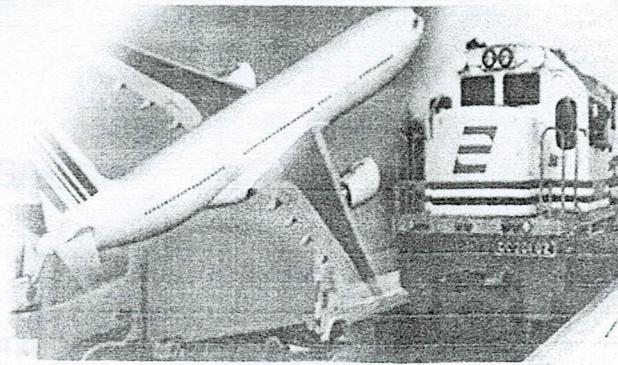




Forum Studi Transportasi antar Perguruan Tinggi



Proceeding^{1^o}

The International Symposium of
Indonesian Inter-University Transport Studies Forum
(FSTPT) - 18

“Connectivity of Transportation Infrastructure
in Supporting Logistic Systems”

Bandar Lampung, August 21-30th 2015

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Penulis : Rahayu Sulistyorini
NIP : 19741004 2000032002
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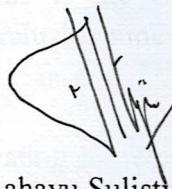
Bandar Lampung, 21 Maret 2016

Mengetahui,
Dekan Fakultas Teknik
Universitas Lampung



Prof. Suharno, M.Sc., Ph.D.
NIP. 196207171987031002

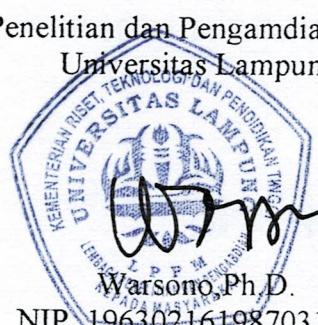
Penulis,



Dr. Rahayu Sulistyorini, S.T, M.T.
NIP. 19741004 2000032002

Menyetujui:

Ketua Lembaga Penelitian dan Pengabdian Masyarakat (LPPM)
Universitas Lampung



Warsono, Ph.D.
NIP. 196302161987031003

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WELCOME MESSAGE



Ladies and Gentlemen,

Indonesian Inter University Transport Studies Forum, or Forum Studi Transportasi antar Perguruan Tinggi (FSTPT) was established in 1998. Since then 18 Conferences have been carried out in many Universities in Indonesia. On behalf of the FSTPT, I would like to extend my warmest welcome to all Universities participating in the 18th International Conference of Indonesian Inter University Transport Studies Forum, held in Lampung University, Indonesia from 27th to 30th August 2015.

I would like to deliver our highest appreciation to Lampung University for their availability, great effort and hospitality in hosting and organizing this 18th FSTPT conference.

It is our satisfaction to realize that the conferences organized by FSTPT are uninterrupted since 1998 up to 2015, which have provided an opportunity for the professionals and researchers to exchange their knowledge and share about the latest development and research in transportation. There have been 1908 papers, published in 17 proceeding until year 2014.

I should express my gratitude to all the members of the organizing committee who have worked hard to prepare the conference, and special thanks to the chairman of the conference, DR. Rahayu Sulistyorini, who has dedicated her valuable time to organize this conference.

Finally, I wish all members of FSTPT a successful and motivating conference, and have a fruitful experience in this Conference.

Head of

Indonesian Inter University Transport Studies Forum

Prof. Dr. Ir. Erika Buchari, M.Sc.

PREFACE

Indonesian Inter-University Transport Studies Forum (FSTPT) as a forum for transportation researchers, observers and college organizes an international symposium with the theme "Connectivity of Transportation Infrastructure in Supporting Logistic Systems". This is a forum of sharing idea and advance discussion all about transportation problems from several points of view including from University/Academic, related Agency, Policy maker and also Citizen in our Country. This symposium is one of annual meeting member FSTPT result in Jember University on 22 August 2014 which was established The University of Lampung as a host for the 18th FSTPT symposium.



We would like to thank for all of your good cooperation, effort & coordination from all parties for success this symposium including Central Committee of FSTPT. Also we would like to thank you very much for your value-able time especially my honor Rector who support very much this symposium, my Dean, Central Committee of FSTPT 2014-2016, All of my Associates in all over Indonesia, All Government and Privat Agency and All of my Partner / Colleague in Lampung University.

This symposium series started from opening on August 27, with workshop event from 4 keynote speaker (Mr. Prof. Dr. Ir. Agus Taufik Mulyono, M.T.,; Prof. Dr. Ir. Rokhmin Dahuri, MS; Dr. Ir. Bona Frazila, M.Sc. and Ir. Tri Tjahjono, M.Sc., Ph.D. The interesting topic will include about transportation, logistic, road performance, road quality handling, integrated transportation and coastal management. At the same day also we will perform annual meeting of FSTPS member.

The symposium on August 28 present five key note speaker (Dr. Shinya Hanaoka; Mr. Leo Haring; Prof. Ir. Ofyar Z. Tamin, MSc., PhD.; Dr. Ir. Hermanto Dardak, MSc., and Ir. Zulfikri, M.Sc, DEA,), then continued after lunch with parallel session, about 146 papers including from Indonesia (from Aceh 'till Eastern) and foreign member. These papers had been properly reviewed and selected by the Scientific Committee (thank you very much), about 247 papers were reviewed.

