# Systematic Literature Review on Aerotropolis

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**Abstract.** This research aims to systematically review the literature on aerotropolis and study emerging aerotropolis research from various disciplinary perspectives. The research data collection process uses reference management software, namely Publish or Perish. This research uses data from articles published and indexed by Google Scholar, Crossref, OpenAlex, and Semantic Scholar. The keyword grouping process is assisted by VosViewer software. After carrying out the research stages, 1,143 titles were obtained with 4,617 citations and evaluated based on the selected topics; the elimination of duplicate articles from each database was carried out. Finally, 772 articles were obtained after sorting. Of the 772 publications on aerotropolis, 175 keywords were identified. Based on the publication bibliometric map, 9 clusters were formed. Cluster 1 consists of 35 concepts, cluster 2 consists of 32 concepts, cluster 3 consists of 24 concepts, cluster 4 consists of 21 concepts, cluster 5 consists of 20 concepts, cluster 6 consists of 13 concepts, cluster 7 consists of 12 concepts, cluster 8 consists of 10 concepts, and cluster 9 consists of 8 concepts. The nine clusters related to the keyword "aerotropolis" can act as exogenous or endogenous factors in explaining aerotropolis.

**Keywords:** Aerotropolis, Airport City, Systematic Literature Review, Bibliometric Analysis.

## 1 Introduction

Aerotropolis terminology is a relatively new concept in urban planning and transportation involving the integration of airports and surrounding areas into one planned and integrated urban development area. In conducting a systematic literature study on aerotropolises, a comprehensive analysis of existing research, studies, and literature on the topic of aerotropolises is needed comprehensively [1].

Interest in aerotropolis research has been growing annually. Yet, the societal and governmental acceptance of aerotropolis necessitates substantial harmonization and stakeholder dialogue. While aerotropolises present significant opportunities for metropolitan urban development, they are also plagued by negative aspects associated with airport presence. These include noise pollution, a higher risk of accidents, and environmental concerns such as land use issues, recycling challenges, sustainability, and escalating climate change concerns. Consequently, these issues have become focal points in the evolving field of aerotropolis research [2].

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Other names, such as Airport City or Aerial Life, are called Aerotropolis. Aerotropolis involves a metropolitan subregion whose land use, economy, and infrastructure are centered on airport activity. The term aerotropolis can be divided into 'aero,' which means aviation, and 'tropolis' which means metropolitan city. Philosophically, an aerotropolis can be considered a scientific study of airport life in a metropolitan city. An airport city consists of two main characteristics: airport logistics and supply chain, aviation-related multifunctional commercial infrastructure, and multimodal air life as the core of the aerotropolis. The second characteristic relates to business clusters and corridors related to development and accessibility to the airport by residents [3].

The objective of this study is to conduct a systematic review of literature on aerotropolises and to examine the burgeoning research on aerotropolises through diverse academic lenses. Airports have evolved beyond their traditional role as mere transportation hubs, transforming into hubs of multifaceted activities. This evolution is reflected in the progression of terminology from 'airport' to 'aerotropolis', 'aerial life', 'airport city', and 'airport corridor', indicating a significant integration of airport nodes with urban development [4].

Cities are made up of individuals whose functions depend on interconnected networks, facilities, and systems that facilitate the movement of people, goods, and services. The non-static nature of cities causes constantly changing trends and dynamics. Each city grows and develops according to the different roles of each city. Physical and structural development is an integral part of the transformation of urban life. Historically, urban development was often limited by zones. This includes economic trade zones, military zones, airport zones, community economic zones, special economic zones, innovative city zones, and aerotropolises. Previous studies have shown the existence of notable cities regarding aerotropolis cities or cities whose functions depend on the presence of airports [5].

Aerotropolis is a method of urban transformation with airports as the core of its economic activities. Airports are no longer just for the elite but offer a more open and friendly atmosphere for all users. In this decade, there is more and more open access at airports as more and more airport management provides non-aeronautical services, including malls, bookstores, restaurants, duty-free goods and services, boutiques, retail services, entertainment areas, and cultural and relaxation [6].

