
SMART TRANSPORTATION SYSTEM EVOLUTION: A COMPREHENSIVE MAPPING AND ANALYSIS

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ABSTRACT

Smart transportation is an important trend worldwide, reducing accidents, traffic jams, and pollution. It uses technology and communication to parse errors and monitor everything online. This research aims to determine how to implement a smart transportation system to provide convenience for users and the city. Smart transportation systems are designed to reduce accidents, pollution, and other problems. However, many cities still need to implement them and require government approval. This research aims to implement the system in every city to ensure citizens can use it more. This research uses a qualitative and bibliometric analysis approach to analyze bibliographic research data in journals from 2012 to 2022. The cluster obtained from software shows that smart transportation uses the most electricity from ordinary transportation and requires a ready implementation system. Other topics related to implementing an intelligent transportation system, such as benefits and how to implement it, are obtained. The conclusion is that smart transportation must be implemented to reduce risks and make urban citizens feel more secure and comfortable using it.

Keywords: Evolution, Smart Transportation System, Smart City.

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INTRODUCTION

Research on smart cities and smart transportation has become one of the most frequently discussed to date, as we know that transportation is essential for the life of the community because this transport is one of those needs that are always used continuously. Not only do more people live in the city, but more problems in the city, especially traffic, occur because of the increasing amount of transportation used; therefore, there is a need for smart transport systems (L. Zhang et al., 2018). So, what is smart transport? Smart transportation, in our opinion, is the technology used in transport to help its use (Oswald, 2014); because smart transportation is made to solve existing problems, then it needs a way for intelligent transportation to be in line with the plan. The function of transportation is to relocate people from one place to another in a shorter time, both for themselves and together (Kadir Abdul, 2006). Transportation is seen as one of the most frequently used needs. A smart city has begun to plan to create smart transportation that will help the city clear up road problems. Then, introducing intelligent transportation also helps advance the smart city and move forward. Therefore, to realize this, it is necessary to map the smart transportation system, which must be done equally by the government.

Smart transportation has become one of the things that some smart cities have always considered over the past few years. Smart cities are beginning to look for ways to implement this smart transportation system comprehensively, even though some urban areas have already used

this intelligent transport system thoroughly, which also helps the city's economy (Lingli, 2016). The government does this because more and more people are using transportation, and the smart transportation system has an interest in making progress towards smart cities; not only progress, but this smart transport also helps add to the urban economy because of the sales value of smart transport, and also the damage caused by conventional transportation is less, than the profits such as that which the government does map this intelligent transport system (Ibrahim et al., 2021). Mapping this intelligent transportation system requires much collaboration, starting from the side of the transportation-making plan. There is also what technology to use against smart transportation, what features should be in the input into the technology that will later be used against such transportation so that it can help reduce the problems for those who use the transport, and also how to make the map done successfully used by the whole society. I think some of those things can help map smart transportation systems so that this smart transportation can grow worldwide yearly.

Research on smart transportation has been a lot, and many cities also want to use or implement this intelligent transportation system. Many authors also research this subject, later published in books or journals to supplement science in learning about smart transportation and smart cities. Then the exciting thing is that this writing is made to clarify more about a research trend that prioritizes the theme of smart transportation and smart cities. The calculation of this research is done to help the learning part to know who the author is the highest in doing his research after completion setting up its research which is with the theme of smart transportation and smart cities, not only can we also know and analyze what countries are involved in the research on the topic of intelligent transport and intelligent cities. This writing would also like to analyze who is an essential author in discussing the theme of smart transportation and this smart city. Not only that, but to deepen and expand on the theme of smart transportation, smart cities should prioritize looking at the most important topics first, which also helps writing. Another thing about this writing is that I look at everything by using a bibliometric approach with the help of a computer application called CiteSpace to find additional readings such as books and journals using Scopus. This research uses a method of analysis (Zupic & Čater, 2015). The learning offered in using this bibliometric is by using a way that is to gather the results of the data that can then be analyzed with quotations, authors, and also keywords (Leung et al., 2017).

