



1841A

Proposition of Sustainable Community Development based on Safety utilizing Motorcycle Culture in the ASEAN Region



Kenji Doi, Project Leader

Project Members

| | |
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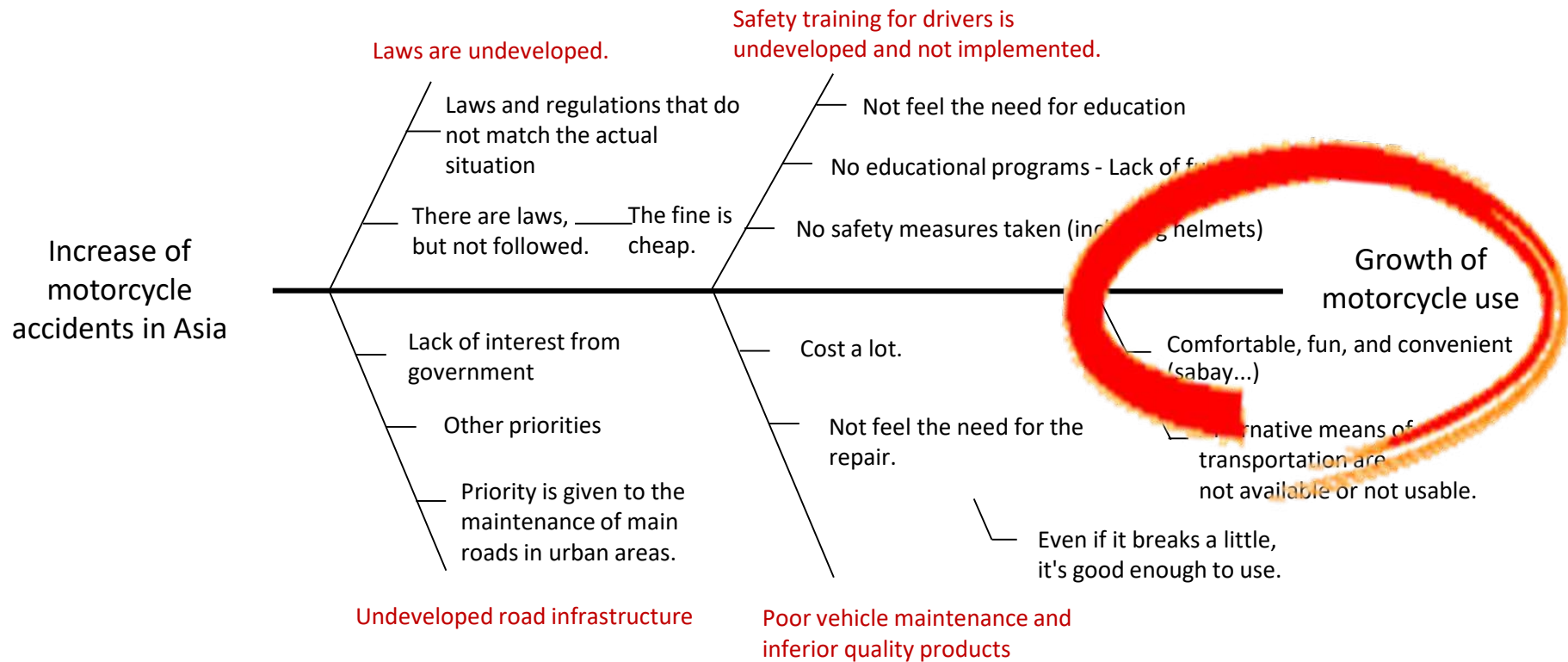
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|------------------|---|
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Objectives of the Study and Targets for this Year

On the other hand, systematic understanding of the causes of motorcycle accidents is lagging.

In particular, 74% in Thailand, 62% in Malaysia, 74% in Cambodia, etc.

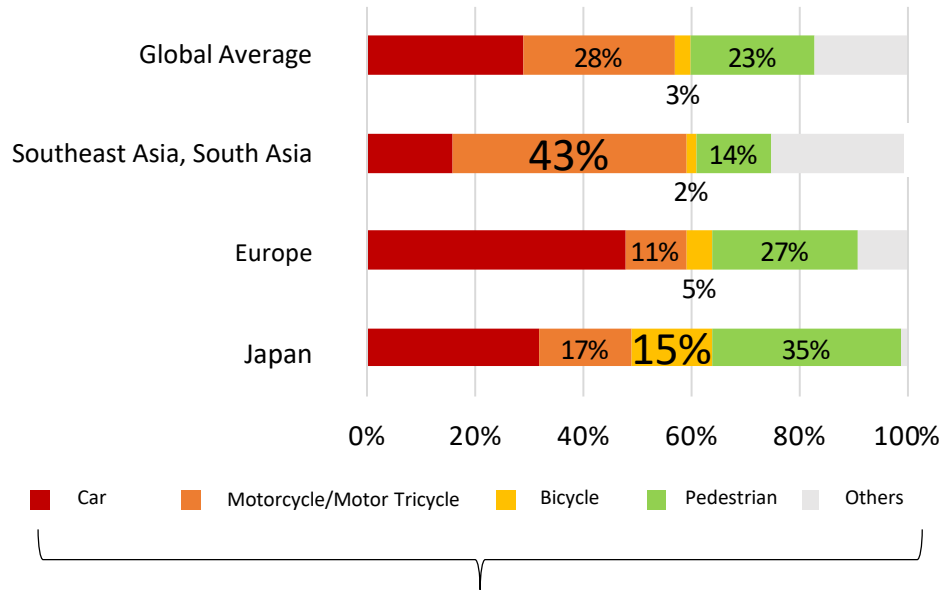
Accidents involving motorcycles in almost all ASEAN countries are the main cause of fatalities (WHO).



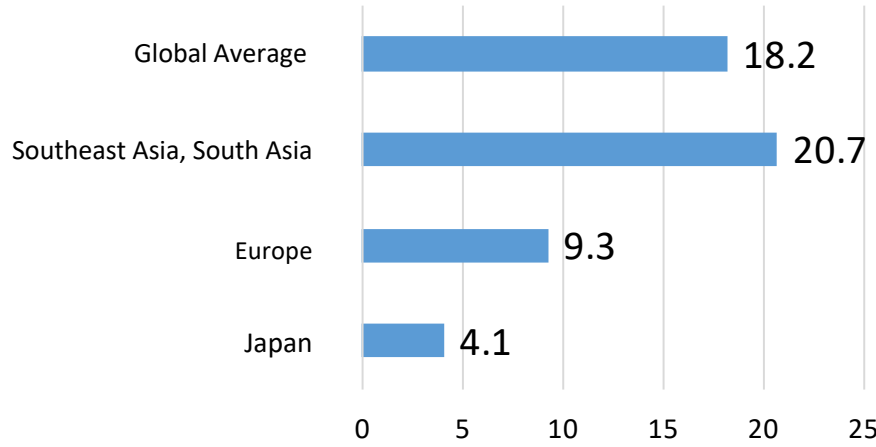
Focus of the Research.

Ratio of Traffic Accident Fatalities by Mode (2016)

Source: WHO 「Global status report on road safety 2018」¹⁾



Number of Global Traffic Accident Fatalities (2016)



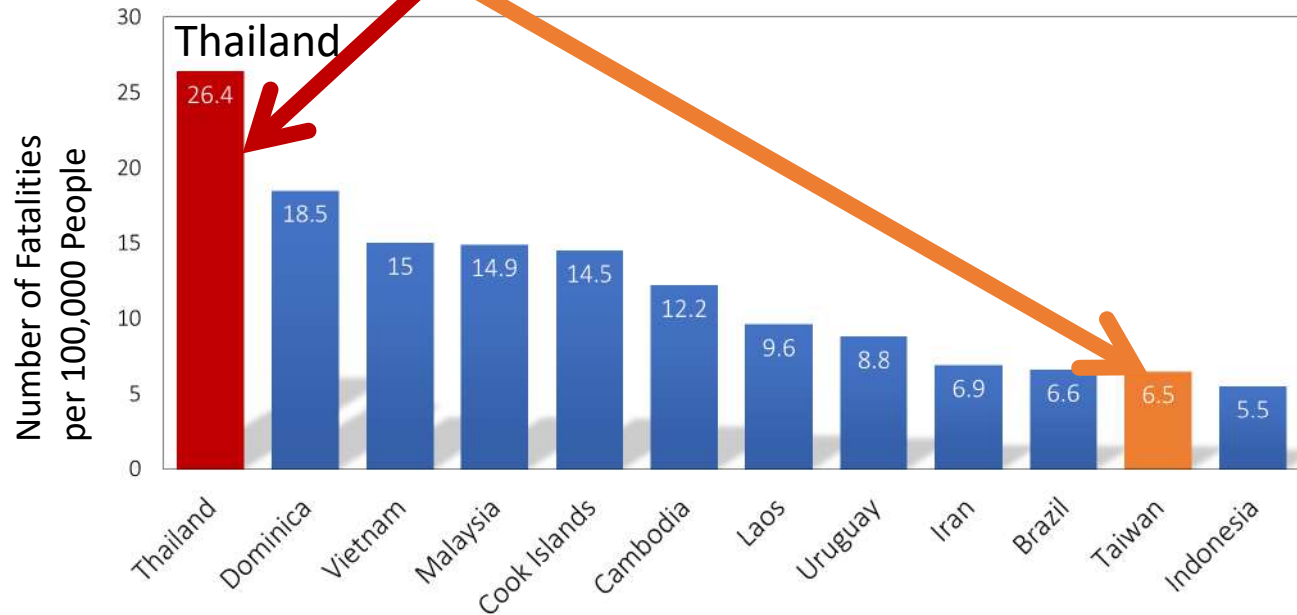
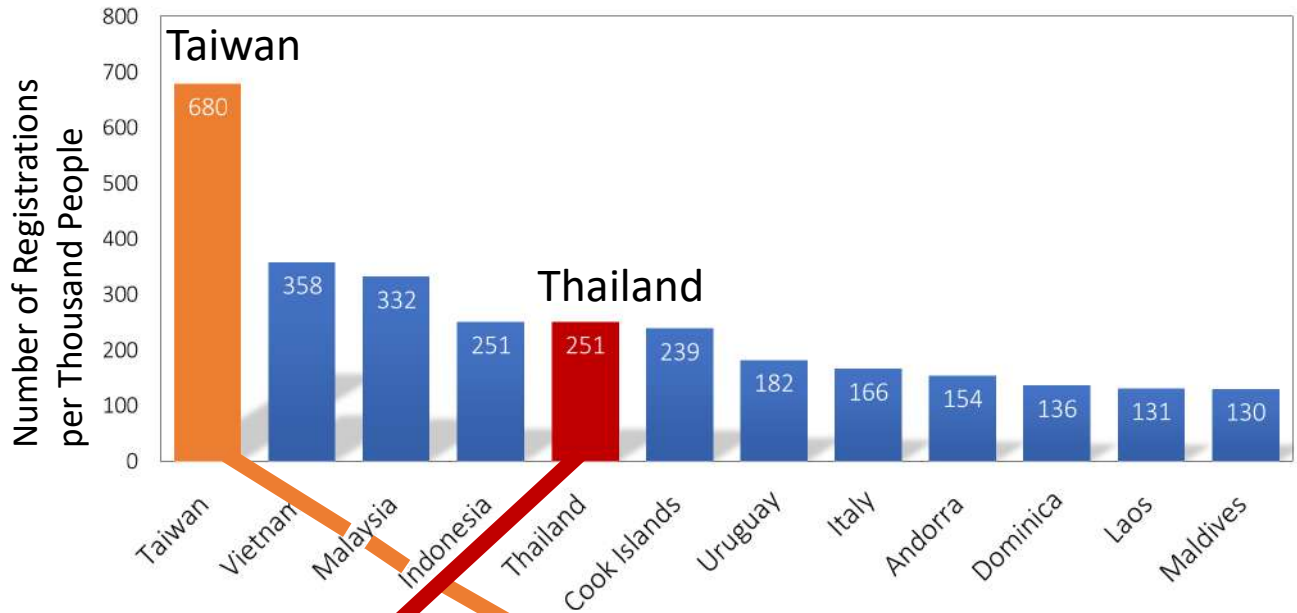
Number of Traffic Accident Fatalities per 100,000 Population (Unit: Person)

Diverse Road Transportation Users

The road traffic users who are in a vulnerable position are called Vulnerable Traffic Users. They need to be given priority and protection. However, the definition of vulnerable traffic users varies widely from country to country and region to region.