As the digitalization process progresses across various sectors, it's essential for airports to adapt and meet evolving needs effectively. The advancement of artificial intelligence, intelligent technology implementation, telecommunications, and digitalization are pivotal in shaping and transforming the future aerotropolis. Key factors like land availability, transportation networks, accommodation facilities, and the presence of commercial and recreational activities are central to the formation of airport cities, acting as attractive forces for aerotropolises. These pull factors are fundamental to growth and development within a system. The aerotropolis development is propelled by a combination of five main elements: the commercial sector, passengers, cargo traffic, land business development, and non-aeronautical revenue. These primary factors are bolstered by various sub-dimensions such as duty-free shops, restaurants, cultural and entertainment venues, hotels and accommodations, banking and currency exchange services, free trade zones, golf courses, factory outlets, family services, and health services. The interplay of these five aerotropolis drivers is crucial for the sustainability of the sector [2].

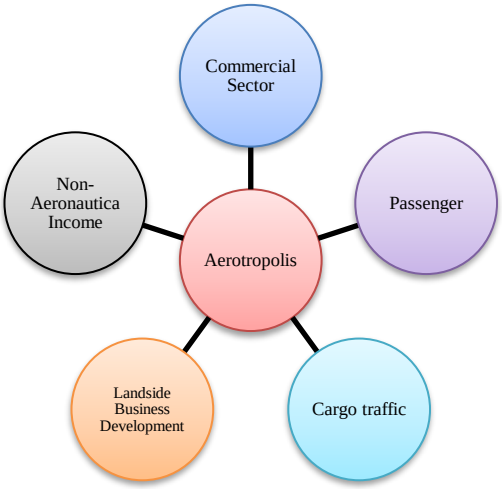


**Fig. 1.** Pull Factors Aerotropolis [2]

Despite the advantages of aerotropolises, airport cities continue to face several obstacles due to environmental issues that many consider essential. One of the main factors is the large amount of land and investments required to build an aerotropolis. Other inhibiting factors are noise pollution, which can increase deafness, and the degradation of agricultural land. Aerotropolis also has to contend with speed and high-resolution internet access issues, rising aviation fuel costs, increasing greenhouse emissions due to airport-related development, and the need for continued innovation in airport cities. Some of these challenges are universal and also apply to other cities globally [7].

## 2 Methods

Reviewing past studies, often known as literature review, is a crucial component of research. A well-constructed review lays a robust foundation for scientific contribution. Examining prior research aids in the evolution of theories and related fields of study, while also directing the trajectory of future research endeavors. According to this interpretation, the purpose of library research is not to contribute new theories but rather to elucidate and categorize findings from existing research [8]. Systematic Literature Reviews (SLRs) employ a specific and transparent method to comprehensively survey literature in a particular area or sub-area [9].

This research uses data from articles published and indexed by Google Scholar, Crossref, OpenAlex, and Semantic Scholar. The use of Google Scholar, Crossref, OpenAlex, and Semantic Scholar is because these platforms can be accessed for free. The research data collection process uses reference management software, namely Publish or Perish. Publish or perish is used to conduct a literature review of the studied theme. Each article data used must be indexed by Google Scholar, Crossref, OpenAlex, and Semantic Scholar, and then the output results are input into the VOSviewer software. All article data obtained will be filtered and only include

articles related to aerotropolis. Researchers searched for data in Publish or Perished using the keyword "aerotropolis," using the criteria of title, abstract, and keywords in an unlimited period.

## 3 Results and Discussion

After carrying out the research stages, 1,143 titles were obtained with 4,617 citations and evaluated based on the selected topics. Articles are saved in *.ris format. VOSviewer software is used to visualize and analyze trends through bibliometric map visualization.

**Table 1.** Article Search Results Grouped Based on Database

| No | Database | Number of Articles | Citation | Citation Per Year |
|---|---|---|---|---|
| 1 | Google Scholar | 353 | 2.629 | 114 |
| 2 | Crossref | 80 | 561 | 16 |
| 3 | OpenAlex | 157 | 370 | 16 |
| 4 | Semantic Scholar | 253 | 1.057 | 45 |
| TOTAL | | 1.143 | 4.617 | 191 |

After obtaining articles from the databases used as references, duplication of articles from each database was eliminated. Finally, 772 articles were obtained after sorting.

**Table 2.** Article Search Results After Sorting

| No | Article type | Number of Articles |
|---|---|---|
| 1 | Used articles that passed sorting | 772 |
| 2 | Articles that do not pass sorting | 641 |
| TOTAL | | 1.143 |

The next step is to classify articles based on the year of publication. This was done to find out information regarding the distribution of scientific papers over the years.

