

Embracing Paratransit in Bandung Metropolitan Area, West Java, Indonesia

Ibnu Syabri, Pradono, Budhy T. Soegijanto

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Ibnu Syabri (corresponding author) and Pradono are associate professors in transportation and infrastructure planning, under the Research Group in Regional and Urban Infrastructure Systems, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung, Indonesia (SAPPD-ITB); Budhy T. Soegijanto is emeritus professor at SAPPD-ITB and used to work for the National Planning Board of Indonesia, Contact: syabri@pl.itb.ac.id.

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Introduction

Located in the heart of the region of West Java, Indonesia, Bandung Metropolitan Area (BMA) shares some common characteristics with other developing country's cities: a growing urban population inadequately served by the transport system, declining standards of public transport, overlaps and conflicts among the agencies responsible for planning and implementing transport solutions, massive growth in the use of paratransit, growing dependence on private transport (cars and motorcycles), inadequate and deteriorating transport infrastructure, and poor or non-existent facilities for non-motorized transport (walking and bicycling). In the last few years, the transformation and development of the BMA, the rise in the standard of living and the constantly growing number of households purchasing cars have increased the number of people travelling. In addition, the recent opening of a motorway link with Jakarta (i.e. Cipularang Toll Road operated in 2004) has seriously complicated the situation, especially in the core area of BMA, the city of Bandung.

The public transport services that exist within and around Bandung are no longer sufficient to meet the growing demand for travel. Between 2000 and 2009, average travel time on working days in the region rose from 30 minutes to 65 minutes, and now, according to recent survey conducted by Dishub (2010), the condition is worse with the average travel time in the working days at around 50 minutes, and more than one hour especially during weekend (e.g. in most artery roads the average speed is 5–15 kph) when visitors from Jakarta and surrounding *kabupaten*¹ filled up the city centre. Moreover, the outer Bandung area is saturated by dense road traffic. The roads entering and leaving Bandung used by trucks, private cars and motorcycles have reached their limits and create bottlenecks with average traffic delays of more than 90 minutes.

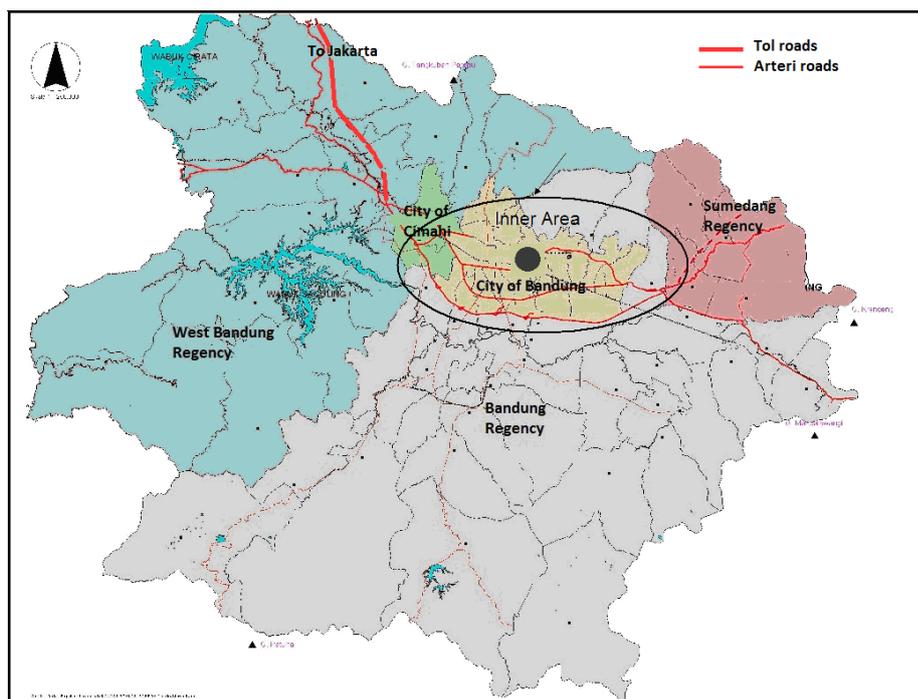
In response to the BMA's poor quality of transportation system services and growth problems, within the paratransit arm, minibuses ('*angkots*'), motor-cycle taxis ('*ojeks*'), non-motorized pedi-cabs ('*becaks*'), and horse-drawn buggy ('*delmans*') have played an important role and been an important source of mobility in BMA. This paper seeks to clarify the contributions and challenges posed in rationalizing of paratransit services in the BMA. It begins by providing brief information about the general characteristics of BMA, followed by its city structure, traffic and street network. The range of informal sector experiences in the BMA, the costs and benefits of the sector in general are discussed. The paper is closed with brief remarks about the potential integration between paratransit and the conventional bus system.