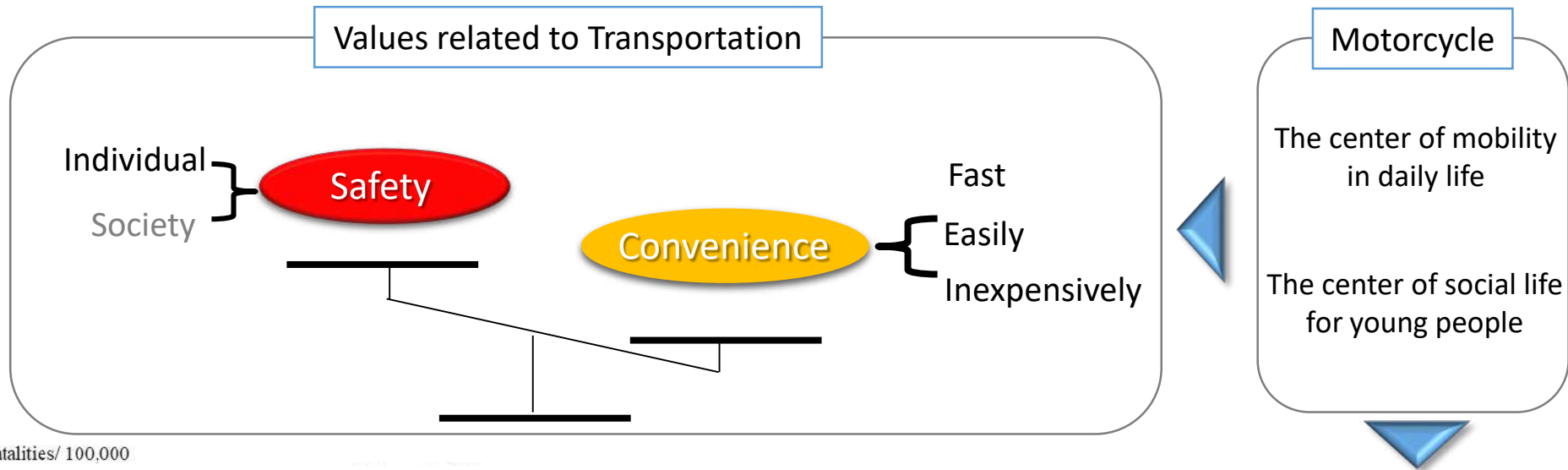
Motorcyclists in Southeast Asia and South Asia are considered as vulnerable road users. Differences in the relationship between the vulnerable and the strong in different countries and regions are reflected in the differences in road safety awareness.

Motorcycle Ownership Rate and Accident Rate



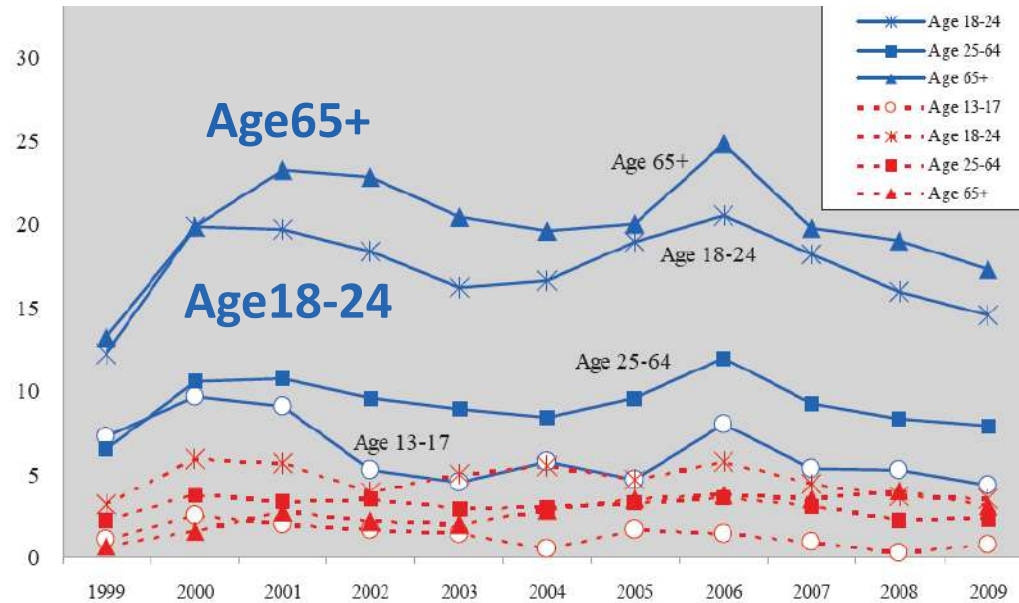
What are the similarities and differences between Thailand and Taiwan?

Positioning of Motorcycles in Taiwan



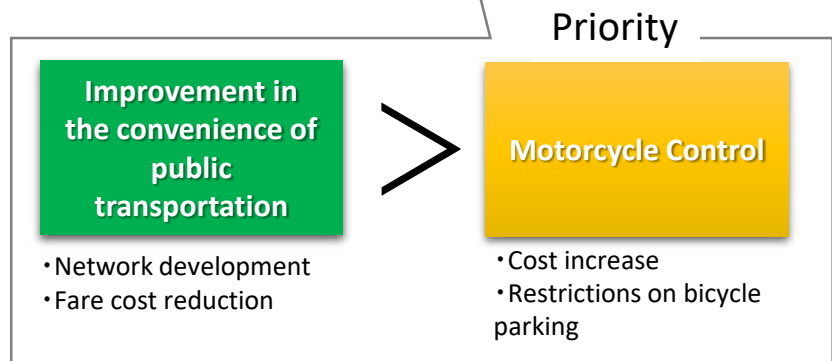
Fatalities/ 100,000

Fatality Rate of Motorcyclists by Gender and Age



Use of motorcycle = People's Right

Young people have a strong interest in and influence over politics, and politics has no choice but to respect them.



Road Space Design focusing on Motorcycles



Road space design focusing on motorcycles

Since the mixture of cars and motorcycles travelling on the same roads increases the risk of accidents, a separate type space design has been introduced to prevent the mixtures of cars and motorcycles on the roads.

(機車:Motorcycle,汽車: Car)

- ✓ Motorcycle only lane
- ✓ Motorcycle priority lane
- ✓ No motorcycle lane
- ✓ Motorcycle waiting area
- ✓ Two-step right turn for motorcycles



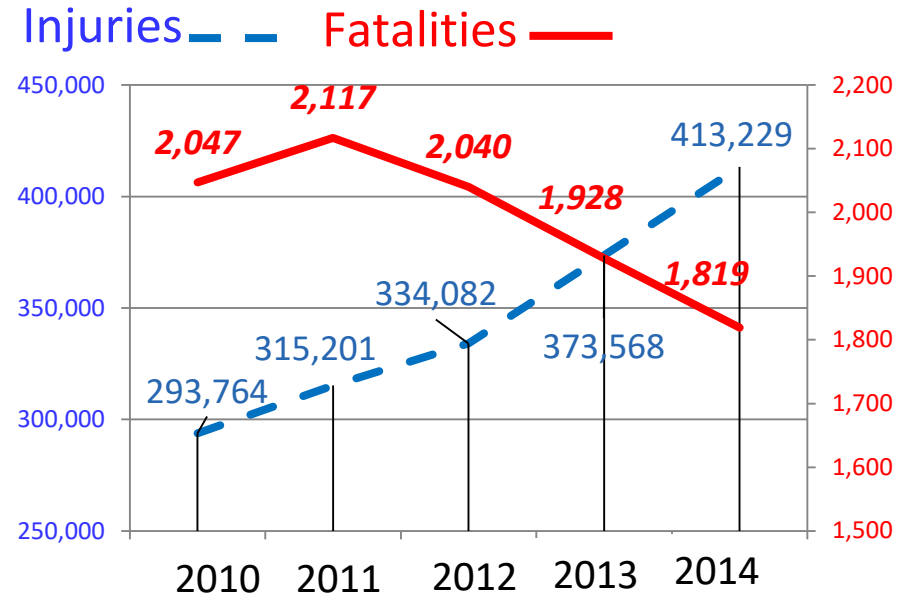
Overprotection for Motorcycles

- ✓ Use of sidewalk and eave walkways as bicycle parking spaces
- ✓ The sidewalk is converted to a motorcycle parking space. (Taipei)
- ✓ Inadequate sidewalk maintenance/Few pedestrian protection facilities



Actual Conditions of and Countermeasures against Traffic Accidents in Taiwan

Number of Fatalities and Injuries in Traffic Accidents

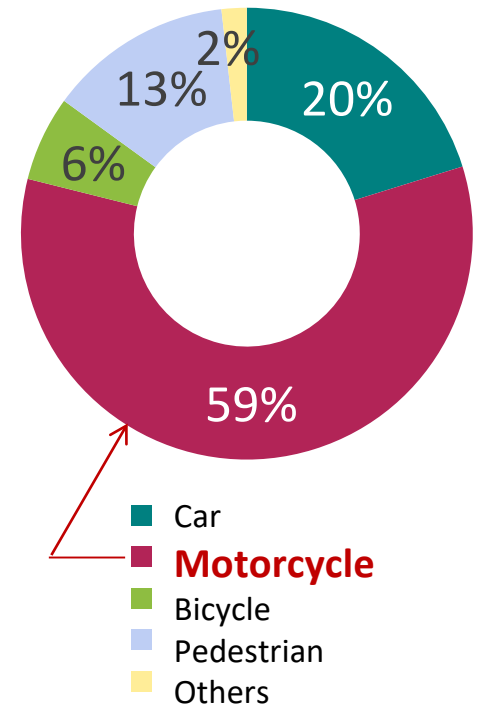


The increase in the number of injuries is believed to be due to excessive speed of about 10km/h which is not well enforced.

Top Four Factors in Traffic Fatalities in 2014

| Factor | Rate |
|-----------------------------------|-------|
| Careless driving | 18.5% |
| Ignoring the Yield | 16.9% |
| Ignoring traffic lights and signs | 11.6% |
| Drinking and driving | 8.3% |

Traffic Accident Fatalities by Mode (Past 10 Years)



From the 12th Road Traffic Order and Road Safety Reform Plan (2016 to 2018)

