Foreword

The main part of this project was conducted in 2008-2010 and was first reported in Swedish in 2011. The idea was born out of the observation that different journeys by bus and metro is different pleasant, especially with regard to the risk of fatigue and nausea. A problem if you use public transport in comparison to driving a car is that you cannot influence your own ride comfort. It is exposed to the level of comfort of the operator and its drivers are bidding on. Therefore, it may be justified to try to achieve a comfort level that even the more discerning motorists or more carsick sensitive people are attracted to.

Among other things, a model has been developed that can show how the driver is driving uncomfortable, and this should be implemented also in real time. The report should in itself be of great value to increase the level of knowledge about the ride and public transport.

The project has been led by the undersigned at the research group for public transport at KTH. Closest collaborators were Dr. Jerker Sundström, as most of the project time worked at VTI, later at Trafikverket (The Swedish Transport Administration). Other people who made the interview work and other work efforts are Katrin Dziekan, KTH (the former) and students Sam Kaiseromwe, Ary Pezo Silvano, Kristoffer Särhagen and Jens West. Mats Knutsson, who initially worked at SL has meant a lot to the project could get started, as well as Peter Rosen at SL helped with eg contacts of bus operators in Stockholm.

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Dr. Karl Kottenhoff
Project leader
Summary

Poor ride experience in principle leads to lower attractiveness of the public transportation system. How big is the divers’ role for bus and rail passengers’ perceived comfort and how much are they affected by various misbehaviors? Interviews showed that heavy braking and cornering forces, jerks as well as uneven speed affect passengers' comfort experience. Correlation and regression analysis was used to develop indicators for quantitative analysis of levels of bad driving and discomfort. The four indicators that were produced essentially reveal the sensitivity for; 1) longitudinal acceleration and braking levels, 2) longitudinal jerks, 3) lateral cornering acceleration levels, and 4) uneven speed, so-called "Pump driving". Further, these indicators were used to assess bus and metro operation in ordinary services. From these runs, ride comfort in real traffic was estimated and what driver behaviors that contributed most to passengers’ experience could be detected. Foremost, the evaluations reveal that ride comfort deficiencies is lower in metro cars than in buses. Secondly, large differences appear between individual drivers. Most drivers present intermediate comfort levels, which most passengers find acceptable, although several drivers are on the boundary of presenting acceptable ride comfort. Thirdly, it appears that about one tenth of the drivers deviate by presenting considerably uncomfortable driving. And fourth, there is a corresponding amount of drivers who drive a lot better than average drivers. The knowledge and indicators, that has been developed, can be further refined to be used for programming of support systems, both for driver training and in regular service operation. The results can also be used to improve the various tools for eco-driving to also indicate ride comfort level in a proper way and warn the driver at un-comfortable driving.
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1. The significance of ride comfort

The quality of public transport is important for those who have to use it, “the captured riders”, and for attracting new users. Ride comfort constitutes part of the total comfort experience of a journey. The experienced comfort level of the public transport alternative relates to this. (Friman & Fellesson, 2009).

Is then the experienced comfort level an important part of passengers’ assessment? Many studies show that “hard” factors like travel time, departure frequency and travel cost are more important for mode choice. (Wardman & Wealan 1998, Wardman 2000) On the other hand Kottenhoff (1999) and Kottenhoff & Byström (2010) show that a number of comfort attributes in trains may be traded off against 5-10% ticket price. This can also be expressed in travel time: People chose journeys with high comfort, for example regional commuter trains when the comfort is high (Kottenhoff & Lindh 1995, Fröidh 2000).

Comfort is a construct that can be divided into many attributes related to visual, audible, sensory, thermal, esthetic and psychological dimensions (Oborne 1978, Johansson B. 1989, Kottenhoff 1999, Karlsson & Larsson, 2011). Ride comfort is that part of the comfort construct that can be related to technically measurable or experienced vehicle movements such as queasy static accelerations, shakings and vibrations as well as jerks (Heinz, W. 1999). Most effort has been put into the dynamic response of buses to road irregularities, e.g. Eriksson & Friberg (2007) and ditto for the rail mode. Less research effort has been made to study the relationship between drivers’ driving style and passengers’ experience of comfort. (There is one study on pigs’ stress level, Peters et.al, 2008).