General Characteristics of the BMA

Historically, the BMA has been the main centre of West Java province. In 2009 (BPS, 2010), the population of west Java was 43.02 million, about 17.5 per cent of the Indonesian population for a surface area covering 5 per cent of the total surface area of Indonesia, making it the most populous province of the country. With a surface area of 34,736 km² (5 per cent of the country's total surface area) it is the most densely populated province in the country outside the province of Jakarta, with an average 1.191 people per square kilometres.

1. A political subdivision of a province.

Figure 1. The Bandung Metropolitan Area



Source: Bappeda Jawa Barat, 2006.

As shown in Table 1, according to Bappeda Jawa Barat (2006), BMA forms a megalopolis with over 8.3 million inhabitants, covering a surface area of 348,891.38 thousand hectares, whose average population density is 2,153 inhabitants per square kilometre. More than 90 per cent of this population is located in the inner area, and is forecast to increase to almost 12 million by the year 2030, or 77 per cent of the estimated maximum population of 15 million. The proportion of population in the inner area is estimated to decrease slightly from 80 per cent in 1995 to 79 per cent by 2030. The rate of growth is expected to increase as the

Table 2. The Bandung Metropolitan Area

| Development Area | Population (1000s) | | | | Max. density (pph) | Employment (1000s) | | |
|-----------------------------|--------------------|--------------|---------------|---------------|--------------------|--------------------|--------------|--------------|
| | 1995 | 2010 | 2030 | Max. | | 1995 | 2010 | 2030 |
| Inner Areas (total): | 5,147 | 6,738 | 9,276 | 12,006 | 94 | 2,127 | 3,024 | 4,991 |
| | 80% | 80% | 79% | 79% | | 89% | 90% | 93% |
| - City of Bandung | 2,235 | 2,452 | 2,890 | 3,225 | 200 | 1,152 | 1,463 | 2,342 |
| | 35% | 29% | 25% | 21% | | 48% | 44% | 44% |
| - Rest of Inner Areas* | 2,912 | 4,186 | 6,386 | 8,781 | 73 | 975 | 1,461 | 2,649 |
| | 45% | 50% | 55% | 58% | | 41% | 44% | 49% |
| Outer Areas** | 1309 | 1639 | 2424 | 3201 | | 261 | 322 | 384 |
| | 20% | 20% | 21% | 21% | | 11% | 10% | 7% |
| TOTAL | 6,456 | 8,377 | 11,700 | 15,207 | 60 | 2,388 | 3,346 | 5,375 |
| | 100% | 100% | 100% | 100% | | 100% | 100% | 100% |

* The regions: 1.Padalarang; 2. Soreang; 3. Ciparay; 4. Rancaekek; 5. Tanjungsari.

**The regions: 1. Rendeh; 2. Sindang Kerta; 3. Ciwidey; 4. Pacet; 5.Lembang.

Source: Bappeda Jawa Barat, 2010.

economy builds and infrastructure becomes more developed. Jobs are concentrated in the inner area and the eastern part of the city. Over 30.5 per cent of the jobs in this zone are in the government-military sector and 53.5 per cent are in the services sector. Few employment opportunities existed in the northern area and in the southern part of the city.

The GDP of the BMA has increased significantly from 114,572.01 billion rupiah in 2008 to 123,543.04 billion in 2009 (at 1993 constant prices). This represents an actual economic growth of 7.83 per cent over a one year period. This is the first year of significant growth for the BMA whose GDP growth was previously 7.53 per cent as recorded in 2004 (Bappeda Jawa Barat, 2010).

Growth and Traffic in the BMA

During the past decade, the increase of the GDP of BMA has been followed by increasing urbanization towards the city fringe-areas and the vehicle population has risen (during the past 5 years, cars and motorcycle has increased 5 per cent annually, see Table 2), while road surface area increased by just 0.5 per cent a year. According to the statistics agency of the city of Bandung (Dishub, 2010) as shown in Table 2, the paratransit fleet is the dominant mode of transportation in the BMA. The number of motorcycles has more than doubled in ten years going from 227.6 thousand units in 1999 to 548.5 units in 2009. And the number of private cars has also more than doubled from around 120 thousand units in 2001 to 243 thousands in 2009.