Then, some previous studies have emerged on smart transportation and smart cities. (Andrienko et al., 2017). To say that this smart transportation system is a discovery that is being sought by many countries; each country makes this intelligent transportation product and therefore requires experts in making this smart transit where the expert understands everything about this smart Transportation system; in addition, it also supports the human ability to build this Smart Transportation System. (J. Zhang et al., 2011) This smart transportation is excellent when applied because it benefits safety during use. This smart transportation system is also made using excellent data and technology, thus reducing the unwanted risk when we use this smart transport system. The smart transport system is very well known for being the best for smart transport. (Attaran et al., 2022). Said that smart cities and smart transportation are interrelated because the challenges that must be met for a smart city include challenges in the implementation of public

burdens even more in the smart city has much technology used, so it also requires the transformation of the form of transportation system into smart transport.

From the explanation above, which is the result of previous research, it should be understood that smart transportation cannot use technology, especially in a smart city. Of course, such a thing must be noticed. Smart cities, as the most important thing, of course, plan this to get their benefit, for example, to help the city become more advanced. So, from that, this title is exciting and is a title that the whole world can use. This paper aims to see if the topic of smart transportation and this city is growing, and research on this topic of intelligent transport and this smart city is continuing to grow from 2012 to 2022. To help the writer who uses this bibliometric approach in this writing, aid with CiteSpace. The journals are obtained from Scopus (van Eck & Waltman, 2017).

METHOD

This article uses a qualitative method combined with the study of the readings obtained. The qualitative method, combined with the reading study, is one way to collect the data we find; the data we find is written data such as journals, articles, books, and even records, and other written data. The bibliometric approach displays data of various kinds, including data from journal results interviews and data from the last journal, which already existed. Some data are derived from the dictionary, which follows the theme chosen by the author, which is then analyzed by way of seeing the year the data was seen from various perspectives, which aims to determine the data related to the topic. The country or region of the issued journal, data corresponding to the author's topic, and the last data from the year (Liang et al., 2022). This writing uses the help of search engine journals, articles, readings, and also books or more familiar with Scopus; the step using SCOPUS is to press ADD TITLE where you enter the title with keywords such as ("Transport pinta"r) then select LIMITED TO (Languages, years, and open access) so that this emerged 136 articles, which to further deepen the writing with the theme of smart transportation and smart cities which from 2012 to 2022 to get 136 articles which are related to the topic. Scopus is the primary learning for the writer to do this writing. Scopus is known as the most important or most commonly used search engine for journals; Scopus is also known as a search engine that can find based on the category desired by the author in which the results of this search engine proved accurate (Valderrama-Zurián et al., 2015).

CiteSpace also assists this writing to help authors in making introductions about writing this smart transportation and smart city. The document obtained from the Cite space is done with the first step: selecting the keyword, reference, and writer. Then, the visual will appear, the result of which is used to help the writing. Then, press SUMMARY on the top to get the table results. Learning in aid with CiteSpace to observe the visualization of presentations with a bibliometric approach. Cite Space is one of the software that is on the computer to create and display bibliometrical approaches. The function of CiteSpace is to display bibliometric directions with specific results (van Eck & Waltman, 2010).

RESULTS AND DISCUSSION

The results of Scopus, which obtained 136 articles, produced data with various categories. The findings related to the theme of smart transportation and smart cities that the authors chose

to use from 2012 to 2022 have a lot of different views. This writing grouped all the data to make it easier to understand which of the years of the data, which country is most helpful in spreading research on a particular topic, where the journal comes from, then there is also the name of the author, the agency that issued the writing, and the relationship of the journal with the theme determined.

Years of Publication

Research with the theme of smart transportation and smart cities has often been on the lookout, so it has become a trend in learning in the last ten years. The reason this theme is often discussed is that, in the present era, technology has become more advanced and also increasing; the most core is the technology for smart transportation, where this transportation is often used once in day-to-day life, not only in the presence of smart transport also makes a profit for a smart city. From that point of view, I use this theme to make writing so that it can be used as a view in the learning category. The image below shows the trends of publications on smart transport and smart cities that will take place from 2012 to 2022.

