ISBN: 978-93-86291-30-1

PROCEEDINGS OF

Academics World

INTERNATIONAL CONFERENCE

DATE: 21ST-22ND NOVEMBER, 2016

VENUE: LOS ANGELES, USA

Association With

World Research Library

The Res

PROCEEDINGS OF

ACADEMICS WORLD 52nd INTERNATIONAL CONFERENCE LOS ANGELES, USA

ISBN- 978-93-86291-30-1

Organized by

academics world

Date of Event:
21st-22nd November 2016

Event Co-Sponsored by

Corporate Address
IRAJ Research Forum
Institute of Research and Journals
Plot No- 161, Dharma Vihar, Khandagiri, Bhubaneswar, Odisha, India
Mail: info@iraj.in, www.iraj.in

Publisher: **IRAJ**

ISBN- 978-93-86291-30-1

Type set & printed by:

R. K Printers
Bhubaneswar, India

About IRAJ Research Forum (IRF):

The ***IRAJ Research Forum*** is an International non-profit academic association under 'Peoples Empowerment Trust' with the stated goals of promoting cooperation among scientists, defending scientific freedom, encouraging scientific responsibility, and supporting scientific education and science outreach for the betterment of all humanity. It is the one of the world's largest and most prestigious general scientific society.

Objective of IRF:

- To provide a world class platform to researchers to share the research findings by organizing International/National Conferences.
- To use the research output of the conference in the class room for the benefits of the students.
- To encourage researchers to identify significant research issues in identified areas, in the field of Science, Engineering, Technology and Management.
- To help dissemination of their work through publications in a journal or in the form of conference proceedings or books.
- To help them in getting feedback on their research work for improving the same and making them more relevant and meaningful, through collective efforts.
- To encourage regional and international communication and collaboration; promote professional interaction and lifelong learning; recognize outstanding contributions of individuals and organizations; encourage scholar researchers to pursue studies and careers in circuit branches and its applications.
- To set up, establish, maintain and manage centers of excellence for the study of /on related subjects and discipline and also to run self supporting projects for the benefit of needy persons, irrespective of their caste, creed or religion.

About Academics World:

Academics World is a non-profit organization that promotes the Engineering and Technology, Science and Medical related latest developments and issues to be discussed and experimented through interactions amongst the researchers and academician across the globe at a common platform in association with IRAJ & The IIER.

Conference Committee

Program Chair:

Dr. P. Suresh
M.E, Ph.D. Professor and Controller of Examinations,
Karpagam College of Engineering.,
Coimbatore, India.

Kevin Wongleedee
Suan Sunandha Rajabhat University,
Thailand

Sanam Jain
Nano Serendipity Consortium Private Limited,
Mumbai, India

ElifEroglu Hall
Bilecik SeyhEdebali University,
Bilecik, Turkey

Conference Manager:
Mr. Bijan Kumar Barik
Mob: +91-9776047497

Conference Convener:

Mr. Amareswar Sahoo, The IIER
Mob: +91-9007375847

Mr. Sanket Pattanayak, Academics World
Mob: +91- 7855922996

Publication Head:
Mr. Manas Ranjan Prusty, IRAJ, India

INTERNATIONAL ADVISORY MEMBERS

Prof. Goodarz Ahmadi,
Professor, Mechanical and Aeronautical Engineering, Clarkson University, USA

Dr Chi Hieu Le,
Senior Lecturer, University of Greenwich. Kent ME4 4TB. United Kingdom

PROF. (ER.) Anand Nayyar
Department of Computer Applications & I.T.KCL Institute of Management and Technology, Jalandhar
G.T. Road, Jalandhar-144001,Punjab, India.