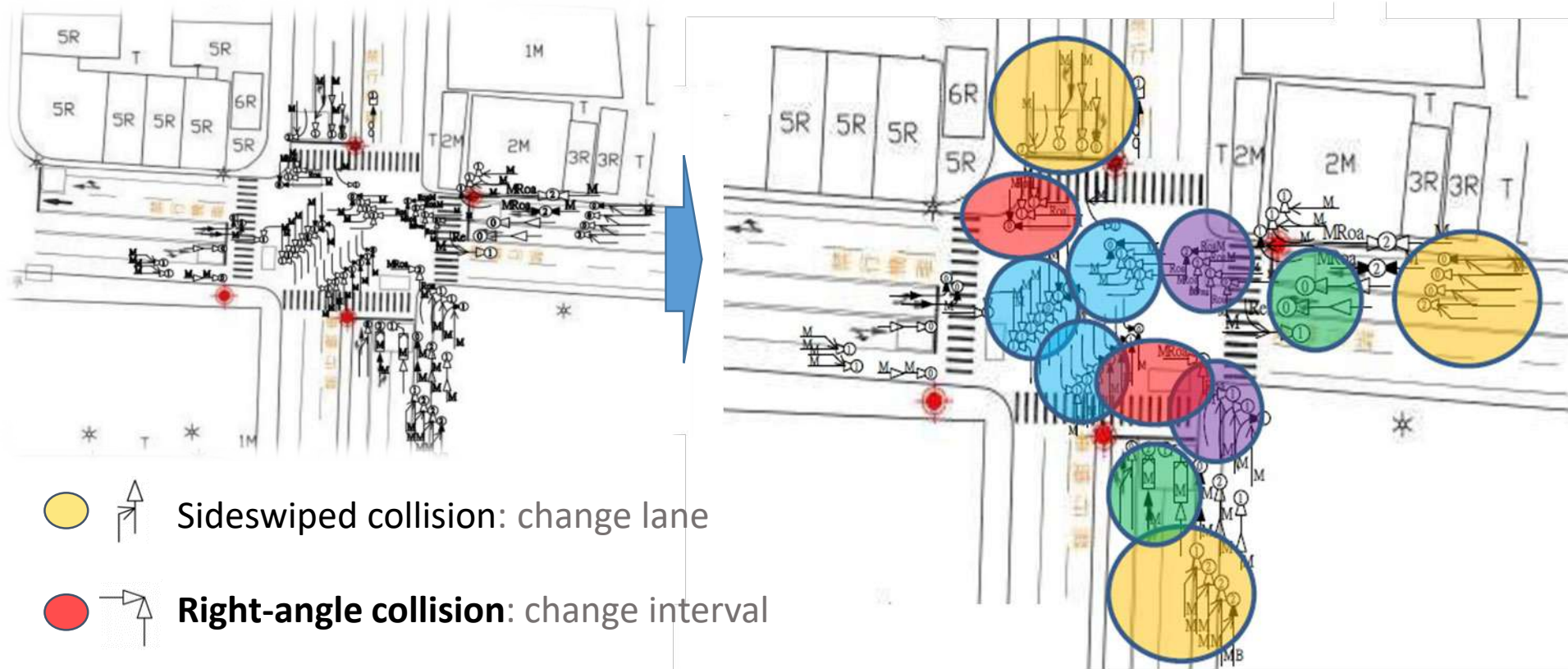
Strategy


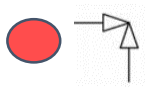
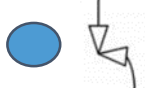
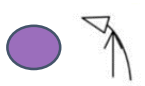

- ⊕ Speed Management
- ⊕ Stop/yield at Intersections
- ⊕ **Motorcycle Safety**

Goals

- 12% decrease in fatalities in traffic accidents in 3 years
- 0% increase or decrease in the number of people injured in traffic accidents in 2016
- Number of people injured in traffic accidents is below the 2013 level.

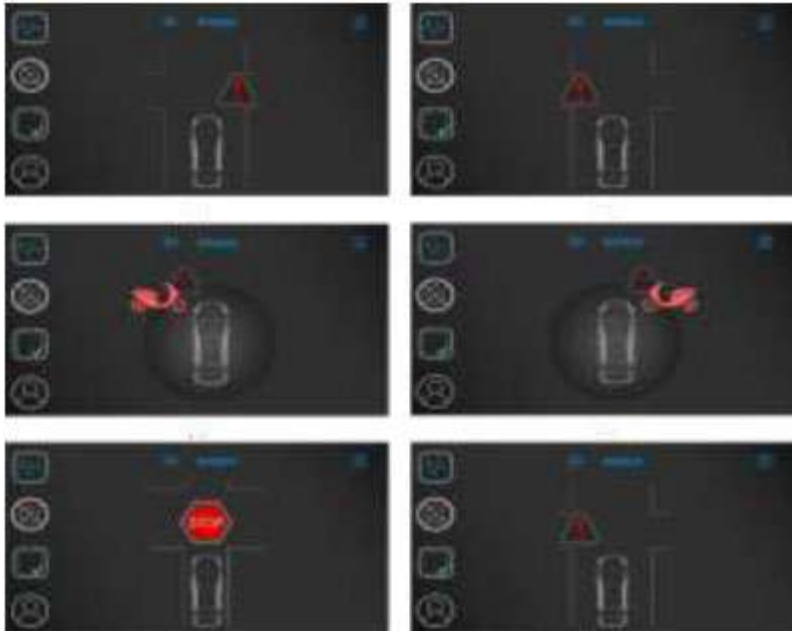
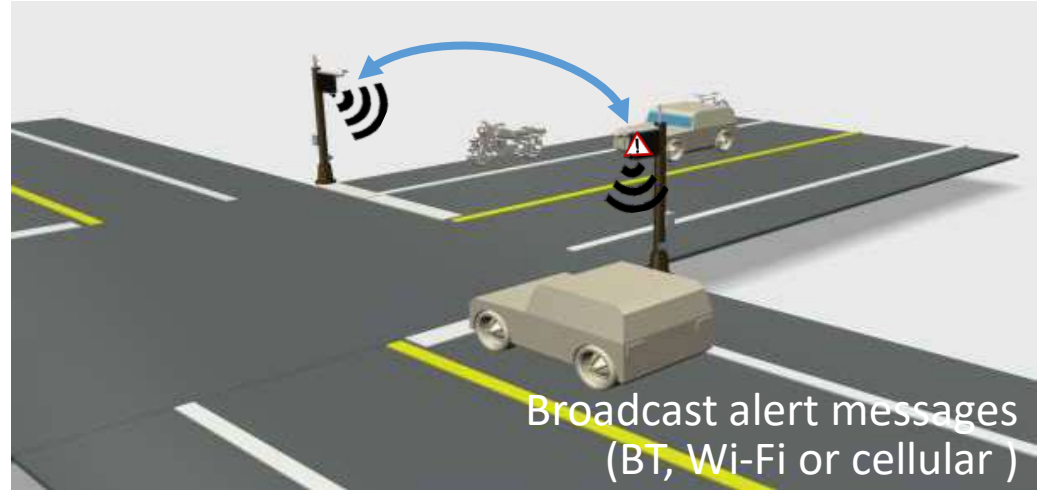
Characteristic Types of Motorcycle Accidents



-  Sideswiped collision: change lane
-  **Right-angle collision:** change interval
-  Left turning other-angle collision by left turning movement : turning movement with opposite straight movement
-  **Right turning other-angle collision** by right turning movement : turning movement with straight movement
-  Rear-end collision: change interval and width of intersection

Motorcycle ITS Trial: 70% Accident Reduction Effect

Detect approaching vehicles by 10/24GHz/active RFID.



Positioning of Motorcycles in Thailand

The Three "S"s
representing the
Thai National Character

| | | |
|---|--------|-----------------------|
| } | Sabai | (With a good feeling) |
| | Saduak | (Conveniently) |
| | Sanuk | (In a joyful manner) |

<http://caliban.blogspot.com/2003/10/suay-sabai-saduak-sanuk-thai-diaries.html>

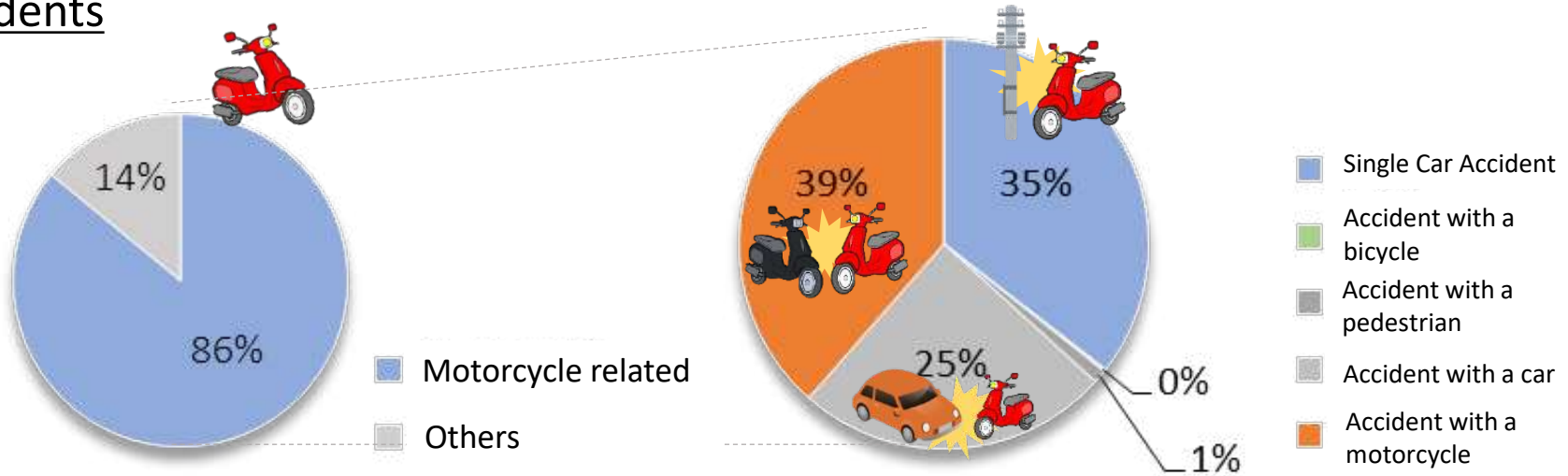
Walking is neither sabai nor saduak and definitively not sanuk. You will hardly see anybody walking in a Thai town, whatever its size. Schoolchildren are cycling, and biking is the prevalent form of transport across town with the motorized tuk-tuks and samllors. **It is very common to see a full family of 4 on a single bike.**

When travelling through Bangkok, biking is the fastest and most dangerous form of transport but is a fun way to reach your destination. Even if it is not that cheap, bikes are available nearly everywhere and commonly used by people.

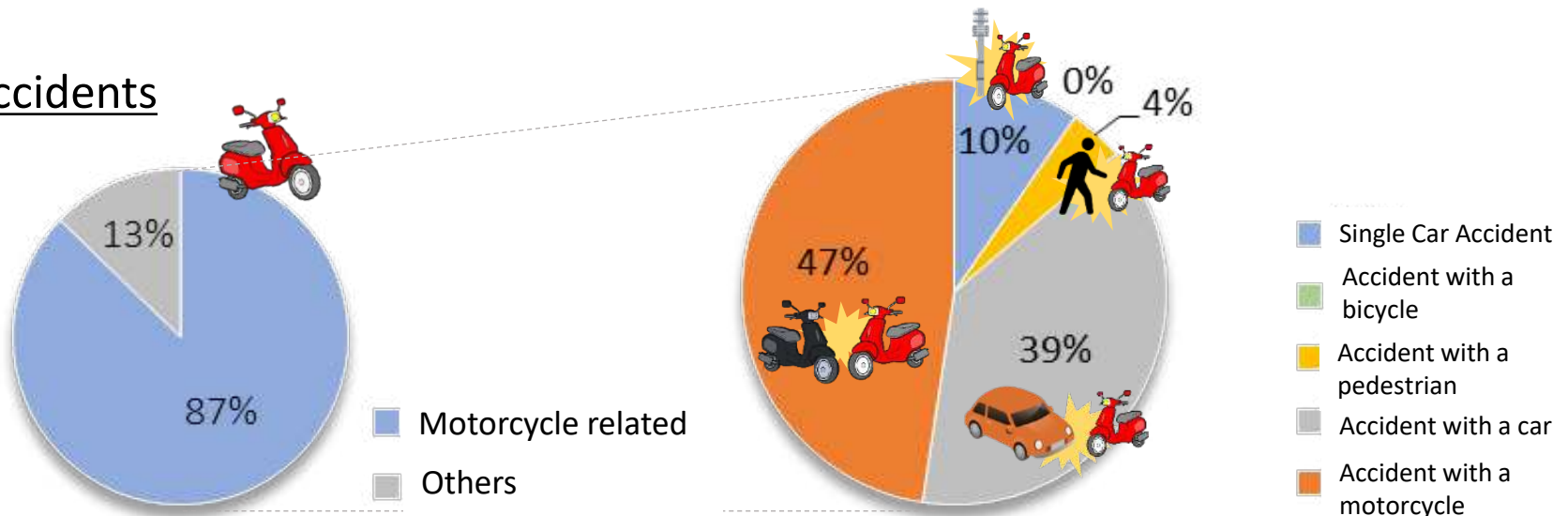
→ Similar to the Taiwanese sense of value for motorcycles

