Influences of Bus Drivers’ Salary System on Their Behaviors: 
Experience from Urban Bus Market of Developing Countries

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Abstract: This paper investigates different types of bus drivers’ salary structures built in the design of contracts between bus operators and bus drivers in urban bus transport markets of developing countries. This is to address their impacts on divergent drivers’ behavior that consequently determine bus safety and service level of bus operation. The paper identifies how divergent drivers’ behavior evolves from different types of salary systems under urban bus environment and their possible impacts on service level of bus operation. It also discusses the possible advantages and disadvantages of each salary system from the perspective of bus operators, passengers and social issues are discussed. Finally, this paper gives basic recommendations to improve the driver efficiency for better safety and quality of services, in particular for Yangon City, the former capital of Myanmar.

Key Words: Bus drivers’ salary system, Drivers’ behavior, Bus services quality.

1. INTRODUCTION

In most of the developing countries in the world, the current state of service level of bus operation is far from satisfactory. Bus systems, often operating with substantial deficits, are frequently severely strained, too often uncomfortable and unreliable, and even unsafe which typically leads to an extremely low customer satisfaction. The causes of those problems can be influenced, at least to some extent, by government in the provision of bus transport services or by bus transport operators themselves in the provision of bus transport services.

The provision of bus transport services is characterized by weakness in bus operators’ finances, ineffective service monitoring system, and a lack of innovative management for smart bus operations. For the majority of bus operators in developing countries, all income is derived from the fares collected from passengers and therefore collection of fare revenue becomes the key requirement for a successful operation. However, in the absence of an effective monitoring system, bus transport is vulnerable to revenue leakage principally due to unethical or improper behavior of the bus crew. Such behavior comes in various forms. For example, there is the possibility that they might not report all revenue earned to the bus operators. There is also the possibility that a collusion between passengers and the bus crew results in the false issuance of tickets thereby defrauding the operators.

Consequently, to maximize revenue from bus operation while reducing revenue leakage,
operators usually offer a salary system in which a share of fare revenue becomes the salary or part of the salary of the bus crew. Such solution serves towards the maximization of profit of the operators by giving a strong incentive to bus crews to combat fare evasion by passengers to collect all fares and submit all revenues to the operators. This, however, falls short of solving the revenue leakage issue in the absence of an effective monitoring system. On the other hand, this salary system links the monetary benefits of the bus crew to the number of passengers a bus can have. And in the absence of proper law enforcement and a service monitoring system, antisocial drivers’ behavior like over-speeding, aggressive driving behavior, etc. becomes a part of driving practices, and results in uncomfortable, unreliable and unsafe travel. Compared with the system where fare revenue is shared, a fixed salary system can overcome antisocial drivers’ behavior. However, it may also result in reduced revenue generation. Therefore, the monetary advantages linked with antisocial drivers’ behavior as a consequence of the drivers’ salary systems are one of the key factors affecting bus service quality as well as financial viability of bus operators.

A few studies found in literature mainly deal with owner/driver contracts in public transportation and many important issues still remain unresolved. For example, Rusco and Walls (2001) examined passengers’ preferences on two distinct types of minibuses in Hong Kong – red minibus and green minibus – which are distinguished by different institutional and operational characteristics and differences in contractual relationships between owners and drivers. They revealed passengers’ preferences for the value of travel time cause sorting over the choice between two types of minibuses. Rusco and Walls (2005) analyzed the influencing factors for the determination of the choice of driver contract based on small public bus markets in Hong Kong and the Philippines. They found that risk aversion, the costs of monitoring, access to capital markets, and constraints determined by the level of economic development and people’s income, region and passenger population are the main determinants of the choice of contract type between owners and drivers.