The hole series of this symposium finalized with Krakatau field trip (tour), Pahawang island and also Tapis Carnival as a series of Krakatau festival, this is an annual festival in Lampung province to expose the beauty of Lampung province tourism. The outcome of this symposium is International Proceeding Paper, and the selected paper will be registered in an International journal.

We are very grateful to have you all here in this symposium, Thank you.

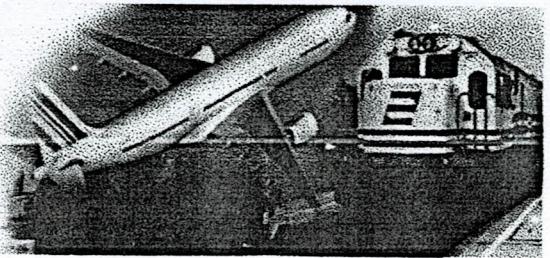
chairman of the conference

Dr. Rahayu Sulistyorini



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75	RT127	DAMPAK PEMBANGUNAN JEMBATAN PALU V TERHADAP BIAYA PERJALANAN DI KOTA PALU	Andri, Taslim Bahar	737 746
76	RT128	INTEGRATED TRANSPORT SYSTEM TOWARD SUSTAINABLE TRAVEL BEHAVIOR (Case Study: Work-Commuting Travel from Bekasi To Jakarta)	Rinawanti Safitri, Samuel Petros Sebatu, Sigit Priyanto	747 - 756
77	RT129	PEMODELAN TARIKAN PERJALANAN BERDASARKAN LUAS LANTAI DI GEDUNG PUSAT PERDAGANGAN GROSIR DI KOTA SURABAYA	Miftachul Huda, Hera Widayastuti	757 - 766
78	RT130	PENGARUH PENAMBAHAN ABU TANDAN SAWIT DAN GIPSUM TERHADAP TANAH LEMPUNG LUNAK BERDASARKAN PENGUJIAN CBR	Yulindasari Sutejo, Ratna Dewi, Hasan Yudhistira	767 - 776
79	RT132	KAJIAN PERSEPSI PENERIMAAN MASYARAKAT TERHADAP KEBIJAKAN TRANSPORTASI UNTUK KAWASAN RENCANA ECOVILLAGE TAMANSARI DI KOTA BANDUNG	Wita Meutia, Sony Sulaksono Wibowo, Widayarini Weningtyas	777 - 786
80	RT133	STUDI DEMAND AND SUPPLY BUS SEKOLAH DI SMA KOMPLEKS SURABAYA PUSAT RUTE SUKOLILO	Ratih Sekartadjji, Hera Widayastuti, Wahju Herijanto	787 - 794
81	RT134	ANALISIS NILAI WAKTU DENGAN METODE DWELLING CHOICE ANALYSIS UNTUK PERJALANAN KOMUTER DI KAWASAN METROPOLITAN KOTA SURABAYA	Feni Widiyawati, Hera Widayastuti, Wahju Herijanto	795 - 804
82	RT135	PENGGUNAAN KARET SERUTAN DALAM DISAIN SAMI SEBAGAI INTERLAYER DI OVERLAY PERKERASAN BETON	Edward Ngji, Latif Budi Suparma	805 - 814
83	RT136	ESTIMASI MATRIKS ASAL TUJUAN DARI DATA LALU LINTAS DENGAN METODE PENAKSIRAN KEMIRIPAN MAKSIMUM MENGGUNAKAN SOFTWARE EMME/3 (STUDI KASUS KOTA SURAKARTA)	Resita Arum Permata, Syafi'i, Slamet Jauhari Legowo	815 - 824

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85	RT138	INVENTARISASI PARKIR JAKABARING BERDASARKAN GPS ANDROID	Endang Supriyadi, Erika Buchari, Joni Arliansyah	834 - 841
86	RT141	POTENTIAL MARKET FOR MODAL SHIFT FROM ROAD TO RAIL FREIGHT Case Study: South Sumatera-Lampung Line	Kristianto Usman, Rahayu Sulistyorini	842 - 848
87	RT142	ANALISIS DAMPAK BEBAN OVERLOADING KENDARAAN BERAT ANGKUTAN BARANG TERHADAP UMUR RENCANA DAN BIAYA KERUGIAN PENANGGANAN JALAN	Ika Ulwiyatul Lutfah, Agus Taufik Mulyono	849 - 856
88	RT143	KAJIAN RANTAI PERJALANAN KOMODITAS KARET DAN SISTEM INFORMASI BERBASIS TRANSPORTASI MULTIMODA UNTUK PENJUALAN KARET PETANI DI SUMATERA SELATAN	Keshia Zara Sandiaga, Erika Buchari	857 - 866
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90	RT151	PENINGKATAN DAYA DUKUNG TANAH GAMBUT SEBAGAI SUBGRADE JALAN DENGAN MENGGUNAKAN PERKUATAN ANYAMAN DAN GRID BAMBU	Ratna Dewi, Angelina, Esti Patri Wulandari	878 - 885
91	RT152	TRAFFIC IMPACT ANALYSIS ON THE DEVELOPMENT OF JEMBER ICON USING PTV VISTRO	Sonya Sulistyono, Januar Fery Irawan, Didit Septiawan	886 - 896
92	RT153	EVALUATION OF ONE WAY TRAFFIC FLOW POLICY CHANGES IN CITY OF JEMBER	Nunung Nuring Hayati, Ahmad Hasanuddin, Grendy Firma Setiawan	897 - 905
93	RT154	STRATEGI PENINGKATAN KINERJA TRAYEK UTAMA ANGKUTAN UMUM PERKOTAAN JEMBER	Nunung Nuring Hayati, Sonya Sulistyono, Wildanus Sabiq	906 - 915
94	RT160	TRAVEL BEHAVIOR OF STUDENTS TO CAMPUS BASED SPATIAL IN MAKASSAR CITY	Syafruddin Rauf, Shirly Wunas, Roland A Barkey, Sakti Adji Adisasmita	916 - 928