Composition of Motorcycle Accidents

All Accidents



Fatal Accidents



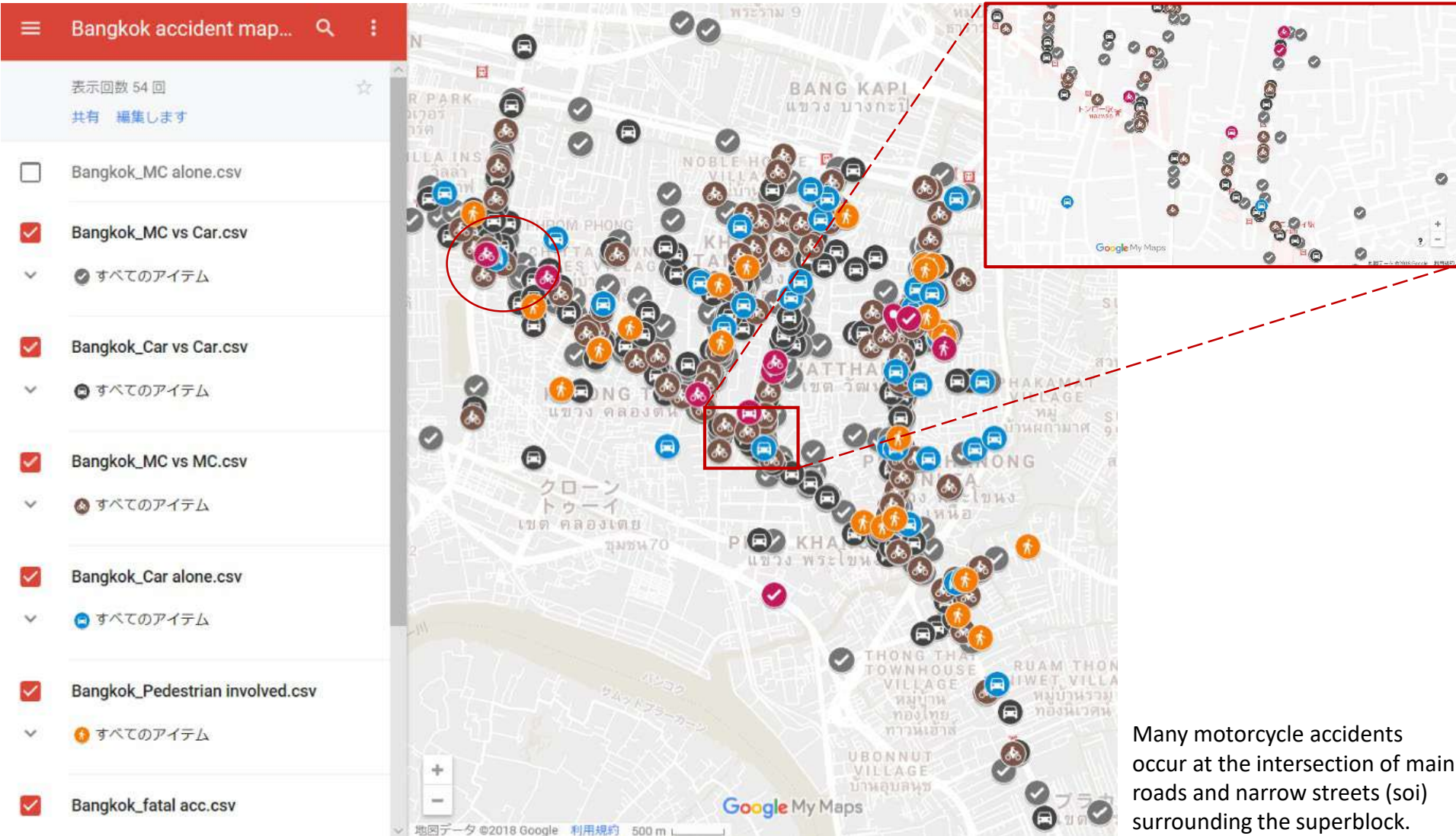
Collisions between Motorcycles (Motorcycle Taxi)



Photographed on
September 13, 2017

Many people walk away or pass the accident sites as if nothing happened, perhaps because it is so common.

Occurrence of Accidents caused by City Block Configuration



Similar Issues seen in Korea

- **A city is formed by superblock** surrounded by wide, multi-lane main roads.
- **Emphasis on speed (60km/h limit is common.)**
- Signal cycle length
(Approx. 140 to 150 s, Max. 180 s)
- A lot of on-street parking ← Japan's garage law was considered, but not introduced.



Map in vicinity of Gangnam Station
©Google

- **Delay in safety measures for living roads in the city area**

For drivers

A road space with a wide width and a high degree of driving freedom, where automobiles, especially large vehicles, are given priority.



For pedestrians

Speed of travel + length of crossing distance → human scale/speed is exceeded and road space is not easily embodied.

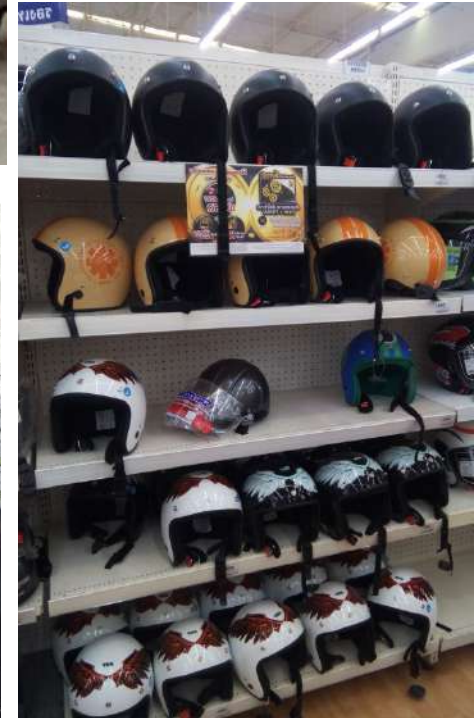
Motorcycle Taxis and Rental Motorcycles supporting the Last Mile Delivery



Motorbike Rental



Damaged Helmet



Actual Conditions of Helmets sold and used in the Local Market



Helmet for motorcycle
1 type (half type)
Shock absorption test
Hemispherical anvil
Impact speed: 5.8-5.95m/s
First time: Back of head
Second time: Left side of head



Helmet's Functions to prevent Serious Injuries

Shock Absorption Test

A dummy head wearing a helmet is induced to free-fall onto an anvil at a specified fall speed. The acceleration of the dummy head is measured.

⇒ Confirm that an **impact** does not apply to **the brain** causing a fatal wound

Plane Anvil

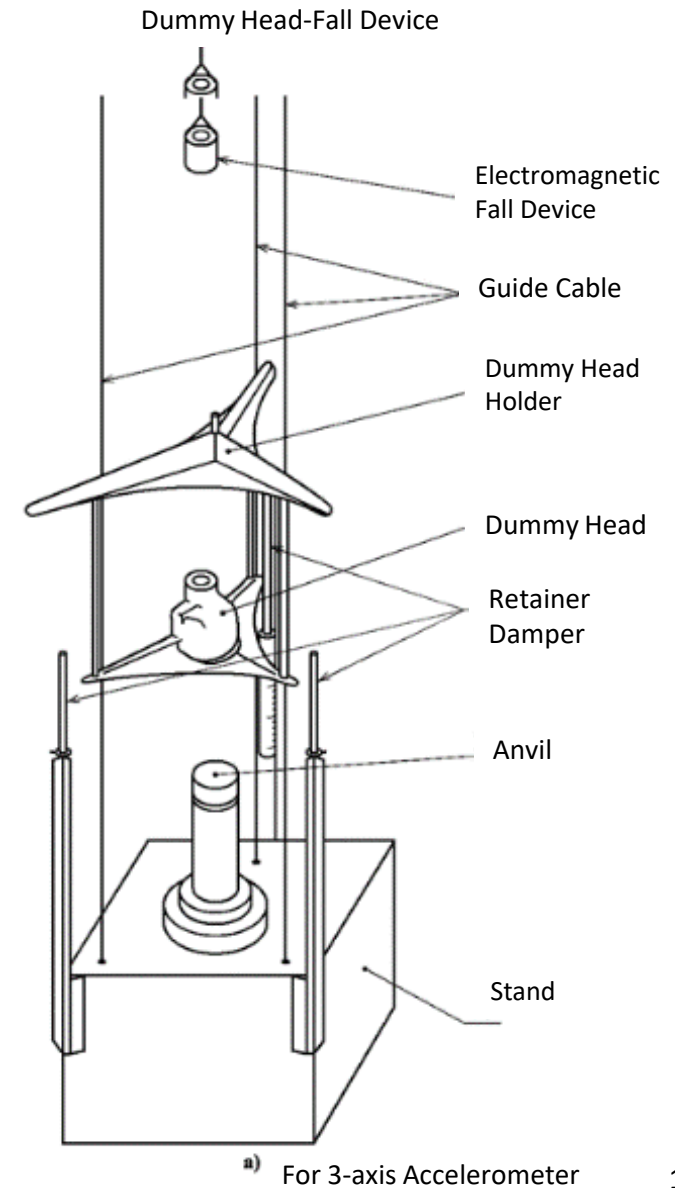


In particular, collision with road surface is assumed.

Hemisphere Anvil



Collision with road structures and vehicles is assumed.

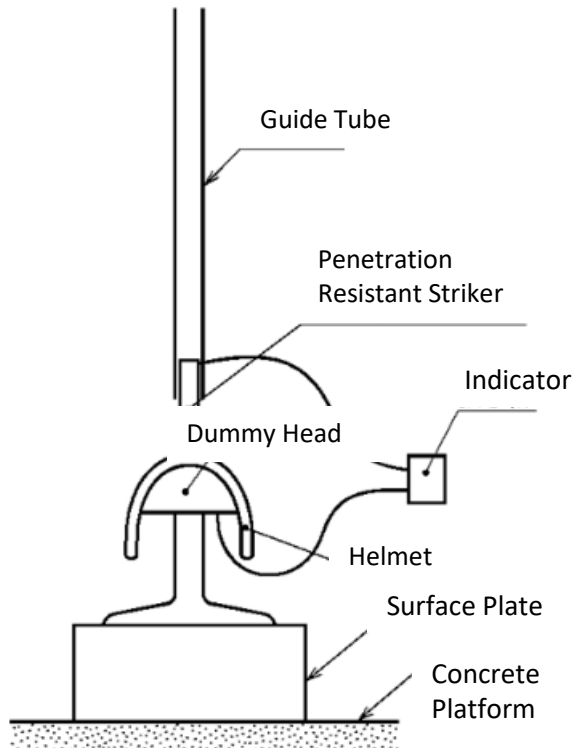


Helmet's Functions to Prevent Serious Injuries

Penetration Resistance Test

Drop the striker from the specified height and let it hit the helmet.

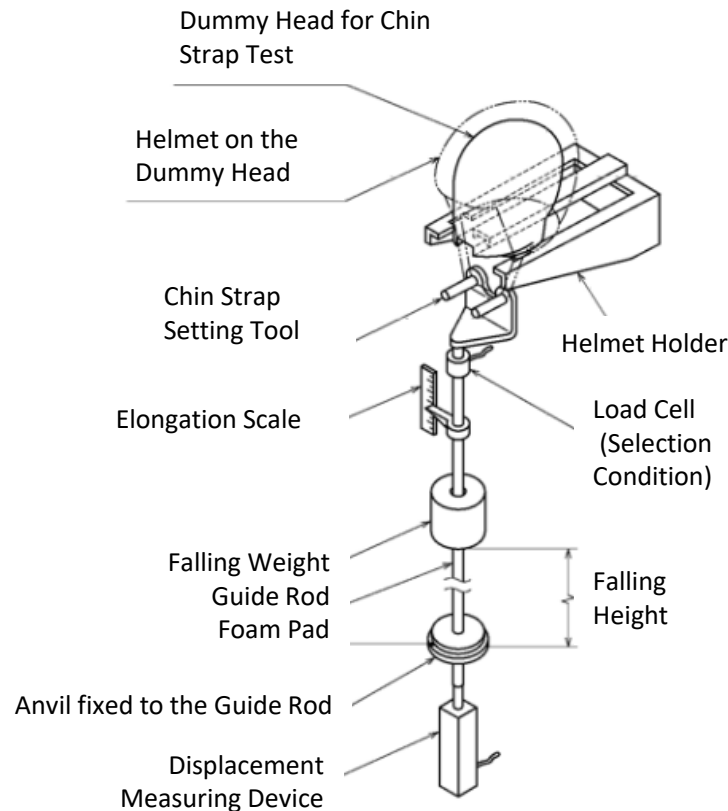
⇒ Ensure that **no sharp objects penetrate the helmet** in the event of an accident.