In Stockholm about every fourth public transport rider is not fully pleased with the drivers’ driving style (Stockholm Transport, 2009). The satisfaction level was higher in rail modes (metro 74%, commuter train 85%) than in local and regional buses (69%).

Even complaint statistics gives a hint that people care about ride comfort in local public transport. In a certain period Stockholm Transport received 32 complaints about too hard acceleration or braking, 25 complaints on to hard cornering and 22 about jerks while only 4 complaints regarded shaky ride. The last observation is interesting though so far most ride comfort projects have been about minimizing shakings and vehicle vibrations. (Stockholm transport data given to the project.)

Also lower frequency movements that may cause motion sickness belongs to ride comfort. This is a problem in both rail and buses, however, for a smaller group, consisting more of children and especially girls (Golding, 2006). It is also noted that drivers seldom get motion sick, when passengers do. It is the longer journeys by public bus that provides the greatest problems (Turner & Griffin, 1999a/b). It turns out that when the run is done with varying speed, "pumping”, but also on curvy roads, the incidence of motion sickness is triggered. Frequencies around 0.2 Hz, ie. acceleration and braking every five seconds gives especially large problems for people sensitive to motion sickness (ISO2631).

The effects of bad driving style can lead to more effects than just reduced comfort experience. The travel time is more difficult to be used for reading and work (Sundström, J. 2006) if vehicle motions are high. At higher deceleration, curve acceleration and jerk levels passengers may fall (Albertsson, P. 2005). This causes many wounded passengers in non-collision bus accidents. (Berntman et.al. 2010 and 2012). The dominating sources were driver handling with sudden breaks followed by accelerations.


There is some relationship between "eco- driving" and better ride comfort. A study of the effect of eco-driving on bus passengers’ comfort ratings showed that there where some good
ride comfort short-term effects (Wåhlberg af, 2006), but that study did not try to penetrate the different reasons for bad comfort experience. What is it that the passenger reacts negatively on? In what way should the driver be careful because of passengers’ comfort experience?

**The significance of driving style**

Driving style deals with the drivers’ handling of controls in relation to the traffic situation. Different driving styles have different outcomes in relation to speed, time table adjustment, smoothness, safety, energy use, ride comfort and so on. The way of driving should reduce the risk of discomfort experience. Furthermore, one can say that a driving style is built up of a number of driving behaviours. In public transport it is not self evident that very slow driving is the best driving because all buses and trains are part of a system built on timetables and coordination between lines. The driver applies and trades off various driving behaviours to form an appropriate driving style in each case. There are for example different ways to slow down, stop and take a curve and to maintain velocity.

What diving behaviours may then affect the passengers? The following assumptions and hypotheses have been developed on the basis of the deficiencies we saw in an exploratory stage: 1) Vertical accelerations and vibrations from the road or rail do not primarily depend on driving style. 2) Uneven driving, sometimes called “pumping” decrease comfort experienced and can give some people motion sickness. 3) Heavy breaking and accelerations, i.e. high quasi-static acceleration levels, reduces comfort. 4) Recurring sharp cornering with high quasi-static lateral accelerations reduces comfort experience and can as well as uneven driving also contribute to motion sickness, and 5) Jerks are perceived as uncomfortable. They also create insecurity and affect the ability to maintain balance. Most of these assumptions and hypotheses have been tested in this work.
2. Exploratory studies

In this exploratory phase we performed some acceleration data collection. Ad-hoc measures by “mystery riders” in the Stockholm metro showed a few cases of very uneven and uncomfortable driving. Figure 1 shows an extreme example.

*Figure 1* Repeated accelerations and decelerations in the Stockholm metro between Old Town and Liljeholmen, about 4 min ride. This driving style can be called "pump driving". Data collected 2008.

The type of driving shown in figure 2 consists of incessant speed changes – shifts between accelerations and decelerations. These can cause motion sickness in susceptible persons and they are mentioned in complaints to Stockholm Transport.
3. Setting up a statistical experiment

We are interested in how comfortable different driving styles are in real bus services. In an exploratory first phase, acceleration data was collected in bus, tram, metro and train services. This sample indicates the ride comfort situation in real services. Passenger satisfaction and passengers’ complaints about driver behaviour were also studied.