**Table 3.** Article Search Results Grouped Based on Publication Year

| Year | Number of Articles |
|---|---|
| 2000 | 15 |
| 2001 | 5 |
| 2002 | 4 |
| 2003 | 2 |
| 2004 | 5 |
| 2005 | 2 |
| 2006 | 12 |
| 2007 | 15 |
| 2008 | 20 |
| 2009 | 13 |
| 2010 | 31 |

| | |
|---|---|
| 2011 | 47 |
| 2012 | 32 |
| 2013 | 44 |
| 2014 | 43 |
| 2015 | 41 |
| 2016 | 42 |
| 2017 | 59 |
| 2018 | 54 |
| 2019 | 74 |
| 2020 | 59 |
| 2021 | 71 |
| 2022 | 31 |
| 2023 | 21 |
| Not identified | 30 |
| TOTAL | 772 |

Based on Table three above, around 9.59% of the articles used in this research were published in 2019 and 9.2% in 2021. Table 1 above can also provide information regarding the distribution of scientific papers over the years. Based on Table 3 above, the first publications published in 2000 were 15 articles. The primary rapid growth started after 2008 when publications reached 20 articles. The publication trend peaked in 2019 at 74 or six articles per year. The volume of aerotropolis studies is growing moderately but is still less than 50 studies per year, a decline in the number of publications starting in 2022.

To analyze all 772 selected articles, it is necessary to determine a list of keywords or concepts that are the main themes of the research. From 772 publications on aerotropolis, 175 keywords were identified that appeared most frequently and were strongly related to each other. Literature information that meets the requirements includes year of publication, journal, title, author, affiliation, keywords, document type, abstract, and number of citations exported into CSV format. The retrieval date is September 1, 2023. VOSviewer (version 1.6.19) was used to analyze Co-authorship, Co-occurrence, Citation, Bibliographic coupling, Co-citation, and themes. Two standard weight attributes are applied: the “Links attribute” and the “Total link strength attribute.”

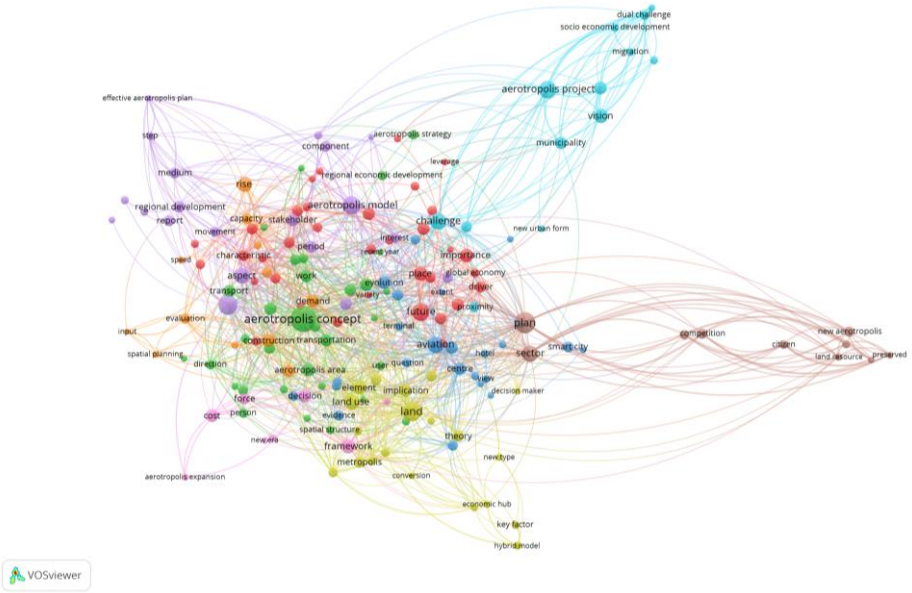


**Fig. 2.** Concept Map or Publication Keywords About Aerotropolis using VOSViewer software.

### 3.1. Classification of Research Concepts or Keywords Based on Google Scholar, Crossref, OpenAlex, and Semantic Scholar Databases

Based on the Fig. 2 above, the distribution of concepts or keywords for publications about aerotropolis can be seen. The different color nodes for each concept or keyword indicate the cluster or grouping. The co-occurrence of concepts or keywords is how often keywords appear together. The node's size shows the frequency of appearance; the more significant the node size, the more often the keyword appears. The curve between nodes represents their co-occurrence in the same publication. The shorter the distance between two nodes, the greater the number of occurrences of the two keywords. Keywords form thematic groups. In the bibliometric map presented above, clusters are marked with different colors, and the size of each keyword is determined by the indicator of the strength of the relationship between concepts, that is, the strength of the links of the searched keyword with other keywords.