In 2009, the total number of trips in the BMA was 2.83 million travellers per day; and the share of motorcycles dominates accounting for 1.02 million daily travellers or 36 per cent of the total number of trips. On the other hand, the number of *angkots*/minibus tended to decline. Moreover, a report shows that the number of bus and *angkot* passengers declined up to 25 per cent and 15 per cent respectively in the preceding five years (Dishub, 2010).

Table 2. Vehicle ownership (in thousands)*

| Year | Motor-cycles | Private cars | Bus | Angkot/ Minibus |
|--------|--------------|--------------|-----|-----------------|
| 1999 | 227.6 | 147.0 | 3.0 | 5.4 |
| 2001** | N/A | 120.6 | N/A | N/A |
| 2002** | N/A | 152.8 | N/A | 5.2 |
| 2003** | N/A | N/A | N/A | 5.2 |
| 2004 | 400.7 | 219.1 | 3.5 | 5.2 |
| 2005 | 424.6 | 229.1 | 3.5 | 5.3 |
| 2006 | 448.5 | 243.7 | 3.9 | 5.3 |
| 2007 | 462.2 | 251.5 | 3.7 | 5.4 |
| 2008 | 479.5 | 260.3 | 3.7 | 5.4 |
| 2009 | 512.2 | 275.7 | 3.7 | 5.4 |

*It is the number of vehicles registered in the state police department of West Java province.

**The private cars decline by more than 15 per cent from 1999 to 2001 and buses decline by 50 per cent from 1999 to 2001, then increase by more than 100 per cent from 2002 to 2004. These figures were the reflection of the Indonesian economic crisis started in 1997 until 2003. They were not the actual count as the vehicle owners often fail to register and obtain a license plate for their vehicles; and for buses.

Source: Dishub, 2010.

In addition to the increase of motorization, urbanisation in BMA is proceeding rapidly and population increases in the BMA are predicted to be high (Bappeda Jawa Barat ,2010). Residential land development is spreading fast in outlying areas which do not have established transport links with the city centre (inner area) and other centres. Economic growth is high and is predicted to continue. This will encourage further land development and will also rapidly increase private vehicle ownership and use. The combination of population and private vehicle increase will cause increased road congestion.

Paratransit in the BMA

The rapidly increasing demand of paratransit in fast growing cities of developing countries such as BMA has been confirmed by many as a response to the inadequacy of services, poor management, financial problem and lack of proper maintenance of the conventional public transport system (see Cervero, 1998; and Cervero and Golub, 2007; for recent reviews). This inadequacy may be due to the immense gap between supply and demand for public transport services. Poor management and financial problems reduce the quality of service of existing public transport systems. Lack of proper maintenance causes the vehicles to deteriorate over time. In such a situation, it is only natural that an alternative system should emerge- one based on local technology (e.g. non-motorized *becaks*, *delmans*) and responsive to the population's needs.

Tables 3 and 4 summarize the past and current composition of formal and informal public transportation in the BMA. *Angkots* and *ojeks* are the most common paratransit entrepreneurial services found in both inner and outer BMA, while *becaks* and *delmans* are the older form of transportation, which were widespread before *angkots* and *ojeks* dominated the secondary and local/tertiary roads, serving short-haul trips and commonly found near the fringe areas of BMA. Taxis, *ojeks*, *becaks*, and *delmans* serve those journeys with no fixed routes and schedules. *Angkots*, and midibus are privately owned and operate on fixed routes, stopping just about anywhere for customers who board at the left side of the vehicles. *Damri* are state-owned public transports, run on fixed routes, and have fixed operating hours, but have no schedules between journeys.

As with roadway functional classification definitions (see Table 3), there is a hierarchy of mass transit options that serve specific travel demands in BMA. Serving arterial and collector roads are dominated by buses (i.e. *damri*), midibus, and taxis, while *angkots* and *ojeks* dominate the secondary collector and local roads. *Becaks* and *delmans* are at the bottom of the transport hierarchy, and the drivers are aware that they are vulnerable to restraint measures on policy grounds.