Prof. R. M. Khaire,
Professor, Dept. Of Elex. and Telecommunication, B. V University, India

Mark Leeson
Associate Professor (Reader)
Area of Expertise: nanoscale communications,
evolutionary algorithms, network coding and communication systems

Dr. P. K. Agarwal
Professor, Deptt. of Civil Engineering, MANIT Bhopal ,Ph. D: IIT Kanpur
M.E. Civil Engg.IIT Roorkee, Membership: Indian Road Congress (IRC), Institute of Urban Transport (IUT)

Shahriar Shahbazpanahi
Islamic Azad University,
Department of Civil Engineering, Sanandaj, Kurdistan, Iran, PhD (Structural Engineering),
University Putra Malaysia, Malaysia , 2009-Present

★★★

TABLE OF CONTENTS

★★★

EDITORIAL

It is my proud privilege to welcome you all to the Academics World International Conference at Los Angeles, USA. I am happy to see the papers from all part of the world and some of the best paper published in this proceedings. This proceeding brings out the various Research papers from diverse areas of Science, Engineering, Technology and Management. This platform is intended to provide a platform for researchers, educators and professionals to present their discoveries and innovative practice and to explore future trends and applications in the field Science and Engineering. However, this conference will also provide a forum for dissemination of knowledge on both theoretical and applied research on the above said area with an ultimate aim to bridge the gap between these coherent disciplines of knowledge. Thus the forum accelerates the trend of development of technology for next generation. Our goal is to make the Conference proceedings useful and interesting to audiences involved in research in these areas, as well as to those involved in design, implementation and operation, to achieve the goal.

I once again give thanks to the Academics World, Institute of Research and Journals & The IIER for organizing this event in Los Angeles, USA. I am sure the contributions by the authors shall add value to the research community. I also thank all the International Advisory members and Reviewers for making this event a Successful one.

Editor-In-Chief
Dr. P. Suresh
M.E, Ph.D. Professor and Controller of Examinations,
Karpagam College of Engineering.,
Coimbatore, India.

■■■

EVALUATION OF PUBLIC TRANSPORT BUS NETWORK IN BANGKOK

CHALERMPOL TAPSAI

College of Innovation and Management SUAN SUNANDHA RAJABHAT UNIVERSITY Thailand
E-mail: [1]chalermpol.ta@ssru.ac.th, [2]paul.pattara@gmail.com

Abstract- The purposes of this paper were to study and evaluate the network system of public transportation utilizing public bus service operated in Bangkok, in order to understand the efficiency of the network system as well as to search for the main nodes which are highly affect the performance of the network and the shortest routes as the alternative in case of emergency to reach the main nodes. The scope of this research included all Bangkok bus terminals or bus stops. The author had collected the information of path number, path and bus stop, with interviews conducted with the local passengers in order to locate 80 most important bus stops. The PAJEK program was utilized to define the main nodes which were Pratu Nam, Bang Plad and Phahonyothin, which had heighest Betweenness Centrality equaled to 0.192991, 0.147541 and 0.13871 respectively, and the three busiest nodes which carried highest amount of buses were Ratchayothin, Sam Yan MRT Station and Pratu Nam, which had the Weighted Degree Centrality equaled to 24, 23 and 21 respectively.

Keywords- Bus, Network, Public Transportation, Centrality.

I. INTRODUCTION

Bangkok metropolitan is the capital of Thailand occupied by a huge population, those both originally living there, moving or relocating from other places to settle, study and work, and traveling around. People always commute from places to places within Bangkok and to other destinations, resulting in a critical demand of efficient and effective mass transit and public transport. If the public transport is not good enough, it will have many problems such as traffic jam and poor toxic to general heath of the population [1]. Currently, land public transport, excluding rail mode operated in Bangkok and neighboring suburbs is public bus service administrated solely by Bangkok Mass Transit Authority. There are currently 115 bus service lines fleeted by 3,008 buses [2].

II. LITERATURE REVIEW

The 2015 report of passenger traffic in Bangkok revealed that there were 224,363,943 passengers' trip using public bus service daily [3]. Especially during rush hours longer time is spent on road travel. Degree of traffic congestion and crowds around bus stops as a result of vehicles traveling at slower speeds and increased queuing becomes even intense caused by unpredictable accidents, events and weather, for example raining, constructions, special events and demonstrations or street protests. This requires the buses to change routes, which makes trip times longer. This problem has been likely solved as immediate remedies, rather than promising a long-term effect, yet contributing no real effective performance due to an absence of efficient, accurate and systematic data collection and analysis of the public bus network system.

