social life as a result of the desire to benefit from its environment with the existence of humanity (Vural, 2018; Vural et al., 2009). Therefore, this situation manifests itself in the graphic and it is seen that it is also used in the literature data before the 1800s. The peak of the mining keyword in the 1900s is explained by the increase in mass production in industrialized countries in parallel with the high development of the industry in this period. The increase in energy consumption based on coal, which is a fossil fuel, associated with the increase in production is explained by the fact that the industrialized European countries have entered a great imperialist division war in order to have underground raw material resources. The increasing frequency of using keywords in the literature changes in parallel with the social, economic and political events experienced.

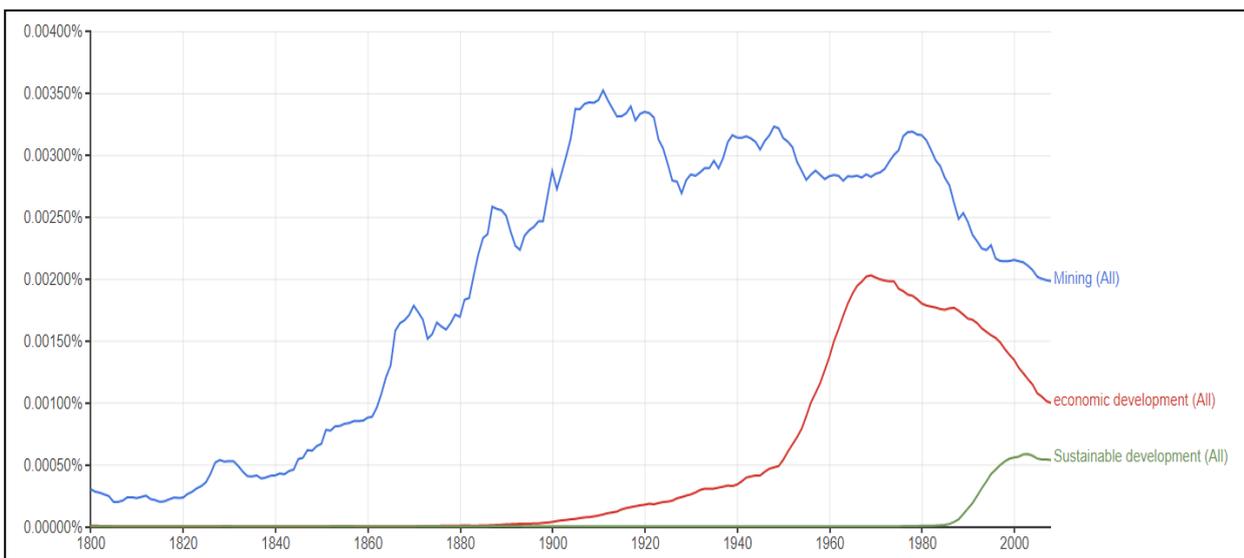


Figure 1a. N-gram Analysis of Mining, Economic Development and Sustainable Development Keywords



Figure 1b. The relationship between keywords mining and economic was examined with n-grams.

The fact that the economic development keyword has a meaningful use in the n-gram analysis chart since 1900 is associated with the new entry of the concept into the literature (Figure 1b and c). There is a very slow rising trend in the chart. The rise continues until the 1940s, which coincides with the aftermath of the Second World War. The sharp rise after the mid-1940s is associated with the post-war economic growth of the countries. In the graphic, it is seen that the peak point was reached between 1950-1970. This is because the greatest economic production and growth in Capitalist Industrial societies was experienced in this period. What happened in the economic and social life has been reflected in the literature and the frequency of using the concept of economic development has increased and reached its peak in the 1970s.