Table 3. Fixed route road modes (2009)

| Mode | Bandung City | | Regencies | | Inter-city | |
|---|-----------------|---------------|-----------------|---------------|-----------------|---------------|
| | No. of vehicles | No. of routes | No. of vehicles | No. of routes | No. of vehicles | No. of routes |
| <i>Angkot</i> /Minibus (12–14 seats) | 5,436 | 38 | 9,250 | 46 | 6,175 | 53 |
| Midibus (26 seats) | 12 | 1 | N/A | N/A | N/A | N/A |
| Buses (<i>damri</i>) (45–50 seats) | 97 | 7 | 0 | 0 | 56 | 4 |
| Total | | 47 | | 46 | | 58 |

Source: SNCF, 2010.

Table 4. Non-fixed route road modes

| Mode | Bandung City | | Regencies | |
|--------|--------------|---------|-----------|--------|
| | 2002 | 2009 | 2002 | 2009 |
| Taxi | 914 | 1,517 | 283 | 400 |
| Becak | 7,800 | 4,000 | 5,716 | 5,500 |
| Delman | 50 | 40 | 5,747 | 4,200 |
| Ojek | 8,000* | 12,000* | 6,000* | 8,000* |

*Authors estimates as no official records.

Source: SNCF, 2010.

Angkot

Angkots are minibuses, mostly 12-seaters, and typically with a rudimentary level of comfort (e.g. narrow access, small benches, and no air-conditioning). *Angkots* have no officially pre-determined stops and passengers get on and off on demand along the line. The lines are marked out by the colour of the rocker panel and by a sticker on the windscreen. Since times are not scheduled, travel time is random, particularly since drivers wait until the vehicle's fills up sufficiently before leaving. The concentration of *angkots* along the main arteries and at the bus terminals is high allowing a high service frequency on these roads (about every 3 to 5 minutes). No data exist on the average age of the fleet, but the average age is 10 years, and a visual observation shows that the mileage of a significant number of vehicles is high and that their maintenance is limited.

Currently *angkots* are the main mode of public transport not only in Bandung but also in all regencies of BMA. In 2009, with 40 per cent occupancy rate, *angkots* accounted for about 570,000 passenger trips per day or 31 per cent of all motorized trips. Although public transportation service provided by the *angkots* is still popular among low-income groups in the BMA and their social role is very important as they generate over 20,000 direct jobs (SNCF, 2010), it should be noted that due to the severe traffic congestion, their low level of services and comfort, *angkots*/minibus increasingly suffer from competition with the motorcycle which has become relatively more affordable and easier for low income households to own through credit schemes. The easiness to obtain driver's licenses for motorcycles has further led to a significant growth in their numbers.

Figure 2. Angkots in the city centre



Source: <http://demokratnews.com/wp-content/uploads/2010/03/Angkot.jpg>, last accessed 23 July 2011.

The *angkot* routes and the maximum number of vehicles permitted to operate on each route are specified by a mayoral decree. Currently, the decree permits a total of 5436 *angkots* to operate on 38 routes within the city, and each vehicle is only licensed to operate on one route. But about 4695 actually operate, which is 13.6 per cent less than the maximum permitted. One of the inherent advantages of small vehicles is that they can be distributed over many routes while maintaining low headways. So why are 4695 vehicles concentrated in such large numbers on few routes (Dishub, 2010)?

Considering their frequent stops and the reduction of road capacity by encroachment in many locations, average *angkot* operational speeds are low. The average speed for all routes is 14.4 kph with a range from 9.5 kph to 26.5 kph. Round-trip times averaged 106 minutes, with a range of 19 to 20 minutes. The distribution of the *angkot* fleet between routes may not be well matched to demand because the number of *angkots* allocated to each route is fixed by decree and there is no day-to-day mechanism to allow capacity to increase in response to increases in demand. In these circumstances, it is likely that capacity on some *angkot* routes may be inadequate.

In terms of fares, the *angkot* fares are set by mayoral decree and range from 2000 IDR to 6000 IDR and fares for intercity routes within the province (53 *angkot* routes) are set by the Governor of West Java Province. The decree specifies the full-distance fare of each *angkot* route. Fares for part-distance journeys are at the discretion of the driver. Most passenger journeys cover only a small proportion of the route length, on average just over a quarter, so the main determinant of fares actually paid is the amount charged by the driver. This can vary widely between routes and drivers.

