

Research Needs in Traffic Management

Univ.-Prof. Dr.-Ing. Manfred Boltze
International Scientific Conference
„Collaboration in Research and Education for Sustainable Transport Development“
HCMC University of Transport, 17 May 2013



- **Member of „TU 9“**, Germany's major Universities of Technology
- App. 25.000 students



Institute of Transport Planning and Traffic Engineering

- Part of the Department for Civil and Environmental Engineering
- **20 doctorates** since 1997
- Currently **15 associates** supporting in teaching and research
- Focus of research on **traffic management** (planning methods, ITS, road traffic signal control, environment-responsive traffic control, quality management, freight transport management, ...)
- Active member of the scientific community:

FGSV – German Traffic and Transport Research Association

AA 3.3 „**Urban Traffic Control**“ since 1999 (Chair 1999-2007)

WCTR – Scientific Committee World Conference on Transport Research

Topic Area Manager „Traffic Operations, Management, and Control“ since 2010

Co-Chair WCTR Special Interest Group „Urban Traffic Control“ since 2011

Scientific Advisory Board at the German Federal Minister of Transport since 2009



Introduction

Vietnamese-German Transport Research Centre



- **VGU** Vietnamese-German University founded in 2008 as a research-oriented university.
- **VGTRC** Vietnamese-German Transport Research Centre operative since August 1, 2010.
- Located on the new VGU campus in **Binh Duong**.
- **VGTRC Staff** (May 2013):
 - Director: Prof. Dr.-Ing. Manfred Boltze
 - Co-Director: Dr.-Ing. Khuat Viet Hung
 - Executive Manager: Dr. Eng. Vu Anh Tuan
 - 8 doctoral candidates
 - 12 Master students
- Interdisciplinary Program **M.Sc. Traffic and Transport** started in 2012. 2nd Intake for September 2013.
- German Partner is Technische Universitaet Darmstadt.
- Well established cooperation with UTC University of Transport and Communications (since 1998).



Introduction

Interdisciplinary Study Program at VGU: Master of Science Traffic and Transport

| | Mechanical Engineering | Civil Engineering | Business Administration / Economics | Language Courses |
|-------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Fourth Term | | Master Thesis 24 CP Intelligent Transport Systems C 3 CP Traffic Flow Modelling / Transport Demand Modelling C 3 CP | Master Thesis 24 CP Management of Logistics and Supply Chains 3 CP Commercial Transport 3 CP | |
| Third Term | Fundamentals of Navigation 4 CP Reliability in Mechanical Engineering 4 CP | Transport Planning and Traffic Engineering C 3 CP Public Transport Planning and Management C 3 CP Railway Systems and Railway Engineering B 6 CP Road and Pavement Engineering B 6 CP | International Business 3 CP Logistic Systems and Supply Chains 3 CP Transportation Institution and Economic Policy 4 CP Logistics 4 CP | 6 CP Language Courses Provided by the Vietnamese-German University |
| Second Term | Motorcycles 4 CP Control Engineering 6 CP | Transport Planning and Traffic Engineering B 6 CP Railway Systems and Railway Engineering A 4 CP | Transport Economics 4 CP Work and Process Organisation / International Ergonomics 6 CP | |
| First Term | Motor Vehicles 6 CP | Road and Pavement Engineering A 4 CP Transport Planning and Traffic Engineering A 4 CP | Introduction to Business Administration / Seminars in Business Administration 6 CP | |

| Module Name | CP |
|-------------|----|
|-------------|----|

- Specialization, major subject
- Specialization, minor subject
- Basics

www.vgu.edu.vn/research/vgtrc/msctt-program/

Need for Traffic Management in Vietnam

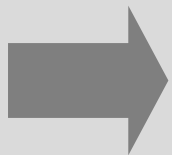
Mobility, freight transport and traffic will continue to have high significance.

Travel and transport demand will continue to increase.

Transport modes and mode choice in Vietnam are changing drastically.

Environmental matters will gain more importance (protection of human, environment and climate).