Chin Strap Strength Test

Apply a preload to the strap in the vertical downward direction and allow the falling object free-fall from a certain height.

⇒ Confirm that the **helmet will not fall off** in the event of an accident.



Helmet Types and Safety Standard Issues

| Helmet Shape | Japan's Standard | Thai Standard (TIS) |
|--------------------------------|----------------------|--|
| Half type, Three-quarters type | JIS T8133 1 type | Based on European Standard (ECE R22) |
| Full-face type, Open face type | JIS T8133 2 types | Based on US's DOT Standard (FMVSS 218) |

Half Type *1

Also known as a "bowl-shaped" type, a structure in which the ear area is not covered by the protection area of the helmet.

Three-quarters Type *1

It is also called "semi-jet type", and the protection range of the helmet is extended to the lower part of the ear compared with the half type.

Open Face Type

Also known as the "Jet" type, the side protection range of the helmet is extended further down compared with the three-quarters type.

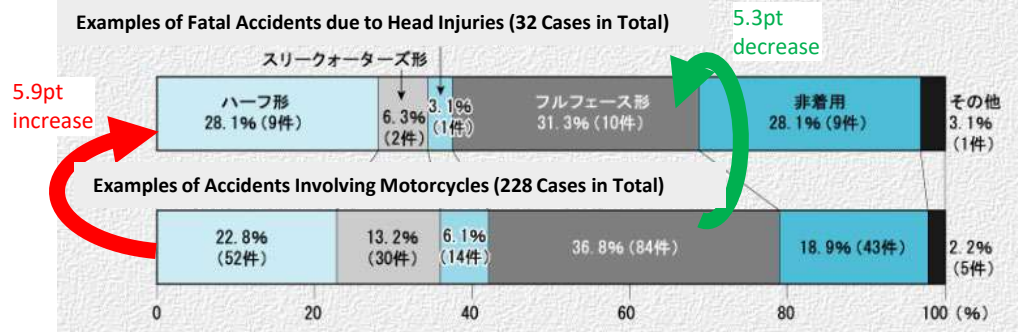
Full-face Type

The protective area of the helmet is an integrated structure including the chin area, and a face shield is generally attached to the window opening to protect the eyes.

*1 The intended use (for 0.125L (125cc) or less) is indicated on the helmet.

Half Type: 28.1% (9 Cases)
 Three-quarters Type : 6.3% (2 Cases)
 Open Face Type: 3.1% (1 Case)
 Full-face Type: 31.3% (10 Cases)
 Not wearing a helmet: 28.1% (9 Cases)
 Others: 3.1% (1 Case)

Half Type: 22.8%(52 Cases)
 Three-quarters Type : 13.2%(30 Cases)
 Open Face Type: 6.1%(14 Cases)
 Full-face Type: 36.8%(84 Cases)
 Not wearing a helmet: 18.9%(43 Cases)
 Others: 2.2%(5 Cases)



Motorcycle accidents in which the type of helmet was identified in Japan was compared with the fatal accidents due to head injuries among the above accidents.

⇒The results suggest that the half type is less safe than the other types, even though it meets safety standards.

http://www.itarda.or.jp/itardainfomation/info39/info39_1.html:ITARDA Survey Results of Motorcycle Accidents and Helmets

The double standard problem between the Road Traffic Law Enforcement Regulations for riding helmets and the Consumer Product Safety Law

Helmet Safety Verification Results

| No. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-----------------------------|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Helmet Shape | | Type 1 | Type 1 | Type 1 | Type 2 | Type 2 | Type 2 | Type 2 | Type 2 | Type 1 | Type 2 |
| Impact Absorption Test | Hemispherical Anvil | ○ | ○ | × | △ | × | × | × | × | | |
| | Plane Anvil | ○ | ○ | ○ | ○ | ○ | ○ | △ | × | | |
| | Result | Pass | Pass | Fail | Fail | Fail | Fail | Fail | Fail | | |
| Penetration Resistance Test | | | | | | | | | | Pass | Fail |
| Chin Strap Strength Test | | | | | | Fail | | | | Pass | Fail |

○: Both locations are within the standard range. △:One of the two locations is within the standard range. ×:Both locations are outside the standard range.

- Type 1 shape helmets generally met the safety standards of Japan.*
- All type 2 shape helmets did not meet the safety standards of Japan.

*Type 1 helmets are designed for 125cc or less motorcycles, and the standard values are laxer than those for Type 2 helmets.

More problems...

-Inadequate helmet protection for the field of view

-Shock-absorbing material is removed to ensure air permeability.

-Fixation of metal fittings (chin strap) is loose. etc.

Differences in Perceptions between Motorcycle Users and Non-Users

How do the people using motorcycles on a daily basis think differently than we do?

1841 アセアン二輪プロ

IATSS

Positioning of Motorcycles in Thailand

| | | |
|---|---|--|
| The Three "S"s representing the Thai National Character | } | Sabai (With a good feeling) Saduak (Conveniently) Sanuk (In a joyful manner) |
|---|---|--|

<http://caliban.blogspot.com/2003/10/suay-sabai-saduak-sanuk-thai-diaries.html>

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You will hardly see anybody walking in a Thai town, whatever its size. Schoolchildren are cycling, and biking is the prevalent form of transport across town with the motorized tuk-tuks and sam-lors.

It is very common to see a full family of 4 on a single bike.

When travelling through Bangkok, biking is the fastest and most dangerous, but fun, way to reach your destination. Even if it is not that cheap, bikes are available nearly everywhere and commonly used by people.

→ Similar to the Taiwanese sense of value for motorcycles

Focus on the relationship between walking and motorcycle use.

Conducting a Web-based Survey

Survey on Changes in Transportation Awareness and Behavior of Foreigners Visiting and Staying in Japan

Subjects: **Foreigners living in Japan for 5 years or less** who are registered in the research company's database

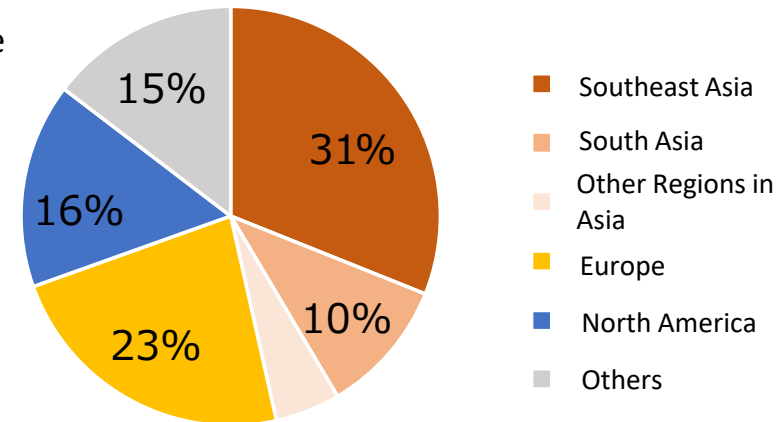
Method: Awareness survey on the web system (in English only)

Number of Responses: 499

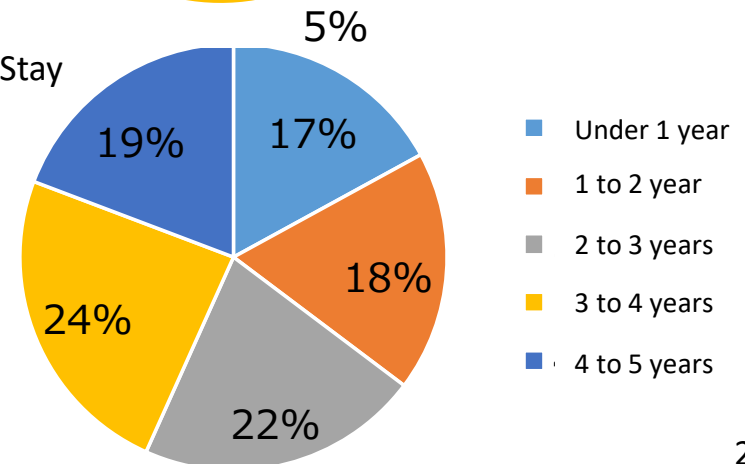
Survey Items

- Personal attributes of the subjects
- Traffic behavior before coming to Japan
- Changes in traffic behavior before and after coming to Japan
- Awareness of the walking environment in Japan
- Change in awareness of walking
- Change in intention of driving behavior
- Change in values toward mobility
- Culture of motorcycles in home country