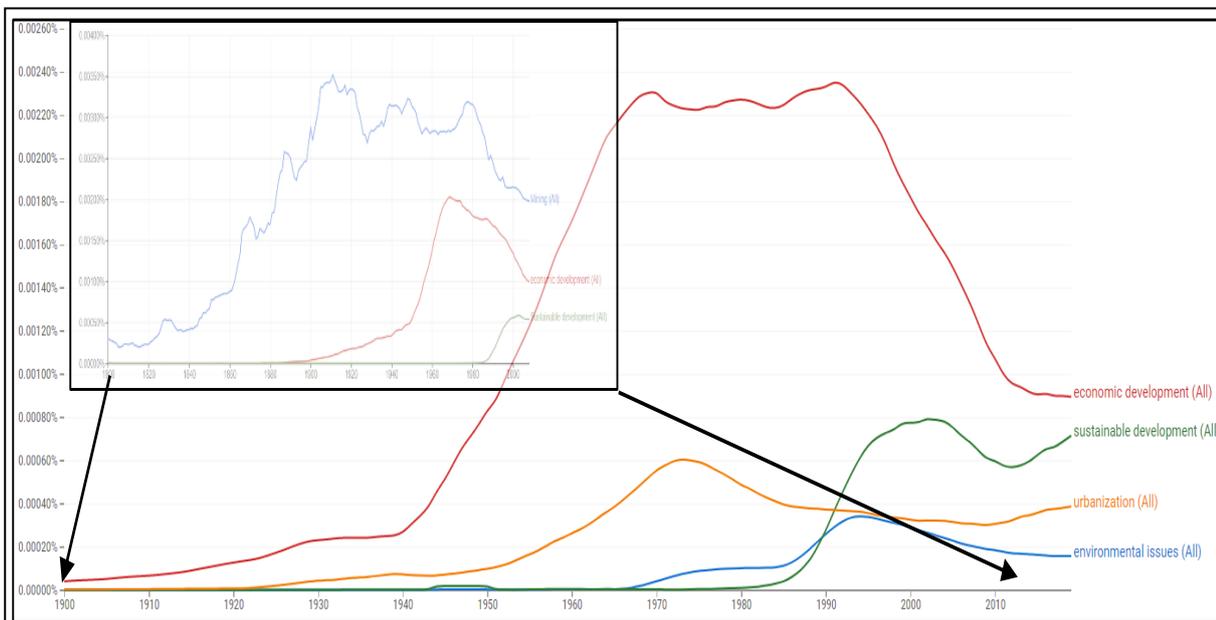


Figure 1c. The relationship between keywords economic development, sustainable development, urbanization and environmental issues was examined with n-grams.

The concept of sustainable development is relatively a new concept that has been brought to the agenda after 1980s in the literature. This situation is reflected in the graph (Figure 1b and c). Due to the high rate of development of industrialization, pollution, and destruction at a level that the ecological balance in nature cannot bear has prompted researchers, intellectuals, and experts to focus on this issue. In the 1980s, it started to be included in the literature that if the rate of development continues like this, it cannot be sustainable in

terms of protecting the ecological balance in the world and nature cannot handle it. In this period, the concept of "sustainable development" has entered the literature with the acceptance that a development strategy to be followed by giving less damage to nature and paying more attention to environmental conditions and ecological balance can only be sustained. The upward trend in the n-gram graph of the sustainable development keyword, which started in the 1980s, continued until the 2000s. This concept is used extensively today.