It is noticeable that previous researches have given special attention to the determination of the choice of drivers’ contract types for small public transport markets such as those involving minibuses or jitneys, regardless of its impact on driving behavior and resulting service level of operation. Even though drivers’ behavior is not the only factor that affects the service level of bus operations, it is recognized as one of the leading contributors. Thus, it is of utmost importance to understand how different types of drivers’ salary systems induce divergent drivers’ behavior especially for urban bus systems of developing countries that have strong impacts on the service level of bus operations. It is also worth mentioning that the salary system of conductors is also similar to that of drivers, so the drivers’ behavior cannot be considered in isolation from the influence of conductors. The conductors’ instructions to the driver, to stop/move for passengers get-on/get-off at bus stops or in-between, also influence the driving behavior. However, it is eventually the driver who is responsible for safe and comfortable bus travel. In this context, the term “drivers’ behavior” represents the combined behaviors of driver and conductor. This study investigates different types of bus drivers’ salary structures built in the design of contracts between bus operators and bus drivers in urban bus transport markets of developing countries to address their impacts on divergent drivers’ behavior that consequently determine bus safety and service level of operation. Thus, the main objective is to figure out how divergent drivers’ behavior evolves from different types of salary systems under urban bus environment and their possible impacts on service level of operation. The findings of this
study will be used to formulate recommendations for the improvement of current salary systems and for future bus transport policy development.

The paper is organized as follows: Section 2 discusses drivers’ salary systems being employed in developing countries based on comprehensive reviews of various bus systems mainly of developing countries, and experience from field visits to some South-East Asian cities and categories them into four main types. In section 3, how different types of drivers’ salary systems influence drivers’ behavior are discussed in the context of their strong impact on service level of bus operation. Details of how divergent drivers’ behavior evolves from different types of salary systems and also the degree by which they influence bus safety and quality of services are presented and examined in Section 4. This section concludes with a discussion of advantages and disadvantages of each salary system from the perspective of bus operators, passengers and social issues. In section 5, discussions on the implication of this study are made in particular for Yangon City, former capital of Myanmar, along with basic recommendations to improve the driver efficiency for better safety and quality of services. Conclusions are presented in the final section of this paper.

2. TYPES OF BUS DRIVERS’ SALARY SYSTEMS

<table>
<thead>
<tr>
<th>City</th>
<th>Salary System</th>
<th>References</th>
</tr>
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<tbody>
<tr>
<td>Hanoi</td>
<td>Fixed salary plus bonus payment for fuel consumption</td>
<td>Information obtained through interview with Transport Management and Operation Center, Hanoi, Oct. 2009</td>
</tr>
<tr>
<td>Bangkok</td>
<td>Fixed salary plus bonus based directly on bus fare revenue</td>
<td>Information obtained through interview with Bangkok Mass Transit Authority, Bangkok, Oct. 2009</td>
</tr>
<tr>
<td>Jakarta</td>
<td>For busway: Fixed salary</td>
<td>Information obtained through interview with Transportation office (Dinas Perhubungan) of DKI Jakarta and BLU TransJakarta, Jakarta, January 2010</td>
</tr>
<tr>
<td></td>
<td>For conventional bus: Bus fleet rental system</td>
<td></td>
</tr>
<tr>
<td>Yangon</td>
<td>1. Fixed percentage of total fare revenue</td>
<td>1. ASEAN-JAPAN Transport Partnership Project, 2009</td>
</tr>
<tr>
<td></td>
<td>2. Fixed salary plus bonus based directly on bus fare revenue</td>
<td>2. Kato et al. 2010</td>
</tr>
<tr>
<td>Santiago</td>
<td>Fixed percentage of total fare revenue (during deregulation)</td>
<td>1. Gwilliam, 2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Antonio and Andres, 2005</td>
</tr>
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</table>

Note:
1) Drivers, who are able to reduce the fuel consumption, can get substantial extra payment.
2) Bus operators hire out their units to drivers for the bus operation with pre-determined fixed amounts, i.e. rental charge. Typically rental charge is determined on a daily basis. The operators do not take account of how much money drivers earn daily from bus operations. Bus drivers pay the bus operators a certain amount of daily bus rental charge and can retain all of the passengers revenue collected after paying rental charge for bus fleet, fuel cost and other costs related to bus operation, in place of a regular wage.
3) Bus drivers’ earnings become pre-determined commission as a percentage of total bus fare revenue collected. This means the drivers are paid on a variable salary that depends on the number of bus passengers. The more the passengers, the more the bus fare revenue thus greater is their salary.