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96	RT163	DEVELOPMENT OF A SPECIAL MATRIX TECHNICS FOR ROAD NETWORK ANALYSIS Case of Identifying Un-connected and Miss-connected Nodes	Hitapriya Suprayitno	937 - 948
97	RT164	ABILITY TO PAY DAN WILLINGNESS TO PAY ANGKUTAN UMUM DI KABUPATEN BELINTUNG	Djoko Setijowarno , Prioutomo Puguh Putranto	949 - 954
98	RT165	ANALISIS PENGARUH PENEMPATAN TENAGA KERJA SERTA KETERSEDIAAN MATERIAL DAN PERALATAN KONSTRUKSI TERHADAP CAPAIAN MUTU JALAN (Stusdi Kasus : Jalan Nasional D.I. Yogyakarta)	Sahaduta Linggar Permono, Agus Taufik Mulyono	955 - 962
99	RT167	PENGARUH PENGGUNAAN ASPAL MODIFIKASI EVA (EVA-MA) PADA PERANCANGAN CAMPURAN BETON ASPAL	Latif Budi Suparma, Yosevina, Dania Suzana Laos	963 - 974
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101	RT170	POTENSI ANGKUTAN UMUM PARIWISATA DI DAERAH ISTIMEWA YOGYAKARTA	Imam Basuki, Amos Setiadi	985 - 993
102	RT171	PENETAPAN PANJANG MERGING TAPER DI AREA KERJA DALAM SEGMENT JALAN TOL	Donny CleoPatra Pakpahan, Tri Tjahjono, Alan Marino	994 - 1003
103	RT174	ANALISIS DAMPAK KEBIJAKAN TERHADAP PERILAKU PEMBELIAN MOBIL DI INDONESIA	Muhammad Ferdi Noor Miza, Rizky Maulana Akbar Silaban, Muhammad Zudhy Irawan	1004 - 1013

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105	RT177	ANALISA PERTOLONGAN PERTAMA PADA KECELAKAAN LALU LINTAS DI JALAN PANTURA TEGAL - BREBES	Yan El Rizal Unzilatirrizqi Dewantoro, Iksiroh El Husna, Hanung Kurniawan, Ardita Puspa Maulida	1022 - 1031
106	RT178	THE USE OF SPEED BUMP TO INCREASE ALERTNESS AND REDUCE USERS' VEHICLE SPEED CASE STUDY: RAILWAY CROSSING WHICH DOES NOT HAVE A LATCH AT JL. TEMBOK LOR - TEGAL, CENTRAL JAVA, INDONESIA	Devi Widitasari, Adam Al faroby M	1032 - 1038
107	RT179	PENGGUNAAN SOFTWARE VISSIM UNTUK EVALUASI HITUNG MKJI 1997 KINERJA RUAS JALAN PERKOTAAN (STUDI KASUS : JALAN AFFANDI, YOGYAKARTA)	Ibnu Ariemasto Winnetou, Ahmad Munawar	1039 - 1048
108	RT181	KAJIAN UKURAN HURUF YANG IDEAL UNTUK SEMUA JENIS FONT PADA RAMBU PERINGATAN (Studi Kasus Jalan Kolonel Soegiono Kota Tegal)	Prita Nur Aristiani, Cherline Anindya P.B, Bagus Priambodo, M.Reza Prismann M.Sc	1049 - 1056
109	RT182	REVITALIZATION AND PORT MASTER PLAN (Case study : Port of Bagansiapiapi)	R. Didin Kusdian	1057 - 1064
110	RT183	HUBUNGAN KONSENTRASI KARBON MONOKSIDA (CO) DI UDARA AMBIEN ROADSIDE DENGAN KARAKTERISTIK LALU LINTAS DI JARINGAN JALAN SEKUNDER KOTA PADAN	Hendra Gunawan, Yenni Ruslinda, Yona Anggela	1065 - 1074
111	RT184	ANALISIS NILAI WAKTU PERJALANAN PENUMPANG ANGKUTAN UMUM KOTA MEDAN DENGAN MENGGUNAKAN RANDOM REGRET MINIMIZATION	Fransiscus Isjuanda Pinem, Medis Sejahtera Surbakti	1075 - 1082