The concept of sustainability has found a place in many areas over time. The main element of the concept of sustainability can be considered as continuity and repeatability. Therefore, the understanding of benefiting from resources that are effective in development by protecting them has been the most important element of the 20th century. In this context, the environmental issue has started to take place and diversify in social life as an important concept. Some of the most common environmental concepts include "environment", "environmental factors", "environmental conditions", "environmental protection", "environmental issues", "environmental problems", environmental pollution. Concepts other than the last one of these concepts were selected as keywords for n-gram analysis and their analysis was carried out in this study (Figure 2a). In addition, the same keywords were divided into subgroups according to those that were closely related to each other and were re-subjected to n-gram analysis. When Figure 2a and 2b are examined, it is seen that the related concepts did not yield a meaningful result before 1900. This situation is compatible with the historical use of the related concepts. The visible rise in the use of environmental keywords in the literature begins in the 1900s. This situation is very understandable. Because environmental awareness in the world does not have a very old past. It should be considered that there is a linear relationship between the handling of environment and related issues and industrialization and urbanization. Because the development of industry is a factor that causes environmental problems. Environmental issues are also directly related to urbanization. In this case, industrialization and urbanization cause environmental problems, and this brings people to be more sensitive to the environment. With the emergence of environmental problems, the environment and related books are increasingly taking place in the literature.

It is known that big cities have emerged in industrialized countries since 1900s. Industrialization, ecology, and environmental issues in the context of the city have always been on the agenda throughout the 20th century (Vural, 2014a, 2014b; Vural and Çiçek, 2020). In fact, environmental organizations have emerged in many countries, and civil social and political movements have shown themselves in the name of protecting natural life and the environment. This development is naturally reflected in the literature. The increase in the frequency of use of environmental concepts until the 1990s, which can be seen in Figure 2, is explained by this. The reason for the decline in the graphic after the 1990s is explained by the adoption of environmental protective regulations in industrialized countries, taking necessary measures and / or consolidating these issues at the end of the struggles for many years. This situation caused a decrease in the frequency of use of the relevant keywords in the literature. When the chart is examined in detail, it is seen that keywords such as environmental factors and environmental conditions have a greater place in the literature. This overlaps with current environmental issues.