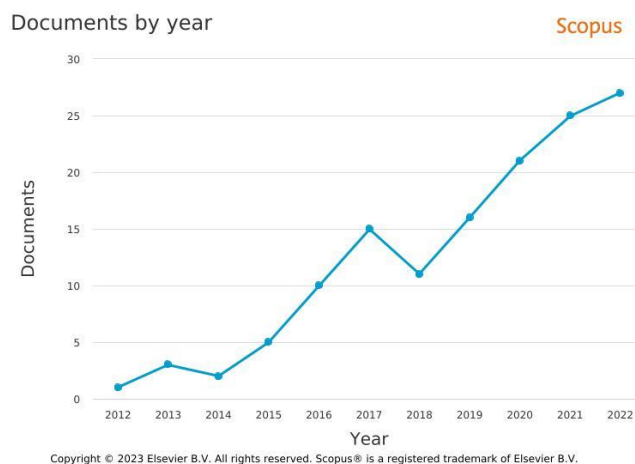


Figure 1. Based on year

The publication of findings on Green and Sustainable Development in Transportation Operations from 2010 to 2023 is depicted in Figure 2. From 2010 to 2012, only one document was published annually in the Scopus Database. In 2013, there were zero documents. However, from 2014 to 2015, there was once again one publication, and then in 2016, there was no publication. In 2017, the publication surge began with two documents; in 2018, the publication spike continued with the publication of four documents. Then 2019, there were two documents, and in 2020, there were four documents. There were three documents in 2021, four in 2022, and one in 2023. Thus, it is concluded that 2017-2023 is the starting point for making and maintaining progress.

Contribution of Different Countries

What is meant by the country's contribution here is that it is the country that gives the most publications corresponding to the theme of smart transportation and smart cities from 2012 to 2022. The image below shows the country that provides the publication with the theme of smart transportation and smart cities.

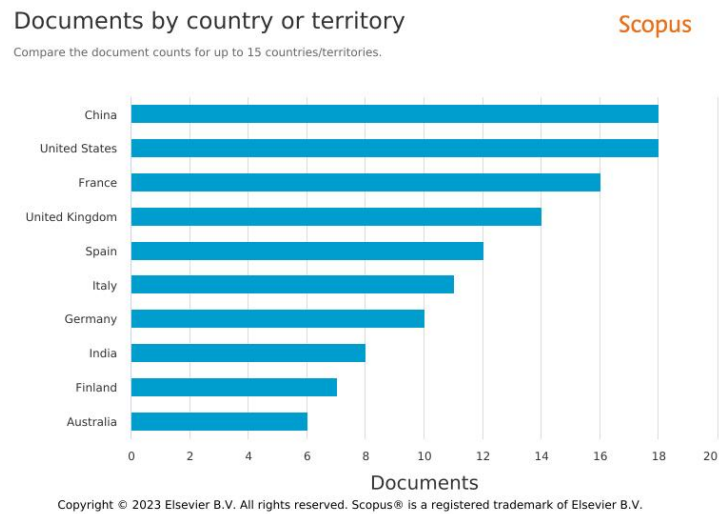


Figure 2. Based on country

The above picture shows that the most important country to give publications with the theme of smart transportation, and this smart city is the country of China is not only. The U.S. also has the most publication; these two countries have the same number of publications from 2012 to 2022, which is 18 documents read by Scopus. There is France, where the French published 16 documents, the UK published 14 documents, the Spanish issued 12, Italy published 11, and Germany only issued 10 documents. India also released only eight documents, Finland only seven documents, and Australia only six documents.

Sources of Publication

There are several origins of the publishers of this study, which have the themes of smart transportation and smart cities. The image below displays the ten most prominent publishers' origins in the smart transport and smart city themes.

