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Low-cost Transport in Asia

A comparative report on five cities

Romeo B. Ocampo

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A Comparative Report on Five Cities

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Résumé

L'étude porte sur les moyens de transport en commun traditionnels et d'origine étrangère dans cinq villes asiatiques : le becak à Bandung et à Jogjakarta en Indonésie, le jeepney dans le Manille métropolitain aux Philippines, le silor à Chiang-mai en Thaïlande et le dolmus et le minibus à Istanbul en Turquie. Le becak est un tricycle à pédales, tandis que les autres moyens de transport sont des véhicules motorisés inspirés de véhicules étrangers.

Ces moyens de transport dits à coût modique (TCM) comblent une lacune dans les équipements de transport et assurent une part substantielle du transport urbain. Cependant, ils ont fini par être jugés peu économiques, difficiles à réglementer et dangereux ; pas nécessairement modiques au plan des tarifs, des investissements et des coûts d'exploitation et assez peu rentables pour les propriétaires et les conducteurs des véhicules. Les autorités ont donc adopté des mesures sévères pour les restreindre ou les interdire dans les plus grandes villes.

Les TCM présentent néanmois des aspects positifs : ils assurent un service qui répond à la demande et qui peut modifier ses itinéraires selon les besoins, desservir de vastes secteurs et divers types de voyageurs et s'adapter aux changements des conditions des transports; ils pourraient compléter les moyens de transport modernes au lieu d'être en concurrence avec eux et ils offrent un secteur informel d'emploi aux pauvres des villes.

Les recommandations obtenues des fonctionnaires des pays en question ou proposées par certaines équipes de recherche reconnaissent l'importance des TCM et suggèrent de les améliorer au lieu de les éliminer. Au nombre des recommandations faites, il y a l'organisation de coopératives de TCM, l'intégration des TCM à des systèmes de transport plus importants et la sélection et la formation des conducteurs.

Resumen

Se investigaron modos de transporte tradicionales e indigenizados en cinco ciudades asiáticas: el becak en Bandung y Yogyakarta, Indonesia, el jeepney en el área metropolitana de Manila, Filipinas, el silor en Chiang Mai, Tailandia, y el dolmus y el minibus en Istambul, Turquía. El becak es un triciclo a pedal, mientras que los otros son modos de transporte motorizados adaptados de vehículos extranjeros.

Estos así llamados modos de transporte de bajo costo (MTBC) responden a la falta de adecuadas facilidades de transporte y forman una parte sustancial del transporte urbano. Sin embargo se les ha llegado a considerar como poco económicos, desordenados y peligrosos, no necesariamente de bajo costo en cuanto a tarifas, costos de capital y de operación, y generando solo rentas modestas a sus propietarios y operadores. Así pues, las autoridades han propuesto o adoptado medidas severas para restringirlos o eliminarlos de las ciudades más grandes.

Pero los MTBCs también tienen características positivas. Estos proveen un servicio que responde a la demanda, es de rutas flexibles, cubre una amplia gama de rutas y usuarios, y puede adaptarse a las condiciones del momento. Por lo tanto estos podrían completar más bien que competir con los modos de transporte modernos. Además, proveen una fuente de trabajo, basada en un sector informal, así como de rentas a los pobres en las ciudades.

Las recomendaciones obtenidas de algunos oficiales, o propuestas por algunos equipos de investigación, reconocen la importancia de los MTBCs y sugieren que en vez de eliminarlos su papel podría mejorarse. Entre las recomendaciones propuestas están : la organización de cooperativas de MTBCs, la integración de los MTBCs en un sistema de transporte más amplio, y la selección y adiestramiento de los operadores de MTBCs.

Contents

Foreword

Urban transport is a vital function in the daily life of any city. Various transport modes move people and goods, and give rise to forever changing patterns of activities in a city. In cities of the industrially advanced countries, most people depend on public transport and the private automobile for mobility. In cities of the developing world, however, generally lower standards of living, high population densities, and diversified cultural milieux have together provided a fertile ground for a bewildering array of transport modes bridging the gap between the public bus and the private automobile. Variously called para transit, or low-cost or intermediate transport, these transport modes are closely associated with the lower-income strata of the population. They provide many jobs and a much needed service to a wide cross-section of the population.

Despite the obvious importance of low-cost transport to most Asian cities, there was a dearth of information upon which informed policy could be formulated. To better understand the dynamics, economics, and politics of urban life, four countries (Indonesia, the Philippines, Thailand, and Turkey) mounted in 1975 a study of such transport modes in five cities (Bandung, Yogyakarta, Chiang Mai, Manila, and Istanbul) with financial support from the International Development Research Centre. In the course of the research, the investigators met in Manila, Yogyakarta, and Istanbul and found, through intensive discussions among themselves and with policymakers and through field reconnaissance, that transport in the five cities had much in common notwithstanding the different societal contexts. All the studies have served to focus public attention and discussion on a subject that was previously characterized by a body of speculative opinion but little well tested data.

Professor Romeo Ocampo, of the College of Public Administration, University of the Philippines, was appointed the coordinator of the network project from the start. He was very much a part of the project from start to finish and attended all the project meetings. The present volume represents Professor Ocampo's efforts to weave the different country studies into a synthesized whole. In this task, he draws on other pertinent material, where appropriate, to strengthen the comparative perspective. The end product is a succinct overview of the main findings of the project consistent with the comparative core. For detailed results in each city, especially with respect to local political and planning issues, the reader should consult the country reports.

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Acknowledgments

This report is based on the efforts of the low-cost transport study teams in Bandung, Yogyakarta, Chiang Mai, Istanbul, and Manila. I thank them for allowing me to draw freely from their reports, for their courtesies during our working meetings, and for their assistance afterward.

I am also indebted to the following staff members of the Social Sciences Division of the International Development Research Centre of Canada for their assistance and patience: Dr Aprodicio A. Laquian, Associate Director of the Division at the time of the study; Dr Yue-man Yeung, Senior Program Officer; and Dr Thomas P. Walsh, Program Officer.

Various members of the staff of the College of Public Administration helped me in producing this report. Aylyn S. Sanchez prepared drafts of extensive sections of the report. Mrs Ma Estrella M. Ocampo prepared the final typescript and coordinated its production. Research and administrative assistance was also supplied by the following: Rebecca P. Albano, Ma Esther E. Maglente, Guillermo Bangoy, Rodolfo Respicio, Jose Giron, Jr., Severo Casem, and German Montesa.

I must also thank Dr David W. Steedman, Director of the IDRC's Social Sciences Division, for his forbearance in waiting for this report. Patience in Ottawa was matched only by concerned understanding in Manila: for this I have Dean Raul P. de Guzman to thank.

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1 Research Issues, Objectives, and Methods

This is a comparative report on the results of five studies of low-cost transport (LCT) systems conducted during 1976–1977 in selected cities in Indonesia, the Philippines, Thailand, and Turkey. The studies, which were based mainly on sample surveys, were undertaken by research teams based in universities in these countries, with the financial and technical assistance of the International Development Research Centre (IDRC) of Canada.

The present report draws primarily on the main reports (listed below) of the five teams. The teams were headed by: Budhy Tjahjati S. Soegijoko at the Institute of Technology in Bandung, Indonesia; Sartono Kartodirdjo at the Institute of Rural and Regional Studies (IRRS), University of Gadjah Mada in Yogyakarta, Indonesia; Telesforo W. Luna, Jr., at the Pamantasan ng Lungsod ng Maynila in Metro Manila, Philippines; Prasert Bhandhachat at the Social Science Research Centre, Chiang Mai University in Chiang Mai, Thailand; and H. Ibrahim Sanli at the Faculty of Architecture, Technical University of Istanbul in metropolitan Istanbul, Turkey. The teams' main reports (in the same order) are cited as Soegijoko (1981), IRRS (1977a), Luna et al. (1978), Chiang Mai Group (1979), and Sanli (1981), or by the city name.

Chiang Mai Group. 1979. Low cost transportation study: a socio-economic of the samlor and silor drivers in the city of Chiang Mai, Thailand, 1976–78. Chiang Mai, Thailand, Social Science Research Centre, Chiang Mai University. 103 p.

IRRS. 1977a. The becak transportation in Yogyakarta. Yogyakarta, Indonesia, Gadjah Mada University, Institute of Rural and Regional Studies. 143 p.

Luna, Telesforo W., Jr., de la Cruz, Ester B., and Blanco, Ambrosio R. 1978. The jeepney: a low cost transport mode in Metropolitan Manila. Manila, Philippines, Pamantasan ng Lungsod ng Maynila. 79 + 90 + 71 p.

Sanli, H. Ibrahim. 1981. Dolmus-minibus system in Istanbul : a case study in low-cost transportation. Istanbul, Turkey, Istanbul Teknik Universitesi. 253 p.

Soegijoko, Budhy Tjahjati S. (editor). 1981. Public transportation in Bandung. Bandung, Indonesia, Penerbit ITB. 303 p.

The aim of the present publication is to report the results of all the studies in a comparative perspective. It describes the objectives and methods of the research project and summarizes the research questions, specific methods, and major findings, conclusions, and recommendations of the country studies. Conceived in 1975, and accompanied by periodic regional meetings to review its progress, the research project was designed to have a comparative framework.

The study teams, however, were free to explore aspects of LCTs of special interest in their cities. Thus, as is suggested at appropriate points, comparison is not always possible even on certain common aspects.

Low-cost Transport Modes in Asia

The principal objects of the country studies[1] were selected modes of public transport at the study sites and the groups directly associated or concerned with the following modes: the becaks in Bandung and Yogyakarta, Indonesia; the jeepneys in Metropolitan Manila, Philippines; the silors in Chiang Mai, Thailand; and the dolmus and minibus in Istanbul, Turkey. These and similar modes of transport have been given different names in a growing number of studies in this field: "para-transit," "intermediate transport," "unincorporated sector," etc. (OECD 1977b).[2] Interest in these modes has grown due to their apparent utility and adaptation to their respective settings. Thus, according to the IDRC project description, LCT modes are the usual means of movement among low-income people in most large cities of Asia. These modes have many things in common: cheap fares, low energy requirements, labour-intensive applications, and small area of coverage. They are the results of ingenious technology adaptations by indigenous craftsmen.