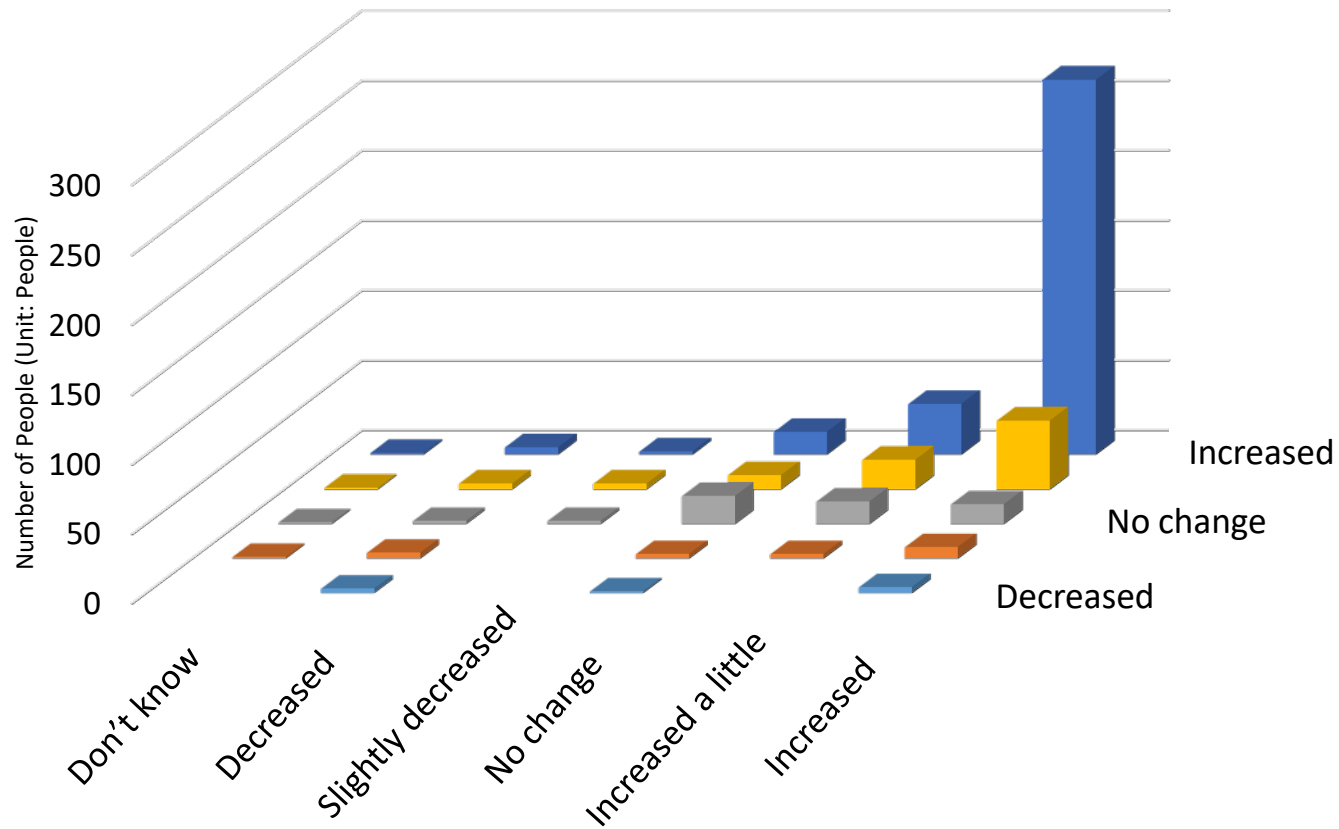
Birthplace



Length of Stay



Changes in the Walking Behavior before and after coming to Japan

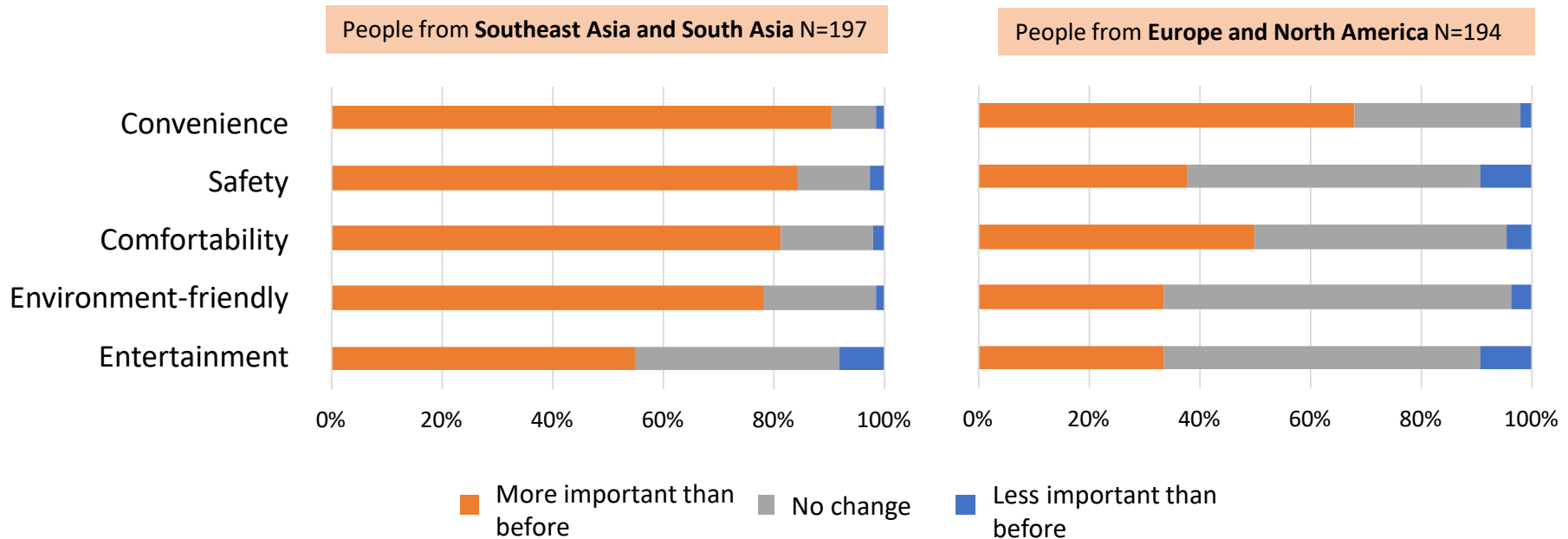


Changes in Walking Frequency of Walking before and after coming to Japan

Change in Frequency of using Public Transportation before and after coming to Japan

- Respondents who **increased** both the **frequency of using public transportation and walking** after coming to Japan: **75%**

Changes in Values of Mobility after coming to Japan



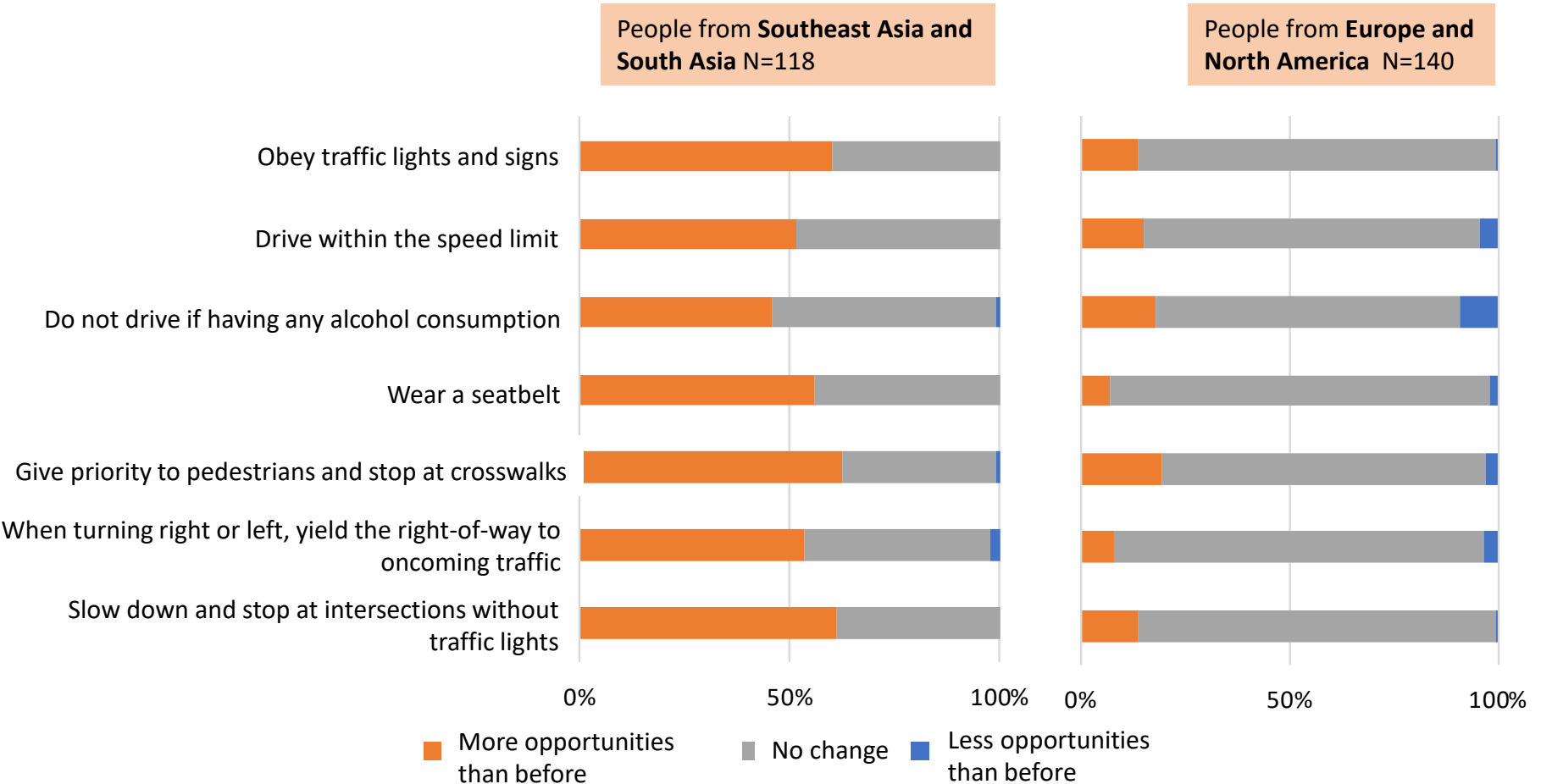
➤ People from **Southeast Asia or South Asia**

Respondents who answered that **safety and comfort** are more important than before: **About 80%**

➤ People from **Europe or North America**

Respondents who answered that **safety and comfort** are more important than before: **About 40%**

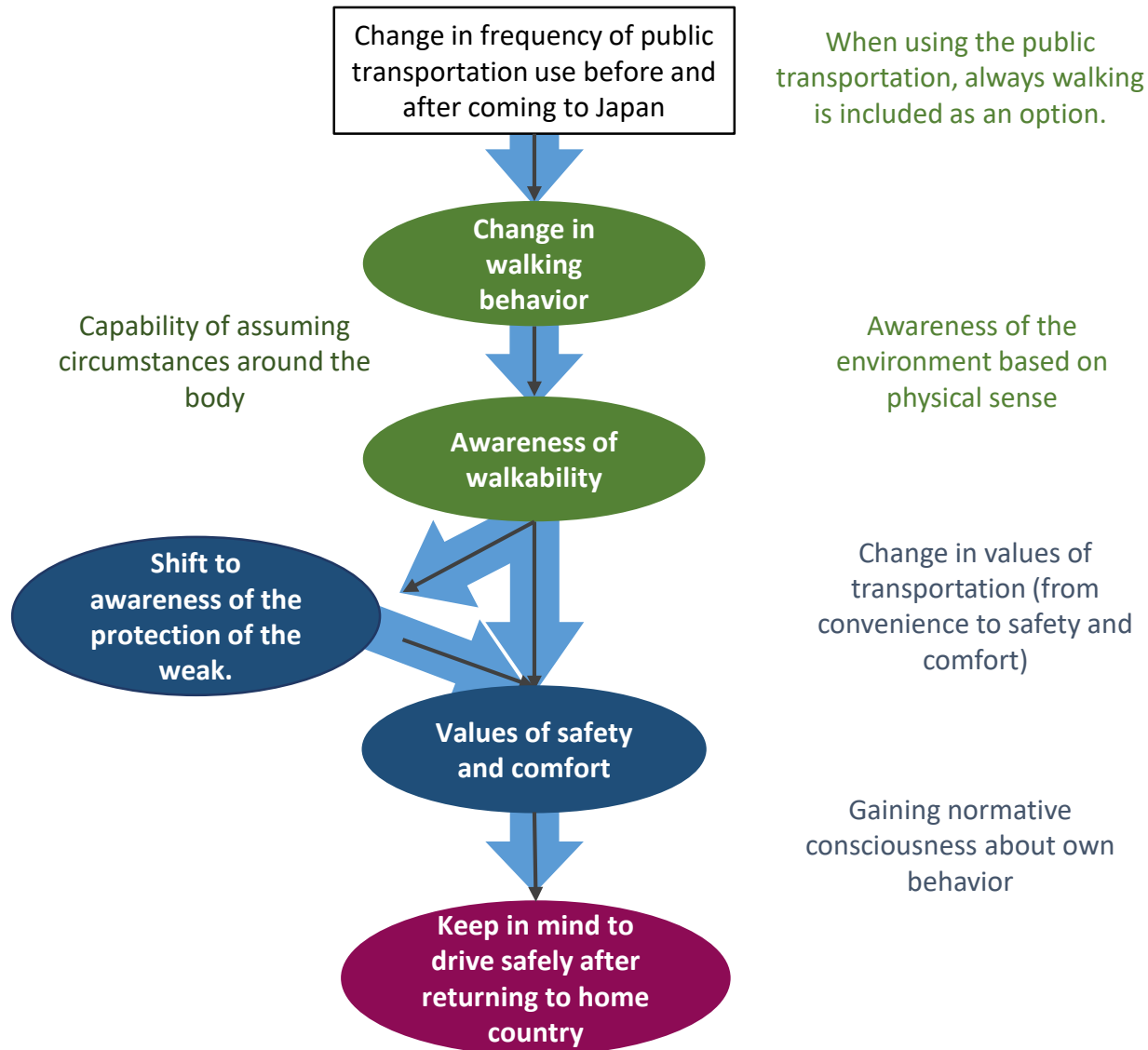
Changes in Attitude and Behavior toward Traffic Rules after coming to Japan



➤ People from **Southeast Asia or South Asia**
 Respondents who answered that **they would try to drive safely**: About **50%**

➤ People from **Europe or North America**
 Respondents who answered that **their driving style has not changed**: About **80%**

