Trend of EASTS Research in the Past 20 Years

Takeshi KURIHARA [a], Naoyuki TOMARI [b], Taro ARATANI [c]

[a,b,c] *Institute for Transport Policy Studies, Tokyo, 105-0001, Japan*
[a] *E-mail: t-kurihara@jterc.or.jp*
[b] *E-mail: tomari@jterc.or.jp*
[c] *E-mail: aratani@jterc.or.jp*

Abstract: This is the 10th EASTS conference; almost 20 years have passed since EASTS was founded. More than two thousands of research papers have been presented at the past EASTS conferences. Research topics or methodologies may change as the EASTS countries' level of infrastructure or public transportation services improve. In this light, this paper reports trends in research of EASTS based on the content analysis of research titles. The result shows that some keywords such as "traffic accident" was frequently appeared for all years, it seemed to represent the constant importance in EASTS research.

Keywords: EASTS, Research Trend, Paper Title, Text-mining

1. INTRODUCTION

Eastern Asia Society for Transportation Studies (EASTS) was founded in 1994 with the objectives of fostering excellence in transportation research and practice and stimulating professional interchanges in all aspects and modes of transportation. In 2012, 17 countries join as the Domestic Societies and 1,528 members support EASTS activities.

EASTS organizes biyearly international conferences on transportation studies. The venues of past conferences were Manila, Seoul, Taipei, Hanoi, Fukuoka, Bangkok, Dalian, Surabaya and Jeju. The number of paper has gradually increased. 425 papers presented at the Jeju conference in 2011 (Figure 1). During this period, Asian countries experienced economic growth and urbanization (Table 1). Along with these situations, EASTS research trend such in topics or methodologies may be changed. Therefore, this study aims to investigate trends in research of EASTS from 1995 to 2011.

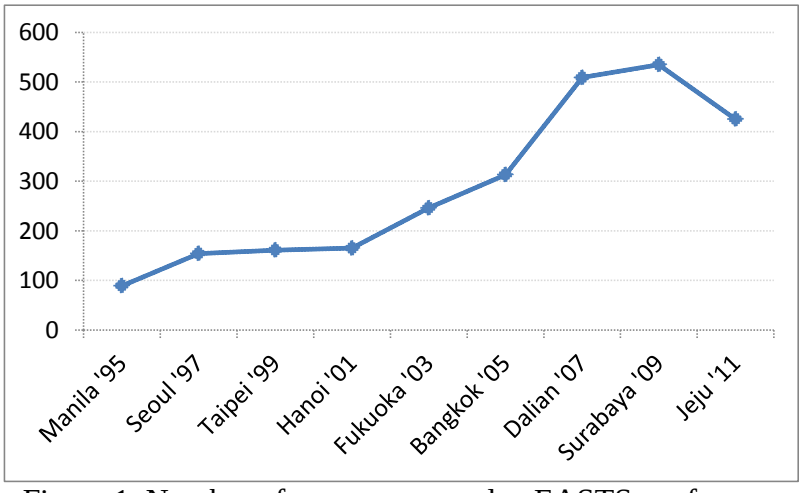


Figure 1. Number of paper presented at EASTS conference

Table 1. Statistics of selected Asian megacities

Countries	Metropolitan	Population in 2010(thousand) Metro	Core	GDP per capita (US$) National	GDP average growth rate(1980-2010) (%) National
China	Shanghai	19,213	10,720	3,744	10.2
Taiwan	Taipei	6,753	2,620	16,423	5.9
Indonesia	Jakarta	24,100	10,100	2,349	5.2
Japan	Tokyo	31,036	8,653	39,738	2.2
Philippines	Metro Manila	21,420	13,503	1,796	2.6
Korea	Seoul	22,130	10,581	21,870	6.8
Thailand	Bangkok	11,970	9,100	3,893	5.5

Source: Morichi and Acharya (2013)

2. METHODOLOGY AND DATA

There are several approaches to analyze research trends. To observe the number of papers by country is one of the alternatives.