The becak is a pedal-powered tricycle that can carry two to three passengers and also goods or luggage.[3] The Philippine jeepney is a locally remodeled jeep holding six to eight passengers; in recent years, the older American-made stock has been replaced rapidly by locally mass-assembled, as well as custom-built, vehicles with larger capacities (up to 14 passengers). The Thai silor (meaning four-wheeled) is a small pickup truck converted to carry 10–12 passengers; intercity silors with larger engines carry about 20 passengers. The Turkish dolmus (literally "full up") is typically a big, vintage, American-made car adapted to carry up to seven passengers, charging either on a per-passenger basis or operating as a taxi. New domestically produced European cars, however, have joined the older brands of dolmus. The minibus in Istanbul is a domestic or foreign-made vehicle with a capacity of 8–10 passengers.

These modes constitute significant though varying proportions of public transport. In Bandung, there were 11 378 becaks in 1975, or 13% of all nonmotorized vehicles (85 794) and 15% of public and private motor vehicles (63 350)[4] in the city. In Yogyakarta, becaks (4296) made up 12% of nonmotorized units (35 814) and 15% of motorized vehicles (24 849) in 1974. They accounted for about 12% of all trips (including walking) per week in 1972. In Chiang Mai, silors (4996) constituted 30% of all motor vehicles in 1974, although only a third of the total number of silors were legally registered as public passenger carriers. Samlors, the Thai equivalent of the Indonesian

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[1]In addition to the main surveys, special studies on related topics were also conducted by the country teams (see Table 1).

[2]For convenience, the term low-cost transport or LCT is used for the modes studied, without judging whether they were in fact "low-cost" in any sense.

[3]Unless otherwise noted, the sources used here are the team reports listed in Chapter 1.

[4]That is, if becaks were counted together with motor vehicles (74 728).

The becak of Yogyakarta and Bandung (top) and the jeepney of Metro Manila (bottom).

The silor of Chiang Mai (top) and the dolmus (middle) and minibus (bottom) of Istanbul.

becaks and Philippine tricycles, were also operative in Chiang Mai at the time of the study when there were an estimated 1000 samlors. Jeepneys in Metro Manila numbered 17 000 at the time of the study and were carrying 40–50% of the riding public. Dolmus (15 918) and minibus (3269) units made up 93% of public transport vehicles in Istanbul in 1976. Together with "midi" and larger buses (310), the dolmus and minibus units carried about 3 135 000 passengers per day or over half the daily total. Since these LCT vehicles operated in different shifts through most of the day, they took up an important share of passenger traffic in these cities.

Issues and Problems

LCTs involve a potentially wide range of policy and empirical issues. Despite the services and advantages that they offered, these modes had been the object of growing public criticism for transport and traffic problems attributed to them. Consequently, a crucial policy issue that motivated the research project was whether LCT modes ought to be banned or phased out in favour of what government authorities considered as more efficient and more modern forms of urban transport in the rapidly growing cities of Asia. The becak had just been banned from the main streets of Jakarta at the start of the study and, in other large Asian cities, similar proposals seemed to be gaining ground due to traffic congestion, physical hazards, uneconomical and often illegal operation, and other social costs that the LCTs were said to cause.

At the same time, appreciation of these modes had been increasing[5] as a relatively cheap and flexible means of mobility for the urban masses, a major source of "informal" employment, particularly for poor migrants to the city, and as an indigenous and potentially capital-saving adaptation of transport technology in the developing countries. Thus, there was a question whether LCT modes were not, on balance, socially beneficial, and should somehow be retained — perhaps with some modifications in their vehicles, their organization and operations, and their roles — and integrated in the urban transport systems that Asian cities were proposing to modernize.

The Bandung study team approached the becak as a "controversial enigma" that urban growth threatened to dispel at its expense. In the larger and faster-growing Indonesian cities, the becak had been viewed as an outmoded, human-powered vehicle too slow and short-distanced for urban traffic, as a major source of traffic snarls and accidents, and as a costly competitor rather than complement to buses. Moreover, becak-driving was viewed as encouraging in-migration, increasing the service burdens of the city, and engaging people in an occupation that was unacceptable from a humanitarian viewpoint. Short of adopting Jakarta's policy of eventually banning the becaks from the city, some Indonesian cities had confined their operation to designated areas, certain hours of the day, or to special lanes or "free-becak zones." However, the Bandung researchers viewed the becak as a spontaneous response to transport needs that retained considerable assets: lower fares, door-to-door service, ability to serve smaller neighbourhoods as well as major

[5]At least on the part of international transport researchers starting to devote attention to LCTs (OECD 1974, 1977a, b).

thoroughfares, and contributing to rural–urban transport of passengers and goods. Moreover, becak-driving was a major employer of unskilled workers, and helped ease the transition of rural migrants into urban life.

Public policy on becaks, therefore, could not be unequivocal. In the light of the controversy surrounding this mode, the Bandung report points out, government authorities faced these questions:

> Should becaks be abolished completely, indiscriminately? Or should becaks be protected, upgraded, and preserved, and be allowed to operate in small cities or in rural areas? Is there any other alternative solution, such as modification of the vehicle's structure, retaining it as an interim solution? If becaks should be abolished from large urban areas, what is the critical city size for banning becaks; how should it be done; what is to be done with the ex-drivers; what alternatives can take the place of the becak as a mode of public transport and as a job opportunity?

While the Bandung report sums up these issues as a conflict between the traditional and modern sectors, its Yogyakarta counterpart views them as a conflict between the roles of the becak as a problematic subsystem of urban transport technology and management, and as an "inseparable" part of the urban socioeconomic system. Among the becak's setbacks was that it had suffered from competition with both modern and other traditional (bicycling or walking) types of mass transport, and from a lag between the increase in motorized traffic and road improvements that had made the becak appear to cause traffic congestion. Due to its simple technology and economy, however, the becak has generated so much employment that its prohibition would have serious social repercussions. The Yogyakarta report notes, however, that the postwar popularity of the becak had also been eroded by "a feeling in certain regions (of Indonesia) of humiliating the becak driver by exploiting his manpower" — or, as the Bandung report puts it, a feeling that the becak involves "exploitation de l'homme par l'homme."

Similar questions faced the researchers in Chiang Mai, Metropolitan Manila, and Istanbul, although here less traditional, motorized vehicles were involved. In Chiang Mai, the becak had its counterpart in the samlor pedicab, but the study focused on the silor,[6] a converted pickup whose increasing numbers were also posing traffic problems and occupational, economic, and social issues for their drivers, users, and the local authorities. Unlike the samlor,[7] the silor continued to gain popularity due to its reasonable fare, flexible routes within the city, and ability to transport goods as well as passengers. The silor compensated for the inadequacy of bus services in Chiang Mai. However, its utility and impact had not been unclouded, or perhaps not fully appreciated, as suggested by the fact that a third of the existing silor units were not officially registered and the local authorities had not seen their way clear to fully legalizing the silor as a public utility vehicle.

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[6]As far as vehicles were concerned. The study included samlor drivers in its sample survey, but only the results for the silor drivers are considered here.

[7]The number of samlors, some of which were motorized, had declined to about 1000 in Chiang Mai, and the report of the Thai team foresees their eventual disappearance from the city due to their limited space for passengers, low revenue, and "hard working conditions" associated with their operation.

The jeepney in Metro Manila was in a similar predicament to the other LCTs. In an area where urban growth and motorization had far outstripped road and traffic improvements, the jeepney was seen by its critics as representing "ruinous competition" in transport organization and traffic behaviour. From the standpoint of more sympathetic observers, however, the jeepney typified a "demand-responsive" and flexible service that buses could hardly replace. At the time of the study, it employed about 34 000 drivers, not to mention many other groups indirectly employed in this sector. Helped along by technological adjustments in jeepney manufacture and by wide publicity as a tourist curiosity, the jeepney was accommodated in the transport system, and the government sometimes seemed more inclined to improve jeepney and bus transport organization rather than phase out the jeepney. However, in Metro Manila, for which monorail and subway modes had been contemplated[8] although perhaps no longer as seriously as before, the jeepney's role, now conceived as a minor one of "feeder" for larger transit modes, was not entirely secure. Its future hinged on prevailing perceptions of its performance and on the question posed by the Manila team: "Is the jeepney an efficient, effective, and responsive mode of transport under existing conditions in the urban area?" Quality of service, traffic management, road development, and urban structure are also implicated in the jeepney's career.

The dolmus-minibus system in Istanbul shared the basic problems of the jeepney and other LCT modes. Judging from the frequent references in the Istanbul report to its "visibility as a problem," this LCT appeared to be even more of a threatened species. Figuring prominently in "traffic anarchy," strikes, and controversy over license plate restrictions, the system generated widespread resentment due to the exploitative operations by its units, especially during peak-demand periods. Their very flexibility — the dolmus could shift to taxi operations and double its fare — brought the "responsiveness," quality, and adequacy of their service into serious question. Thus, public sentiment turned to rail mass transit, a proposition that would, at best, relegate the LCT to a supplementary role. According to the study, however, no evidence supported the implicit assumption that the Istanbul LCT was inefficient, since no serious study had been done before the IDRC-sponsored investigation. Moreover, the system had some organizational strength and saving graces as a major transport service, employer, and technological adaptation. Policy should not be too easily swayed by current popular sentiments, because it remained a question "whether the [dolmus-minibus] system could be eliminated at all," whether it should not rather be accommodated and integrated into the larger system, and, in this case, how and to what extent it should be limited or encouraged.

Research Objectives

The research project was thus motivated by a wide range of policy and empirical issues about LCT modes. However, the project as a whole and the

[8]MMetroplan, a major report by consultants on Metro Manila's transport, land use, and development planning project, had suggested light rail instead of monorail and heavy rapid transit as the more feasible line-haul alternatives for Metro Manila (see Freeman Fox and Associates 1976:13-14).

country studies in particular were not equally concerned with all of the questions involved, and did not intend to pursue their wider ramifications. Rather, the studies were aimed at improving the state of knowledge of the LCTs themselves in their respective contexts, since there was very little information about them at the start of the research.[9] At the same time, the research teams hoped to generate policy recommendations so that the research results could be used to help solve transport problems. Although most of the teams reported the recommendations of various groups concerned with LCTs and transport, only the Istanbul and Chiang Mai teams included their own recommendations in their main reports.

There were other incidental project objectives. As stated in the IDRC project document, the aims of the investigation were:

- To gather and analyze information on the low-cost transport modes in their respective cities so as to understand better how these modes fit into the total transport system;

- To gather and analyze information on the operators of low-cost transport vehicles (owners and drivers) to understand better their economic and social characteristics as well as the roles they play in the operation of the low-cost transport system;

- To disseminate research results and formulate recommendations on what can be done regarding the role of low-cost transport in the overall transportation system in the city or metropolitan area;

- To contribute to the training of developing-country researchers by involving students and young faculty members in the participating institutions;

- To contribute to policy and program changes on transportation in the cities involved in this study through collaboration among researchers, officials, and planners.