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113	RT186	PERILAKU PEMILIHAN MODA TRANSPORTASI PENGUMPAN MENUJU BANDARA TEMON (Studi Kasus: Kereta Api Dan Kendaraan Pribadi)	Irfan Fitriatmaja, Dewanti	1093 - 1102
114	RT190	ANALISIS AWAL KELAYAKAN EKONOMI DAN FINANSIAL DALAM PERENCANAAN MONOREL KOTA MEDAN	Rizky Torang Surya Siagian, Medis Sejahtera Surbakti	1103 - 1112
115	RT191	EVALUASI KINERJA SIMPANG BERSINYAL PADA PERSIMPANGAN TANJUNG API-API KOTA PALEMBANG	Mellysha Indah Mustika, Joni Arliansyah, Rhaptyalyani	1113 - 1122
116	RT192	ANALISIS DAERAH RAWAN KECELAKAAN (BLACKSPOT) DI KOTA PALEMBANG	Muhammad Juhendra, Joni Arliansyah, Rhaptyalyani	1123 - 1131
117	RT193	DESAIN PENANGANAN JALAN YANG BERKESELAMATAN DI RUAS JALAN HANOMAN KOTA TEGAL	Sugiharto, Anugerah Fasikhullisan, Rahmat Syafi'i Romadhon, Firman	1132 - 1141
118	RT196	PENGEMBANGAN METODE PENETAPAN RAMBU KECEPATAN BERKESELAMATAN DI JALAN NASIONAL (STUDI KASUS: JALAN TRANS SULAWESI)	Mentary Adisthi, Tri Tjahjono, Martha Leni Siregar	1142 - 1151
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121	RT200	PERFORMANCE OF UNSIGNALIZED INTERSECTIONS BASED ON CONFLICT STREAMS	Joewono Prasetijo, Ning Wu, Leksmono Suryo Putranto, Wan Zahidah Binti Musa	1171 - 1183

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123	RT202	PENGKATEGORIAN PENILAIAN UJI LAIK FUNGSI JALAN DITINJAU DARI ASPEK KESELAMATAN	Iqbal Maulana, Rizqi Nur Akbar, Firman	1194 - 1199
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125	RT205	ACTIVE COMMUTING TO THE UNIVERSITY (Case Study: Students of Gadjah Mada University, Indonesia)	Mutiasari Kurnia Devi, Siti Malkhamah, Margareta Friman	1211 - 1220
126	RT207	PERCEPTION OF SERVICE RECOVERY IN DEVELOPING AN EFFECTIVE FLIGHT DELAY MANAGEMENT TOWARD A MARKET-ORIENTED AIR TRANSPORT SYSTEM (CASE STUDY: LION AIR IN SOEKARNO-HATTA INTERNATIONAL AIRPORT)	Ayuwandira Febriana Sadu, Lars Haglund, Sigit Priyanto	1221 - 1231
127	RT208	STUDI KARAKTERISTIK PARKIR INAP PADA BANDARA INTERNASIONAL MINANGKABAU	Titi Kurniati, Agung Prasetyo	1232 - 1235
128	RT209	ESTIMASI MATRIK ASAL TUJUAN DARI DATA ARUS LALU LINTAS DENGAN METODE ESTIMASI ENTROPI MAKSIMUM MENGGUNAKAN PIRANTI LUNAK EMME/3 (STUDI KASUS KOTA SURAKARTA)	Zuli Astria, Syafi'i, Slamet Jauhari Legowo	1236 - 1245
129	RT210	ESTIMASI MATRIK ASAL TUJUAN (MAT) DARI DATA ARUS LALU LINTAS DENGAN METODE ESTIMASI KUADRAT TERKECIL MENGGUNAKAN PIRANTI LUNAK EMME/3 (STUDI KASUS KOTA SURAKARTA)	Elfa Monica Zada, Syafi'i, Slamet Jauhari Legowo	1244 - ■■■■■

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130	RT212	STIMASI MATRIX ASAL TUJUAN DARI DATA LALU LINTAS DENGAN METODE ESTIMASI INFERENSI BAYESIAN MENGGUNAKAN PIRANTI LUNAK EMME/3 (Studi Kasus Kota Surakarta)	Wulan Septiyani, Syafi'i, Slamet Jauhari Legowo	1254 - 1263
131	RT213	STUDI EKSPERIMENTAL PENGARUH BENTUK AGREGAT TERHADAP NILAI POROSITAS DALAM CAMPURAN BETON BERPORI PADA APLIKASI JALUR PEJALAN KAKI	Lius Hanta, Amelia Makmur	1264 - 1273
132	RT218	RANCANGAN SIMULASI ALAT ANTISIPASI PENGGUNAAN HANDPHONE SAAT MENGETAR BERBASIS MIKROKONTROLLER ATMEGA16	Atsani Umarul Arifin, Firmansyah Wahyu A.F.C, Agung Nazar P	1274 - 1280
133	RT220	RANCANGAN SIMULASI ALAT ANTISIPASI PENGGUNAAN HANDPHONE SAAT MENGETAR BERBASIS MIKROKONTROLLER ATMEGA16	Atsani Umarul Arifin, Firmansyah Wahyu A.F.C, Agung Nazar P	1281 - 1288
134	RT221	ANALISIS MULTI KRITERIA PENDANAAN JALAN DAERAH DENGAN APBN	Elviany, Leksmono Suryo Putranto	1289 - 1298
135	RT222	PERSEPSI PENUMPANG TERHADAP TINGKAT KINERJA PELAYANAN TERMINAL 2 DOMESTIK BANDAR UDARA JUANDA SURABAYA	I Ketut Oka Mariana, Harnen Sulistio, M. Zainul Arifin	1299 - 1306
136	RT224	ANALISIS WILLINGNESS TO PAY MENGGUNAKAN BINARY CHOICE MODEL (STUDI KASUS: RENCANA RE-AKTIVASI RUTE KERETA API JEMBER-PANARUKAN)	Willy Kriswardhani, Hera Widyastuti	1307 - 1316
137	RT225	APLIKASI PROGRAM OSCADY 4 DAN ARCADY 5 UNTUK PERENCANAAN SIMPANG SEBIDANG (STUDI KASUS: SIMPANG EMPAT BERSINYAL KENTUNGAN, SLEMAN, YOGYAKARTA)	Faza Fawzan Bastarianto, Ahmad Munawar	1317 - 1326