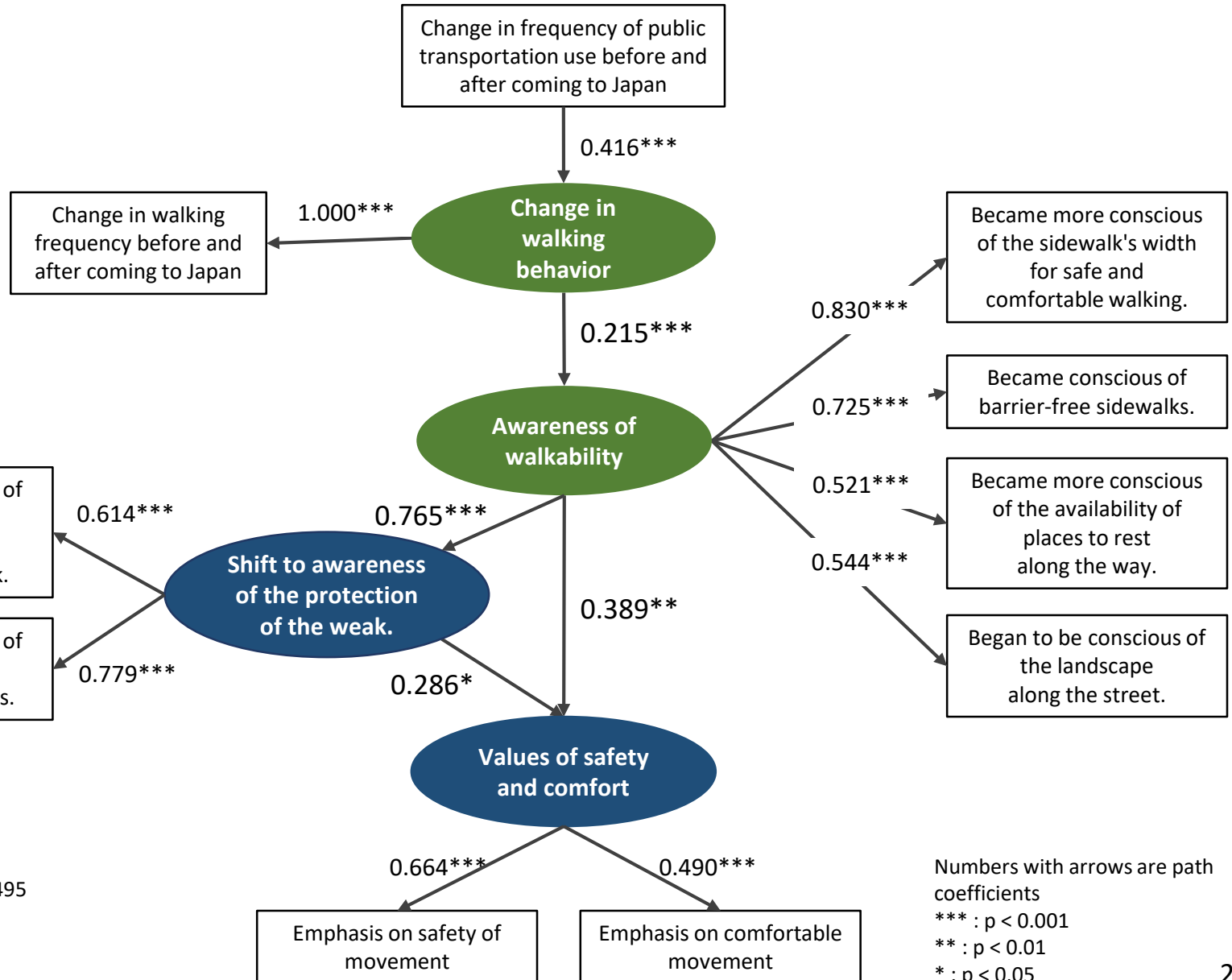
Hypothesis Formulation



The experience of walking in Japan has led to a shift in awareness toward the protection of vulnerable road users and increased safety consciousness.

Relationships validated by Covariance Structure Analysis

All Nationalities



Number of Samples: N=495
 CFI : 0.971
 TLI : 0.959
 RMSEA : 0.044

Numbers with arrows are path coefficients
 *** : p < 0.001
 ** : p < 0.01
 * : p < 0.05

International Comparison

People from Southeast Asia or South Asia

Change in frequency of public transportation use before and after coming to Japan

Change in walking behavior

People from Europe or North America

Change in frequency of public transportation use before and after coming to Japan

Change in walking behavior

- The use of public transportation induced walking and increased awareness of walkability.
- The walking experience promoted the acquisition of the perspective of protecting the vulnerable road users and the formation of a sense of values for safety and comfort.
- The values of safety and comfort formed by the walking experience led to a commitment to safe driving behavior.
- Increased safety awareness was more noticeable among those who came from areas where motorcycles were considered as vulnerable.

Shift to awareness of the protection of the weak.

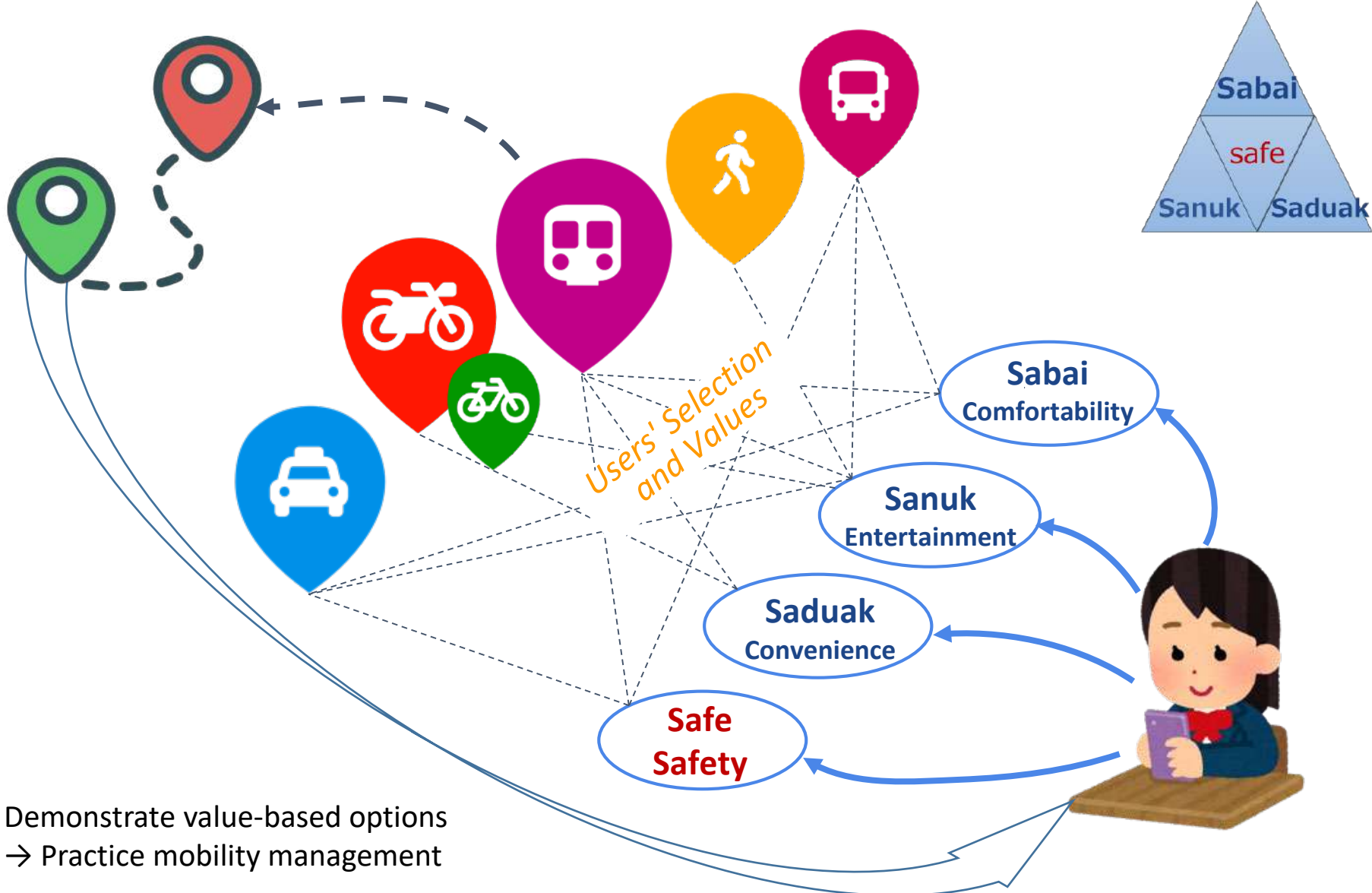
Values of safety and comfort

Values of safety and comfort

Number of Samples: N=194
CFI : 0.957
TLI : 0.921
RMSEA : 0.047

Number of Samples: N=194
CFI : 0.983
TLI : 0.975
RMSEA : 0.029

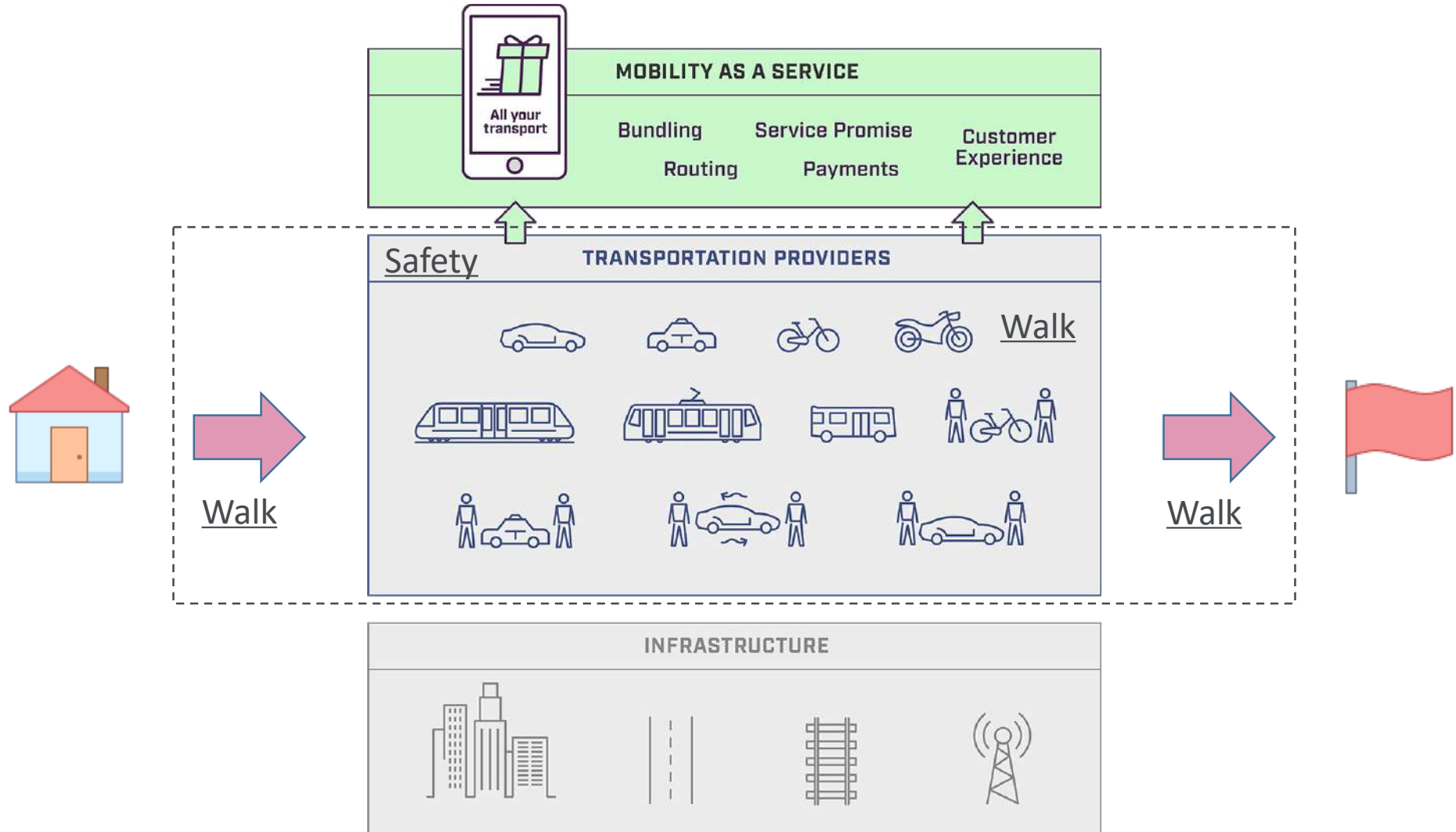
How to change mindsets locally rather than in Japan