It is evident that passengers' origins and destinations are much more diverse than the limited route network and that a high proportion of passengers must use two or more *angkot*/bus routes, and pay two or more fares, to complete their journeys. For this reason, the average fare paid per journey may be double the average fare per boarding. Apparently, most *angkots* do not consistently follow their official routes. Variations include diversions where all, or some of the vehicles divert from the approved route, turning around 'short' before the official terminus; and splitting a route by inserting a mid-route interchange point, thus requiring passengers to change vehicles and pay a second fare.

Currently *angkot* operations are organized through cooperative type institutions. The organizations maintain relationships with the regulatory authorities (i.e. the local transport authority and police) and act as intermediaries in case of traffic offences and accidents on the routes. Every owner of an *angkot* vehicle operating in Bandung must be a member of one of the organizations, and each organization maintains a monopoly on access to specific routes. No vehicle may operate on a route unless the vehicle owner or driver is a member and has paid membership fees. Each route is controlled by a route-unit supervisor.

Ojek

Ojeks are motorcycle taxis. Despite being illegal, they are tolerated and have operated in Bandung for many decades. *Ojeks* provide a means of livelihood for young men who might otherwise be unemployed in the current economic recession. Originally, they served remote and hilly areas, such as North Bandung where the condition, gradient or width of the roads could not accommodate *becaks* or motor vehicles. The popularity of *ojek* lies in their ability to manoeuvre around congested traffic, narrow roads, even in very narrow alleys in slum areas. In addition, they can cut the average commute in half or less- a significant benefit in commuting from the fringe areas to the city centre of Bandung, where unreliable and

relatively costly public transportation combines with ever-worsening traffic congestion to add to the appeal of *ojeks*.

Ojek services have developed not only in the inner city of Bandung, but also in remote locations in Bandung, and they have developed niche markets not only for short feeder trips but also for long-haul journeys connecting the remote areas with the city centre. There are few areas inaccessible to larger vehicles where *ojeks* have developed two main niche markets. This includes (1) feeder services between villages or housing developments travelling in narrow alleys and trunk public transport routes; and (2) taxi services on other roads where *ojek*'s ability to negotiate congested traffic gives them a unique advantage.

Most *ojek* owners own a single motorcycle, which they either drive themselves or rent to a driver. There is no official report of how many *ojeks* currently operate in the city but there were approximately 12,000 *ojeks* operating in inner BMA and 8000 *ojeks* in the outer area. At an average annual rate of 15 per cent, *ojeks* have become the fastest growing mode of public transport in Bandung because currently motorcycles are relatively inexpensive to buy and maintain, and financing can be accessed. A 14 million IDR or around US\$1650 (US\$1 = 8,500 IDR) cycle can be purchased with only an ID card, a family card and a down payment of 0 to 20 per cent. In addition, a person with a motorcycle can easily enter the *ojek* market, since there is no limit on the number of licenses and no license premium needs be paid to enter the business, though a substantial 'joining fee' is required by the most lucrative stands.

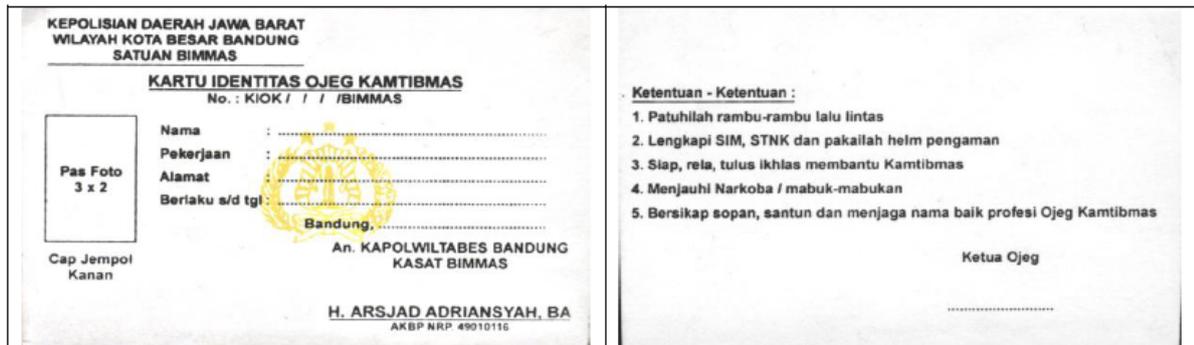
There were 86 *ojek* stands in 2006 and 154 stands in 2009. The largest number at one stand is near Dago area where many universities and student accommodation are located. In this location alone, the *ojek* pool comprises 170 motorcycles, of which 40–50 may be operating at any one time. Most stands have a much smaller number, averaging about fifteen. *Ojek* drivers pay a daily fee to the head of the stand, usually about 500 IDR. New members must be endorsed by existing members and preference is given to local residents. New members at prime locations must pay a joining fee, which varies from 0.5 to 3.0 million IDR. Drivers renting motorcycles pay between 10,000 and 20,000 IDR a day to the owners depending on the operating hours and the type, age and condition of the motorcycle (Syabri et al, 2009).