A text-mining approach is applied in this study (Murai et al. (2010); Sugiuchi et al. (2011)). Many applications are proposed and available for free. Text-mining is a method of clarifying appearance frequency and relativity of words in the sentences. A data used in this study is the proceedings of EASTS. There are eight proceedings (from second conference in Seoul) which can be accessed for each paper. A paper has so large amounts of information. Therefore, we focused on research title because a paper title represents research field, methodology or area of analysis in a limited sentence.

Figure 2 shows flow of this research. At first, words used in research titles are extracted from proceedings paper. Secondly, a text-mining approach is applied for those words in each EASTS conference. Thirdly, the approach is applied in all EASTS conferences focused on time series variation.

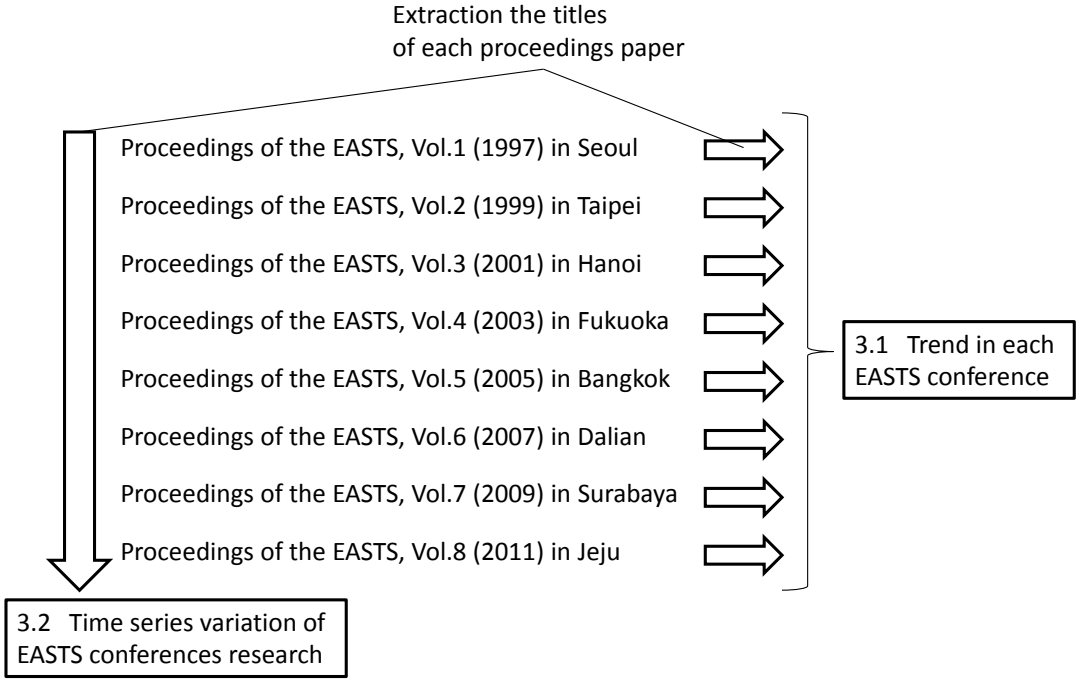


Figure 2. Flow of this research

3. EASTS RESEARCH TREND

In this paper, we form co-occurrence networks for the relationship between high frequent words in the titles in order to understand what concerns of the authors are presented in the research titles and in what context the concerns are presented as the entire spectrum. So we need to note that low frequent words that might be important are not extracted in this paper. In a co-occurrence network in this paper, a node means a word with the size as frequency and the color as the centrality index (from blue (low) to pink (high)). And a link means a relationship of co-occurrence. If a link is bold, it means a strong relationship. But the length of a link has no meaning. Additionally, the distance between two nodes is also not meaningful. The linking and the width of a link are just important.

Some conditions are set initially as followings: 1) choosing minimum term frequency as the number of selected words is more than 50 (but for 1997 and 1999, setting 2 as minimum terms frequency because of low papers); 2) setting top 60 as the filter edges.

3.1 Trend in each EASTS conference

Figure 3 shows the result of co-occurrence networks for each conference.