In this regards, this paper provides an investigation for the structure of the public bus network system in Bangkok, analysis of effective system, identification of significant or main nodes that influence an efficiency of the public bus transport system, and recommendation of secondary shorter routes in case of emergency occurred at the main nodes.

III. DETAILS EXPERIMENTAL

3.1. Materials and Procedures

The study aimed to identify the network system of public bus transport service in Bangkok in order to find main transport nodes characterized as influencing points affecting an efficiency of the public bus transport system; to investigate impacts in case of emergency occurred at the main nodes; and to suggest secondary shorter routes for each bus line. The study was based on the secondary data sought from various sources relating to public bus service in Bangkok. A primary source was the website of Bangkok Mass Transit Authority which is solely authorized in the administration of public bus service in Bangkok. The data involved bus operation that included path number, path and bus stop of each bus line. The collected data was analyzed with readiness of the amount of buses at each stop, the number of passengers with their opinions towards the service at different times: morning time (7.00- 9.00 am), daytime (12.00- 2.00 pm), and night time (6.00- 8.00 pm). This was carried out in order to obtain 80 important bus stops that had high traffic or were used by most passengers and bus lines. After that, these 80 bus stops were employed as the nodes for the analysis of the public bus network system, and for the measurement of distance between nodes on each routes fleeted by different bus lines using Google Map. The PAJEK Program was implemented in building a simulated model of directed network as shown in Fig. 1-2.

Betweenness Centrality of graphs is the value to explain the center link to other nodes in the network

system, illustrating the network system determined by weighing link between nodes with the distance was calculated. Then, Weighted Degree Centrality of graphs is the value to explain the quantity of buses travel in and out the node and illustrating the network system determined by weighing link between nodes with amount of bus lines performing out-going from nodes was calculated [4]-[5]. Finally, the calculation results were used in considering the significant nodes determined by higher betweenness centrality and weighted degree centrality scores.

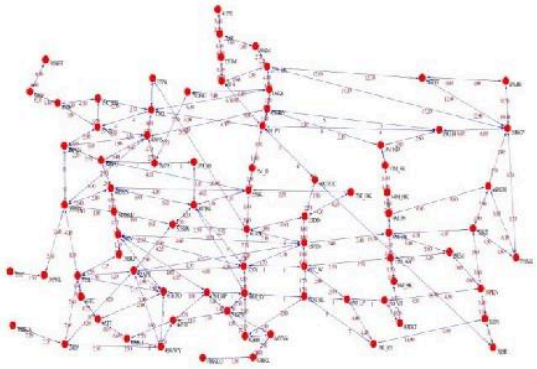

Fig.1. Network system determined by weighing link between nodes calculated by distance

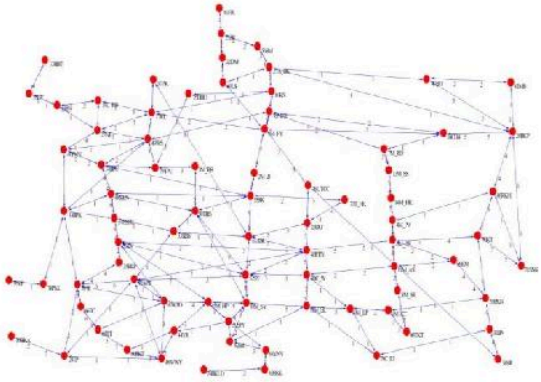

Fig.2. Network system determined by weighing link between nodes calculated by amount of bus lines

A simulation allowing the significant nodes in facing of unexpected emergencies was piloted and AODV Route Recovery technique was adopted in finding alternative shorter routes [6].

IV. RESULTS AND DISCUSSION

4.1. Betweenness Centrality Analysis

The result of the betweenness centrality analysis was shown in Table 1, reporting the top 10 nodes with higher score, ranking from the highest to the lowest. The first 3 high scored betweenness centrality presented Pratu Nam, Bang Plad and Phahonyothin.