**Table 4.** Distribution of Concepts According to Clusters for the Key Term "Aerotropolis" in the Google Scholar, Crossref, OpenAlex, and Semantic Scholar Databases

| Cluster | Concept / Component |
|---|---|
| 1 | 21st century, Aerocity, airport development, assessment, aviation industry, capital, characteristic, competitive advantage, content, driver, economic activity, economic growth, economic impact, experience, field, future, global competitiveness, global economy, globalization, heart, importance, leverage, local economic development, object, place, resource, tourism, tourism development, urban development, urban form, urban growth, urban tourism, variety |
| 2 | Access, aerotropolis area, aerotropolis concept, aerotropolis planning, aerotropolis region, aerotropolis strategy, air transport, business district, direction, distance, economic engine, formation, increase, integration, literature, passenger, person, point, potential development, |

| | |
|---|---|
| | principle, recent year, regional economic development, relation, responsibility, size, spatial structure, subject, transport, transportation, understanding, user, work |
| 3 | Aerotropolis formation, aviation, centre, concentration, destination, distribution, economic, evidence, evolution, extent, firm, hotel, ict, insight, major airport, organization, question, scope, shopping, smart city, terminal, type, ubiquitous city, view |
| 4 | Addition, conversion, decision maker, economic hub, element, establishment, existence, gap, hybrid model, implication, key factor, land, land use, link, metropolis, new type, quality, regulation, successful aerotropolis, sustainable development |
| 5 | Aerotropolis conceptual design, aerotropolis development, aerotropolis development concept, aerotropolis model, aspect, component, effective aerotropolis plan, feasibility, human capital development, interest, layout, medium, movement, period, regional development, relationship, report, stakeholder, step, success |
| 6 | Aerotropolis project, challenge, core, desire, dual challenge, effort, migration, municipality, new urban form, prospect, proximity, socio economic development, vision |
| 7 | Capacity, construction, demand, era, evaluation, input, logistic, response, rise, settlement, spatial planning, speed |
| 8 | Citizen, competition, debate, labor, land resource, new aerotropolis, plan, preserved, sector, water |
| 9 | Aerotropolis expansion, competitive aerotropolis, cost, decision, farmer, force, framework, new era |

Table 4 presents the bibliographic coupling map's structure for the publications referenced in this research. The resulting clusters demonstrate the interconnections among various concepts, depicting the characterization of an aerotropolis through interrelated terms. Additionally, Table 4 highlights how different scientific methodologies contribute to defining the concept of an aerotropolis and its elements. The analysis successfully identified nine distinct clusters from the process of determining keywords, with the first cluster encompassing 35 concepts or keywords. According to the definition, cluster one describes how an aerotropolis involves metropolitan subregions whose land use, economy, and infrastructure are centered on airport activity. As time passes, the 21st century encourages airports to become centers of multifunctional activities and become pillars of globalization, so airport activities are increasingly developing. This has resulted in significant airport development so that the business model is transformed from the airport's primary role to all airport activities. The concepts and keywords included in cluster one include the airport becoming the urban center of a geographically expanded aerotropolis where the airport acts as a multimodal and commercial center. Not all cities that have large airports can be considered aerotropolises. The development of an airport city can meet the criteria for an aerotropolis if the airport city can provide a combination of modes of transportation, goods, logistics, industrial business, retail, and services with fast connectivity. Cluster two discusses the aerotropolis concept with various criteria, including area, district, spatial structure, and access speed. The world of aviation has become the center of global economic life, and its importance in socio-economic activities continues to multiply. The concept of an aerotropolis with an urban design centered around an aviation center with various services and network support is being discussed in cluster three. City development with the u-city (ubiquitous city) concept encourages the development of fully connected infrastructure, including airports.

The concept group in cluster four discusses changes in the typology of airport land use globally due to the development of the aerotropolis concept. The aerotropolis development process requires land that can be developed around the airport. Aerotropolis land development must be integrated with the city development plan to direct harmonious development. Good management

of land conversion can be a critical factor in the success of aerotropolis development. The concept group in cluster five emphasizes the importance of planning aerotropolis development by the airport characteristics model and the characteristics of the city to be developed. Developing an aerotropolis concept design must involve all stakeholders with good resource, institutional, financial, operational, and managerial support. Cluster six contains concepts for aerotropolis development as an effort made by governments in various countries to find a profitable position in the global economy. The presence of an aerotropolis can attract high-skilled workers, tourists, and foreign investment to come. The development of an adequate and modern aerotropolis can be a catalyst for inclusive social and economic development.