The Bandung study was aimed at evaluating the functions of becaks as a form of transport and as a job opportunity, and thus at providing a basis for assessing their prospects and for making policy recommendations. It was to assess the efficiency of becaks compared to other modes and in terms of their own operations, organization and management, effectiveness in providing mobility, and satisfaction and policy perceptions on the part of the public and the becak drivers themselves. Temporal as well as physical and financial variables were to be used to analyze efficiency. The employment function of becaks would be evaluated in terms of the "economies of their operation" and the occupational aspects of becak-driving. Here the income and expenditures of drivers, their working conditions, entry patterns and related socioeconomic characteristics, and career aspirations would be studied.

Similarly, the Yogyakarta study examined two major aspects, i.e., becak transport "as a subsystem of an overall urban transportation system [that] poses a major problem in transportation technology and management" and "as a socio-economic problem in urban society since it has become an inseparable

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[9]As noted, however, researchers and transport planners had begun to devote increasing attention to LCTs at the time of the IDRC project. Robert Textor's previous work (1961) on Chiang Mai's samlors, for example, apparently served as an inspiration for more systematic inquiry into LCTs.

part of [the] urban socio-economic system." It would look into the role and share of becaks in total transport activity, ascertain levels of demand for and supply of becak transport, and determine the current and future economic viability of this mode. Approaching the job aspects of becak-driving from more varied perspectives, the study was intended to draw up a demographic, sociological, and psychological profile of the becak driver as well as his economic and occupational conditions and experiences. It would also inquire into his relations with becak users and owners and observe his family and social life.

The Chiang Mai study likewise sought to gather data for a socioeconomic profile of silor and samlor drivers, to identify social and economic problems associated with their working conditions and transport systems, and to identify alternative strategies for future study to improve the transportation system and the relationship of drivers and government. The study attempted to describe the social and economic characteristics of the drivers, particularly those related to their occupation. To some extent, it was also concerned with traffic policy and management, vehicle licensing, user and official attitudes towards silor and samlor drivers, and "general characteristics of drivers and passengers and government, seeing how those relate to their values and attitudes...." Part of the research effort was devoted to observing traffic hours, routes, and flows. On the basis of its findings, the research team aimed at developing and recommending strategies for improving the transport system and the drivers' working conditions and welfare.

"This study," the Metro Manila report simply states, "seeks to find out how the jeepney transport system works. How it was viewed as part of the network of mass transport facilities ... [and whether the jeepney] ... is an efficient, effective and responsive mode of transport...." Although traffic and transport problems in Metropolitan Manila could be attributed to more basic factors, the study conducted there more specifically sought to investigate the economic and social aspects of the jeepney system, particularly the drivers and operators; to ascertain levels of jeepney demand and supply; and to analyze problems of the jeepney and the public transport system from the viewpoint of government traffic officers and transport officials as well as its drivers, owners, and "commuters."

In Istanbul, the research was intended to meet the need for better understanding of the dolmus-minibus system by filling an important gap in existing knowledge as the basis of relevant policies as well as to improve knowledge for its own sake. Previous studies were lacking, particularly in "an integrated approach to the understanding of the system as a socioeconomic phenomenon as well as an important means of public transport" (Istanbul Group 1976c). The more specific objectives set by the Istanbul team for its study were to describe the LCT system in terms of its various physical, operational, and socioeconomic aspects, to examine possible "courses of change" and their effects on the dolmus-minibus and other modes, to evaluate the LCT system in its local context and in comparison with LCTs in other countries, and to afford a better appreciation of the dolmus-minibus system's problems and potentialities, its weak and strong points. In addition, the team aimed at identifying ways of collaborating with other similar research efforts, and to continue and institutionalize urban transport research activities in Turkey.

More specifically, the Istanbul team wanted to test certain hypotheses (Sanli 1981).

> A general hypothesis was ... that the dolmus-minibus system's visibility as a problem in mass transportation was not warranted, and that, in fact, the system was more of a solution to that problem under the present circumstances. Further ... the system has been especially successful and efficient: a. for the community at-large by extending the utility of its stock of vehicles. b. for the people served by providing effective service throughout the metropolitan area. c. for the operators and his dependants by realizing a satisfactory level of economics of operation.

Another hypothesis advanced by the Istanbul team was that, despite improvements in other sectors of transportation — whose inadequacy in the face of growing demand had elicited the response of the LCTs — the dolmus-minibus system

> will survive and continue its success into the future for such reasons as: a. The possible new alternative mass transport systems would be too costly to implement in the foreseeable future. b. The possible improvements of the existing alternatives will be of limited effectiveness in the long run. c. The system is dynamic and flexible and has taken such deep roots in the society to encounter, successfully, the external threats.... In addition ... the system can be improved, planned and changed for even more successful operation and service.

With some degree of abstraction and modification in terms of context, these hypotheses may be said to have been shared implicitly or explicitly by the other country studies. They were rather brave hypotheses, however, whose optimistic note might not have been equally shared by the other study teams. They all had in common, however, the immediate objective of improving knowledge about the LCTs for the light that this might throw on policy issues bearing on them.

Research Methods

Like their objectives, the research methods employed by the country studies followed a common pattern, but varied in specific ways. In all of them, sample surveys were the main research method. In each study site, questionnaires were administered through interviews with the respondents. To ensure comparability among the survey results, common "core questions" that all the country teams should examine were identified from their draft questionnaires and incorporated into their survey forms to the extent that the additional questions were relevant. For example, questions pertaining to motorized LCTs were obviously not all suitable to the pedal-driven becak or samlor. However, the teams retained or added specific questions that they felt were important in their respective contexts. A common outline regarding the relevant background conditions in their study sites accompanied the suggested core questionnaire.

Table 1. Subjects covered by the LCT country studies.

Study site	Surveys	Special studies
Bandung	Drivers (180)[a], owners (21) and households (1000)	Motorized public transport, based on surveys of drivers (55) and users (63)[b]
Yogyakarta	Drivers (250) and households (750)	Seasonal migrants (42) and commuters (55)[c]; becak syndicate in Surabaya
Chiang Mai	Silor (700) and samlor (300) drivers[d], passengers (100)	—
Metro Manila	Drivers (578), owners (75), households (1011 plus 3930 individual "commuters"), transport officials (19), and traffic officers (51)	Case studies of drivers (11) and operators (4)
Istanbul	"Operator-drivers" (1935) and government officials (20)	Administrative and legal aspects; general urban and transport context; public transport systems; traffic and dolmus operation along major corridors of Istanbul;[e] LCTs in other Turkish cities

[a]Numbers in parentheses indicate sample size.
[b]Other special studies intended but not reported in the main report concerned government perceptions and policies on becaks in Surabaya and traffic management and organization in Bandung.
[c]Not reported: life histories of becak drivers in Yogyakarta.
[d]Surveys or special studies of users, government officials, and "vehicle dealers," etc. were also intended but not reported.
[e]The report on another special study — reserved bus lanes and a light transit system in Istanbul — was not available for the present report.

Some of the country teams also conducted special observations and studies on topics of particular interest in their settings, including other transport modes and "life histories" or profiles of selected individual LCT drivers and owners. The results of these studies are not included in this report although it cites selected details from the available special reports. The subjects covered by the surveys and special studies are listed in Table 1. In addition to the original data-generating surveys and studies, the teams used secondary sources of information such as urban development and transport plans and previous studies that had a bearing on LCTs (Study Committee 1970, CRUPS 1971, Grava 1972, Suharso 1973, Wirosardjono 1974a, Pendankur 1975, Riguera 1975, World Bank 1975a, Viloria and Stonier 1976, IETTA no date).

Purposive random sampling, stratified by size of terminals, was employed to pick the 180 driver respondents in Bandung. The driver population was assumed to be homogeneous, especially in terms of economic characteristics, but was expected to vary in terms of age, place of origin, and routes of operation. Samples were taken of morning and afternoon-evening shift drivers from large, medium, and small terminals, which were selected on the basis of number of becaks parked and proximity to certain land uses. Distinct questionnaires were administered to the drivers and the households.

A household in the Bandung survey was defined as "a family or a single person or group of persons living together in a single cooking unit, including dependents and servants, the total number of which does not exceed 15 persons." A systematic two-stage random procedure was used to derive a

sample representing the whole community in terms of income level, population density, distances to certain areas and transport facilities, and specific household clusters. To account for budgetary and other constraints on sample size, the two-stage method was used. First, samples of the lowest (Rukun Tetangga, or RT) of the four subdivisions of the city were taken in proportion to successively higher tiers.[10] Then, household samples were randomly drawn from the list of households of each RT selected. Because of the costs of interviews and household listings, only 10 households were selected from each of the 100 RTs sampled (out of 5262 RTs).

The driver was the respondent in the driver survey, whereas in the household survey, an initial respondent was interviewed, and then a "random respondent" was selected from each of the 1000 sample households. The initial respondent was asked about his or her socioeconomic characteristics, the size of the household, and the general mobility and travel patterns of its members (the first part of the household questionnaire). The random respondent (who had to be more than 18 years old) was next asked more specifically about his or her travel patterns and preferences, dependence on public transport, opinion on becaks, etc.

For the becak owners in Bandung, the sample was based on 10% of the number of vehicle owners distributed by number of becaks owned. The original sample of 54 owners was further reduced to 21 when initial interviews with 14 owners showed little variation in the patterns of their replies. Interviews were also conducted with an unspecified number of officials of the newly created Becak Drivers and Owners Organization and with city officials in charge of traffic and public transport.

In the special surveys or studies, the Bandung team randomly picked 63 "consumers" and 55 drivers of motorized public transport (MPT) modes, and used data from government agencies. The driver respondents were selected at various terminals or were interviewed while plying their routes (Kusbiantoro and Ro'yat 1981:149).

The sampling methods employed in Yogyakarta were similar to those used in Bandung. Homogeneity among becak drivers — in terms of income, expenditure, attitudes, habits, and life-styles — was also assumed, so that the sample was kept small (250 drivers). Samples of drivers were also taken from becak terminals and from two shifts of drivers, although the Yogyakarta report does not explain in similar detail how the "spatial" and "time cluster" sampling frames were established. (The Yogyakarta report contains a 9 × 7 matrix of "zones" in table 1.1 but does not explain the meaning of the zones in this table.)