Except for the finding that "transportation", "model" and "analysis" were the keywords most frequently used for paper titles, we got the following results.

"Transportation" had co-occurred with "planning" or "management" in 1990's. It turned to have co-occurred with "model", "analysis", "service" or "intercity" since 2001. This implies that the area of transportation research has been getting wider. "Intercity" is a new keyword which co-occurred with "transportation".

The co-occurrence networks also suggest some other trends;

"Highway/expressway" has recently turned to co-occur with "estimation" or "evaluation", instead of "network" in the earlier period.

"Bus" was a frequently-appeared keyword, but keywords co-occurring with it have shifted from "operation" or "transit" to "service".

On the other hand, during the period of 1997 to 2011, "traffic accident" has always appeared. Therefore, "traffic accident" and "safety issue" are much important among Asian countries.

"Road" and "railway" has also been appeared frequently. However, the frequency itself has gradually decreased in the context of co-occurrence with some particular terms.

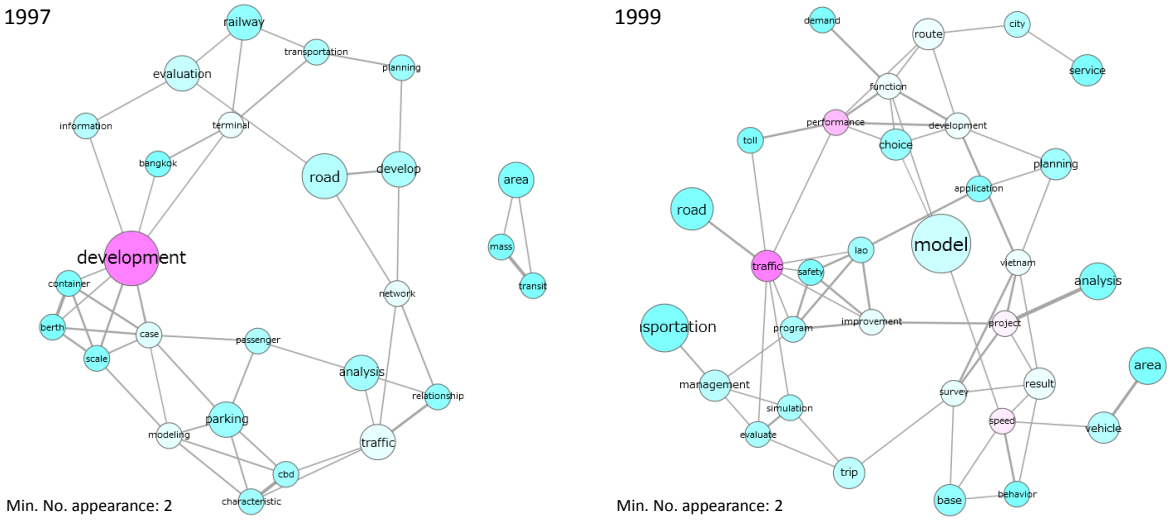
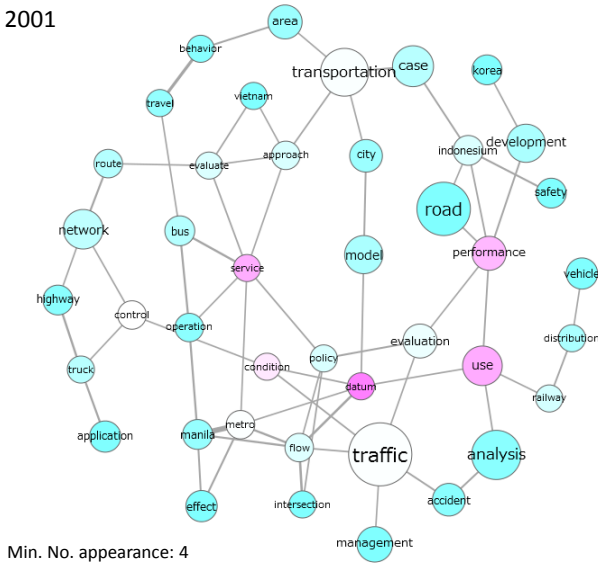