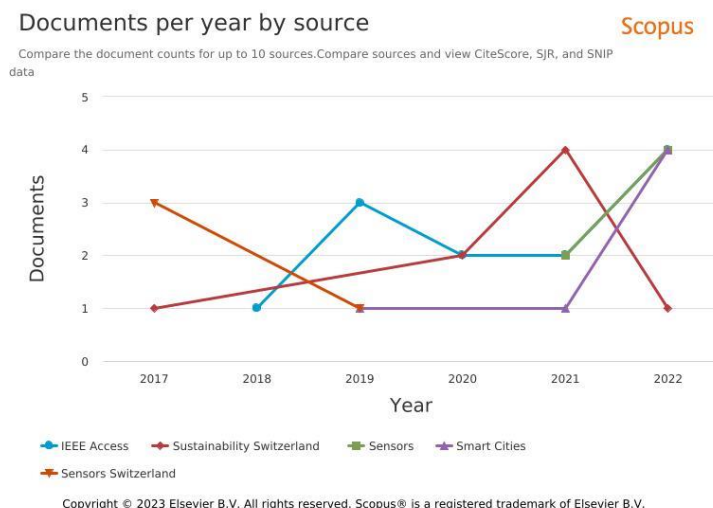


Figure 3. Based on sources

The above picture shows that, in fact, in 2012, not appeared the origin the publisher in the theme of smart transportation and smart city; the origin of this publisher appeared in 2017-2022 when the first "IEEE Access" was to have 12 documents, then there is also "Sustainability

Switzerland” which has the number of documents is 8. There is “Sensor,” which has six documents; there is “Smart Cities,” which has a number of documents. It is 6, the last “Sensors Switzerland,” which has only four documents.

From what we see above, Scopus makes calculations on its own; the smallest number is a number, which means that the journal has good quality. Also, the magazine has a difficult publication because the calculation of Scopus is q1-q4. Looking at all that has been written above, it can be seen that all the journals that were originally published in Scopus are a journal that has qualities that need not be questioned anymore. From this point of view, the theme of smart transportation and smart cities has several origin publishers that can say quite a lot, but all the journals written by the writer are of high quality.

Authors of Publication

The Scopus search engine survey results, which have data on smart transportation and smart cities, resulted in 136 authors’ surveys from 2012 to 2022. The images below show 15 authors, of which this author mostly researches the themes of smart transportation and smart cities.

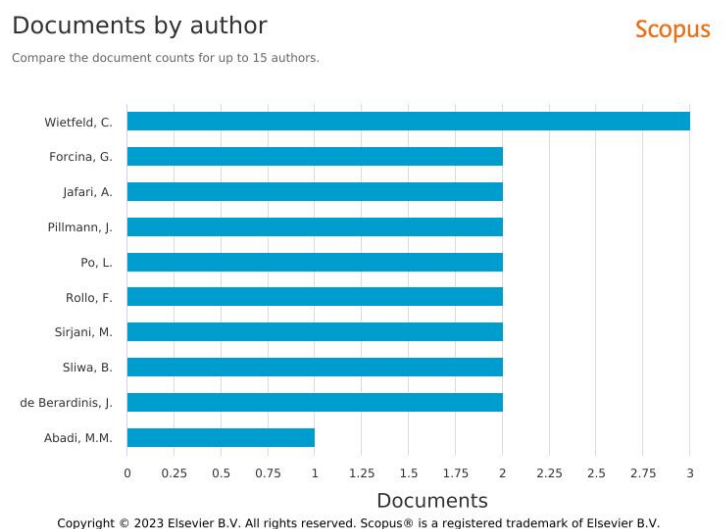


Figure 4. Based writer

The image shown above shows that the author “Wietfeld, C” is one of the most influential authors in the investigation with the theme of smart transportation and smart city, which lasts from 2012 to 2022 and is already in the indicator by Scopus. The author himself has three documents. Forcina, G.” the author, has two documents; there is also the author of “Jafari, A..” who has two papers; Pillmann, J” the writer himself, has two documents. Then “Po, L” has two documents as well, “Rollo, F” author also has only two documents, “Sirjani, M only has two papers, then there is “Sliwa, B” also only has 2 Papers, there also the author “de Berardinis, J” who also has just two documents, Then the last one is “Every, M.M” where this author only has 1 document in the topic of smart transportation and smart city.

Institutional Affiliation Analysis

Several organizations participated in their research in this writing on the theme of smart transportation and smart cities, which starts from 2012 until 2022, where this organization is, of course, from various world categories. The image below tells us that 15 categories of campuses worldwide joined in providing research on smart transport and smart city themes.