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149	RT243	INTERAKSI GUNA LAHAN PERUMAHAN DENGAN VOLUME PERGERAKAN ORANG DI WILAYAH PERKOTAAN YOGYAKARTA	J.Dwijoko Ansusanto, Ahmad Munawar, Sigit Priyanto, Bambang Hari Wibisono	1441 - 1449
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140	RT228	SIMULASI UJI BAHAN NATURAL RUBBER PADA ROLLER BARRIER BERBASIS SOLIDWORKS	Eka Ayu Kurniati, Firmansyah Wahyu A.F.C., Mohammad Reza Prisman, Farida Nur Fadhilah	1347 - 1356
141	RT229	EVALUASI KINERJA EKSISTING LINTAS PENYEBERANGAN TELAGA PUNGKUR - TANJUNG UBAN DI KEPULAUAN RIAU	Atmy Verani R Sihombing, Nicholas Marpaung	1357 - 1365
142	RT230	ANALISIS INTERVENSI INFRASTRUKTUR JALAN UNTUK MENDUKUNG PEMERATAAN HASIL PEMBANGUNAN	Dwi Ardianta Kurniawan, Arif Wisnadi	1366 - 1375
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144	RT232	OPTIMALISASI KINERJA TERMINAL PETI KEMAS PELABUHAN PONTIANAK	Budi Hartanto, Bambang Triatmodjo, Imam Muthohar	1384 - 1393

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147	RT237	USER PERSPECTIVE OF TRANSPORT INVESTMENT BENEFIT IN INFORMATION ERA	Yosritzal	1412 - 1417
148	RT238	ANALISIS DISTRIBUSI BEBAN KERETA API PADA KONSTRUKSI TIMBUNAN JALUR KERETA API	Imami Muthohar, Nur Budi Susanto	1418 - 1431
149	RT242	MODEL PEMBIYAAN PEMELIHARAAN JALAN DARI EARMARKED TAX DI INDONESIA	Tiopan H. M. Gultom, Ofyar Z. Tamin, Ade Sjaffrudin, Pradono	1432 - 1449
150	RT243	INTERAKSI GUNA LAHAN PERUMAHAN DENGAN VOLUME PERGERAKAN ORANG DI WILAYAH PERKOTAAN YOGYAKARTA	J.Dwijoko Ansusanto, Ahmad Munawar, Sigit Priyanto, Bambang Hari Wibisono	1450 - 1458
151	RT244	MAKING TRANSPORTATION AND LAND-USE PLANNING IN INDONESIA SUSTAINABLE (LESSON LEARNED FROM GERMANY)	Synthia Angelina, Dirk Vallee	1459 - 1470

INTRODUCTION

The main reasons for encourage rail freight, which has been developed as major mode of transport in UK, mainland Europe, and America in recent years, were environmental and social impact reduction, effective supply chain, and the ability to reduce heavy trucks off the road. (Berkeley, 2005; Woodhull, 2005). Due to the growth of freight traffic road growth, the road congestion has been increased, and the delivery time. It was (2014) point out the rail advantages compared to road rail as more efficient, had less fluff, faster, frequent, higher capacity.

POTENTIAL MARKET FOR MODAL SHIFT FROM ROAD TO RAIL FREIGHT Case Study: South Sumatera-Lampung Line

Kristianto Usman

Civil Engineering Department

University of Lampung

Jln. Prof. Sumantri Brojonegoro No.1,

Bandar Lampung, 35145

Telp: (0721) 704947

[kris.usman@gmail.com;](mailto:kris.usman@gmail.com)

Rahayu Sulistyorini

Civil Engineering Department

University of Lampung

Jln. Prof. Sumantri Brojonegoro No.1,

Bandar Lampung, 35145

Telp: (0721) 704947

rahayu.sulistyorini@eng.unila.ac.id

Abstract

Modal shift from a road to rail freight has been examined at last decades throughout many regions globally. The shifting decision tends to be considered on some comparative advantages such as more efficient land use, delivery time, frequent, capacity, costs, less environmental and social impacts. Otherwise, the long-distance heavy trucks can be contributed to road congestion that may lead to unplanned maintenance and unpredicted rate of road deterioration. In context of South Sumatera-Lampung line, the modal shift can be arranged to explore the potential market along its line. Finding shows, the existing commodities have an opportunity to be extended, following by its potential market, including energy (especially coal), mining, agriculture, plantation, fishery, livestock, wood industry.