In the "user" survey in Yogyakarta, the household was also the sampling unit for the home interviews. Sampling was similarly done in two stages: first, 75 RKs[11] were drawn from the 163 RKs in the city, and from each RK one RT was drawn at random; then, 10 households were randomly taken from each sample RT, for a total of 750 sample households. The first respondent interviewed was any member of a sample household. Based on a list of household members

[10]Bandung was administratively divided into Kecamatans; each Kecamatan was subdivided into Lingkungans, each of which was in turn subdivided into Rukun Wilayahs. The RTs were the units below the RWs.

[11]The RK (Residential Area Association) is the second lowest of the three (versus four in Bandung) tiers in Yogyakarta's administrative subdivisions.

supplied by this initial respondent, the interviewer then selected the respondent, who had to be more than 14 years old.

The special study of seasonal migrants and commuters in Yogyakarta was made due to the general observation that there were usually heavy inflows of traffic into the city in the morning and outflows in the afternoon. These flows were thought to consist of two groups: those who traveled daily to and from the city, and those who lived there temporarily and visited home periodically. "Various occupations were selected to represent the various groups" under these two major categories, but the sampling method is not explained in the special report (IRRS 1977b:1, 3–4).

The Chiang Mai team randomly selected 700 silor drivers and 300 samlor drivers for its major questionnaire survey — or what it calls "accidental sampling due to problems concerning unreliable registration" of vehicles. The exact nature of the sampling frame and procedure is not clear, but samples were apparently stratified by place and the respondents were interviewed in three groups and stages. The first group interviewed were silor drivers who were members of silor "queues" or stations and had specified routes, especially routes connecting the downtown and University areas. Then, for their second group, interviewers "caught" silor drivers who were driving their vehicles within the city. The third group interviewed afterwards were samlor drivers found in various places in the city such as the downtown area, commercial centre, bus terminal, and railway station.

The Chiang Mai team also planned to conduct "life histories," observations of vehicle service locations, routes, hours, and flows, and interviews of passengers, vehicle owners, traffic officers, and other government officials concerned with transport. However, its main report includes only the data concerning the silor drivers, a summary of the results of the "passenger" survey, and an equally brief resume of a meeting of transport officials, and only these are reflected in this comparative report.

In Metro Manila, multistage sampling methods were utilized for the surveys of jeepney drivers and commuters. For the drivers, sampling was done by route, by vehicle, and then by drivers. A sample of 87 routes was initially drawn from 331 jeepney routes, in proportion to the number of jeepneys plying the prescribed routes and to the shares of jeepneys of the 17 localities in the metropolitan area. Next, jeepneys plying the sampled routes were listed on the spot. From the total listed (6228 jeepneys), 10% or 622 vehicles were systematically sampled, later reduced to 578, with an equal number of alternates. Then, the drivers of the sampled vehicles were interviewed. Similarly, the commuter households (defined as "a group of persons who live together and share in common food and dwelling arrangements," but with special meaning attached to the term "commuter") were sampled by area, by household, and finally by individual respondent. The sampling started with a 10% selection from a list of all (1841) barangays[12] of Metro Manila, i.e., 185 barangays. From each barangay, 10 households were then systematically drawn, and from each sampled household at least four "commuter respondents," as much as possible those with different trip purposes, were

[12]The barangay is the smallest political subdivision in the Philippines. It is usually the next lower tier to the city or municipality. In Metro Manila, a Metropolitan Commission serves as a third higher tier, and four cities and 13 municipalities serve as the intervening layer. Known "high-quality" residential areas were excluded from the sampling map and areas of doubtful classification were checked in the field.

interviewed. A final sample of 1011 households and 3930 commuter respondents was obtained from the 17 localities of Metro Manila.

The sample of jeepney operators (i.e., owners) was drawn from a list of 501 operators identified by the driver respondents. This procedure was followed because a complete list of the 2843 people known to be jeepney owners as of 1975 was not available. Of the 501 operators, 75 were chosen — 25 more than originally set — to better represent this group. For the traffic officers, the sample was initially selected systematically (with a random start) from the 476 traffic beats in the area and then proportionally from the traffic beats in each city or municipality. Finally, the traffic policemen (51) on duty on the sampled beats were interviewed. The 19 officials interviewed regarding policy and administration were selected to represent planning, transport, and traffic-management agencies.

In Istanbul, the sample of operator-drivers represented 10% of all the registered LCT vehicles distributed by type of LCT (dolmus only, dolmus-taxi, minibus, and midibus). These ratios resulted in an aggregate sample of 1935 respondents. "The sample was also weighted by the routes of operation to avoid biases in concentration in various parts of the metropolitan area." This means that percentages were also taken of LCT vehicles according to their routes.[13] The results of the survey were initially hand-tabulated (based on 5% random subsample of the questionnaires) (Istanbul Group 1976c:7), but were also coded for computer analyses. In addition to the general survey results, case histories of individual drivers were examined to obtain details about LCT operations.

Special studies were also undertaken on what the Istanbul research team called the "macro and micro economics" of the LCT system; the future role of rail mass transit; various modes of public transport; the general urban and transport context of the dolmus-minibus system; and the administrative and legal aspects of transport in Istanbul. To obtain information and opinions about LCTs, a special survey was made of 20 government transport officials and another questionnaire was sent to other cities about their perceptions of their own LCTs.

[13]Vehicle "stations" as well as routes were mentioned in a previous report as a basis for stratification (see Istanbul Group 1976a:6).

2 LCTs in the Context of the Study Cities

The low-cost transport modes in the five Asian cities covered by this report may be viewed as a range of adaptive, if imperfect, responses to changing patterns of mobility in their respective settings. These changes in turn may be traced to various rates of population growth, urbanization, and socioeconomic development, with foreign technology and local culture as an important pair of interacting factors. Modern technology from abroad has elicited, or (perhaps in the same breath) threatened, the LCTs, but in any case through the mediation of the local people.

Beyond the modes selected by the country studies, a wider variety of traditional and transitional means of movement persist or exist in these countries, depending on their receptivity to foreign ideas and native inventiveness. From a common effort to make transport modes appropriate to local conditions, specific variations inevitably arise between and even within the same countries. This is to be expected, for the settings of the LCTs have significant differences as well as similarities.

Three of the countries are in Southeast Asia, still largely rural and tradition-bound in many respects. To take only one of many dimensions of difference, they have been exposed to various degrees of Western influence, whose results show more clearly in Metro Manila than in Bandung, Chiang Mai, or Yogyakarta. The fifth study site is located thousands of miles away in Asia Minor, at the physical and cultural confluence of East and West: Istanbul is half Asian, half European.

Neither the LCTs nor existing public policies in these cities have kept pace with the material and cultural forces of their environments. To begin to understand the nature of these transport modes and the issues surrounding them, their context must be described. This chapter deals with the changing size, composition, and structure of the study cities and regions, their land-use patterns, circulation systems, traffic conditions, and transport policy and management framework.

As elsewhere in this comparative study, the main reports of the study teams are the main sources and, unless otherwise noted, quoted passages are from these reports. However, especially where they are lacking in comparable data, their results have been supplemented with information from other available sources (Bovy and Gakenheimer 1975; Mahayni 1976; Shepard 1976).

General Features

Tables 2 and 3 provide comparative data (as of the mid-1970s) on selected

Table 2. Area, population size, and growth rates of LCT countries.[a]

Countries	Area ('000 km²)	Population ('000) Total Mid-1975	Urban 1960	Urban 1975	Average annual growth rates (%) Total 1960–70	Total 1970–75	Urban 1960–70	Urban 1970–75
LIC[b]			8	13	2.4	2.4	5.4	5.5
Indonesia	1904	135.2	15	19	2.2	2.4	4.4	4.7
MIC[b]			32	43	2.7	2.7	4.8	4.5
Thailand	514	43.0	13	17	3.1	2.9	4.8	5.3
Philippines	300	43.3	30	36	3.0	2.8	4.3	4.8
Turkey	781	41.2	30	43	2.5	2.5	5.2	4.2
IC[b]			66	76	1.0	0.8	1.9	1.8

[a]Source: World Bank (1978, annex tables 1 and 13).
[b]World Bank classification: Low Income Countries, Middle Income Countries, and Industrialized Countries.

Table 3. Selected economic and social characteristics of LCT countries.[a]

Countries	GNP per capita (US$; 1976)	% distribution GNP Agriculture	Industry	Services	% of labor force in agriculture 1960	1970	% of age group enrolled in: Secondary school 1960	1975	Higher education 1960	1975
LIC	150	45	19	39	88	85	2	8	—	1
Indonesia	240	29	34	37	75	66	6	18	1	2
MIC	750	21	32	45	60	51	12	35	2	7
Thailand	380	30	25	45	84	80	8	25	2	2
Philippines	410	29	34	37	61	53	26	56	13	20
Turkey	990	29	28	43	79	71	14	30	3	7
IC	6200	6	41	52	15	11	53	83	9	22

[a]Source: World Bank (1978, annex tables 1, 3, and 18).

physical, demographic, economic, and social characteristics of the countries involved in the LCT studies. Based on indicators in the World Development Report for 1978 (World Bank 1978), these data include averages for the groups into which the Bank classified different countries. As shown in these tables, the four countries differed in area, degree of urbanization and gross national product (GNP) per capita, but had roughly similar national population sizes (except Indonesia), high rates of urban growth, and still great but declining dependence on agriculture.

Indonesia was a rural archipelago, but had a sizeable and rapidly growing urban population, particularly on the island of Java. Its urban population was concentrated in Jakarta (4.6 million in 1971), Surabaya (1.6 million in 1971), and Bandung (1.3 million in 1976). Bandung, whose population was three times that of the next largest city, had grown at declining rates of 1–2% per year, but had reached one of the highest densities in Indonesia (about 150 persons/ha). Yogyakarta, on the other hand, had 357 000 people in 1973 and in 1971 was the 10th largest of the Indonesian cities with populations of more than 100 000 (Wirosardjono 1974b, table 10).

Bandung

Bandung is 120 km west of Jakarta. Situated on hilly terrain, it is connected to the latter by rail, air, and highway (bus, minibus, and shared taxi services are available). Yogyakarta is farther southwest of Jakarta, at the meeting of West, Central, and the southern parts of Java. At the time of the study, Bandung was a regional commercial, industrial, administrative, educational, and tourist centre surrounded by a fertile agricultural area famous for its flowers, vegetables, fruits, and rubber, tea, and cinchona plantations. The educational facilities in the city — including 20 universities and institutes and 30 academies — attracted 5000 new students per year. Student activities had given the city important political as well as administrative functions in recent years. Many national government offices, including postal, telecommunications, and army supply facilities, were located in Bandung, which also served as the capital of West Java.