In urban bus systems in developing countries, bus operators usually own bus fleets and hire drivers to run their service. The compensation for drivers is determined according to bus operation system and operator preferences. Traditionally, there are two basic concepts of drivers’ salary systems i.e. fixed salary or share of bus fare revenues. However, to enhance operational and financial performance of bus operation, various incentives are commonly added to the above mentioned basic forms. These incentives are based either on driver performance or collection of bus fare revenues. As a result, new forms of salary systems have
evolved. In order to explore the various salary systems in practice, a review of various bus systems of developing countries and experience from field visits of Hanoi, Bangkok, and Jakarta is presented in the following Table 1.

In light of the above discussion, drivers’ salary systems in practice in developing countries can be classified into four categories, shown graphically in Figure 1.

**3. IMPACTS OF DRIVERS’ SALARY SYSTEMS ON DRIVERS’ BEHAVIORs**

This section provides a detailed explanation of how divergent drivers’ behavior evolve from the different types of salary systems, what their possible impacts on bus safety and quality of bus services are, and what measures can be undertaken to improve salary systems.

**3.1. Share of Fare Revenue System**

Even though paying drivers based on the total fare revenue collected makes sense as a solution to the revenue leakage problem faced by bus operators, it has several negative effects on the quality of services and safety. Since drivers’ income depends on the number of bus passengers, they attempt to maximize this by collecting as many bus passengers as possible resulting in a tough competition among drivers. Such eventually evolves into aggressive driving practices. They race to the next bus stop to beat rivals’ vehicles in picking up passengers. They stop for long periods of time at bus stops to wait for more passengers until a competitor appears. Moreover, they often stop at unauthorized places along the road if there is a passenger.

This driver behavior can be seen in most developing countries. For example, buses in Yangon are driven at high-speed between bus stops, where they then wait for as long as possible to maximize their passengers, and the result is a very poor quality of bus service (ASEAN-JAPAN Transport Partnership Project, 2009). Similarly, before reforms were introduced in Seoul’s bus system, bus drivers recklessly raced other buses to pick up passengers waiting at bus stops, but they deliberately avoided picking up elderly or disabled passengers to save time. Thus, an official report of the Seoul Metropolitan Government sharply criticized the private operators in Seoul for encouraging truly outrageous bus driving behavior (Pucher et al. 2005).
The consequences of this driver behavior can create enormous safety problems. There is fairly indisputable evidence of high accident rates associated with this nature of competition and the incentive of drivers to maximize revenue. In Yangon, 35.3% of all accidents are caused by urban buses. Incredibly, the majority of all injuries are also caused by buses (ASEAN-JAPAN Transport Partnership Project, 2009). However, the problems include more than just accidents due to aggressive or reckless driving. Such reckless driving makes the passengers even more uncomfortable and unsafe and disturbs traffic flow. This reduces road capacity thereby causing traffic congestion in urban areas that can have a seriously detrimental effect on bus services as well as damage the urban environment. Moreover, using vehicles intensively can increase vehicle maintenance costs and result in more frequent breakdowns of vehicles during bus operations. Furthermore, stopping at unauthorized places and maximizing layover times at bus stops lead to irregularity in service frequency, long waiting times at bus stops, and longer overall passenger travel times.

The principal advantages of this system is that drivers are more motivated to work harder while also providing bus operators with the incentive to earn better returns from their bus operations by encouraging their drivers’ motivation to work. Furthermore, this system can give them a strong incentive to combat fare evasion by passengers. However, such a system is not always an effective deterrent against pilferage of revenue, since it depends on the honesty of drivers to remit all fare revenue collected. Gwilliam (2003), and Antonio and Andres (2005) pointed out in the case of Santiago’s bus system that due to lack of secure ticketing and revenue recording arrangements, many drivers further supplement their incomes substantially by not turning in the full revenue collected.

3.2. Bus Fleet Rental System

Typically, a bus is operated by a driver who rents it on a daily basis from bus operators for a fixed daily sum. The drivers can retain any surplus revenue as their remuneration. In case the revenue is insufficient to cover all operation costs and rental charges, the driver must make up for the difference. Therefore, their own daily earnings are highly dependent on the revenue they are able to make, and may be directly related to their efficiency. Nevertheless, this provides drivers with an incentive to work harder despite various malpractices by drivers in an attempt to maximize their income, by getting as many bus passengers as possible.