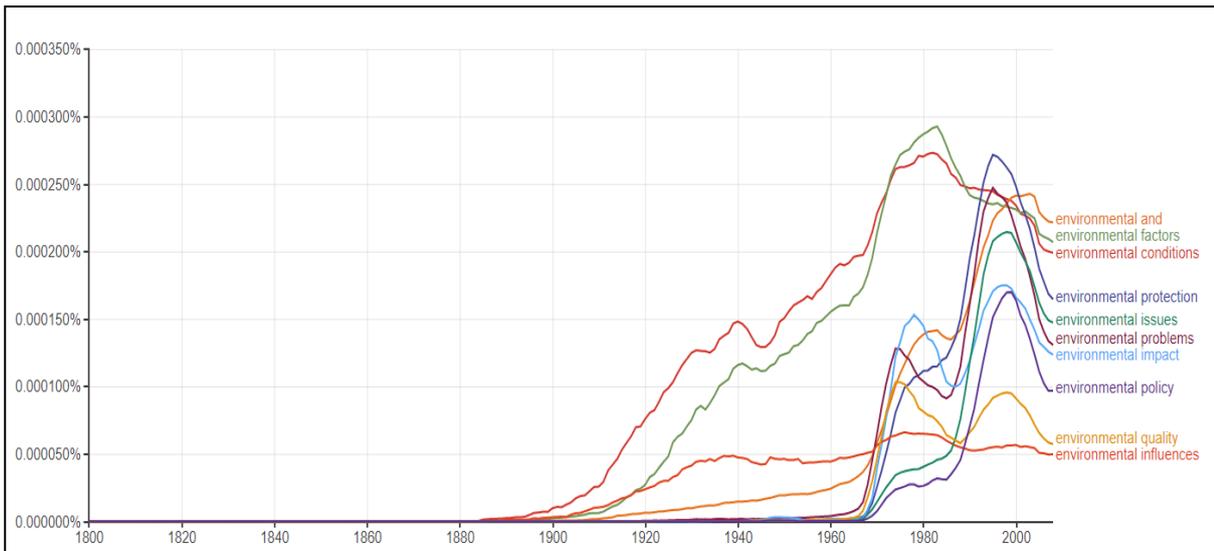


Figure 2a. Chart of N-gram Analysis of Environment and Some Related Keywords

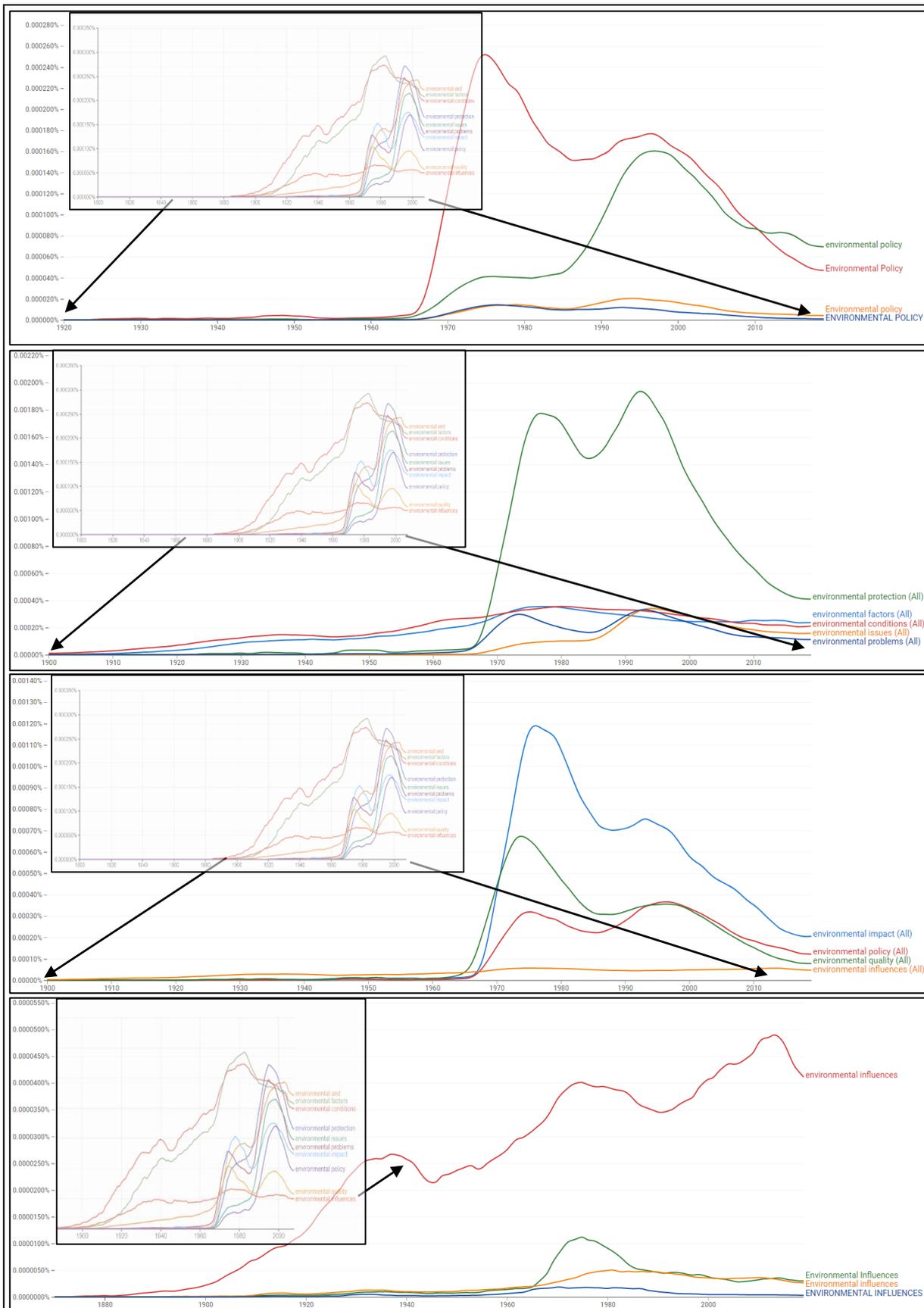


Figure 2b. The keywords in Figure 2a were subjected to n-gram analysis under subgroups according to those showing close relationship with each other.