The population of Bandung (total area: 8098 ha in 1974) was relatively young, with 48% under 20 years old in 1974. On the average, educational achievements were better than the nation's at the middle levels, but not at the primary and university levels. The leading occupations in the city were government employment (9%), trade and commerce (5%), transport and warehouse services (3%), and agriculture (3%). Incomes appeared to be closely associated with educational achievement. A survey of three kampongs showed that 96% of those without education earned no more than $3.75/month[14] while 70% of those with academy or university education earned $50–100/month. However, "side jobs" and self-employment (including becak ownership) considerably boosted incomes for some groups.

Yogyakarta

Yogyakarta is located on a fertile plain 113 m above sea level and close to the shores of the Indian Ocean. It was originally a court city founded in 1756 AD. Between 1956 and 1976, its population increased by 200 000 to 480 000 and to a density of about 113 persons/ha (total area: 3250 ha.) The city also performed certain regional cultural, economic, and administrative functions as one of the five districts in the Special Territory of Yogyakarta. There were 47 universities and academies in the city. However, in the words of the Yogyakarta team's report, the city remained basically a "typical traditional city." Next to trade and commerce (20%), farming (18%) was still the most important occupation, with employment in government (8%), industry (3%), and transport (2%) trailing behind.

In a 1970–1971 survey of six Indonesian cities including Yogyakarta and Bandung, average monthly incomes were shown to be $3.70 for those with less than primary education and $21.25–25.00 for those with university education. Those with less than high school education, who made up 89% of the survey sample, were earning $3.70–6.88. Data for Yogyakarta itself indicated that its families probably had higher incomes on the average, with 55% of the families in 1968–1969 earning monthly incomes below $15.00, while 16% were earning more than $25.00.

[14]Foreign exchange rates used in this report were those prevailing in 1977, i.e., the equivalents of U.S. $1.00 were: Rp 400, 7.41 pesos, 20 baht, and 19.45 Turkish lira.

While most of Bandung's area was already built up (79%), with 51% devoted to residential, industrial, institutional, and other urban uses, Yogyakarta was predominantly (45%) "residential land with surrounding gardens" and 18% was still agricultural land; 35% of Bandung's land uses, though, was classified agricultural and greenbelt.

Chiang Mai

Chiang Mai is located on a 313-m high plateau 809 km northwest of Bangkok. In the early 1970s, it was the second largest city in Thailand, although its population of 110 000 was only 1/30th of metropolitan Bangkok's more than 3 million people (Noranitipadungkarn and Hagensick 1973:2). Like other primary cities in Asia, Bangkok had absorbed most of the urban component of Thailand's national population, which had grown by 3.0% per year over 10 years to 34.2 million in 1970. Originally founded in 1300 AD as a strategic "new town" between the warring kingdoms of Burma, Laos, and Thailand, Chiang Mai became the capital of a northern Thai state that, in 1933, was reduced to a changwat or province. The city was created in 1935. In 1976–1977, it had municipal jurisdiction over 1750 ha of its 6000-ha area[15], which was in turn part of the 23 000-km^2 Province of Chiang Mai.

The city was linked to Bangkok by highway and air, and to surrounding towns by seven radial roads. Chiang Mai's economy was based on agriculture (rice and vegetables), cottage and other small industries (silk and silver products), commerce, and tourism. It was an importer of manufactured goods, including foreign-made products. Agricultural goods were brought in daily for its seven fresh-food markets. Buddhist temples, historic sites, festivals, and the famous hill-tribe villages of the north added to its attractions as "Thailand's tourist heaven." (A boom in tourism caused local investors to overbuild recently.) There were also 15 bank branches in the city, although nonbank transactions were still popular.

Due to its location, Chiang Mai was an administrative and cultural as well as economic centre in northern Thailand. Aside from the city and provincial offices, a number of regional offices and institutions of the national government were based there. These included the new University of Chiang Mai, five other special colleges, and certain major medical facilities.

Istanbul

Metropolitan Istanbul, with its population of about 4 million was the largest urban area in Turkey, a country whose urban population had tripled since the 1950s to 16.8 million or 42% of the total. Already a city of over 1 million by the turn of the century, Istanbul's population had grown by 4% per year from 1970 to 3.8 million in 1975. The metropolitan area — consisting of one central city, 31 municipalities, and 19 ilces or subdistricts — had a territory of 6500 km^2, with population densities of 100–300 persons/ha in the central and coastal areas.

Istanbul is divided by the Bosphorus channel into the Asian or Anatolian section on the east and the European sector on the west. The latter is further

[15]The rest of the area was governed by a special district (sukhaphibal) with limited functions and by the provincial headquarters district (amphur muang).

divided by another channel, the Golden Horn. In the mid-1970s, about 72% of the population lived on the European side. Commercial establishments were also concentrated on this side, while 60% of Istanbul's industries were located on the Asian section. Bridges connected the two main and smaller sections and linked them with a highway network with a new peripheral system leading out to the countryside.

Aside from being a strategic military, commercial, and industrial junction between two continents, Istanbul had been a religious, cultural, and educational centre of historic importance. It had the oldest and largest universities in the country, including Istanbul University and Istanbul Technical University, and many other schools and colleges. Its picturesque mosques, bazaars, and recreation and amusement facilities attracted thousands of foreign tourists as well as local people from surrounding areas. Nonetheless, transport problems had intensified in the area. The physical layout and growth pattern of the metropolis, the limited number of channel crossings, and the resulting congestion at its main junctions had restricted traffic movement in Istanbul.

Of the four LCT countries, Turkey was the most urbanized and most affluent, in terms of GNP per capita, but even here agriculture remained important, and 32% of metropolitan Istanbul's population was still classified as rural in 1975.

Metro Manila

Metro Manila was the Philippine version of the primary cities of Asia. Its population of 4.97 million in 1975 was nine times greater than that of the next largest urban area in a country whose national population had already become 36% urban (World Bank 1978, table 2; the Philippine census of 1975 indicated that the national population was only 32% urban, of 42 million). Growing at 4.6% per year between 1970 and 1975, the metropolis' population had an average density of over 80 persons/ha (386 in the central city) in the 636-km^2 area of the four cities and 13 municipalities comprising what is now officially called the "Capital Region."

The metropolis, located by the Manila Bay on the main island of Luzon, was connected by highway, rail, shipping, and air lines to its regional and national hinterland. As the nation's political, economic, and cultural centre, Metro Manila enjoyed the lion's share of its government bureaucracy, educational facilities, income, and wealth, and the bulk of the country's modern industry and infrastructure. Being also the focus of its migration and growth processes, however, the metropolis had some of the country's most obstinate social and physical problems, including those of family income disparities, housing, and internal transportation.

Urban Structures and Transport Systems

The role and prospects of the LCTs were apparently shaped by the population pressures, urban structures, and the general transport systems prevailing in the five study cities. The current profiles of these cities (as of the time of the studies) were in turn formed by the combined influences of

geography, history, and contemporary forces. In this section, the urban pattern and transport system in each city is described, together with the various existing modes, traffic and transport problems, proposed solutions, and the institutional framework for transport policy and implementation.

Bandung

An indication of the growth that had taken place in and around Bandung was that a Greater Bandung area had been proposed in recent plans, which also suggested that the city was no longer suitable to remain the regency (Kabupaten) capital (Anonymous 1977:17). Between 1969 and 1974, residential and other urban uses of the city's land area expanded from 38 to 51%. The structure and area of the city, however, remained basically the same despite the growth of the population.

Physically and otherwise, the city was divided into two distinct segments. The northern part — the residence of the colonial Dutch administrators — was the better planned, better equipped, and lower density portion. The southern section was occupied by the commercial centres and by more indigenous dwellings. Residential uses, which expanded from 27 to 37% between 1969 and 1974, were distributed throughout the city, including the central section with its mixed Indonesian and Chinese population. Due to the influx and growth of population, however, the indigenous areas — particularly the Kampungs — had reached densities of 171–309 persons/ha in the southern segment. In one Kecamatan (Cibeunying) on the eastern side, densities exceed 500 persons/ha in some sections (Anonymous 1977:19).

Bandung had a circular shape, having expanded in a "concentric pattern with a single central district right in the middle." The government buildings and main bus terminals were located just north and south of this central area. The city had an irregular grid network of roads leading outward in four general directions. Less than 1% had been added to this network between 1961 and 1974, and none at all between 1974 and 1976 (Kusbiantoro and Ro'yat 1981:152), although new ringroads were being built in the southern section in 1977. Most of the major roads were second-class, whereas roads serving the residential areas were third- to fifth-class.

There were still unoccupied areas in Bandung, but congestion had been felt in the city, so that planners were thinking of moving the regency capital elsewhere and of "dispersing" the population to smaller "counter-magnet" urban centres. Vehicular traffic was restricted by the lag in road construction or improvement, on one hand, and, on the other, by the increase in motorized and nonmotorized vehicles from 174 197 to 240 362 between 1965 and 1975. Nonmotorized units (including about 70 000 bicycles) declined slightly from 86 437 to 85 794 between 1974 and 1975, while motorized public-use vehicles increased from 1757 in 1971 to 3048 in 1975 and then more than doubled to 8114 in 1976. Even more dramatically, the number of private cars almost tripled, from 16 097 in 1971 to 45 581 in 1976.

At this juncture, several kinds of motorized modes of public transport had been introduced in Bandung (Kusbiantoro and Ro'yat 1981): the four-wheeled modified Hondas (authorized capacity: 17 passengers), Colts (16), and Opelets (small, 10; large, 17), and the three-wheeled motorized Bemos (7). These vehicles comprised 8–20% of all passenger vehicles and were "the city's

principal means of public transportation." Unlike the becaks and Bemos, these jitneys and minibuses were assigned specific routes, although frequently these were not followed. They served mainly the middle- and lower-income groups, with growing patronage from higher-income groups as well. These vehicles operated within specific radii of 1–4 km for the Bemo, 5–9 km for the Honda, and 6–9 km for the Colt and Opelet.