Aerotropolis contains a sprawling integrated airport area where, in this area, there are supporting services such as hotels, offices, businesses, as well as distribution and logistics facilities. Cluster seven discusses concepts closely related to one of the indicators of aerotropolis success, where growth patterns, land use, and business development around the airport grow well. The growth of the spatial area around the airport must have a proportional and balanced composition where every business and supporting service can support the growth of the aerotropolis. The development of an aerotropolis area requires vast areas of land; often, the development of an aerotropolis area threatens agricultural land, water resources, and even green areas in a region. Cluster seven emphasizes the importance of sustainable aerotropolis development. In some cases, the construction of aerotropolises causes droughts and floods and, in the long term, can bring about climate change in a region. The pros and cons of aerotropolis development often revolve around comparing the productivity of land when used as an aerotropolis or for other productive activities such as agriculture and plantations. Expansion of the aerotropolis area often results in losses due to land eviction, relocation of residents, problematic compensation, loss of flora and fauna, and conversion of agricultural land. Aerotropolis development is often associated with neo-liberalism practices, which only benefit prominent entrepreneurs due to increased transportation connectivity. Cluster Nine discusses how it is necessary to reduce the negative impacts of aerotropolis development behind its potential and promising positive impacts.

### 3.2. Classification of Research Concepts or Keywords Based on Publication Year Period

In this research, from the selected 772 publications, the concepts or keywords that appear most commonly and are interconnected in sequence include aerotropolis concept, plan, land, aerotropolis development, aerotropolis model, aerotropolis project, future, aviation, challenge, and sectors. The subsequent table highlights the dominant concepts or keywords identified in publications centered on aerotropolis themes.

**Table 5.** Evolution of concepts or keywords from year to year

| Year of Publication | Discussion of Concepts/Keywords |
|---|---|
| 2000-2008 | Logistic, speed, shopping, economic engine, urban development, hotel, rise |
| 2009-2010 | Economic impact, major airport, access, concentration, urban form, 21st century |
| 2011-2012 | Recent year, future, feasibility, ict, global competitiveness, response, economic hub, evolution, transportation, report, success, understanding, terminal, heart, destination |

| Year of Publication | Discussion of Concepts/Keywords |
|---|---|
| 2013-2014 | Aviation industry, user, distribution, insight, firm, metropolis, assessment, globalization, global economy, aviation, question, demand, importance, link, competition, content, economic, competitive aerotropolis, variety, view, economic activity, proximity, transport, leverage, element, aerotropolis planning, type, air transport, centre, passenger, force, existence, reference, decision maker, spatial structure, establishment |
| 2015-2016 | Effort, framework, experience, organization, new type, work, place, challenge, sustainable development, sector, tourism development, economic growth, extent, water, addition, plan, literature, cost, key factor, driver, subject, aerotropolis model, conversion, urban tourism, aerotropolis concept, land, competitive advantage, business district, aspect, gap, municipality, field, object, implication, vision, component, urban growth, land use |
| 2017-2018 | Relation, relationship, tourism, capacity, citizen, hybrid model, successful aerotropolis, human capital development, core, quality, evidence, dual challenge, resource, regulation, decision, ubiquitous city, scope, capital, era, regional economic development, settlement, aerotropolis formation, aerotropolis development, formation, point, person, size, local economic development, desire, new urban form, aerotropolis project, period, aerotropolis conceptual design, prospect, socio economic development, increase, farmer, medium, interest, construction, integration, layout, migration, potential development, principle, responsibility, debate, direction, smart city, movement, regional development, step, aerotropolis strategy, aerocity |
| 2019-2023 | Aerotropolis development concept, aerotropolis expansion, labor, aerotropolis region, characteristic, distance, effective aerotropolis plan, new aerotropolis, preserved, stakeholder, land resource, evaluation, airport development, aerotropolis area, spatial planning, input, new era |

Table 5 presents an analysis of literature that organizes concepts or keywords by the year of their publication. This chronological classification of concepts or keywords provides insights into the evolving trends in aerotropolis-related literature studies. Between 2000 and 2008, studies on aerotropolis predominantly focused on the development of services around airports, including logistics, hotels, and regional development. The period of 2009-2010 saw literature exploring the impact of 21st-century development demands on large airports and their significant influence on the urban landscape and economic benefits for surrounding areas. In 2011-2012, the focus shifted to the development of hub airports and the transformation of airport terminal characteristics, tailoring airport management to the specific needs of the hub and its destinations. The years 2013-2014 marked an exploration of the dimensions of aerotropolis development and their links to global economic growth.