The owners estimate that maintenance costs average 100,000 IDR a month to cover engine check-up, spare parts, oil, tyres and other items, though costs vary from month to month. The daily income of *ojek* drivers varies between 30,000–60,000 IDR, depending on their operational hours and demand. The fare charged for a typical trip of about 2 km, was reported to be 3000–5000 IDR. The fare was higher, 5000 IDR or more per trip, if the destination was outside the usual operating area, in a mountainous area or if the road condition was poor.

Commonly, a group of *ojeks* forms an organization or stand which manages the number of *ojeks*, arranges the departure sequence as passengers present themselves, and deals with the authorities, particularly the police. The large stands are headed by a '*ketua*' (head) who may be 'elected' by the members or be self-appointed.

Although the popularity and widespread acceptance of *ojeks* has rapidly risen in recent years, the 2001 Bandung's municipal decrees explicitly exclude *ojeks* from the definition of public transport so there is no power to license them; and the 1996 technical guidelines on public transport also stated that *ojeks* were unsuitable vehicles for public transport and should be phased out. However, *ojeks* are being unofficially 'registered' by the local Police Sector Offices called Babinsa. The drivers of *ojeks* carry an 'Identity Card' issued by Community Liaison Office of Bandung City Police (see Figure 3) to legitimize their operation.

Figure 3. An *Ojek* identify card issued by Community Liaison Office of Bandung City Police



Source: Syabri et al, 2009.

This apparent legitimization of *ojek* operations and recognition of their ‘territorial rights’ shows that informally *ojek* has been embraced as one alternative form of public transportation. However, a formal acceptance of *ojeks* from BMA’s local government in terms of regulation does not exist although the initiatives and a task force to integrate paratransit including *ojek* with the conventional bus system has been established since 1996.

Becak

Becak is another type of paratransit that has existed in BMA for almost 50 years. It is one type of traditional non-motorized public transport that still exists in Bandung. The *becak* has basic characteristics such as cruising speed or speed limit of 10 kph, average speed of 5.3 kph, ideal trip length of 1.5 km, and average trip length of 2.3 km. *Becak* drivers have relatively low incomes ranging from 20,000–60,000 IDR per day for 10–12 working hours.

Becaks can negotiate narrow roads in local communities, and therefore provide services for which there is at present no alternative. These include taking produce to markets, carrying the

Figure 4. *Becak* operator and passengers at a street of Bandung city



Source: <http://indonesiancultureart.blogspot.com>, last accessed 20 March 2011.

elderly, transporting small children to school, providing freight and passenger capacity for housewives or going to the market. The *becak* is not fossil fuel dependant, is easy to maintain, constitutes an effective means of carrying freight, and provides a flexible/personalized public transport service. *Becaks* may serve any class of society enabling safer and a more personal service for short distance travel such as for shopping or going to nearest *angkot* terminal or road (non-work trips).

Despite these advantages, however, the *becak* has been criticized from time to time, mainly from the point of view that it obstructs traffic. The other aspect, which has been criticized, is that it is physically degrading to those who operate them by virtue of the vehicle's movement being totally reliant upon human pedal power, and in mixed traffic its low speed of about 5.3 kph and tendency to accumulate in busy areas impedes traffic flow. Moreover, government policy toward *becaks* has resulted in a decline in the industry.

Becaks are at the bottom of the transport hierarchy, and drivers are aware that they are vulnerable to restraint measures on policy grounds. In the mid-1990s many cities, including Bandung, decided to reduce and restrict *becak* by a 10 per cent reduction of their numbers each year. Central areas were marked by prohibition signs. However, *becaks* still exist in some fringe areas of Bandung city. There were about 12,400 in 1976 (Soegijoko, 1982), 7800 in 2002, and 4000 in 2009. There is no way to know the exact number of *becaks* because not all *becaks* are registered.