Figure 3. Text-mining analysis by conferences



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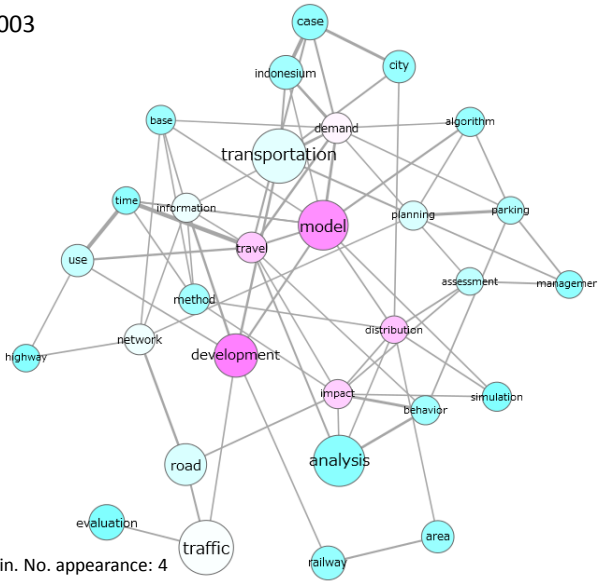

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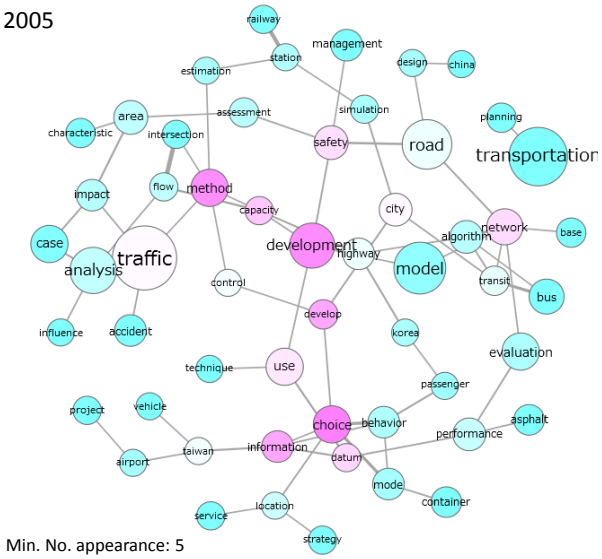

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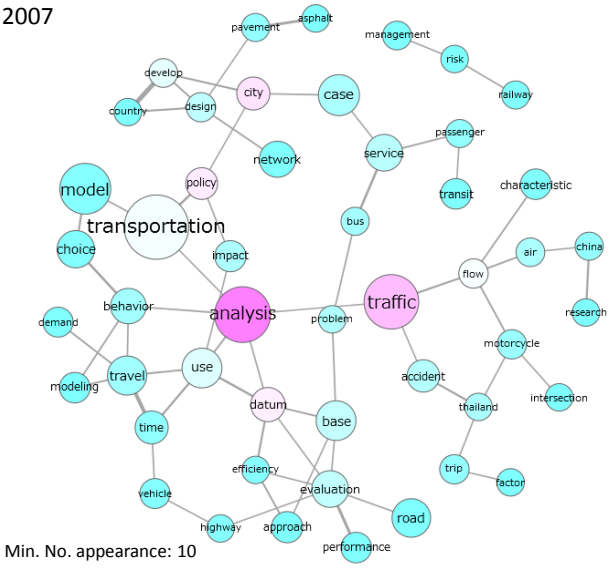