This system is also the practice in the conventional bus system in Jakarta. Bus drivers stop for long periods of time at the entrance and exit of bus stops and at non-designated places along the road. They sometimes stop operating even though there are still passengers on board, and go back to the terminal to seek new passengers. After a sufficient number of bus passengers have been collected, the bus driver then drives fast. They often violate traffic laws and regulations, such as making illegal stops at improper places and overtaking along prohibited sections (Bappenas and JICA, 2001). The consequences of this system are the same uncomfortable and unreliable services, and unsafe travel on buses similar to what has been discussed in the previous sections. There are some advantages, however, since operators’ revenue is not directly related with the bus fare collected by bus drivers, and the need for monitoring of revenue control systems can be eliminated.

3.3. Fixed Salary System

Since bus drivers are paid a basic salary, they do not have the incentive to use the vehicle intensively by driving fast, stopping at non-designated places and waiting for passengers at bus stops for long periods of time. Thus, this can conserve the life of the vehicle as well as
provide more reliable and safer bus services to passengers. On the other hand, this creates the weakest incentives for the drivers to provide the appropriate levels of effort when providing bus services. Revenue leakage problem is also accentuated by this system. Therefore, the effectiveness of this system is usually limited except where standards of honesty of bus drivers are generally high. In practice, some operators employ drivers using a fixed salary system in combination with some incentive schemes that are explained in the following section.

3.4. Fixed Salary plus Incentives System
Incentive schemes such as bonus payments can be a valuable disciplinary tool, as well as being a means to maintain drivers’ motivation to work, to reduce costs and improve services. There are several types of bonus payments based on drivers’ performance such as reduced fuel consumption, fewer breakdowns and awards for accident-free driving, etc. This system can be effective because incentives are attractive to the driver concerned, and the measures are readily defined and measured. Bonus payments for fuel consumption can reduce the problem of theft of fuel faced by bus operators and increased operational costs as well. This also has the effect of encouraging drivers to drive in a more economical manner, and therefore more safely and with more sympathy towards the vehicle. Accident-free driving awards can, if effectively implemented, be very cost-effective through the reduction of the number and severity of accidents. Furthermore, it provides an incentive to drivers to drive more carefully, which makes the ride more comfortable and the journey safer. However, without an effective revenue control system, revenue leakage problem still persists.

3.5. Measures to Improve Salary Systems
Fundamental requirements for bus systems are that services should be safe, reliable with sufficient capacity to meet demand at all times, as well as bus operators having reasonable returns from bus operations to sustain the system. Therefore, the best way to improve salary systems and bus performance is to find the alternatives that can combine the positive aspects of different types of drivers’ salary systems while minimizing the negative parts rather than finding superiority of one system over the other.

To minimize negative aspects of systems, three areas of weakness require effective attention.

1. **Lack of Law Enforcement:** Since a major contributor in developing countries is poor enforcement of traffic regulations, this aspect leads to a lack of drivers’ discipline resulting in unsafe driving behavior.

2. **Operational Restrictions:** Traditional revenue control and monitoring systems, and lack of penalties by operators against dishonesty are seen as inappropriate for detection and control of revenue leakage.

3. **Technical Skill Deficiency:** As literacy rates in developing countries are typically low, drivers’ skill for better use of vehicle, driving practices and social aspects are also usually deficient.

In such situations, both enforcement agencies and the operators need to play key roles. The enforcement agencies should be vigilant in dealing with violations of traffic regulations. Meanwhile, the operators should enforce rules regarding operational matters and address technical issues of drivers through skill enhancement programs.
Figure 2. Diagram showing the structure of divergent drivers’ behavior
4. DIAGRAM OF DIVERGENT DRIVERS’ BEHAVIORS

In view of the detailed discussions above, a comprehensive structure representing divergent drivers’ behavior as a result of different types of salary systems under different situations, and their implications on service level of bus operations and bus safety is developed and shown in the following Figure 2.

This section describes the possible advantages and disadvantages of different drivers’ salary systems from the perspective of bus operators, bus passengers, and social issues as can be seen in Table 2.