Running a test vehicle with test persons similar to real bus operation can do this. A problem when using test subjects for the judgment of tolerated comfort level, is that they might misunderstand their role. There is a risk that they will just perceive the level of jerks or shaking and grade these, as if they were replacing accelerometers (Alm, I. 1989). Instead they should express their feelings of comfort or tolerance of discomfort. With this in mind a field test was designed and set up.

There were good reasons to choose a statistical experiment. One is the efficiency of this method – we could investigate several attributes in every step of the experiment. Another benefit is that the test subjects have some difficulty to uncover what is happening. We anticipated this would lead them to use their feelings about the ride comfort instead of their intellectual perception. These four driving behaviors were found to be important to include:

• Quasi-static acceleration levels at start and brake.
• Quasi-static acceleration levels / lateral forces during cornering.
• Jerks, especially at stopping (intersections and stops).
• Uneven speed profile; "pump driving, sewing machine driving".

Three verbal response scales for the test subjects’ judgments were used: The driver's skill, speed and comfort rating. The subjects rated their experience of these three measurements for each run on the sample loop.

A typical Stockholm city bus, a 12 m Scania bus with rear engine, was used for the test runs. BusLink in Stockholm was kind to provide the bus and a test driver. The test was made in a Stockholm suburb (Bredäng) with low car traffic. The road loop used was 3.4 km long with 8 bus stops (7 of these where ordinary bus stops). One turn of the loop took 7-8 minutes and a full experiment included 8 loops. Three such experiments were made in the autumn of 2009, with 51 test passengers in total.

Figure 2  The 3.4 km test loop with 8 stops in Bredäng, Stockholm. Each of the 8 turns represented a profile in the statistical experiment and took 7-8 minutes to run.
Table 1  Statistical design for the experiment. Each of the 8 lines describes one driving style profile on the loop.

<table>
<thead>
<tr>
<th>Driving style profile</th>
<th>Acc/retard</th>
<th>Jerks</th>
<th>Curving</th>
<th>Speed regulation</th>
<th>Acceptance share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Soft</td>
<td>Soft</td>
<td>Hard</td>
<td>Uneven</td>
<td>Even</td>
<td>14%</td>
</tr>
<tr>
<td>2. Hard</td>
<td>Hard</td>
<td>Soft</td>
<td>Even</td>
<td>Even</td>
<td>0%</td>
</tr>
<tr>
<td>3. Hard</td>
<td>Hard</td>
<td>Hard</td>
<td>Uneven</td>
<td>Even</td>
<td>4%</td>
</tr>
<tr>
<td>4. Soft</td>
<td>Hard</td>
<td>Hard</td>
<td>Even</td>
<td>Uneven</td>
<td>3%</td>
</tr>
<tr>
<td>5. Hard</td>
<td>Soft</td>
<td>Hard</td>
<td>Even</td>
<td>Uneven</td>
<td>57%</td>
</tr>
<tr>
<td>6. Hard</td>
<td>Soft</td>
<td>Soft</td>
<td>Even</td>
<td>Uneven</td>
<td>48%</td>
</tr>
<tr>
<td>7. Soft</td>
<td>Soft</td>
<td>Soft</td>
<td>Even</td>
<td>Uneven</td>
<td>98%</td>
</tr>
<tr>
<td>8. Soft</td>
<td>Hard</td>
<td>Soft</td>
<td>Uneven</td>
<td></td>
<td>27%</td>
</tr>
</tbody>
</table>

One single driver represented 8 different drivers with eight different driving styles. See table 1. Three types of data was collected at the 8 runs in the loop:
- Ratings of driving skill, perceived speed and ride comfort from the 51 subjects.
- They also had to answer if the skill and comfort level for each run was god enough or not.
- Answers to some background questions.
- The measured accelerations in three directions from the 24 (= 3 * 4) runs.

The following acceleration curve (fig 3) illustrates an example of longitudinal acceleration data.

Figure 3  Printed driving profile data (No3). The four types of assumed comfort disturbances, high quasi-static retardation (blue line), high lateral acceleration curve (red line), uneven 'pump' driving (blue) and jerks (blue) are checked. The yellow line shows vertical accelerations, which were not dealt with in this project.
**Test subject ratings and acceptance of profiles**

The rating scales used for respondents’ ratings were done as a 100 mm long line, where each mm represents 1 point. The respondents were asked to put a cross at each of the three lines; for driver’s skill, speed and comfort.