Although they had no fixed stopping places en route, there were formal and informal terminals in Bandung's centre and outskirts for public passenger vehicles, including buses and taxis (the latter shared the terminals of the nonbus four-wheeled vehicles). These terminals had been "redeveloped" in recent years, and two new ones were built in 1974. Meanwhile, the older terminals in the central area had created traffic problems, so that they were to be relocated outside this district when the Southern Ring Road was built. Informal terminals had also developed near markets, hospitals, schools, and crossroads in residential areas, and generated other activities nearby (such as those of hawkers and vendors).

Due to the population size and density of Bandung, its concentric growth pattern, limited roadways and terminals, and increasing number of public and private motorized vehicles, traffic problems intensified in the city. However, the nonmotorized public vehicles were getting a great share of the blame. Aside from the becaks, there were the dokar (horse-drawn passenger cart) and gerobak (horse-drawn cargo cart) whose numbers, however, were insignificant and declining. The becaks, especially, were the object of local restrictions. Although the provincial and municipal governments were still undecided whether to retain or prohibit the becaks, they imposed restrictions on the becaks' production (1973), their areas of operation (1974), and licensing for owners and drivers (see also IRRS 1977a:40).

The measures to ease Bandung's transport problems, however, were apparently not well implemented. The new regulations, for example, did not prevent the construction of new becaks or becak operation in prohibited areas. This could be traced to the diffuse authority of government over transport. Transport policy and implementation in the city were the responsibilities of several agencies — the municipal traffic planning board, traffic police department, department of public works, and the West Java Provincial Office of Road Transportation. The planning board had been created to coordinate transport planning and traffic management activities among these agencies but "in practice ... the coordination aspect does not exist."

Yogyakarta

This city was characterized by a more regular pattern consisting of broad squares each around a court located at its centre. The city used to be the residence of court officials, the king's retainers, and artisans, and its functions as a court city were responsible for its expansion in the past. Subsequently, urban growth was stimulated by the construction of a railroad link and commerce with western Java, the installation of utilities and facilities in the city, and by the building of educational institutions since the turn of the century. The boundaries of the Javanese kampungs and Chinese quarters were defined in 1916.

During the 1950s and 1960s, Yogyakarta expanded in different directions. Many commercial and allied functions remained in the central area, particularly

in the main business district known as Malioboro, where theatres, hotels, office buildings, and small industries were located. With the increase in motorized transport since the mid-1960s, however, residential uses expanded farther away from the core, and new residential and smaller shopping nuclei formed in peripheral areas. Yogyakarta's municipal boundaries were thus extended, although in recent years actual expansion occurred more often in the eastern and northern sections.

Population densities in the city gradually rose from 105 persons/ha in 1971 to 113 in 1976, with a range of 38–256 among the 14 subdistricts in 1973. At this time, the city had a total area of 3250 ha and a population of 356 699. Growing 1.5% every year since 1965, this population had increased to about 480 000 by 1976.

The leading occupations in Yogyakarta then were commerce, farming, and government employment. The tertiary or service sector (especially "community, social, and personal service" and "trade, restaurants, and hotels") was the most dominant among the city's economically active population (78%), with the secondary (19%) and primary (2%) sectors trailing behind. Establishments tended to cluster in certain quarters of the city, but often together with residential units. Commercial and prewar buildings were located in the city's central area, while educational and cultural facilities were in the northern section together with higher-income residences. Heavy industry and residential uses were located in the western sector.

Four main roads linked Yogyakarta to its environs. Internally, the road network divided the city into broad quarters, with three main routes for the north–south traffic and another two for east–west movements. The road network comprised only 2.9% of the total area of the city — far below what the Yogyakarta research team regarded as the standard (14%).

Nonmotorized vehicles (35 814 in 1974) still outnumbered motorized vehicles (24 849) of all types in Yogyakarta, but the latter were probably catching up. Bicycles (31 369 or 52% of all vehicles) and motorcycles (33%) dominated the street scene of this "student town," also known as "bicycle town." Many students were already switching from pedal to motor bikes. Becaks (7%), private cars and jeeps (5%), public motor vehicles (3%), and horse- or ox-drawn vehicles (0.3%) comprised the rest in 1974. Public motor vehicles included taxis, buses, pickups, and trucks. The Yogyakarta report does not mention the bemos, jitneys, and minibuses that had figured so prominently in Bandung's public transport system.

The Yogyakarta research team observed some tension between the outward expansion of the city and the "centripetal forces" of its central functions. Yet, according to their report, Yogyakarta did not yet have the kind of traffic problems that were plaguing bigger cities. It was still small enough —"medium-sized" — for intracity travel to be largely "self-service." Walking was still a major means of movement, especially for shopping purposes, and rapid transport was not yet needed. Thus, the becak still had a place in Yogyakarta where the municipal government had not issued any restrictions on the becak, unlike in Bandung.

As a means of public transport, however, the becak was slower and "more expensive" than motorized public transport. Like other nonmotorized vehicles, the becak had been losing ground to motorized vehicles. However, the Yogyakarta report presents no data to substantiate this point, and it also notes that becak licensing was not being strictly enforced. At any rate, the becak

seemed deeply attached to the socioeconomic fabric of the city, so that any proposals to modernize transport in Yogyakarta deserved scrutiny from the viewpoint of becaks.

Chiang Mai

Chiang Mai had grown by 2.5% per year between 1965 and 1974 (Fouracre and Maunder 1977:2), and changed physically during the past decade, mainly due to the efforts of the national government to promote tourism in that northern city. Apart from stronger links with other regions, the city had an immediate hinterland of some 40 000 people in addition to its own population of 110 000.

Chiang Mai is a flat area with a scenic mountainous backdrop, where a royal garden palace had been built. On a road map, it appears as a network of radial and ring roads emanating from a central grid. A river bisects the city, setting apart the eastern third of its area. Near the middle was "a neat square area ... surrounded by the town moats." This square defined the old town, now occupied by residences, business and government offices, and Buddhist wats, which dotted other places in the city.

A commercial area adjoined this central square. In the southern area was the famous silversmith village, and in the western part were several major government institutions (including Chiang Mai University) and the airport. Residential uses occupied areas along the two main roads running parallel on the western side and also on the northern section. The latter section expanded rapidly in recent years due to the construction of educational, shopping, and bus terminal facilities. The traditional wooden houses and shops had given way to new concrete buildings in Chiang Mai, but control of building and other land uses was minimal so that public and private concerns could construct practically any kind of building.

A significant amount of road construction had just taken place in Chiang Mai, so that it had one of the most convenient systems of internal communications in Thailand. A 100-km superhighway breaking a major natural barrier to another town (Lanpang) greatly increased the number of visitors to Chiang Mai. This and the new radial and ring roads contributed to the city's recent urban growth (Noranitipadungkarn and Hagensick 1973:14–16). However, many narrow irregular streets that larger vehicles could hardly negotiate remained in the city. Traffic management was limited for the most part to a series of one-way streets and parking restrictions (Fouracre and Maunder 1977:2).

Motorcycles, minibuses (silors), cars, buses, and samlors constituted the main vehicular transport in the city. Motorcycles and private cars had grown in number more rapidly than public motor vehicles and samlors during the last decade; average annual increase in the number of samlors was only 1.4% in 1960–1970. Minibuses, however, were carrying more of the public passengers (86%) than buses and samlors (Fouracre and Maunder 1977:19).

The "city municipality" of Chiang Mai was in charge of municipal roads and other local facilities, whereas the national highways department was responsible for intertown routes. A national land-transport office controlled the franchise for bus routes and the licenses of bus drivers. The issuance and

renewal of driver permits and vehicle licenses, as well as traffic regulation, was the responsibility of the national police force under supervision of the provincial governor general.

Chiang Mai did not yet seem to have very serious traffic problems, but its public transport service could be improved. However, for reasons that might well include the force of tradition, such service was not effectively controlled. Many silors operated without a license for passenger service, and minibuses had no fixed routes within the city. Users preferred silors for their convenient service, but also partly because bus service, whose fare was cheaper, was limited. According to Fouracre and Maunder (1977:1-7), "the bus service is in decline and probably losing money."

Istanbul

Compared to the smaller cities, Istanbul had felt greater urban pressures on its traffic and transport system. Its hilly topography, the Marmara Sea and the Bosphorus gave its urbanized area a triaxial shape. Population and urban uses were concentrated along the seashores and the banks of the north–south channel. Densities were highest in the central areas, especially on the European or old-city side; however, development on the Anatolian side had been faster in recent years, and subcentres had developed on either side. New residential developments (primarily for lower-middle income groups) also occurred along the main radial roads, and even in peripheral areas where proper building was more difficult but which were conducive to squatter settlement.

This pattern of development generally followed the highway network. This 350-km long network (including the new peripheral system) served both primary and local distributor functions. However, it was turning out to be inadequate for Istanbul's local and intercontinental movement needs. Used indiscriminately by all types of road-based vehicles, the highway system and the concomitant linear pattern of development induced great volumes of cross-channel traffic that the bridges could not adequately accommodate. Internal vehicular movement in the older central sections was also restricted by the narrow streets, into which traffic would spill during peak hours.

There were several vehicular modes of transport in Istanbul. Those used for public transport include: buses and trolleys of the IETTA (Istanbul Electric, Tunnel and Trainways Authority), which accounted for 27% of daily trips in 1970; minibuses (25%); dolmus units (24%); "people's buses" (3%); local railways (8%); passenger boats (12%); and dolmus boats (1%). The bus system had declined, serving only 630 000 passengers in 1976 as against 746 000 in 1970, and only some 600 of the fleet of 704 buses and 101 trolleys of the municipal system were operating during the study. On the other hand, the number of private cars had increased rapidly, at rates exceeding their level of contribution (10%) to passenger traffic. The Istanbul report (Sanli 1981) states that 150 private cars were being "pumped onto the already congested city roads, everyday," but does not indicate what this means in terms of rate of increase (p. 24). However, a chart (p. 25) shows a steeply rising trend in car ownership, from 19 cars per 1000 population in 1973 to a "low projection" of 42 per 1000 by 1980.

This situation had produced too much yet too little traffic in Istanbul: the channel-determined patterns of movement, limited crossing facilities, and congestion in central areas were restricting traffic generation to lower levels

(67%)[16] than might have been possible with a more adequate system. Solutions more drastic than those envisioned in the smaller LCT-study cities had been proposed for Istanbul's transport problems. These included reserved bus lanes, a "light metro system" (a more moderate alternative to an underground rail mass-transit system, which had also long been advocated), and restraints on the use of private cars, plus extensive improvements in the bus system. More basically, three alternative forms of urban expansion were considered as bases for transport options, e.g., a — expansion along the radial corridors of the metropolitan area, b — linear development along the Marmara coasts, and c —curtailment of growth in the central sections and the creation of new growth centres within and outside the metropolitan area.