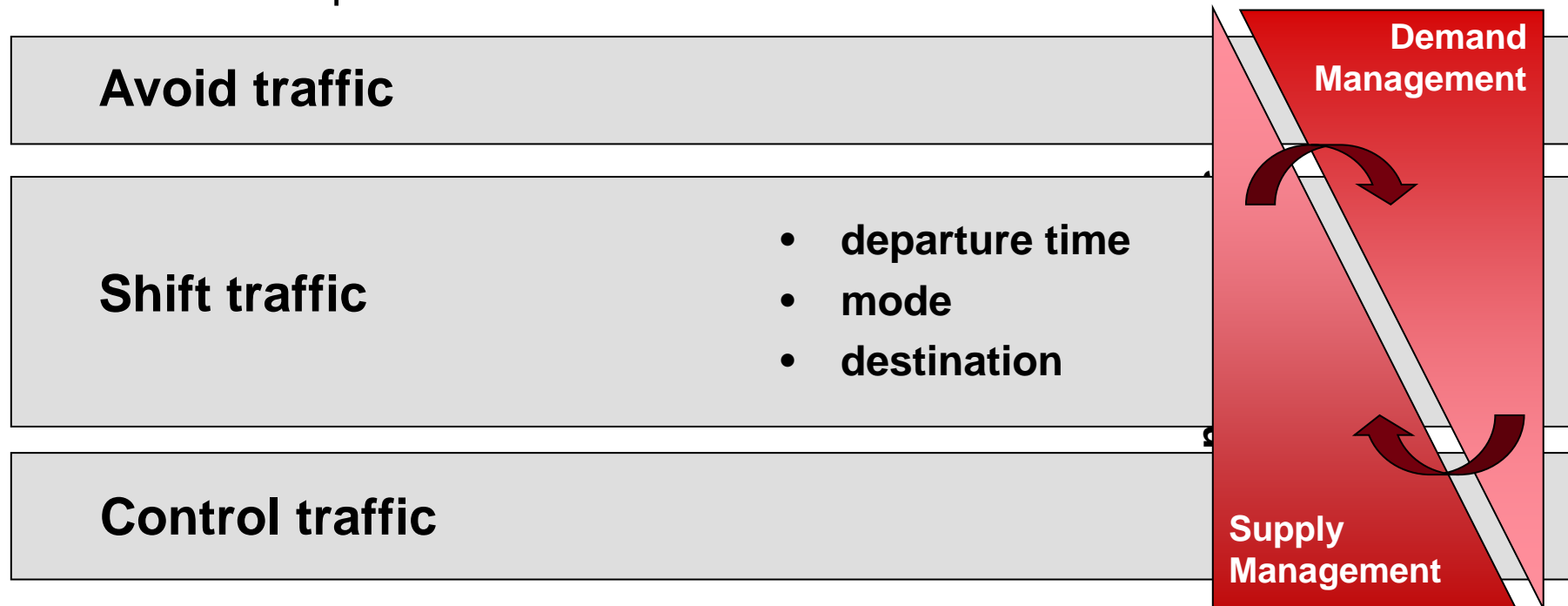
Heavily loaded transport systems will require more flexible regulations.



The need to balance travel demand and transport supply will increase.

Definition of Traffic Management

Traffic management influences the supply of traffic and transport systems as well as the demand for travel and transport through a bundle of measures with the aim to optimise the positive and negative impacts of traffic and transport.



Demand Management as an Integrated Part of Traffic Management

| TRAFFIC MANAGEMENT | Passenger Travel | Freight Transport |
|--------------------|----------------------------------------------------------|-------------------------------------|
| Influencing Supply | Provision and Operation of Traffic and Transport Systems | |
| Influencing Demand | Mobility Management | Freight Transport Demand Management |

Mobility Management (Travel Demand Management) influences the demand for passenger travel by implementing a bundle of measures with the aim to optimise the positive and negative impacts of traffic and transport.

Freight Transport Demand Management (FTDM) aims at influencing the demand for freight transport by implementing a bundle of measures with the aim to optimise the positive and negative impacts of traffic and transport.