To be able to include a logit analysis in the experiment, subjects were also asked to answer if a certain run, or driving profile, was good enough or at least acceptable. This binary data showed up to be very useful.

A first analysis shows that all four driving attributes are significant and thereby mean something to passengers’ acceptance. For example, in average 39% accept the driving profiles with low longitudinal quasi-static accelerations while just 26% in average accept the profiles with hard braking. Hard jerks made even greater difference. The two worse profiles (driving styles 2 and 3) were accepted by less than 5% of the test passengers.

**Response data versus acceleration data**

Data analysis included two main steps: 1) Production of preliminary indicators in Matlab from the raw acceleration data and 2) testing of these preliminary indicators in SPSS towards passenger comfort ratings (from earlier measures) to find the best fit. With this two-step method, optimal indicator decryptions were approximated.

Simple binary correlation, but also linear regression models and logistic regression models have been used to analyze the various data dependencies. Table 2 indicates results from initial correlation analyses between driving behavior, binary described in design terms (low/high, even/uneven)) and test subjects’ grading.

### Table 2  Correlations between designed driving behaviours and passengers judgements on a scale. “--” mean a negative correlation.

<table>
<thead>
<tr>
<th>Driving behaviour in exp. design (0/1)</th>
<th>Driving skill judgement</th>
<th>Ride comfort judgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>High longitudinal acceleration / braking</td>
<td>- -</td>
<td>- -</td>
</tr>
<tr>
<td>High jerks</td>
<td>- - -</td>
<td>- - -</td>
</tr>
<tr>
<td>High lateral acceleration / hard cornering</td>
<td>- -</td>
<td>--</td>
</tr>
<tr>
<td>Uneven driving</td>
<td>- -</td>
<td>- -</td>
</tr>
</tbody>
</table>

All bad driving behaviors were highly correlated with test persons’ judgments. For example “--“ means that a specific behavior, e.g. hard breaking, causes a highly significant negative response from the test subjects. Furthermore, the highest correlation level was for jerks, but it is doubtful to show this, because it may be misinterpreted. In fact the test driver made so hard jerks in the test runs that they merely exist in regular public transport services. The conclusion is that we must use the levels measured by the accelerometers to describe each driving behavior. To design useful indicators have been the greatest challenge.

**Building comfort indicators allowing for driving style**

An easy way to visualise ride comfort is by putting a glass of water on the vehicle floor. Today various representations of accelerometer data can be shown by smart phone apps, but
the algorithms are not explicit. So, what about the indicators used for eco driving indication? They should have some correlation with ride comfort but their algorithms are not primarily for comfort. They are not even described in a standardized way (Strömberg, 2013). Logically sharp cornering, jerks and travel sickness measures must not be included in these. The good thing is that some of the equipment used, should be able to complement with passenger comfort algorithms.

Wåhlberg (2006) proposed an integration of acceleration levels over time. He used what he calls “Celeration” which is the integrated sum over time of all absolute values of accelerations. After some reasoning we decided that the use of rms values is a better measure. The higher levels of “celeration” are then emphasized to reflect how accelerations likely affect passengers on board.

One could imagine having a single aggregate indicator for (poor) comfort, for example an indicator based on a vector sum of vibration in all directions. A more disaggregated way to measure and create indicators is to divide the different driving styles and thus comfort effects into more than one indicator.

**The comfort indicators**

The indicators should reflect different driving *behaviours* (discriminated driving style) and ideally be independent of each other.

From the experiment, three types of data exist; 1) the statistical design, 2) sampled acceleration data for X, Y, Z directions and 3) test passengers assessment data. All these data sets interact and these interactions can be expressed in various ways, for example correlation. Passengers’ grading correlate highly with the experiment design. Does this mean that jerks always imply worse experienced comfort than other bad driving behaviours? No, it depends on the actual level of the driving behaviours – how hard they are.

Each indicator should also show in what ways the driver is driving poorly. This means that it should be clear whether the driver brake too hard or drive too jerky, drive too fast cornering or drive on an uneven pace.

The four indicators have been developed to suit the experiment where a test track of 3 km length and 7-8 min run time was used.