Meanwhile, as already pointed out, the dolmus and minibus were getting what the Istanbul team felt was a disproportionate share of the blame for Istanbul's current transport problems, compared to the deficiencies in the bus and highway systems, the rapid growth of car ownership, and the constraints imposed by Istanbul's urban form. These other factors were acknowledged by proponents of transport improvements, but in any event the measures proposed to deal with them appeared likely to affect the "visible" LCTs in significant ways. As the study team found, many LCT drivers expected to be adversely affected by such measures.

Governmental responsibilities for traffic and transport in Istanbul were "fragmented" among several national and local agencies. These agencies were principally concerned with either extraurban transport systems or intraurban traffic regulation and safety. The State Highways Department of the Ministry of Public Works was in charge of the improvement and maintenance of intercity roads, including the peripheral road system and the Bosphorus Bridge. The Regional Traffic Directorate of the General Directorate of Security had charge of intercity traffic, and the Istanbul Traffic Directorate was concerned with intracity traffic. There was also a distinct Security Directorate for the peripheral highways and the Bosphorus Bridge. The Ministry of Transport and Communications shared the responsibility for general transport regulation and also for the operation of certain public modes. Connected with the Ministry were the State Railways, which ran the commuter railroad, and the local division of the Turkish Maritime Bank, which operated local passenger ferries in the city.

Other agencies concerned with the planning as well as regulation of transport in the city, including the LCT system, were the Greater Istanbul Master Plan Bureau, the Istanbul Municipality, and the Provincial Traffic Commission of Istanbul. A creature of the Ministry of Reconstruction and Resettlement, the Master Plan Bureau of Istanbul was responsible for preparing transport plans as part of its activities and for recommending implementing measures to the Municipality; but they were not cooperating effectively. Although the basic Highway Traffic Law 6085 of 1953 relieved the Municipality of transport and traffic functions, it had continued to perform them and had taken actions independently of the Master Plan Bureau in regard to improvement projects, traffic regulation, and approval of routes and fares of the LCT and IETTA bus systems.

LCT routes, stations, and stops were within the recommendatory power of the Provincial Traffic Commission. This was headed by the Governor or

[16]This index was a matter of argument between those for and against a mass rail transit proposal.

Deputy Governor and composed of representatives of national and local agencies and associations, including the Federation of Drivers and Automobile Operators in Turkey. The Commission could recommend policies on traffic regulation, safety, and education, subject to the approval of the Traffic Directorate of the General Directorate of Security. It was this Commission that had restricted the number of dolmus license plates in 1966 and minibus plates in 1967, and was subsequently given the responsibility of determining the number of additional LCT plates to be issued in urban areas where plate restrictions were in force. In Istanbul terms, the "plate" stood for the license to operate.

In conclusion, the Istanbul LCT study team observed that the institutional and legal framework for transport in Istanbul was fragmented, unduly or unevenly oriented to interurban general transport and intracity traffic safety (whereas most accidents occurred on the intercity highways), and inadequately concerned with the factors underlying these accidents — factors that ranged from proper planning to licensing procedures and rule enforcement. Consequently, new legislation had been proposed to correct these deficiencies, though planning was insufficiently considered in this proposed law. Another factor of considerable importance was the associations of drivers and operators, such as the Federation mentioned above, that looked after the welfare and interests of their members. Such associations had temporarily saved the LCTs from extinction and might help them adapt to changes in transport regulation.

Metro Manila

Like Istanbul and Bandung, Metro Manila by the mid-1970s had long expanded beyond the Spanish colonial bastion at the Manila Bay mouth of the Pasig River. Indeed, urbanization had exceeded the official bounds of the Metropolitan Commission established in 1975 to integrate four cities and 13 towns (636 km^2). Urban expansion had been physically restrained, however, by the mountain ranges and Laguna de Bay on the east, so that the area narrows down to a strip on its southern portion. The transport network generally followed the area's topography.

As roughly described by the major roadways, urban growth formed half circles emanating from the core city of Manila, which contained the highest population density, the older industrial, commercial, and government establishments, and the largest concentrations of slums. Due to the terrain, urban expansion had generally been northward from Manila, but in more recent years growth had taken different directions. Although much of this growth simply spilled over into the adjoining cities and towns, major activity centres developed in the suburbs. Urbanization had generally taken a southward direction in the past decade.

A series of radial and circumferential roads composed the main channels of movement in Metro Manila. The existing railroad and the crowded highways to the north and south had been augmented in the previous 10 years by expressways, and road links to the eastern region were being established or improved. A major current project was the construction of a coastal highway along Manila Bay going as far north as Bulacan province and southward to Cavite province. A significant spin-off from this project would be the reclamation of 2700 ha of Bayshore land for a new city extending just south of Manila toward Cavite city at the "hook" of Manila Bay.

Nearly all transport in Metro Manila was road-based. Private cars, jeepneys, taxis, and buses (including minibuses) were the main modes of passenger travel. Motorized tricycles also operated in the suburban towns and in the interiors of Manila's districts. The jeepneys carried most of the public transport load. The report MMetroplan (using data of ca. 1971) indicated that there were 17 000 jeepneys in Metro Manila and that these accounted for 46% of person-trips and 28% of vehicle-trips. Buses (2500) accounted for 16% of person-trips and 2% of vehicle-trips, and private cars (200 000), for 25% of person-trips and 40% of vehicle-trips. Daily "linked" person-trips were borne as follows: 37% in jeepneys; 31% in cars; and 19% in buses (Freeman Fox and Associates 1976:50, 287–288).

The LCT study team reports that, in 1975, 40–50% of 7.8 million daily person-trips were being made by jeepneys, 25% were by bus, and the rest were by car, taxi, commuter train, or another mode. Journeys to or from school were the most dominant, reflecting the youthful age structure (especially in the 5–19-year-old age groups) of the population. Journeys to work were next in frequency.

Traffic congestion had been chronic in Metro Manila due to a number of factors. Many existing roads were narrow and intersections were seldom grade-separated. Undermaintenance, frequent excavations by utility companies and public works agencies, poor road design, and desultory traffic management and regulation enforcement produced traffic bottlenecks (about 30 identified in recent studies) in the area. A basic problem, according to the LCT study team, was the "excessive crowding of population and activity into a small land area in which a satisfactory arrangement of land uses is lacking .... There are very few areas where employment is concentrated ...." Land uses were "very mixed" with uneven, ribbon development along major roads and "sprawl" characterizing the patterns of expansion. Yet there were sufficient concentrations of and imbalances between work places, educational facilities, and other activity centres, on one hand, and residential areas, on the other, to generate congestion-level traffic within and outside the metropolitan area (Freeman Fox and Associates 1976: 63–67).

A number of nontransport as well as transport measures had thus been considered to solve the traffic problems of Metro Manila. Among the strategies recommended were to give the area a more compact development pattern (versus "sprawl"). New-community areas, however, were also delineated, and growth centres were designated outside Metro Manila to attract further increments of population and activity. The new city being reclaimed from the Bay alone would generate a significant amount of intertown traffic, since it was planned to have a total resident population of 106 000 and a daytime population of 917 000.

In addition to major road construction projects, proposals had been considered to install monorail and rapid transit (partly underground) systems in Metro Manila. MMetroplan, which was completed in mid-1977, however, dismissed monorail as requiring a risky technology unsuitable for normal urban service, and heavy rail as too costly even as a long-term solution. One proposed line of rapid transit would, by 1990, attract only 2.5% of motorists, "have a negligible impact on traffic congestion," and entail negative benefits of $47 million. Instead MMetroplan recommended improvements in bus, jeepney, and taxi service, reservation of more bus and jeepney lanes, and the introduction of "cordon pricing" in a designated central area of Metro Manila to discourage

motorists from competing with public vehicles during peak periods. As a longer-term solution, the report suggested a light-rail system of electric streetcars using existing thoroughfares (Freeman Fox and Associates 1976:14, 1977:12–13 and 48).

The government organized a Metropolitan Manila Transit Corporation in 1974 to augment the private bus fleets in the area with premium-fare as well as normal-fare vehicles. In the years that followed, more jeepneys were granted permits to operate, so that a total of 21 700 units (as against 3600 buses) had been registered by June 1978.[17] Measures to improve transport planning and traffic management were also taken. However, traffic congestion in Metro Manila persisted and, despite MMetroplan's contentions against banning jeepneys, they were not entirely relieved of public criticism and phaseout suggestions. Critics expressed concern over their increasing number, but tended to overlook the growing number of private cars (from 200 000 in 1974 to 242 000 in 1977) and taxis (12 400 in 1976).

As in Istanbul, government responsibility for transport and traffic in Metro Manila was fragmented among 14 agencies and bodies at the national, metropolitan, and local levels. The Ministry of Public Highways was in charge of national roads in the area, while local governments were responsible for the construction and maintenance of those designated as municipal streets. The national Board of Transportation (BOT) had authority to issue 4-year franchises for service routes and to fix the fares of public passenger vehicles. The licensing and registration of vehicles were functions of the Land Transportation Commission (LTC). The enforcement of transport rules and regulations, however, was shared by BOT and LTC with the national Constabulary Highway Patrol Group (CHPG), the Metropolitan Command (Metrocom) of the Philippine Constabulary, and local units of the Integrated National Police (INP). In 1976, Metrocom was given exclusive jurisdiction over enforcement of public transport rules, but an agreement was subsequently forged among the five agencies to coordinate their enforcement activities.

The Metropolitan Manila Commission also subsequently intervened in transport planning and management. The Metropolitan Manila Transit Corporation was set up to purchase and operate buses. Transport planning for Metro Manila was undertaken jointly by national and Metropolitan bodies or agencies, and local barangays contributed part-time volunteers to help regulate traffic. New uniformed traffic officers were next fielded, to augment the limited number of regular policemen assigned to traffic work, as part of a "traffic efficiency" experiment. The traffic problem, however, proved more difficult than expected, leading to the revival in 1978 of a proposal to create a national Ministry of Transport, the reallocation of enforcement responsibilities from BOT and LTC to the Metro Manila Commission and local police, proposed bans against cargo trucks from major thoroughfares at certain hours — and a ban against further grants of provincial permits for jeepneys (Anonymous 1978a; see also Freeman Fox and Associates 1977:40 for MMetroplan position on the jeepney).