From 2015 to 2016, the literature emphasized government initiatives in constructing aerotropolises that are in harmony with urban spatial and regional development strategies. The 2017-2018 period was notable for its high productivity in aerotropolis research, featuring a broad range of keywords. The literature during this time extensively discussed the dual impact of aerotropolis development, highlighting not only its positive effects on transportation, economy, and tourism but also its detrimental impact on social, cultural, and environmental aspects. However, there was a decline in aerotropolis publications between 2019 and 2023. The primary focus during these years was on the adaptation of aerotropolises to a new era, emphasizing the need

to enhance synergy and sustainability in the face of economic disruptions, particularly in the transportation sector and aviation industry.

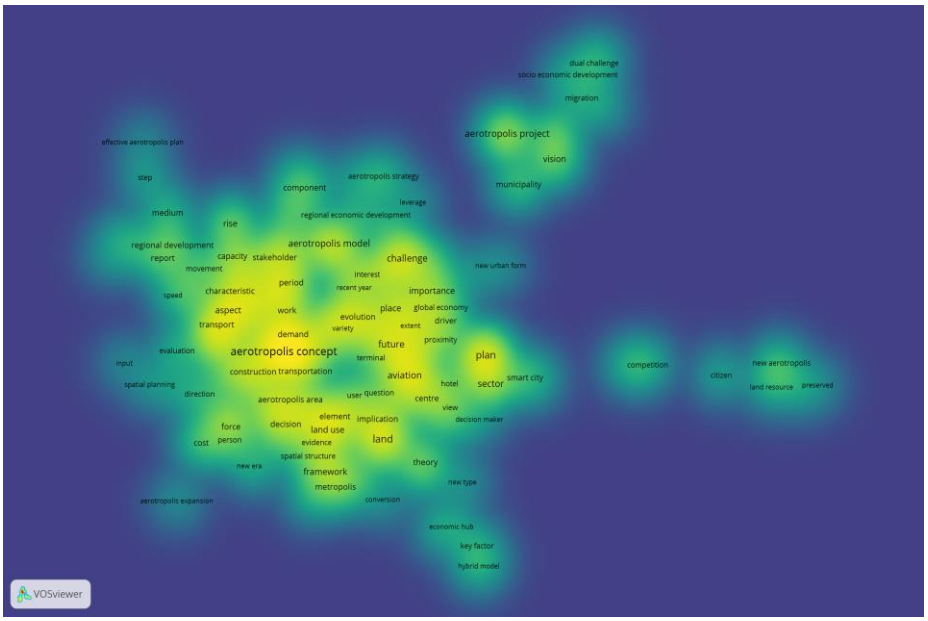


**Fig. 3.** Concept or Keyword Map Publication About Aerotropolis Using Vosviewer Software (Grouping Based on Density).

By classifying literature concepts and keywords based on the period of publication year, the evolution of the subject matter that is trending in aerotropolis studies from time to time can be known. A detailed timeline of aerotropolis studies helps increase understanding of the evolution of the aerotropolis research agenda and mapping shifts in research paradigms over time.

The image below shows the VosViewer output regarding the distribution of concepts or keywords based on the year the literature was published.