The other two indicators are trickier. They need more insight and complicated estimation procedures. The third indicator shall show the sensitivities for jerks, especially at traffic and bus stops. The fourth indicator shall show passengers sensitivity to uneven driving.

\[ Dc = p_{ad} \times I_{ad} + p_{c} \times I_{lat} + p_{j} \times I_{j} + p_{p} \times I_{p32} \quad [1] \]

where

- \( Dc \) = drive dis-comfort measure. Scale is about 0-100+ Higher level is worse.
- \( p_{ad} \) = parameter showing the sensitivity for accelerations and decelerations.
- \( p_{c} \) = parameter showing the sensitivity for curving; lateral accelerations.
- \( p_{j} \) = parameter showing the sensitivity for jerks.
- \( p_{p} \) = parameter showing the sensitivity for “pumping”; uneven accelerations.
- \( I_{ad} \) = indicator for acceleration and deceleration levels.
- \( I_{lat} \) = indicator for curving; lateral levels.
- \( I_{j} \) = indicator for jerks.
- \( I_{p32} \) = indicator for “pumping”; uneven accelerations with certain levels, 3s period time and \( 2m/s^2 \) variation of acceleration level (\( \Delta a \)).

All indicators have been calibrated for best explanatory power for the measured accelerations and the test passengers’ ratings, when used together [formula 1]. By an iterative process the specifications that gave the highest match between the certain bad driving behaviours and the test subjects grading were selected. The estimated comfort indicators represent disaggregated comfort levels for a 5-10 min run.
4. Results and discussion

• Ride comfort matters!

Our work shows that driver behaviours matter to passengers. We have used two ways of investigating this; explicit and implicit methods. Explicit means here bad driver behaviour that the riders are aware of. This has been seen by complaints, customer satisfaction statistics and in our comfort questionnaire. (These explicit results are not fully reported in this paper.) The implicit methods builds on the assumption that passengers are affected by ride comfort differences where they do not or cannot judge if it is the effect of a certain driver behaviour. In the statistical experiment we tried to design driving patterns so complex that the test riders should not be fully aware of the underlying instructions to the test driver.

Passenger satisfaction data, questionnaires about comfort and the experiment with test passengers all support the assumption that ride comfort matters. It also gives a hint of the type of problems that passengers’ experience. But it does not tell if the ride comfort level is good enough in regular service. The project assumptions and hypothesis (in brackets) can then be further commented:

1. Heavy accelerations, ie. high quasi-static levels, reduces comfort. This applies both to start accelerations and braking, but it was found that the highest levels most often occur at braking. Our field experiment shows that people significantly do not accept or dislike high levels.
2. “Jerks are perceived as very uncomfortable. They also affect the ability to maintain balance.” Our field experiment showed the highest negative reaction was for jerks, at least of the high magnitude that was used in the experiment. One test person with a wound back had to interrupt the test, because of pain. For him, jerks definitely created insecurity and his negative reaction also affected the fellow test persons to fell uneasy.
3. “Recurring sharp cornering with high lateral accelerations to both sides reduces comfort experience and can make some people motion sick.” Hard cornering reduced the comfort grading negatively. Regarding travel sickness, a few passengers reported they felt it to some degree after the eight loops in the experiment, but we cannot make conclusions about the distinct reasons.
4. “Uneven driving, sometimes called pumping, decrease comfort experience and can make some people motion sick.” Both interviews and the field experiment showed that people don’t like uneven driving. It affected the comfort and driver skill ratings negatively. Our estimations show that 3 s period time (1/3 Hz) is worst for discomfort. This points at similar frequency sensitivity.
5. “Vertical accelerations and vibrations do not reflect the ride quality that depends on driving style.” This is partly true, but we experienced that motion in different directions correlate. High longitudinal and lateral motions also lead to some vertical motions, which we detected.

• Ride comfort levels in regular services

It may be questioned whether it is appropriate to have the same or different indicators and standards for ride comfort levels in bus and in train services. Examples of acceleration levels in rail and bus modes are shown in table 3.
Table 3 Examples of longitudinal and lateral acceleration and jerk levels in rail and bus services in Stockholm (measured 2008-2009 by us).