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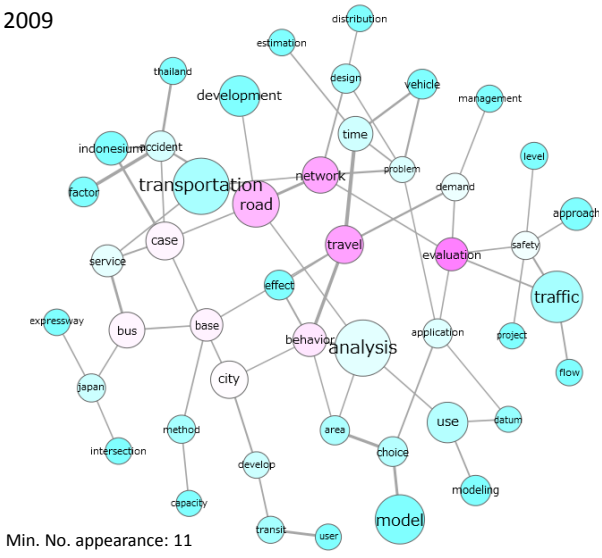

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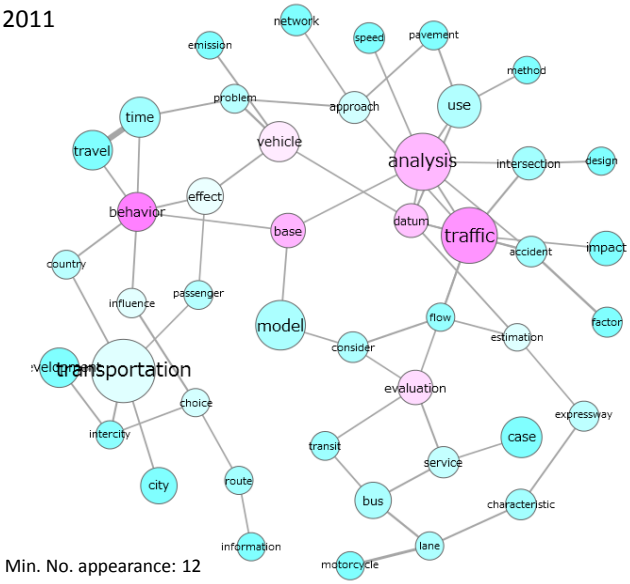

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Figure 3. Text-mining analysis by conferences (continued)

3.2 Time series variation of EASTS conferences research

In this section, we tried to analyze time series trends by using the pooling data for all conferences (Figure 4). But year of 1997 and 1999 was excluded due to the data shortage. This time, a node colored yellow shows the keyword co-occurred frequently (with some terms) in one year (conference). That color is getting dark as the keyword co-occurred frequently in several years (conferences). For instance in Figure 4, "road" has frequently co-occurred in 2001, 2003, 2005, 2009 and 2011. The link only connects keywords to year.

You can see that "network" is frequently appeared in 2001 and 2009. When it focuses on "network", figure 3 suggests that "network" co-occurred with "highway", "control" or "route" in 2001, while it co-occurred with "road", "design" or "evaluation" in 2009. That means that, even though the same keyword was used in the research title in different years, research targets or approaches has been changed over time.

"Travel" has appeared after 2007. Figure 3 shows that "travel" is getting co-occurred with "time" or "behavior" frequently. This implies that "travel time" and "travel behavior" are ones of recent trends of EASTS research. In 2011, "time", "vehicle" and "behavior" appeared frequently when it compared to the other conferences. "Time" co-occurred with "travel", "behavior" or "problem", "vehicle" co-occurred with "effect", "problem", "emission" or "datum", and "behavior" co-occurred with "influence", "country", "travel", "time", "effect" or "base" (figure 3). Although some low frequent words were not analyzed, several trends were found in this paper.