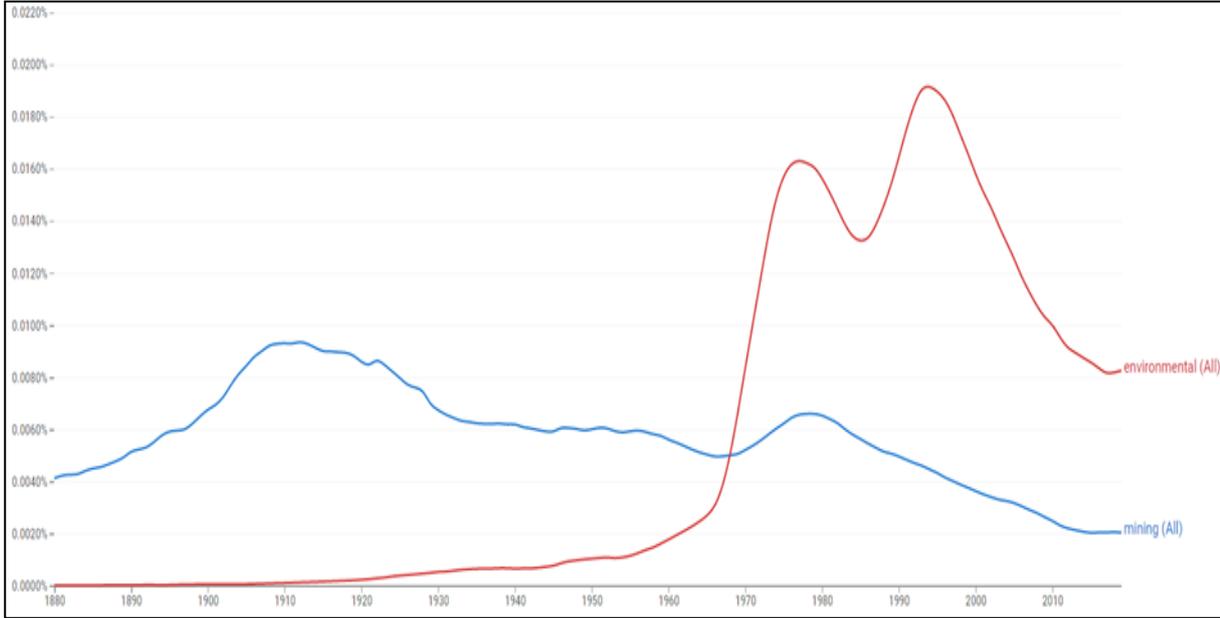


Figure 3. N-gram analysis of mining and environmental keywords

When the two graphs are evaluated together (Fig. 1, 2, 3), the usage frequency in the mining concept and the usage frequency of environmental concepts in general show a parallelism. Concepts such as environmental problems, environmental protection, environmental impact are seen to be in parallel with the concept of economic development. A second peak period in related concepts is observed after the 1980s. This rise is in parallel with the concept of "sustainable development", considering that the concept of "sustainable development" was widely used in the literature after the 1980s, it is seen that the relevant n-gram graph confirms this.

An n-gram analysis of the concepts such as Mining, economic development, sustainable development concepts and the environment and related "environment", "environmental factors", "environmental conditions", "environmental protection", "environmental issues" and "environmental problems" was carried out to cover a period of approximately 200 years between 1800-2020 (Fig. 1, 2 and 3).

When the n-gram analysis results for the period examined were examined, it was determined that the use of selected keywords in the last 200 years showed significant parallels. Based on this, it was seen that n-gram analysis gives meaningful results in appropriate keywords to be selected. Therefore, it is thought that the selection of the periods to be targeted for the literature in the studies to be carried out, and the n-gram analysis in deep analysis are illuminating for practical directions.

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