<table>
<thead>
<tr>
<th>Salary Systems</th>
<th>Bus operators</th>
<th></th>
<th>Bus passengers</th>
<th></th>
<th>Social</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Advantages</td>
<td>Disadvantages</td>
<td>Advantages</td>
<td>Disadvantages</td>
<td>Advantages</td>
<td>Disadvantages</td>
</tr>
<tr>
<td>Share of fare revenue system</td>
<td>Reasonable returns from bus operations</td>
<td>Increase in vehicle maintenance costs</td>
<td>-</td>
<td>Unsafe travel</td>
<td>Low comfort</td>
<td>Unreliable services</td>
</tr>
<tr>
<td>Bus fleet rental system</td>
<td>Reasonable returns from bus operation No revenue leakage problem No monitoring of revenue control system is needed.</td>
<td>Increase in vehicle maintenance costs</td>
<td>-</td>
<td>Unsafe travel</td>
<td>Low comfort</td>
<td>Unreliable services</td>
</tr>
<tr>
<td>Fixed salary system</td>
<td>Reduction in vehicle maintenance costs Revenue leakage problem Low driver efficiency</td>
<td>Safe travel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fixed salary plus incentive system</td>
<td>Reduction in vehicle maintenance costs Reduction in fuel costs</td>
<td>Revenue leakage problem</td>
<td>Safe travel</td>
<td>Reliable services</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The share of fare revenue system enables bus operators to earn reasonable returns from their bus operations through the drivers’ motivation for getting more passengers for their own benefit at the cost of certain disadvantages for both operators and passengers. For example, aggressive driving or racing is likely to accelerate wear and tear of vehicles causing frequent wear.
breakdowns in services that gradually increase vehicle maintenance costs and shorten the life spans of vehicles. Conversely, driven by the sole motive of profit maximization, drivers may be highly efficient in operating buses but their driving practices ends up in unreliable, uncomfortable and unsafe bus services for passengers, in addition to the problems of traffic congestion, environmental pollution, and difficult commuting for the handicapped and elderly. Similarly, under the bus fleet rental system, the supervisory requirement for monitoring of revenue control systems is usually eliminated since the operators’ revenue is not directly related with bus fares collected by drivers. However, the impact of this system on the level of service can be visualized as similar to the share of fare revenue system but can relatively be more severe because drivers probably have nothing at stake even in the worst performance scenarios.

In contrast to the systems mentioned above, a fixed salary system does not offer revenue based incentives to drivers, which result in the regulated use of vehicles that can prolong the vehicle life and reduce maintenance costs for operators. This may also lead to safer rides and more reliable services. However, it also has disadvantages for operators. In view of the fact that drivers’ income is not based on fare revenues collected, their motivation to work is reduced and, coupled with high probability of revenue leakage/stealing, this system increases the financial burden on operators. With a shortage of revenue, the provision for replacing bus units is first reduced, followed by cuts in maintenance work and expenses. Initially, this leads to a loss in service quality, and ultimately to a loss in quantity as vehicles become unroadworthy. To counter such issues, some operators enhance drivers’ motivation by introducing performance-based incentive schemes, which can improve outcomes. However, in the absence of advanced fare collection systems and effective revenue control, revenue leakage problems may persist.

5. DISCUSSION ON IMPLICATIONS FOR YANGON BUS SYSTEM

Having the knowledge of how different salary systems influence drivers’ behaviors and consequentially their impacts on the service level of bus operations, this study can discuss the applications of such systems in terms of improving passenger safety and comfort. Moreover, the study may now also recommend towards future development and planning of bus operations policy.

Therefore, as an example to demonstrate the application of this research for the improvement of the current salary system, Yangon city is selected as a case study. It is chosen because Yangon represents a typical metropolitan city in South-East Asia with a high demand for bus transport services, and, more importantly, due to the availability of detailed information on the current bus operation system.