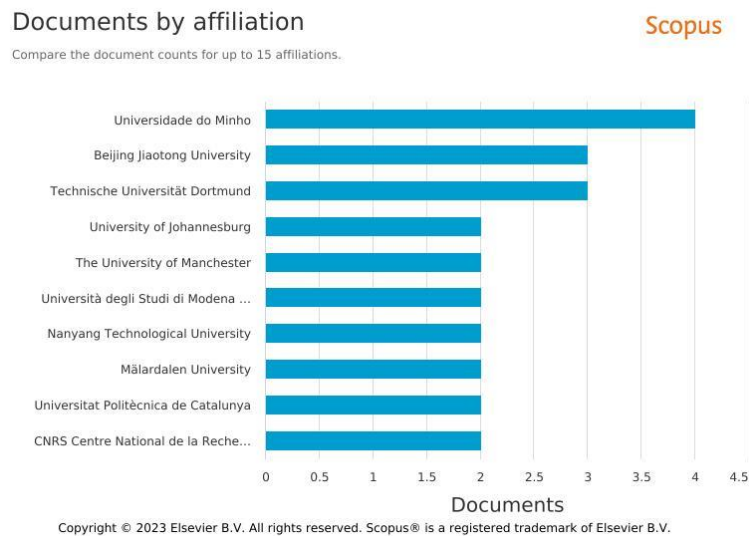


Figure 5. Strengthen the Institution

The images that have been shown show that the most critical organization in providing its research on smart transport and smart cities is the “Universidade do Minho,” which provides the research of 4 documents, then there is the “Beijing Jiaotong University” which has the research provided of 3 documents. The organization “Technische Universitat Dortmund” also provides its distinction with three documents. There is the “The University of Johannesburg,” which has two documents. There is “The University of Manchester,” which gives two documents as well, and “Universita degli,” which also gives two papers.

Network Visualization with Density View

This mapping uses the result of the smallest number done on all publishers whose data has been obtained from Scopus; this smallest amount includes keywords, references, and authors, who are then used for CiteSpace. The image displayed below shows the results of keywords, references, and the keyword with 16 clusters, but only 15 clusters are in a summary of the search engine CiteSpace.

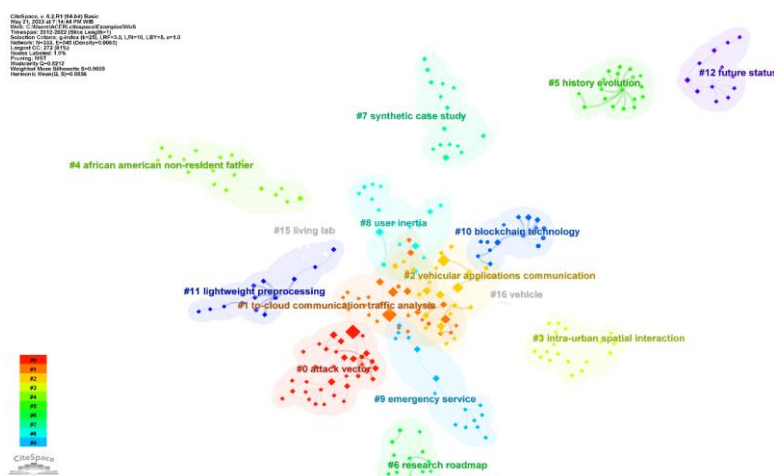


Figure 6. Improve the visualization.

The above image shows that each network in the image has its meaning. First, there are different colors and meanings of different colors; it has a group meaning, while the label or the writing has a keyword meaning in which the critical word includes the reflection and the author. While the cluster itself is intended for insights and descriptions of how bibliometric approaches are used, mapping illustrations are used to explain a broad description of bibliometric approaches. In Cluster #0, there is a vector invasion; then, in Cluster #1, there is to-cloud communications traffic analysis; in Cluster #2, there is vehicle application communication; in Cluster #3, there is spatial interaction in cities; in Cluster #4, there is African American non-resident father cluster #5, cluster there is historical evolution, then there is cluster #6 roadmap research, clutter seven there is a case study of the synthesis, then Cluster eight there is inertial user, then cluster nine there is emergency service. Cluster #10 is blockchain technology and cluster #11 is light pre-processing. You have cluster #12 of historical development, cluster #13 of living lab, and the last is a vehicle cluster. Of the 136 documents submitted to CiteSpace, 15 clusters were produced, 15 of which were clusters summarized from Citespace; therefore, below is a summary table of the cluster.