<table>
<thead>
<tr>
<th></th>
<th>Acceleration (from stops)</th>
<th>Retardation (braking)</th>
<th>Lateral acc. (cornering)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light rail</td>
<td>1.0 m/s^2</td>
<td>1.0 m/s^2</td>
<td>&lt;1.0 m/s^2</td>
</tr>
<tr>
<td>Metro train (C20)</td>
<td>1.3 m/s^2</td>
<td>1.3 m/s^2</td>
<td>Mostly low</td>
</tr>
<tr>
<td>SL buses</td>
<td>1.5 – 2.0</td>
<td>Up to 3+</td>
<td>Up to 3+</td>
</tr>
</tbody>
</table>

The levels are much lower for rail modes than those that often appear in buses. However, it is very difficult to establish general levels of bus service. Low and comfortable levels can be achieved in coach services on high quality motor ways, but also in some slower city services. At the other end, lateral acceleration levels of up to 4 m/s^2 were measured in Stockholm buses driving in roundabouts.

In the next phase, acceleration data was systematically collected in a number of selected bus lines and metro. It became obvious that drivers had different behaviors and driving styles. About one tenth of the drivers produced divergent “comfort” levels, like statistical outliers. These “real” data sets were used to analyze ordinary services.

The point of our statistical experiment and the estimated parameters is that we can disaggregate the vehicle movements and analyze the different components’ contribution to the ride comfort experience. That is the four selected driver behaviors in our model. The results from such a use of the parametric model is shown by figure 7, where 14 different runs on the same route are shown; a stretch on city trunk-bus line 4 in Stockholm.

![Figure 4: The diagram shows discomfort levels and the contribution from various types of bad driving behavior for 14 trips on part of line 4 Odenplan – Stockholm East Station.](image-url)

The worst driver style, in trip no.11 (fig. 4), exposes passengers to an unacceptable discomfort (just over 110). Even the second worst driver, in trip no.13, runs significantly worse than average drivers who have discomfort scores around 50. A discomfort score of 100 comes from the level at 100 mm – fully unacceptable – in the questionnaire for runs with test passengers.
The answers from the binary interview question; if test passengers accept a certain test loop, reveal that the acceptance limit is located around 50 (mm). This means that, for the sample from route 4 two runs show entirely unacceptable comfort levels. For run 13, quasi-static braking levels is the most significant reason, while for run 11 hard jerks make the biggest contribution to dis-comfort.

It should be said that even though the field experiment was made in a bus, the estimated discomfort model have been applied on acceleration data from both regular bus and metro services.

**What to do now?**

Do we need to do anything at all, when most passengers anyhow are satisfied, if not all times, but on most journeys? We can reason about this. People are different; their sensitivity varies. Standing people are more sensitive to quasi-static forces and jerks than the driver who sits steadily in his seat. Even seated passengers may perceive the comfort level differently than the driver, who knows the upcoming road and cornering all the time.

The impact of the driver must be discussed. How to limit the driver's impact so that uncomfortable driving is minimized? A new trade-off between the driver's ability to experience the vehicle as "spirited" and passengers comfort experience should be made, for example:

- Maximum acceleration and deceleration (braking),
- Minimum time between zero and the maximum acceleration,
- Limitation of uncomfortable "pump diving".

Our idea builds on the reasoning, that the drivers don’t know how sensitive the passengers are and what ride comfort disturbances they do not accept. A few systems for assisting driving already exist. There are systems linked to the vehicle odometers for 1) restricting the acceleration levels, and other systems for 2) warning the driver. The latter are quite common for eco-driving. The problem, regarding comfort experience, is that these are optimized for fuel saving, not for comfort maximization. Therefore they don’t give all the appropriate ride-comfort indications. Our findings can be a start for implementing ride comfort algorithms for four uncomfortable driving behaviors.

An open question is how a dis-comfort real time information should be used. It does not have to be presented to the driver, at least not all the time. Indicators used for driver education may be integrated values for a longer time period. It is also a benefit if indicators are possible to merge with each other. Than summary ride-comfort scores can be presented to the driver or the driving instructor. It can also be recorded and used by the public transport company management. These considerations must be made. It also has to do with the driver’s role. Is he mainly a vehicle operator – a bus or metro vehicle driver – or is he a front person in a company selling services? Our ideas and results should be especially helpful in the latter case. By that, drivers are given clear knowledge and public transportation can seriously attract even travelers with high demands while creating professional pride.
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