Integrated Strategies for Sustainable Urban and Transport Development in Motorcycle Dependent Cities

Nguyen Thi Cam Van (Doctoral Candidate at VGTRC)

Problems

- In many Asian cities, the dominance of motorcycles has caused the problems of increased congestions, accidents, and pollution;
- Major causes are inadequate land-use development, over-utilization of private modes, and inadequate public transport services;



Research Objectives

- To find out interrelations btw urban and transport development in MDCs;
- To design and evaluate integrated strategies for sustainable urban and transport development in those cities.

Integrated Public Transport Development

Integrated Design of Public Transport Systems for Megacities in Developing Countries

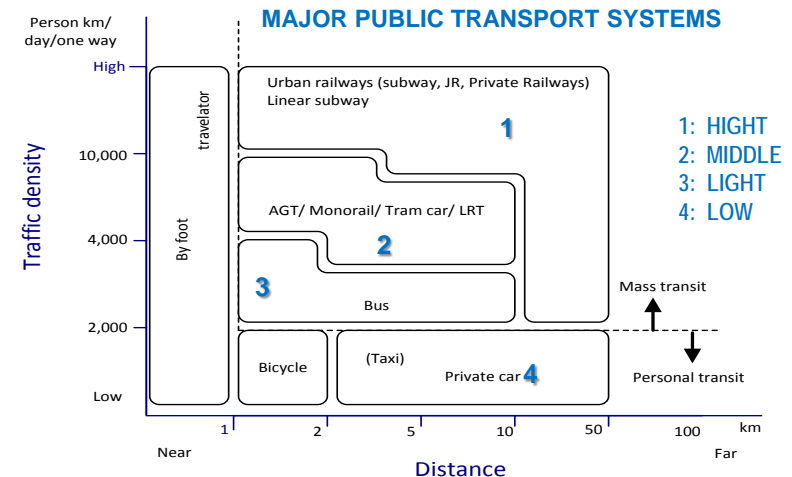
Nguyen Van Quoc (Doctoral Candidate at VGTRC)

Challenges in Megacities

- Travel demand is huge, ever increasing, and diverse;
- Need to accommodate and integrate different public transport systems (PTS) to meet the demand.

Research Objectives

- Develop the framework for integrating various PTS and components within a PTS (e.g., urban railways);
- Determine barrier factors for the integration at different levels;
- Develop guidelines for removing the barrier factors.



Bus Prioritisation in Motorcycle Dependent Cities (MDCs)

Nguyen Van Nam (Doctoral Candidate at TU Darmstadt)

Challenges in MDCs

- Too low share of public transport.
- Buses cannot compete successfully with other modes because they are suffered by congestion and too long travel times.



Research Objectives

- Analyse experience with prioritisation of public transport in developed countries.
- Build a systematical catalogue of measures including measures for bus stops, measures for travel ways, and measures for traffic signal control.
- Investigate applicability of measures in MDCs, and develop adapted measures.

Integrated Public Transport Development

Quality Management for Public Transport in MDCs

An Minh Ngoc (Doctoral Candidate at VGTRC)

Problems

- High motorcycle ownership and low demand for public transport (Motorcycle > 70%, Bus < 12%);
- Public transport quality is quite poor and inadequate from the viewpoint of users;
- Lack of quality control and quality assurance maintained by public transport authorities and operators.

Research Objectives

- Review the state-of-the-art of QM for public transport (PT)
- Develop a quality criteria system for PT
- Quality assessment and quality improvement for PT



Parking Management Schemes for Developing Countries

Truong Thi My Thanh (Doctoral Candidate at VGTRC)

Problems

- Lack of understanding the impacts of parking management schemes (PMS) in developing cities.
- Lack of effective parking management policies.



Objectives

- Categorise, analyse and understand the influences of PMS on accessibility and mobility.
- Develop methods to evaluate the impacts of PMS.
- Suggest effective PMS for city centres of developing countries.



Examples for Research Needs

Real Time Monitoring of Urban Transport



Project:



- REMON: Real Time Monitoring of Urban Transport
- Joint Project in Hanoi (36 months: 2012-2015)
- Funded by BMBF (Germany) and MOST (Vietnam)
- 8 partners in Germany
- 14 partners in Vietnam (TDSI, UTC and VGTRC as main partners)



Major Research Objectives:

- Develop a real-time traffic monitoring system based on GPS Data from mobile phones.
- Develop integrated traffic management strategies.