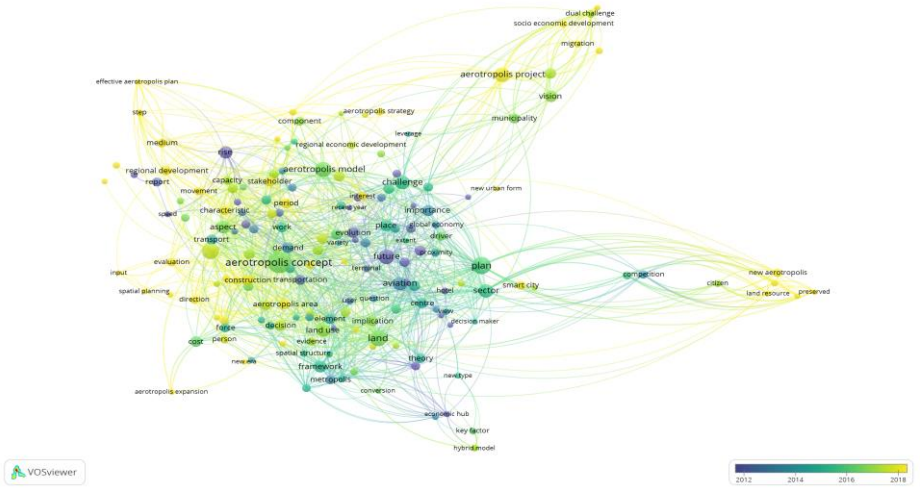


**Fig. 4.** Concept or Keyword Map of Publications About Aerotropolis Using Vosviewer Software (Grouping by Year).

## 4 Conclusion

This study primarily focuses on theoretical aspects rather than economic analysis; thus it does not provide calculations concerning the movement of goods, services, and passengers at airports, or assess logistics and supply chain aspects. The objective of this research is to apply one of the methodologies from the literature review to examine both external and internal factors associated with the aerotropolis concept. A quantitative approach using bibliometrics is employed to analyze bibliographic data. This involves exploring references in scientific articles featured in journals, charting the scientific domains covered by a group of journals, and categorizing scientific articles that utilize the aerotropolis concept. The bibliometric analysis involves a comprehensive review of numerous publications available to the researcher. Selected studies are used to elucidate various concepts that form and represent the aerotropolis, as well as the factors influencing it. This research entails a comparative analysis of statistical data regarding the number of publications, their impact, and the connections between concepts pertinent to the research keyword "aerotropolis."

With the help of publish or perish and VOSVoewer software, the author found publications with the critical term "aerotropolis" in the Google Scholar, Crossref, OpenAlex, and Semantic Scholar databases totaling 1,143 titles with 4,617 citations. Based on the publication bibliometric map, 9 clusters were formed with 175 concepts. Cluster 1 consists of 35 concepts, cluster 2 consists of 32 concepts, cluster 3 consists of 24 concepts, cluster 4 consists of 21 concepts, cluster 5 consists of 20 concepts, cluster 6 consists of 13 concepts, cluster 7 consists of 12 concepts, cluster 8 consists of 10 concepts, and cluster 9 consists of 8 concepts. The nine clusters related to the keyword "aerotropolis" can act as exogenous or endogenous factors in explaining aerotropolis.

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## References

[1] Syafarudin, A., and Mulyana, B., "Formulation Strategy of Pt. Bandara Internasional Jawa Barat Bandung Indonesia, Kertajati in Business Aerocity (Aerotropolis)," *International Review of Management and Marketing*, Vol. 9, No. 3, 2019, pp. 106–111. https://doi.org/10.32479/irmm.8113

[2] Ndaguba, E. A., Cilliers, J., and Ghosh, S., "A Systematic Review of a City in a City: An Aerotropolitan Perspective," *Land*, Vol. 11, No. 9, 2022. https://doi.org/10.3390/land11091499

[3] Kasarda, J., "Airport Cities : The Evolution," *Paper Report*, No. May, 2013, pp. 24–27.

[4] Schaafsma, M., "From Airport City to Airport Corridor," 2010.

[5] Kasarda, J. D., and Lindsay, G., "Aerotropolis: The Way We'll Live Next," Farrar, Straus and Giroux, 2011.

[6] Kasarda, J. D., "The Evolution of Airport Cities and the Aerotropolis," *Airport Cities: The Evolution*, 2008, pp. 1–39.

[7] Banai, R., "The Aerotropolis: Urban Sustainability Perspectives from the Regional City," *Journal of Transport and Land Use*, Vol. 10, No. 1, 2017, pp. 357–373. https://doi.org/10.5198/jtlu.2016.889

[8] Priharsari, D., "Systematic Literature Review Di Bidang Sistem Informasi Dan Ilmu Komputer," *Jurnal Teknologi Informasi dan Ilmu Komputer*, Vol. 9, No. 2, 2022, pp. 263–268. https://doi.org/10.25126/jtiik.202293884

[9] Rowley, J., and Keegan, B. J., "An Overview of Systematic Literature Reviews in Social Media Marketing," *Journal of Information Science*, Vol. 46, No. 6, 2020, pp. 725–738. https://doi.org/10.1177/0165551519866544