Yangon, a former capital of Myanmar, is the country’s largest city and the most important commercial center. It has approximately 4.2 million people in an area of 598.75 km$^2$ (United Nations, 2009). The vast majority of citizens cannot afford a car due to low-income levels and rely on the bus transport system to get around. The modal share of bus transport in Yangon city is 84% (Zhang et al. 2008). Although the bus transport system is critically dominant in Yangon, the level of service provided by the Yangon bus system is widely considered to be deficient.
Bus services in Yangon City are currently provided by both the public and private sectors. The fares and routes are regulated by the government. There are no timetables for bus services except for a few bus routes. There is no legal obligation for the bus operators to notify the public about the daily service frequency, schedule for the first and last buses, and expected journey times between stops. Regarding the contract between operators and drivers, there are two types of salary systems that are currently employed among urban bus operators. These are the share of fare revenue system and the fixed salary plus bonus system based directly on the bus fare revenue (Kato et al. 2010). In both cases, bus drivers’ incomes are directly linked to the number of passengers they are able to pick up, and pushing them to compete with other buses, even with those from the same company. As a result they frequently violate traffic rules and regulations, and make travel uncomfortable and unsafe.

Since the drivers’ salary system is dependent on the bus operation system and operator preferences, improvements are therefore recommended to improve their behavior in Yangon City rather than to introduce a new salary system. The improvements describe the key role of the government and operators to solve law enforcement, operational and technical related issues to improve the outcome of drivers’ salary systems. These are summarized in the following Table 3.

<table>
<thead>
<tr>
<th>Issues</th>
<th>Symptom</th>
<th>Problems</th>
<th>Causes</th>
<th>Possible Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law enforcement issue</td>
<td>Poor driving quality</td>
<td>Aggressive driving behavior</td>
<td>1. Weakness in enforcement of regulation</td>
<td>1. Improving enforcement of all regulations</td>
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<td></td>
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<td>2. Inadequate penalties system</td>
<td>2. Introducing severe sanctions against offenders</td>
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<td></td>
<td>3. Encouraging effective passenger participation</td>
</tr>
<tr>
<td>Operational issue</td>
<td>Financial unviability of operators</td>
<td>Revenue leakage</td>
<td>1. Lack in innovation for fare collection</td>
<td>1. Implementation of effective revenue control systems, based on the issuing of tickets or use of secure fare boxes or turnstiles</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Ineffective monitoring system</td>
<td>2. Strong detection and severe penalties</td>
</tr>
<tr>
<td>Technical issue</td>
<td>Poor safety standards</td>
<td>Shortage of skills</td>
<td>1. Poor educational standards of drivers</td>
<td>Organizing technical lessons for drivers to improve their skills and knowledge of efficient driving and vehicle operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Limited training facilities</td>
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In closing, it is noted that law enforcement strengthening, efficient management and control for operation, including effective revenue control procedures, training, and appropriate incentives are essential prerequisites to improve bus operation. Both government and operators can play an important role in developing a sustainable bus transport system. Therefore, through the understanding of roles and responsibilities of government and operators, the existing bus service standards can be considerably improved.

6. CONCLUSIONS

Drivers’ salary systems in practice in developing countries can be classified into four categories such as share of revenue system, bus fleet rental system, fixed salary system, and fixed salary plus incentives system. Both share of fare revenue and bus fleet rental system, have certain financial advantages to operators by motivating the drivers to work harder to
increase their shares of the revenues. Meanwhile, negative impacts in terms of aggressive driving behavior, uncomfortable passenger ride, and an increased probability of accidents becomes frequent.

Unlike the above-mentioned two systems, the fixed salary system makes drivers drive more safely as they do not have any incentive to use the vehicle intensively. On the other hand it provides low motivation to work coupled with a high probability for the pilferage of fare revenues that persists even in the presence of addition performance-based incentive schemes offered by operators.

To counter the negative impacts of salary systems, practical steps must be taken including the improvement of enforcement of all regulations, introduction of severe sanctions against offenders, and effective passenger participation. Moreover, effective revenue control procedures and adequate measures are also essential to reduce the chance of pilferage of fare revenues. Also, training and skill enhancement for drivers with the assistance of operators are important to ensure the safety of passengers and improve the service level of bus operations.

Knowledge of bus drivers’ salary system, their behavior and impacts on service level of bus operation is an important factor for bus transportation policy. This has relevance for policymakers as well as bus operators. Therefore, this study can make an important contribution to the bus operators in designing the systems that provide better service to passengers by documenting the behavioral changes induced by a salary system. Further additional research is needed quantify the impact of different types of drivers’ salary system on service level of operation.

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