<http://www.remon-hanoi.net/en>

Modelling Travel Demand and Traffic Flow under Mixed Traffic Conditions

Modeling of traffic links and zonal centroid connectors under mixed traffic conditions

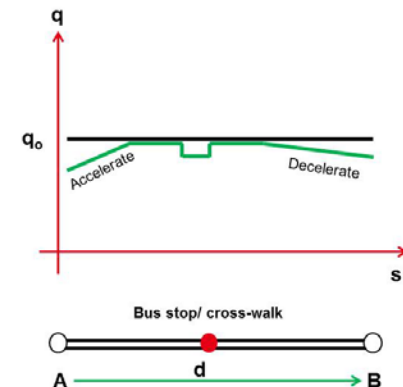
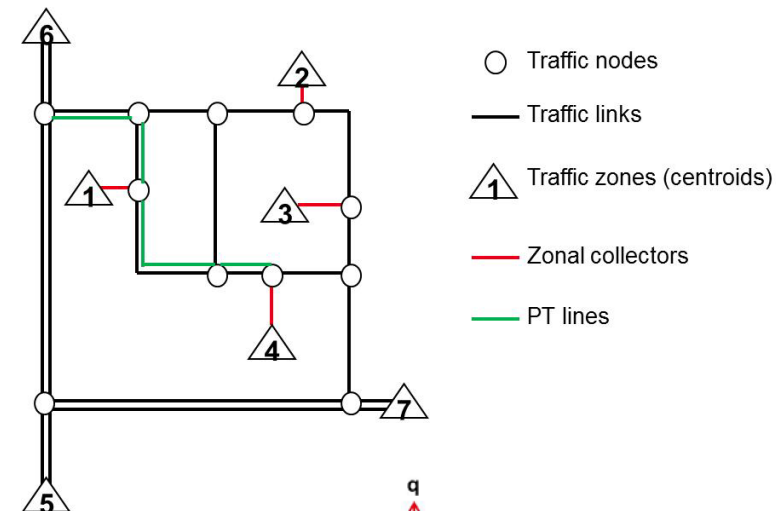
Vu Anh Tuan (Doctoral Candidate at VGTRC)

Problems

- High share of motorcycles in mixed traffic;
- Link attributes (e.g. capacity, freeflow speed) are not always homogeneous along its length;
- Modeling of zonal centroid connectors does not consider additional time (e.g., parking, walking, waiting) and intra-zonal congestion.

Objectives

- Identify problems of modelling road networks with mixed traffic.
- Refine modelling of links and zonal centroid connectors.
- Calibrate the fundamental diagram for mixed traffic in MDCs.



Traffic Signal Control

Capacity Analysis for Signalised Intersections in Motorcycle Dependent Cities

Huynh Duc Nguyen (Doctoral Candidate at VGTRC)

Problems

- Mixed traffic as an unique characteristic of MDCs.
- Conflicts among traffic streams reduce the capacity of signalised intersections.
- Lack of understanding the factors that affect the capacity of signalised intersections.

Research Objectives

- Develop appropriate methods for analysing the capacity of signalised intersections.
- Suggest solutions to enhance the capacity.