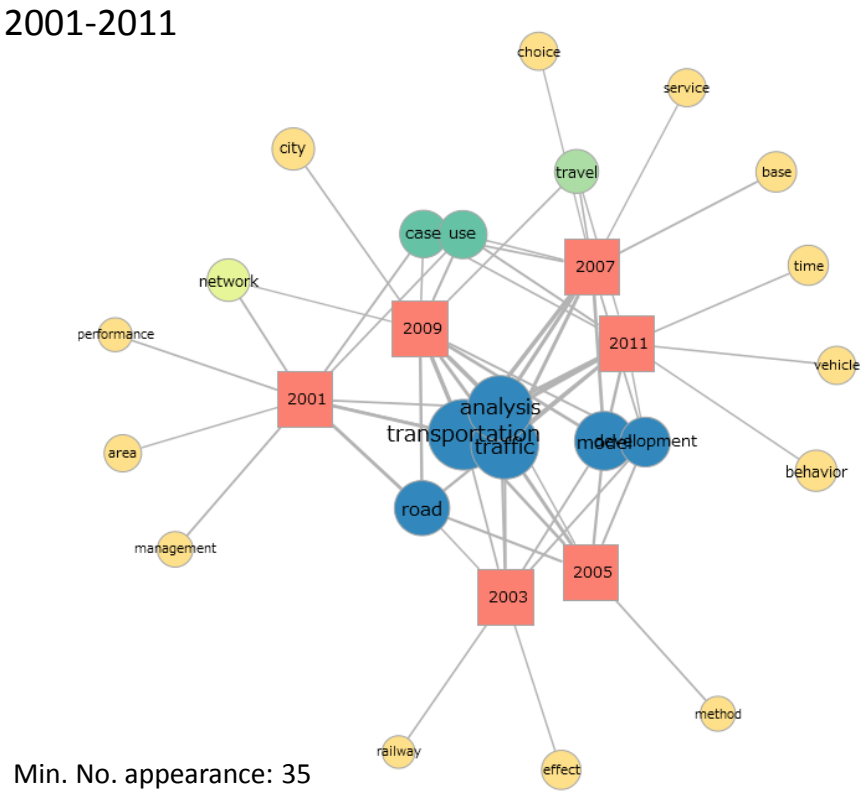

Figure 4. Text-mining analysis for all conferences (2001 to 2011)

4. CONCLUSION

For the objective of investigating research trends of EASTS, we tried to analyze the research titles based on the text-mining approach.

We found four types of trends from this analysis.

1) Constantly frequent

During the period of 1997 to 2011, "traffic accident" has always appeared. Therefore, traffic accident and safety issue have showed the great importance among Asian countries.

2) Co-occurred keywords change

"Network" co-occurred with "highway", "control" or "route" in 2001, while it co-occurred with "road", "design" or "evaluation" in 2009. We find changes of research targets or approaches over time.

3) Recently frequent

Some co-occurred keywords have gradually increased. For instance, "bus" and "service", "travel" and "time" or "travel" and "behavior"

4) Recently infrequent

"Road" and "railway" were used to appear frequently. However, the frequency itself has gradually decreased.

Although this study only analyzed research titles, several suggestive trends are able to be found out. More detailed information such as nationality of authors or study areas would be required for further analyses.

This study has several limitations with regard to the data that we investigated. First, the research trends which are analyzed in this study depend on the paper titles. Most titles did not include study areas and research trends by country could not be analyzed in this study. Secondly, we could not analyze trends by research categories due to data shortage. Although EASTS has variety of research topics from A: Transportation General to J: Air and Water Transportation, the research trends could not be found out in some topics such as logistics or regional planning (Table 2). Viewpoints of EASTS characteristics compared with the other academic societies were also not found out. The strength and weakness of EASTS will be able to understand after comparing the research trends with other societies, for example, TRB, WCTR or among others.

Table 2. EASTS research topic and trend analysis limitation

Topic	Key word	Trend Analysis
A Transportation General	Asia, Poverty, Cooperation, Disaster	×
B Transportation Economics and Policy	Pricing, Financing, TDM, ITS	×
C Travel Demand Analysis and Forecast	Behavior, Demand, Network	○
D Logistics and Freight Transportation	Logistics, Freight	×
E Regional Planning and Environment	Regional, Environment, Energy, Tourism	×
F Public and Non-motorized Transportation	Railway, Bus, Pedestrian, Bicycle, TOD	○
G Highway Design and Maintenance	Highway, Design, Pavement, Parking	△
H Road Traffic Engineering	Flow, Control, Motorcycle	○
I Traffic Accident and Safety	Accident, Safety	○
J Air and Water Transportation	Air, Port, Airport	×

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