Cluster Summary Analysis

The table below is a summary of the results that were done by CiteSpace software to produce 15 clusters that are very related to this smart transportation system.

Table 1 summary clusters

NO	SIZE	SILHOUETTE	YEAR	LABEL (LRR)
0	34	0.918	2018	Attack Vector
1	31	0.909	2017	to-cloud communication traffic analysis
2	27	0.949	2019	Vehicular applications communication
3	21	0.998	2014	intra-urban spatial interaction
4	19	0.998	2016	American-resident father
5	18	0.971	2010	history evolution
6	17	0.962	2021	research roadmap
7	17	0,992	2018	synthetic case study
8	17	0.943	2017	user inertia
9	15	0.993	2014	emergency service
10	15	0.99	2020	blockchain technology
11	13	0.98	2017	lightweight reprocessing
12	12	0.979	2015	history evolution
15	9	0.966	2017	living lab
16	7	0.991	2021	vehicle

Cluster (#0) Attack Vector is one of the clusters with 34 documents; it also has a silhouette value of 0.918. The most mentioned documents within the cluster are 31 documents on smart cities, seven documents on artificial intelligence, and the latest documents on intelligent transportation; the most important documents in this cluster (Alhilal et al., 2022) t explain that many technological advancements make automotive companies use technology as a basis in smart transportation, i.e. by expanding the enlargement of data in vehicles and also of course there must be technology learning in the transportation engine which is related to the 5G network system.

Cluster (#1) to-cloud Communication traffic analysis comprises 31 documents with a silhouette value of 0.909. The most popular documents in this cluster are 30 documents on the Internet of Things, 12 documents on transportation, and ten documents on long-term evolution. Cluster (#2) Vehicular applications communication # has 27 documents with a silhouette value of

0.949. The most popular documents are 21 on 21 intelligent systems, 15 intelligent transport systems, and eight intelligent vehicle systems. Within these two clusters, the most important documents are (Moya Osorio et al., 2022a). With the emergence of 6G, there are many ways to think about smart transportation planning.

The cluster (#3) of intra-urban spatial interaction has a cluster of 21 documents with a silhouette value of 0.998. The most popular documents are two complex networks, 1 smart card, and one spatial reorganization. The most important documents are by (Sun et al., 2015), which explain which should understand how long-term urban transportation, which has so many challenges and the presence of defects in the long term, helps in urban evolution.

The cluster (#4) American-resident father has 19 documents with a silhouette value 0.998. The most popular documents are three algorithms, two articles, and one checklist. The most prominent document is (Julian et al., 2016), which describes a document that focuses on conducting random tests to determine whether a program is eligible or not.

Cluster (#5) history evolution has 18 documents with a silhouette value of 0.971. the most appearing documents are one electronic equipment manufacturer, one transportation industry 1 Fletcher S, 2011, NEW YORK, VElectricCars, PO, then the most important documents of this cluster are (Whittingham, 2012), which explains the storage of energy in which this energy storage must be highly renewable so that there is no explosion.

The cluster (#6) research roadmap has 17 documents with a silhouette value 0.962. The most prominent documents of this cluster are two wireless communications, two agricultural robots, and two education (Imoize et al., 2021). The 5G network is experiencing a lot of problems, especially at limited speeds and in poor catacombs so experts are preparing ways to address this problem with the help of 6G networks to help in smart transportation technology.

The cluster (#7) synthetic case study has 17 documents with a silhouette value 0.992. The most popular documents are four charging (batteries), two mobile telecommunication systems, and 2 electric power transmission networks (Moham, 2019). It explains a need for increased reliance on intelligent transport to overcome the unprecedented burden of electricity.

The user inertia cluster (#8) has 17 documents with a silhouette value 0.943. The most appearing documents are eight transportation systems, seven traffic congestion, and three applications. Then, the main documents (Ilié & Chaouche, 2017) explain that the smart transportation system has a basis that is dependent on the smart agent who can be aware of the conditions of the smart traffic rules.