After the financial crisis of 1998, the prohibitions were not enforced and *becaks* returned to the city centre and their numbers increased. The increase in unemployment after the monetary crisis has increased the role of *becak* as a means of livelihood and recent conflicts between the authorities and *becak* operators in Jakarta have demonstrated that strong measures to implement the reduction policy are not politically feasible.

Becak operators feel that the conflicts in Jakarta may have a deterrent effect on similar measures in Bandung and the traffic police acknowledge the risks of enforcing a ban. The hilly topography of Bandung already limits *becaks* to certain areas, and, in the prevalent disorder on secondary roads, *becaks* are not perceived to be a major impediment to traffic flow. Many *becak* drivers now feel they may break laws governing traffic flow and prohibited areas with impunity. In addition, since there are no alternative jobs available, it is better than being unemployed so *becak* drivers remain *becak* drivers.

The ban of the *becak* is an indication of the extent of official concern about controlling this mode. The advantages of the *becak* is that it is environmentally very friendly, provides a source of employment for the unskilled and meets a clearly identifiable niche market for short local trips, which no other mode can meet. The policy dilemma centres on how to control their ill-effects (mainly obstruction and congestion) while allowing them to continue operation - and without generating violent opposition from the large (probably 20,000 people in Bandung) *becak* constituency.

Delman

Delman is another 'traditional' mode of public transport that has survived, and in some areas, continues to thrive. There are few *delman* within Bandung city mainly serving for sightseeing tours in some historical areas. But in the fringe area of Bandung, there are an estimated 5700 *delman* where they stand and wait for hire like a taxi, carrying either passengers or freight, or both. Some *delman* drivers can take their *delmans* wherever they wish as long as they stay off from main arterial roads. Others operate fixed routes, providing services between the town centres, particularly the markets, and outlying villages, carrying five passengers at separate

Figure 5. A *delman* overcrowded by a group of elementary school children in the busy street of Bandung



Source: <http://www.abatasa.com/beritaphoto/detail/local/170/bergelantungan-di-delman>, last accessed 25 July 2011.

fares. In such locations they are sufficiently well organised to defend their routes against competition by *angkots*. *Delman* usually operate in daylight hours from 05.00 – 18.00. No driver license or route license is required for *delman*. Only an operating license, issued by Dishub of Bandung City is needed for the vehicle.

A survey of 30 *delman* drivers in June 2009 (as seen in Table 5) found that the average age was 36.65 years old, the average family size was 6 people in the house, and the average monthly income was 600 thousand IDR with 7 hours working daily, 5.6 days per week. Like *becaks*, *delmans* serve short-distance trips with an average of 7.65 kilometres. It appeared that the majority of *delman* users are woman, and mostly students. They use *delmans* to reach public transportation terminals from home and vice versa. One reason why people still use *delman* is because it is the only alternative in their residential area and available at any time.

Table 5. *Delman* driver characteristics

| Driver characteristics | Average | Range (minimum-maximum) |
|---|---------|----------------------------|
| Age | 36.65 | 23–78 |
| Number of family members | 6.59 | 3–14 |
| Monthly income from Monday – Friday (000 IDR) | 183 | 40–400 |
| Monthly income on weekend (000 IDR) | 414 | 360–510 |
| Monthly household expenses (000 IDR) | 1.11 | 600–3000 |
| Work years as <i>delman</i> drivers | 17.53 | 2–51 |
| Daily working hours | 6.62 | 5–9 |
| Work days in a week | 5.53 | 3–7 |
| Distance travel (km) | 7.65 | 2–12 |

Source: Syabri et al, 2009.

Concluding Remarks

In the BMA we found that the paratransit modes of transport do not have a function in the total urban public transportation system. They can serve areas where regular bus service is not available, either due to physical limitations (narrow roads) or economic considerations. The smaller paratransit vehicles, such as the *ojek*, *becak*, or a minibus/*angkot*, can be used to serve local transport needs that cannot be served by taxis because of unavailability or high cost. Although the number of passengers of *angkots* is declining, they still can serve as local transport and also as feeders to the bus line-haul service, especially for low-income groups.

The paratransit transportation modes (especially *ojeks* and *angkots*/minibus) not only have an important function in providing public transportation services but they also provide employment to a significant number of the population as drivers, as owners, and in other related jobs, for example, in workshops and repair shops, or as gasoline vendors and drivers' helpers. However, the integration of paratransit with the conventional bus service still faces fundamental problems in the BMA (e.g. coordination between two systems, the management of the systems, and government policy) .

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