Table 1: Betweenness Centrality Analysis

Node Code	Bus Stop	Betweenness Centrality
45PTN	Pratu Nam	0.192991
33BPA	Bang Plad	0.147541
5M_PY	Phahonyothin	0.13871
49WS	Wongsawang	0.135183
6M_PB	Phetchaburi MRT Station	0.134175
17KL	Kae Rai	0.127225
10M_SY	Sam Yan MRT Station	0.118985
72APT	Victory Monument	0.107302
50TBS	Bang Seu Marget	0.106402
52SY	Siam	0.101755

4.2. Weighted Degree Centrality Analysis

The weighted degree centrality analysis shown in Table 2 portrayed the top 10 nodes with higher score, ranking from the highest to the lowest. The first 3 nodes carrying the highest amount of buses included Ratchayothin, Sam Yan MRT Station and Pratu Nam.

4.3. The Analysis of Secondary Shorter Routes in Case of Emergency Occurred at the Main Nodes

The analysis presented the secondary shortest routes as alternative for the existing routes in case of emergency. Table 3 shows the analysis result revealing that there were 10 bus lines receiving an effect in case of emergency occurred at Pratu Nam Bus Stop, and 10 alternative routes were introduced. Table 4 presents 3 bus lines affected in case of emergency occurred at Bang Plad Bus Stop, and introduce 3 alternative routes. Table 5 reports 12 bus lines affected in case of emergency occurred at Ratchayothin Bus Stop, and gives 12 alternative routes.

Table 2: Weighted Degree Centrality Analysis

Node Code	Bus Stop	Weighted Degree Centrality
43MRY	Ratchayothin	24
10M_SY	Sam Yan MRT Station	23
45PTN	Pratu Nam	21
52SY	Siam	21
5M_PY	Phahonyothin MRT Station	20
61ASC	Victory Monument	19
16KS	Kasetsart University	18
51SL	Sanam Luang	18
6M_PB	Phetchaburi MRT Station	16
55SK	Saphan Kwai	16

Table 3: Secondary Routes for Pratu Nam Bus Stop in Case of Emergency

Bus Line	Existing Route	Alternative Route
2	72APT-45PTN-20C_W	72APT-52SY-20C_W
11	6M_PB -45PTN-52SY	6M_PB-12M_AS-20C_W-52SY
13	23DD-45PTN-20C_W	23DD-61ASC-52SY -20C_W
23	6M_PB-45PTN-26TV	6M_PB-12M_AS-20C_W-52SY-26TV
54	23DD-45PTN-20C_W	23DD-61ASC-52SY -20C_W
60	6M_PB -45PTN-72APT	6M_PB-12M_AS-20C_W-52SY -72APT
72	6M_PB-45PTN-26TV	6M_PB-12M_AS-20C_W-52SY-26TV
77	61ASC-45PTN-72APT	61ASC-53SDS-72APT
93	6M_PB -45PTN-52SY	6M_PB-12M_AS-20C_W-52SY
204	61ASC-45PTN-72APT	61ASC-53SDS-72APT

Table 4: Secondary Routes for Bang Plad Bus Stop in Case of Emergency

Bus Line	Existing Route	Alternative Route
18	54SSRU-33DPA-40PNN	54SSRU-68SYN-34BPO-40PNN
66	68SYN-33BPA-38PKL	68SYN-54SSRU-26TV-35BLP-51SL-38PKL
203	40PNN-33BPA-51SL	40PNN-34BPO-68SYN-54SSRU-26TV-35BLP-51SL