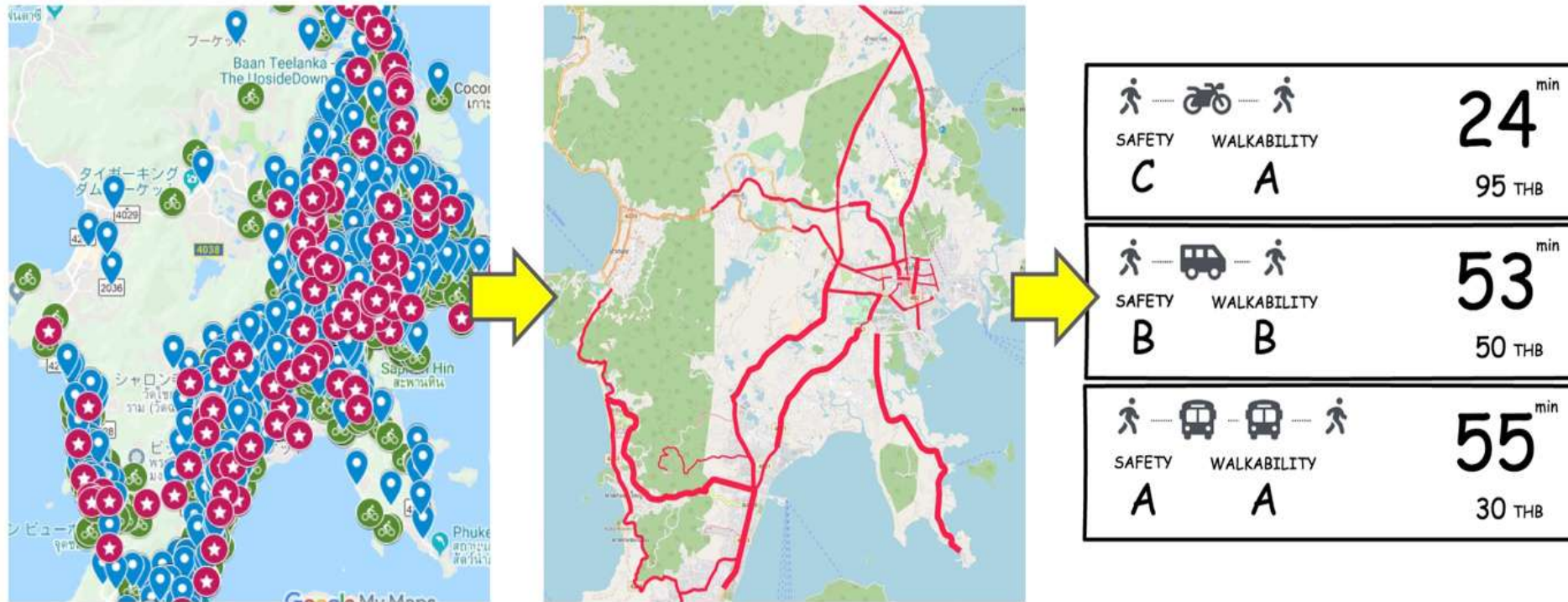
Demonstrate value-based options
→ Practice mobility management

MaaS-LC designed for Safety and Walkability

LC: Local Contexts



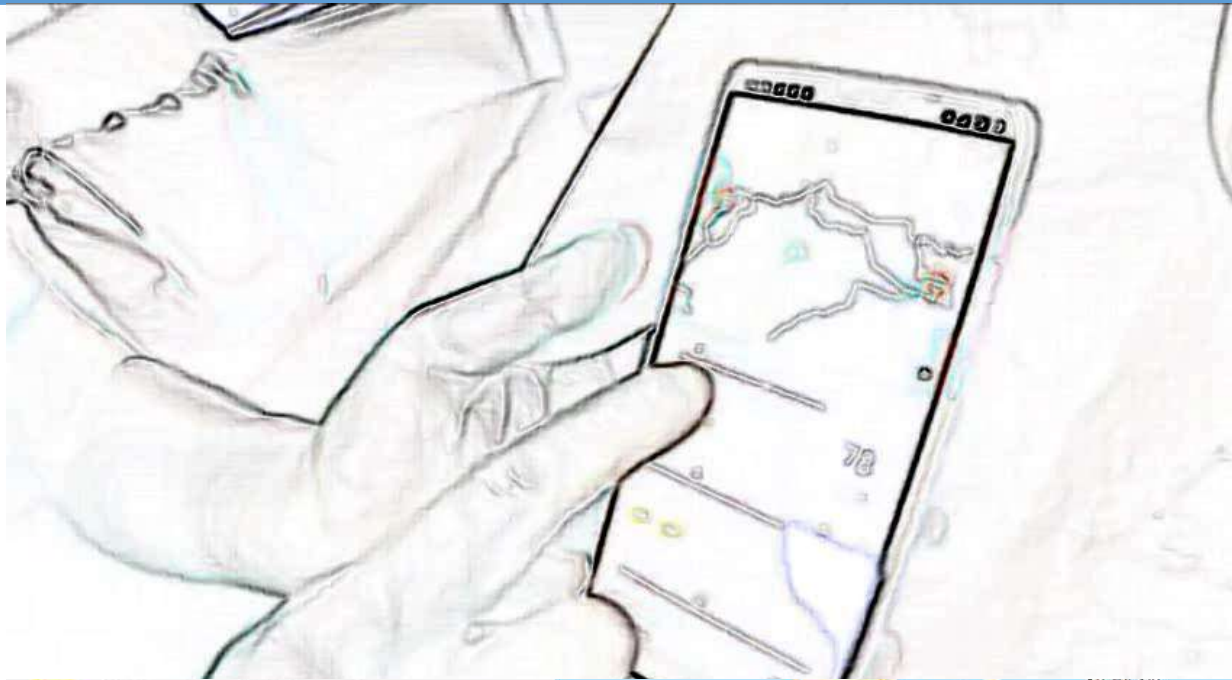
Safety Considerations in Maas-LC



Safety Index calculated from **accident risks on routes** and modes of transport.

Walkability calculated from walking paths.

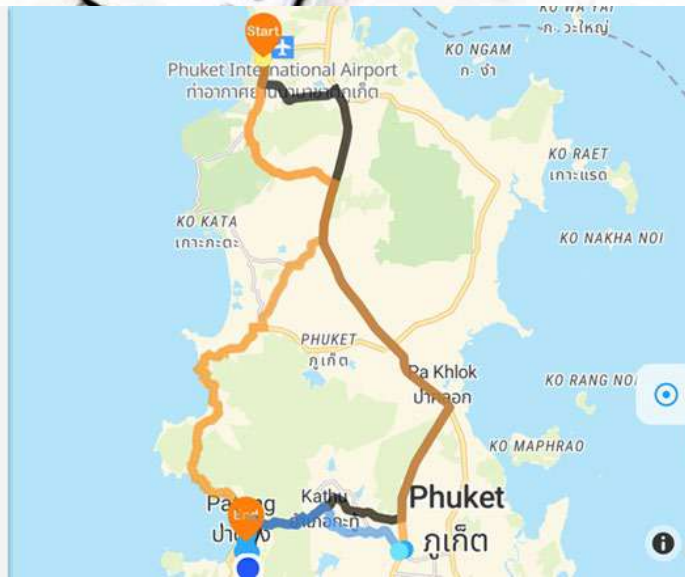
Local Practicality Test



12:09

Recommended routes

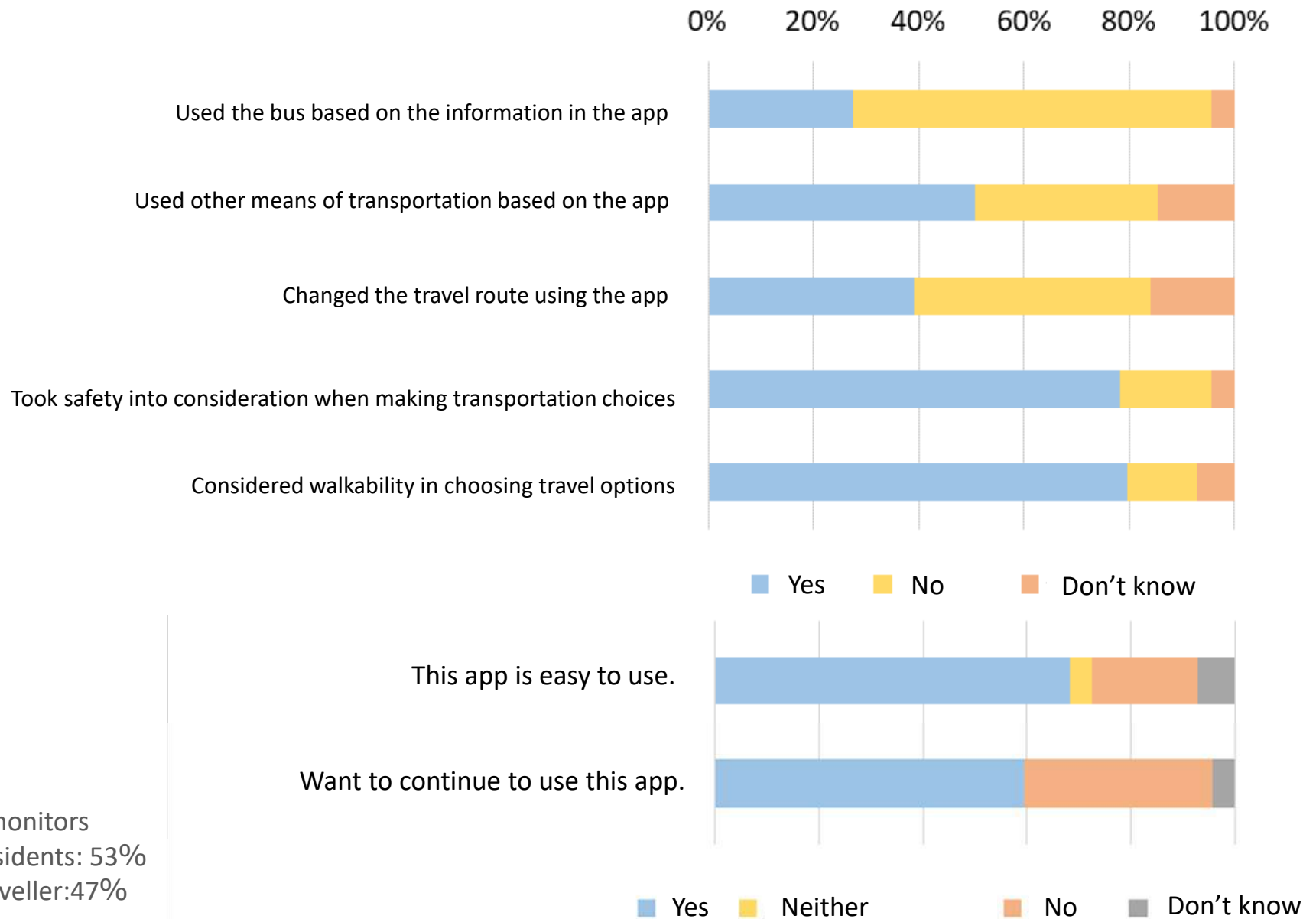
| | | | |
|--------|-------------|--------|---------|
| | | | |
| | 13:24 | 70 min | 50 THB |
| SAFETY | WALKABILITY | | |
| A | A | | |
| | 14:16 | 76 min | 140 THB |
| SAFETY | WALKABILITY | | |
| A | A | | |



GoTH

30 minutes
15 THB

Local User's Evaluation



69 monitors
 • Residents: 53%
 • Traveller: 47%

Summary

- This year (the first year), we focused on the area with the highest traffic accident fatality rate in Thailand, where traffic fatalities are frequent, to collect accident data, visualize accident occurrence situations, verify the safety of helmets worn in the area, and develop a MaaS-LC prototype to encourage people to switch from motorcycles to public transportation and paratransit.
- In addition, based on a web-based awareness survey, it was found that in countries and regions with high rates of motorcycle use, motorcyclists are regarded as vulnerable road users, and that this perception of them as vulnerable delays regulation of motorcycles and creates a unique situation in which motorcycle-related accidents account for about 80% of all accidents. The report also revealed issues related to traffic culture.



公益財団法人 国際交通安全学会

International Association of Traffic and Safety Sciences