Keywords : modal shift, road to rail freight, potential market, South Sumatera-Lampung line

Abstrak

Dokumen ini berisi rincian panduan penulisan makalah dari the 18th FSTPT International Symposium. Untuk memasukkan makalah untuk dipresentasikan dalam simposium, ikutilah instruksi dalam dokumen ini. Penulis (para penulis) wajib mengikuti semua informasi yang ada di dalam dokumen ini sebelum memasukkan makalah untuk di-review. Makalah yang tidak mengikuti panduan ini tidak akan dipertimbangkan untuk dipresentasikan dan dipublikasikan. Batas terakhir pemasukan *draft* makalah adalah 27 Juni 2015. Makalah akan di-review oleh Komite Ilmiah FSTPT dan hasilnya akan diinformasikan kepada penulis kontak. Penulis (para penulis) wajib merevisi makalah sesuai dengan semua komentar dari Komite Ilmiah dan memasukkan ulang makalah paling lambat pada tanggal 9 Agustus 2015. Semua makalah yang telah dimasukkan ulang akan dipublikasi di dalam prosiding simposium. Selanjutnya, 16 (enam oelas) makalah terbaik yang telah dipresentasikan akan dipublikasikan dalam JURNAL TRANSPORTASI. Abstrak ditulis dalam maksimal 150 kata.

Kata Kunci: kata kunci A, kata kunci B, kata kunci C, kata kunci D, kata kunci E

INTRODUCTION

The main reasons for encourage rail freight, which has been developed as integrated freight transport in UK, mainland Europe, and America in recent years, were considered with environmental and social impact reduction, effective supply chain, and keep the long-distance heavy trucks off the road, (Barkeley, 2005; Woodburn, 2003). Moreover, due to freight traffic rapid growth, the road congestion has been increased, and may affect the delivery time. Powrie (2014) points out the rail advantages compare to road such as more efficient land-use, faster, frequent, higher capacity.

As a prospective transportation modal, the following factors can be influenced the shift decision: relocation activity, manufacture system and distribution networks, trading relationships, production and distribution scheduling (Woodburn, 2003). In addition, the hinterland-port link is one of the attractive inter-modal systems to be implemented (Woodburn, 2012).

In context freight transportation from South Sumatera to Lampung Province, the proper rail freight is needed as a modal shift from the road to prevent its exceed load thus may lead to unplanned maintenance and unpredicted rate of road deterioration. Recent inter-modal development on this freight line involves reconnection and revitalization the freight line with port Panjang-Lampung. As a result, an appropriate supply chain improvement can be performed (Leilit Unila, 2014).

To address the modal shift decision with its relevant factors, this paper is examined to describe the potential market for that purpose, considering some prospective commodities along this distribution line.

LITERATURE REVIEW ON MODAL SHIFT FROM ROAD TO RAIL FREIGHT

Road vs Rail Freight

To compare road and rail in term of public investment, the following cost parameters are described in quantitative manner (Affuso et al., 2003) :

a) Construction cost (1999 prices) :

Road : bypass (£ 3.95 million per km), carriageway (£ 2.88 million per km)

Rail : new line (£7.00 million per km), upgrading (£ 3.44 million per km)

b) Environmental cost (1999 prices) :

Road : noise and vibration (0.26 - 0.58 pence per passenger km)

air quality (0.61 - 1.06 pence per passenger km)

climate change (0.19 – 0.56 pence per passenger km)

Rail : noise and vibration (0.35 pence per passenger km)

air quality (0.18 pence per passenger km)

climate change (0.26 pence per passenger km)

c) Safety cost (1998 prices) :

Road : D3-D4 motorway (0.77 pence per vehicle km) –

Modern S/C road (2.97 pence per vehicle km)

Rail : 0.23 pence per passenger km

d) Time savings (1999 prices) :

Road : 1744 (pence per hour)(per passenger)

Rail : 803 (pence per hour)(per passenger)

e) Fuel duties (1999 prices) :

Road : cars (5.83 pence per km), other goods vehicle (17.53 pence per km)

f) Train fares : "fares may be allowed to increase if service quality improves"

g) Maintenance and Vehicle Operating Costs (1999 prices).

Road : standard (S2, 2 lanes) (£ 6,887 per km per annum)

Rail : including train fares

INTEGRATED FREIGHT TRANSPORT AND SUPPLY CHAINS

The integrated freight transport through the proper supply chains system is needed to ensure all commodities are delivered just in time with its specific quantity and quality. However, many of them are consisted long and complex. In contrast, customer intent on shortest delivering time at reasonable price (Barkeley, 2005). Hence, the inter-modal supply chain should be developed effectively.

Dai et al.(2012) examined one of the preferred inter-modal systems is rail freight-port. On the other hand, to achieve the goal, these following issues are important to be examined, including competition between train operators due to efficiency and innovation, competitive track-access charges, sufficient terminals for commodities collecting, efficient bureaucracy (Barkeley, 2005).

COMMODITIES ALONG SOUTH SUMATERA-LAMPUNG

South Sumatera Commodities

In energy sector, South Sumatera contributes significant role nationally, supporting by an abundant deposit such as: coal(22.24 billion tonnes), natural gas(19,149 TSCF), oil(812,960MSTB), geothermal (1,911 MWe), methane gas(183 TSCF), metal mining (gold 1,000,964 Oz; copper 12,831,586 Oz; iron ore 7,547,043 MT, granite 7,120,000 MT; lead 4,383,019 MTIn addition, coal deposit recorded as 53% of Indonesian coal national deposit, otherwise it just produced 8% of national production (92% in Kalimantan, which has 47% national deposit))(South Sumatera Bappeda, 2012, cited in Lemlit Unila, 2014).