Cluster (#9) emergency service has 15 documents with a silhouette value 0.993. the most frequently appearing documents are four motor transportation, four traffic control, and two wireless technology; the main documents in this cluster (Saber et al., 2013) explain that more and more people are using on-board applications that are smart apps on a mobile phone that are used for smart transportation.

Technological advances in the world now make transportation not want to miss its new look, which with this new look can make society more comfortable in using it. At this time, the use of transportation is increasing considerably, and of course, the increasing use of this also causes many things that are not desired when driving (Chen & Silva, 2021). Nowadays, there is transportation that uses technology, more known as smart transportation. The government is working hard to keep up

with existing transportation changes to help address problems that often occur during driving (Moya Osorio et al., 2022b). Governments should implement smart transportation to help their cities' financial economies. Not only does implementing this smart transport help cities become more advanced, but it also does so (Yang & Xu, 2018). So, from that research on smart transportation that uses technology to help this smart transport system, from a few years back, is very much in discussion. This is due to the rise of technology now, especially when we know that smart transportation is one of the most frequently used (Ribeiro et al., 2021). Therefore, this writing aims to explain the trends of the increasing publication views it makes every year, the participating countries, the organizations from which the publication originated, and the writing related to smart transportation in smart cities. Then, not only that, because of the danger of narrating and also the prominent topic of narration, that is what becomes a very important thing to do more extensive research. This is done to help find the middle path related to this smart transportation topic.

Previous writing (Leviäkangas & Ahonen, 2021) said that the frequent problems on the highway and also problems while driving made smart transportation plans a system for smart transport. Then there is also a study conducted by (Lenders et al., 2021), which in the writing of the research says that there are already some experts who have discussed how to run a smart transportation system. So, you can implement smart transportation systems that use highly renewable technology. Previous research, which originated from (Gouissem, 2020), said that smart transportation could be perfectly implemented when data from smart transport systems, which is data on transport usage, is input to smart transport cloud systems so that it can know how personal the user is. In addition, smart transportation is designed to help in solving problems on the highway. The study also says that when governments want to implement smart transportation systems, they must also consider many things so that smart transport can be used without restrictions. Almost all smart transportation systems prioritize technologies that are most often directly connected to networks such as 4G and 5G to help use these smart transportation.

Then, in connection with the theory of smart transportation (Garau et al., 2015), there are three indicators: private, public, and emergency transportation. These indicators are combined in the measurement of whether the level of success is high or not in the city because by measuring this rate of success then, the intelligent transportation system can continue to run. Not only is there also another theory (Anthony Jnr et al., 2020) which also explains about the other theory of intelligent transportation which for the success of the indicators that are in need of focus measurement to the area in which the smart transportation network and also the area that is the innovation in smart transport this is done aim to be able to know how the development of this smart transport. Therefore, this writing is made to tell you that it is very interesting to see the trend in publishing every year, and then you can also see that this smart transportation theme is quite high. Even the year 2022 was the highest publication year in the last ten years. It, therefore, proves that the theme of smart transportation cannot be separated from what is called technology. Students and authors discussed the subject. What we know for sure is that every different view depends on how we focus.

From the period 2012-2022, publications on the topic of smart transportation experienced a dramatically rising trend, as can be seen in Figure 1. From that point of view, the timeframe of smart transportation has increased so that intelligent transportation across parts of the world will

have a huge increase in the years to come. Because of this, an increasing number of smart transport designers are designing any system that should be implemented in smart transportation. (Sweeting & Hambleton, 2020) The increasing trend of publications on the topic of smart transportation has become proof that the state government also sees that transportation must be changed, which must continue to use the latest technologies.

Then, countries around the world have helped in publishing scientific research on smart transportation topics from 2012 until 2022, which has passed the Scopus agreement. Which finds that the longest-running country uses the implementation of a fairly high smart transportation system. China and the United States, which are the two largest and longest-running countries in implementing smart transportation systems, are shown by their presence in publications of scientific research on this topic. This is reinforced by research from (Expósito-Izquierdo et al., 2017), which says that with good technology and systems, it is possible to find new ways for smart transportation to work together. It's like China, where almost every citizen owns so much technology that in China itself, almost every transport and stop is filled with technology.