Table 5: Secondary Routes for Ratchayothin Bus Stop in Case of Emergency

Bus Line	Existing Route	Alternative Route
24	43MRY-5M_PY-76UTCC	43MRY-7M_RD-13M_SS-14M_HK-4M_P9-6M_PB-45PTN-23DD-76UTCC
26	43MRY-5M_PY-2M_JJ	43MRY-49WS-79TPU-3M_BS-50TBS-55SK-2M_JJ
29	43MRY-5M_PY-2M_JJ	43MRY-49WS-79TPU-3M_BS-50TBS-55SK-2M_JJ
34	43MRY-5M_PY-2M_JJ	43MRY-49WS-79TPU-3M_BS-50TBS-55SK-2M_JJ
59	43MRY-5M_PY-2M_JJ	43MRY-49WS-79TPU-3M_BS-50TBS-55SK-2M_JJ
96	18CH4-5M_PY-2M_JJ	18CH4-43MRY-49WS-79TPU-3M_BS-50TBS-55SK-2M_JJ
107	43MRY-5M_PY-76UTCC	43MRY-7M_RD-13M_SS-14M_HK-4M_P9-6M_PB-45PTN-23DD-76UTCC
129	43MRY-5M_PY-76UTCC	43MRY-7M_RD-13M_SS-14M_HK-4M_P9-6M_PB-45PTN-23DD-76UTCC
134	43MRY-5M_PY-2M_JJ	43MRY-49WS-79TPU-3M_BS-50TBS-55SK-2M_JJ
136	43MRY-5M_PY-2M_JJ	43MRY-49WS-79TPU-3M_BS-50TBS-55SK-2M_JJ
145	18CH4-5M_PY-2M_JJ	18CH4-43MRY-49WS-79TPU-3M_BS-50TBS-55SK-2M_JJ
191	43MRY-5M_PY-2M_JJ	43MRY-49WS-79TPU-3M_BS-50TBS-55SK-2M_JJ

The findings of this study demonstrated sensitivity of the public bus transport system in Bangkok to scheduled and unpredictable events. Thereafter the public bus service management in Bangkok requires improvements at a certain extent for urban passenger transport mobility, especially traffic around the main bus stops as the main nodes. Alternative routes with shorter distance must therefore be critically sought out as needed in public transport planning. The same nodes may remain as the same stops fleeting in and out for the bus lines, or new nodes may also be proposed as temporary and secondary stops to increase the existing traffic capacity and mobility.

CONCLUSIONS

This study allowed the author to see capability of Bangkok's public bus service in unusual setting through the simulation. Further studies may utilize other types of mass transit for instance supporting bus service operated by private companies, Bangkok Mass Transit System or BTS and public passenger ferries. Moreover, there should be an integration of data across different public transport services for demonstration of traffic simulation in order to increase an effectiveness of Bangkok's public transport system as a whole.

ACKNOWLEDGMENTS

The author would like to thank the Research and Development Institute, Suan Sunandha Rajabhat University, Bangkok, Thailand for financial support. Also, the researcher would like to thank Dr. Kevin Wongleedee, Director of Institute of Lifelong Learning Promotion and Creativity for proof reading this research paper.

REFERENCES

[1]. Choo-In, S., 'Zinc Contaminate on Urban Roadside in Rush Hour, Bangkok, Thailand'. World Academy of Science, Engineering and Technology, International Science Index 91, International Journal of Environmental, Chemical, Ecological, Geological and Geophysical Engineering, 8(7), pp.489 – 492, 2014.

[2]. Bangkok Mass Transit Authority, "Annual Report 2015", pp. 17-18, 2015.

[3]. Traffic and Transportation Bangkok Department, Bangkok, "Traffic statistics, 2015", pp. 78-79, 2015.

[4]. Bisharat, R.M., "Identifying important nodes in weighted covert networks using generalized centrality measures", Proceedings, European Intelligence and Security Informatics Conference, pp. 131-137, 2013.

[5]. Santiago, S. and Alejandro, R., "A stable betweenness centrality measure in networks", IEE International Conference on acoustic, speech and signal processing (ICASSP), pp. 3859-3862, 2014.

[6]. Somnuk, H. and Lerwatechakul, M., "Multi-hop AODV-2T", International Symposium on Intelligent Ubiquitous Computing and Education, pp. 214-217, 2009.

★★★