Other sectors also contribute a huge number annual production, including agriculture, plantation, livestock. In 2011, some agriculture commodities with high demand, produced paddy (3,83 million tonnes), corn (123,3 thousand tonnes), soybeans (18,9 thousand tonnes), then beef livestock (13,6 thousand tonnes), sugar plantation (74,8 thousand tonnes), palm plantation (13.4 million tonnes per annum with 1.8 million tonnes CPO yearly (crude palm oil) approximately.(South Sumatera Dewan Ketahanan Pangan, 2012 cited in Lemlit Unila, 2014)

Lampung Commodities

As a hinterland of Panjang hub port, Lampung has strategic position in the Indonesian supply chain system. Large number of these following commodities are produced in Lampung (Lemlit Unila, 2014) :

- Agriculture (paddy 2.98 million tonnes per year, sugar cane 0.99 million tonnes per year, corn 1.92 million tonnes per year, cassava 9.02 million tonnes per year, robusta coffee 150.42 thousand tonnes per year, pepper 21.92 thousand tonnes per year, sugar (33.4 % of national production), tapioca powder(60 % of national production), canned pineapple (265 thousand tonnes per year), cocoa 3.22% of national production)
- Fishery (327.132 thousand tonnes per year, including 44.167 thousand tonnes prawn)
- Livestock (712.43 thousand cattle per year)
- Wood industry (228,5 thousand m³ per year)
- Energy (geothermal 600 MW)

POTENTIAL MARKET FOR SOUTH SUMATERA-LAMPUNG RAIL FREIGHT LINE

Intermodal Rail Freight – Panjang Port

Port Panjang is one of the international hub ports in Sumatera Island. State-run port management company, PT Pelabuhan Indonesia (Pelindo II), is further modernizing the Panjang Port in Lampung to transform it into an international port as an alternative to the Tanjung Priok Port in Jakarta. Besides modernizing port facilities and equipment in order to improve services and work productivity, PT Pelindo II will also revitalize the railway track from Pidada to Panjang Port, stretching to 3 kilometers. The presence of modern loading equipment has already minimized queuing time at the docks.

In 2010, as many as 30 ships queued at the port daily. In 2012, the number dropped to between three and six ships daily. Before the presence of new equipment, the unloading time for a ship at Panjang Port was 30 tons per gang hour (TGH). With the modernization of equipment and port infrastructure, Panjang Port expected to offer zero waiting times in the near future. The port area planed to expand by reclaiming up to 30 hectares of the coast. Goods from around Sumatra could be transported by train and directly loaded onto ships at the port should the railway lines be revived. Crude palm oil (CPO) from South Sumatra, Jambi and Bengkulu need no longer be transported by trucks for exporting from the port, thus saving time and money. To revive the railway lines, PT Pelindo II and state railway firm PT KAI are currently holding technical discussions.

With the modernization of equipment and increasing the depth of the shipping lane around the docks, or Mean Low Water Spring (MLWS), up to 14 meters, large ships from Europe could now directly enter the docks at the port, so exporters did not have to send export goods from Tanjung Priok Port. The loading and unloading time will also be quicker compared to previous years. Various export commodities and those volumes through this hub show in Figure 1.

NO	KOMODITAS/PRODUK	EKSPOR			
		PELAHUAN	NEGARA TUJUAN	JUMLAH (TON)	NILAI (USD)
1	CPO/MINYAK SAWIT	PANJANG	INDIA	152.963,30	168.993.564,40
2	UDANG BEKU	PANJANG	UNITED STATES	8.582,26	82.451.897,70
3	BATUBARA	PANJANG	JAPAN	550.042,93	65.046.771,77
4	COCOA	PANJANG	MALAYSIA	19.465,00	58.827.330,00
5	KOPI ROBUSTA	PANJANG	JAPAN	26.308,98	35.941.770,76
6	LADA HITAM	PANJANG	UNITED STATES	10.953,85	32.147.495,85
7	KARET SIR 20	PANJANG	CHINA	7.842,24	35.897.040,00
8	MINYAK INTI SAWIT	PANJANG	NETHERLANDS	19.700,00	32.147.495,00
9	NANAS KALENG	PANJANG	SPAIN	15.513,22	32.147.495,00
10	PULP	PANJANG	INDIA	11.290,12	12.597.136,00
TOTAL				822.666,91	941.811.386,91

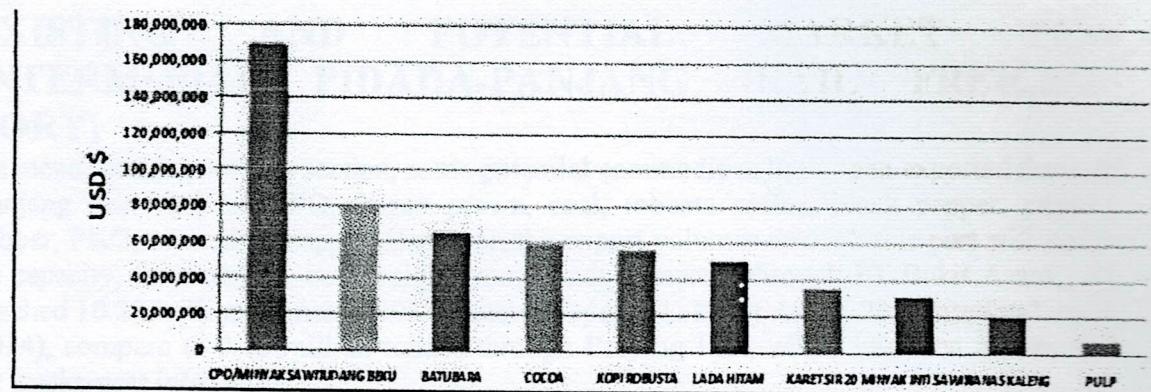


Figure 1. Export commodities through Panjang Port (Source : PT. Pelindo II Panjang Branch, 2012 cited in Lemlit Unila, 2014)