The study also has the opinion that smart transportation is supported by technology, which is based on the system that has been determined. There are two systems, which are technology with 5G and 6G networks, which help in focusing smart transportation systems.

In addition, this writing also found that "Wietfeld, C" became one of the authors that most gave his publication, which focuses on the implementation of smart transportation systems. One such study is titled "New System Architecture for Small Scale Motion Sensors Using 5G mmWave Channels." The study says that network technology is one of the highly renewable systems that can help in the movement of sensors by using 3D movement so that it can help the smart transportation in its system (Hager et al., 2021).

It then displays a network of visualizations based on keywords that use event analysis to identify where the direction of research and themes are popular and has also been demonstrated by helping find the progress of research programs and science. So, get 15 clusters. This cluster is used for the description of the bibliometric category, and then the mapping is a picture of the entire bibliometric network. Therefore, this writing finds that scientific research publications on the implementation of intelligent transportation in 2012-2023 that Scopus has already believed are related to 5G and 6G network systems technology.

Then, the result of the CiteSpace merger obtained a summary of 15 clusters, of which there are 3 clusters related to this writing; from the summary result, of course, with the help of CiteSpace, there are 3 clusters that I think are very related to the smart transportation system.

The most important is the keyword #vector attack, which, of course, cites 31 documents about smart cities, seven documents about artificial smart technologies, and the last is about urban transportation. The one on this main sticker writes about the technology that is now being used, which is a technology with progress every year; with this advancement, technology has transformed transportation, so it creates great opportunities for smart transportation. So the entire transportation can work together to provide new technology, such as engine manufacturing using large-scale data which is assisted by the 5G network system, so it can create applications that can be used for smart transportation which is based on 5G (Alhilal et al., 2022).

Then there is also a cluster that has a large number of clusters with the keyword #traffic analysis communications, in which the keyword quotes 30 documents which are about the Internet of Things, then there are also 12 documents that discuss transportation, and the last ten documents on long-term evolution. Then there is also the last cluster with the keyword communication application vehicle, which this keyword quotes 21 documents that discuss smart systems. Then, there are also 15 documents that discuss smart transport systems and eight documents that talk about smart road systems. The second and third cluster discusses how the smart transportation system for the future should be, which in the future has already been called the Internet network with the 6G system, so there must be the name of the application already made with the Internet network system 6G past which we know that smart cities only have the limit of the 5G internet network, with the rise of the network system also will definitely increase the intelligent transportation technology system so that there must be what is called security for the users of smart transport to avoid what is not desired in the collection of this smart transport technology (Rezwanul Mahmood et al., 2022).

CONCLUSION

This writing shows that the year 2022 is one of the years that made publications with a considerable amount with the theme of smart transportation and smart cities; of course, this publication is already in line with the policy in the search engine Scopus from 2012-2022. Then there are China and the United States, two countries that publish a considerable amount of publications on smart transportation and smart cities. Then, IEE is one of the origins of publications with a relatively high number. There is also the author who most often gives his idea in this research, "Wietfeld, C." This author gives his research from 2012-2022, which is recognized by the search engine Scopus. Then, there was an organization that conducted research on the theme of smart transportation and smart cities, "Universidade do Minho."

The results of the warning, which uses CiteSpace, found 15 clusters which have been summarized by Cite Space which is taken from the year 2012-2022 Cluster 0, but there is also a vector attack, then Cluster 1, there is to-cloud communications traffic analysis, cluster 2, there is vehicle application communication; Cluster 3 spatial interaction in the city, cluster 4 African American non-resident father, clutter five there is historical evolution, then there is cluster 6 roadmap research, Cluster 7 there are case studies of synthesis, then cluster eight there are inertial users, then Cluster nine there are emergency services. There is Cluster 10 of blockchain technology; Then there is light preprocess Cluster 11; then there is Cluster 12 of historical evolution, cluster 13 of living labs, and the last vehicle cluster. However, the main of these 15 clusters are three related to the future smart transportation system. However, this writing is considered successful in describing smart transportation trends from 2012 to 2022. However, this writing, of course, also lacks data collection or visualization because, using Scopus and CiteSpace, we suggest that it is possible to use other search engines and VOSViewer to make visualizations.

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