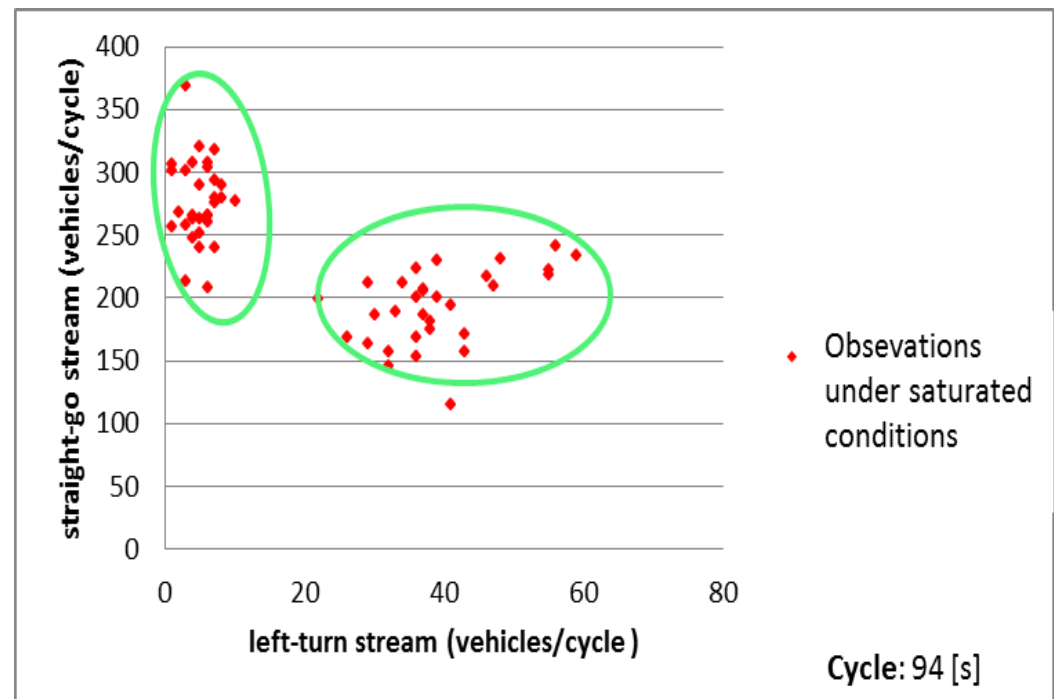


Capacity Analysis for Signalised Intersections in Motorcycle Dependent Cities (MDCs)

Huynh Duc Nguyen (Doctoral Candidate at VGTRC)

First Results

- Capacity depends on individual driving behaviour and acceptance of priority rules.
- Observations clearly show two clusters. In one of them the drivers of the minor stream have stopped the major stream.
- Current micro-simulation tools cannot model this significant effect (even social force models cannot, so far).



Traffic Signal Control

Traffic Safety Analysis for Signalised Intersections in MDCs

Tran Quang Vuong (Doctoral Candidate at VGTRC)

Problems

- Significant number of accidents at signalised intersections due to bad driving behavior, improper infrastructure and signal control.
- Lack of empirical research on traffic safety at signalised intersections in MDCs;

Objectives

- Analyse factors (causes) of traffic accidents at signalised intersections.
- Suggest effective solutions to improve traffic safety at signalised intersections.



Impacts of Traffic Management Measures on the Vietnamese Rice Industry

Nguyen Thi Binh (Doctoral Candidate at VGTRC)

Problems

- E.g. the Mekong Delta contributes app. 50% of Vietnam's rice and 90% of its rice export.
- The costs of rice logistics (with app. 25% of total rice price) are much higher than in other developing and developed countries.

Objectives

- Understand the existing situation of rice production and distribution in Vietnam.
- Analyse traffic management measures applied in this context.
- Assess the impacts of traffic management measures.
- Recommend effective measures for the processes of rice production, logistics and traffic.



So Many Further Research Topics ...

- Strategies for Dynamic Traffic Management in Cases of Incidents.
- Application of Intelligent Transport Systems (ITS) under Vietnamese Traffic Conditions.
- Online Detection of the Traffic Situation with Floating Car Data and Floating Phone Data.
- Developing an ITS Architecture for Vietnam.
- Application of Road Pricing and other Mobility Pricing Instruments.
- Highway Traffic Control Systems.
- Environment-responsive traffic control.
- Standardised Accident Reports and Data Bases for Traffic Safety Analysis.
- ...



Proposals for Future Cooperation

These are just some **ideas for discussion**:

- Meeting of academic staff from relevant institutes in HCMC every 6 months to present current research and to discuss research needs and potential projects.
- Setting up a Transport Development Forum for policy makers and researchers to discuss transport problems, policy issues, and potential solutions.
- Found a Vietnamese Traffic and Transport Research Association to promote exchange and to propose national standards in the area of traffic management.
- Edit an quarterly online journal on Traffic Management in Vietnam.
- Joint seminars on selected topics.
- ... other ideas ... ?

VGTRC Symposium 2013

An ITS Architecture for Vietnam.

HCMC, Friday, 8 November 2013



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