CPO consignments from Sumatra to Rotterdam, the Netherlands, can be directly carried out through Panjang Port, because the port's performance is now the best in Sumatra and it is the main supporting port in the Sumatra region for Tanjung Priok Port. The Panjang Port currently has four Gantry Jib cranes from China, each with a capacity of 40 tons, or 180 tons per hour per unit. The improvements and additions have had a positive impact on ship arrivals at the port. In 2010, 2,402 ships arrived at the port. That number increased to 2,848 in 2011.

The flow of containers was recorded at 99,821 boxes in 2010, rising to 112,200 boxes in 2011, while the flow of goods in 2010 was 13.72 million tons, increasing to 15.51 million tons in 2011. With the improved performance of Panjang Port, the Lampung provincial administration expects that Lampung can open an import route via the port. But, in order to achieve that, it has to wait for a decision from the industry and trade ministers. In order to accommodate rapid growth (doubled in last decade), and potential market along South Sumatera-Lampung province, freight line into Port Panjang phase I (Pidada-Port Panjang) has been reconnected and revitalized for that purpose as shows in Figure 2.

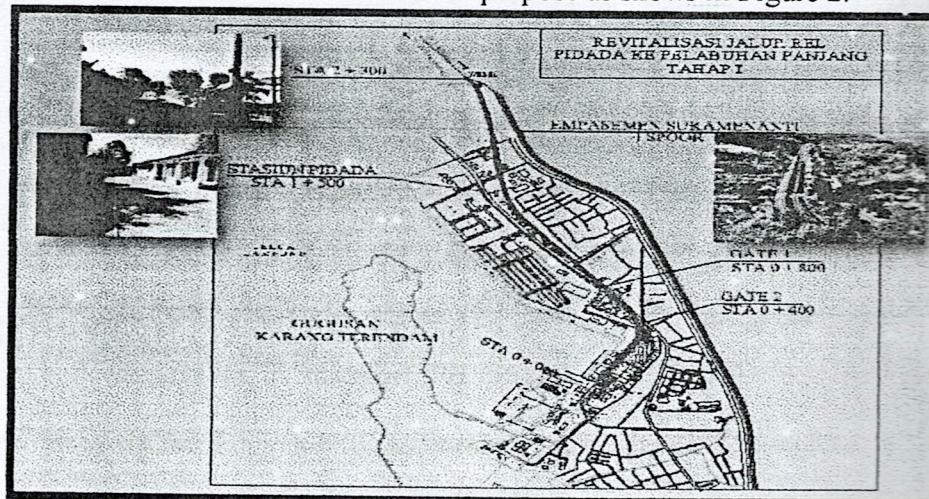


Figure 2. Pidada-Port Panjang Rail Freight Line Revitalization Phase I
(Source, Lemlit Unila, 2014)

EXISTING AND POTENTIAL MARKET FOR INTERMODAL PIDADA-PANJANG (RAIL FREIGHT- PORT)

As mentioned in previous section, some potential commodities have been exported through Panjang Port such as CPO, frozen prawn, coal, robusta coffee, black pepper, pepper, rubber, PKO, canned pineapple. However, the export volumes through this port still under its capacity, for example, coal freight from South Sumatera through PT Bukit Asam port reached 10.22 million tonnes in 2012 (Annual report PT. Bukit Asam, 2012 cited in Lemlit 2014), compare to 0.55 million tonnes through Panjang Port, which has been transported by trucks-port inter-modal.

Moreover, for coal freight, refer to its abundant deposit and existing volume through Panjang Port, the revitalized inter-modal connection can be used to explore the potential market by a modal shift from truck-port to rail freight-port, especially to accommodate the coal exporters along South Sumatera-Lampung. As a comparison, one truck has capacity 10 tonnes per trip, whereas rail freight can be loaded up to 3000 tonnes per trip (Lemlit Unila, 2014).

Other existing market to be extended such as cement (up to 42 tonnes per wagon), pulp, (50 tonnes per wagon), CPO (30 tonnes per wagon), PKO (30 tonnes per wagon), lateks (30 tonnes per wagon), general cargo (20 tonnes per wagon), container (up to 45 tonnes per wagon), fuel (up to 38 kilo litres), fertilizer (Lemlit Unila, 2014).

Many of the commodities along South Sumatera Lampung have yet transported through rail freight lines (see section 3) whereas most of these probably transports using trucks.

CONCLUSION

In conclusion, rail freight can be used for modal shift from trucks consider with the following comparative advantages: higher capacity, faster, frequent, just in time delivery, less environmental impacts and costs, less safety cost, competitive maintenance and operating cost, long-term investment, although the higher initial cost is needed to allocate. The potential market for modal shift from road to rail freight can be focused to extend the capacity of existing market and examined the others. The existing market to be extended including coal, cement, pulp, CPO, PKO, lateks, general cargo, container, fuel, fertilizer. Furthermore, the potential market to be examined can be explored through these following commodities: energy, mining, agriculture, plantation, fishery, livestock, wood industry.

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