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[17]The number of jeepneys includes 1015 "auto calesas" and 20 706 public utility jeepneys (21 721). As of 31 December 1976, there were 14 983 jeepneys and 5117 operators; and by the end of 1977, 17 691 jeepneys and 6835 operators. The corresponding figures for buses were 2902 (277 operators) as of December 1976; 3563 (265) as of December 1977; and 3617 (277) as of June 1978 (BOT 1978).

3 Physical and Operating Features of the LCTs

Physically, the Indonesian becak, the Thai silor, the Philippine jeepney, and the Turkish LCTs would seem to have very little in common. The becak was virtually the rickshaw reborn on a bicycle, whereas the dolmus was often a vintage American car passing for a jitney or taxi. The LCTs also differed in terms of decor, motive power, capacity, and other technical features. They did share certain essential characteristics, however. They seemed to be filling important gaps in the transport systems of their cities, those that fell somewhere between the truly traditional means and the modern mass-transit modes being talked about in the larger metropolises. As long as these cities were awake, these LCTs provided round-the-clock, flexible, and, in some cases, door-to-door service. Although their services were tacitly acknowledged, the very dynamism of some LCTs presented certain traffic problems and public hazards.

This chapter describes the salient physical and technical characteristics, service patterns, and operating behaviour of the LCTs, including their interaction with other transport modes and the public. The findings of the research teams in the five study sites, which have been used as sources, were derived primarily from the sample surveys of LCT drivers (180 in Bandung, 250 in Yogyakarta, 700 silor drivers in Chiang Mai, 578 in Metro Manila, and 1935 in Istanbul). Sample drivers are cited as though they were equivalent to "sample" vehicles. Specific numbers of respondents or responses vary from time to time and percentages have been rounded off to the first digit. Findings from the surveys of owners, users, and other groups are also cited occasionally, although details about the economic, social, and policy aspects of the LCTs are considered in subsequent chapters.

Vehicle Characteristics

The vehicles studied were of two general types: the human-powered becaks in Indonesia and the motorized vehicles in the other study sites. The becak was essentially a bicycle converted into a tricycle for passenger service, and the jeepney and silor were private motor vehicles transformed into public-use vehicles. The dolmus was typically a foreign-made private car slightly modified for multi-passenger or taxi service, while the mini-midibus was manufactured originally for small-bus service.

Table 4. Engine and passenger capacities and operating ranges of LCT and motorized public transport vehicles.

Vehicle	Engine	Number of passengers		Route distance per round trip (km)
		Legal	Actual	
Becak	na[a]	1-2	1-2	1-6
Bemo	200 cm^3	7	15	1-4.5
Opelet (small)	1000 cm^3	10	20	6-9
Opelet (large)	1600 cm^3	17	20	6-9
Colt	1350 cm^3	16	20	6-9
Honda	3600 cm^3	17	20	4.5-9
Silor (urban)	1000-1200 cm^3	10-12	12	—[b]
Silor (intercity)	—	20	—	—
Jeepney	60-90 hp	10-14	12-14	—[c]
Dolmus	24-100 hp	7	10-14	15
Minibus	75-99 hp	8-10	25-34	15

[a]Pedal driven.
[b]— denotes no data.
[c]Varies widely.

Certain specific features of these vehicles are worth noting for their significance as both technical and cultural adaptations (Table 4).

Becak

The becak, which appeared on the Indonesian scene shortly before World War II and flourished thereafter, was essentially a pedal-driven tricycle with an open cab that could seat two, or sometimes three, passengers. The cab was in front and the driver "pushed" or pedaled from behind. In contrast, the driver of the Thai samlor pulled his passenger car and the Philippine tricycle usually had a side-car for passengers. Becaks could also carry goods with their passengers, and a few (3% of the sample in Yogyakarta) concentrated on transporting goods.

According to Meier (1977:58), pedal tricycles were always manufactured locally out of standard bicycle frames and other locally available materials and parts. The becak was also an object of artistic expression. In addition to functional accessories such as bells and lamps, the vehicle was adorned by small flags, ruffles, and other ornaments. Becak painting was a folk art, although Arjuna might be found with Batman on the same vehicle (Purdy 1975:5). Although becak painting was declining in larger cities such as Jakarta and Bandung, where it was often limited to names and formal designs, it retained its native touch in Yogyakarta, where natural scenes still dominated the artwork and becak names might be borrowed from the characters of the Javanese wayang or shadow plays.

Many becaks had apparently been in service for several years. Nearly 40% of the sample becaks in Bandung and 36% from Yogyakarta were at least 5 years old at the time of the study. About 25% of the samples in both cities were 4 years old or less. Despite restrictions, however, the production of becaks in Bandung had continued.

Silor

The Thai silor started coming into use in Chiang Mai in the mid-1960s, with the introduction of Mazda pickup trucks by Japanese dealers. Converted for passenger use, in part to replace motorized tricycles, these trucks were small enough for the narrow streets of the city. Typically, the pickup was simply covered on top and provided with two side seats in the payload section to accommodate passengers. The survey results suggested that silors operating within the city carried 10–12 passengers, while intercity silors were bigger and carried about 20. Engine capacities ranged from 800 to 1200 cm^3, with 1000–1200 cm^3 being the most frequent range. Most silors used gasoline (87% were using "super" gasoline); less than 1% of the sample vehicles were regularly using diesel fuel.

The Thai samlor was closer to the traditional nonpedal rickshaw than the Indonesian becak. However, it was comparatively lacking in adornment and local colour. The silor was even more severely functional in appearance. The original body of the silor was modified by the addition of metal or canvas roofing that extended over the driver's compartment. Sometimes railing was attached to hold goods. The rear gate of the pickup was replaced with a boarding step for passengers. The passenger seats and other attachments were removable so that the vehicle could carry freight exclusively. The silor was usually painted plain colours, with abstract if any decorative design.

According to the Chiang Mai data, only 26% of the sample silors had been modified and 67% of the survey respondents said "No" to the question on modification, probably because 65% of the vehicles had been bought secondhand. However, most of the vehicles were apparently relatively new: nearly half (48%) of those within recall having been manufactured in 1972–1976 and 40% in 1967–1971. About 82% had been purchased in 1972–1976 and 14% in 1967–1971.

Jeepney

The Philippine jeepney was a more completely converted and elaborately adorned vehicle for passenger service than the silor. Originally made from U.S. army jeeps left over from World War II, the vehicles now used Japanese engines more often than American (46% vs 37% of the Metro Manila sample). Engine capacities ranged from 60 to 90 hp; most vehicles (83%) had 75 hp and four cylinders (99%). Passenger capacities ranged from 8 to 18, with 12 (49%) and 14 (30%) passengers being the most common.

Jeepneys had generally grown larger at the time of the study. Older, smaller ones for 5–7 passengers were permitted to operate as "auto calesas" (AC) and, as such, could carry bulk goods and deviate from their regular routes. But the government phased out the AC category in favour of the public utility jeepneys (PUJ). Most (87%) of the jeepneys in the survey sample were classified as PUJs; the rest were ACs.

Most jeepneys were converted from jeeps or parts by local assembly and body-building shops. Starting as small repair and painting shops, a few of these establishments (e.g., Sarao Motors) had grown large enough to turn out as many as eight jeepneys per day, employ 380 workers, and manufacture almost all parts except the engine (Anonymous 1978b:16–17). More than a fifth (23%) of

the sample jeepneys, however, were made by smaller shops that could produce no more than four units per year.

Like the silor, the jeepney had two upholstered benches for passengers, who boarded through a rear entrance. One or two passengers could also be accommodated beside the driver. Jeepneys, however, were often more extravagantly built or festooned with stainless steel, accessories, antennas, curtains, and mirrors. Like the Indonesian becak, they were an object of modern folk art that appealed to, or assailed, the senses. Prayers and little altars adorned with sampaguita or everlasting flowers competed with girlie-type stickers and slogans for the attention of the passenger not already distracted by the blare of a radio or cassette recorder.

The postcard-pretty jeepney, however, was fast being joined by the more austerely designed and mass-assembled Asian utility vehicle (AUV). AUVs followed the basic form of the jeepney, but they were built on a higher chassis and had somewhat narrower passenger compartments and more uniform colors. Products of the Progressive Car Manufacturing Program launched in 1973, the AUVs, such as the Ford Fiera, Chrysler Cimarron, Toyota Tamaraw, and GM Harabas, were made by larger multinational car and truck manufacturers in the Philippines. They were viewed as a threat to local jeepney makers, though two of these had also begun to build their own AUVs.

Dolmus and Minibus

The Turkish dolmus was essentially a private car that had undergone little or no alteration except for the attachment of a taximeter in the case of those used as taxis. The minibus or midibus was "a bus of smaller capacity." A dolmus might be an old Cadillac, Desoto, or even Edsel: most dolmus were foreign made (75% of the sample). However, brand-new Mercedes Benz cars and domestically produced Fiats, Renaults, and Anadols (23%) had also joined the vintage American vehicles. The older imported cars were typically larger, and fit the legal description of a dolmus: a vehicle for up to seven passengers, charging fares on a fixed per-passenger basis. The newer ones were generally domestically produced, had less space for passengers, and could operate as dolmus or switch to taxi operation. A taxi charged a fare determined either by a taximeter or a preset tariff.

Most of the sample LCTs were dolmus units that operated also as taxis (57%), although some operated solely as dolmus (16%) or as taxis (10%). Existing law prohibited taxi operation of cars with more than two rows of seats, including the driver's. Minibuses were allowed to carry 8–10 passengers and midibuses, up to 14 passengers; legally, however, vehicles carrying more than 10 passengers were defined as buses. Of the minibus and midibus units sampled, 51% were of domestic manufacture and 49% were foreign-made. Taken together, 72% of the sample cars and small buses used as LCTs were of foreign origin, and 26% were domestically produced.

Very few LCT vehicles in Istanbul were recent (1969 or later) models (9%). About two-thirds of the dolmus were made between 1950 and 1959, and faced the prospect of increasing deterioration and higher upkeep costs. Those used solely as taxis and small buses were more often of later vintage, probably because domestic car production in Turkey started only in the late 1960s. Taxis, minibuses, and midibuses were thus generally newer stock than dolmus

vehicles. Gasoline was by far the most common fuel (93%), although 38% of the small buses alone in the sample were using diesel. Engine capacities among dolmus units varied widely from less than 24 hp to more than 100. There was a slight concentration in the 50–75 hp range and, in the case of the small buses, in the 75–79 hp range. Six cylinders were typical (63–86%) among the LCT cars, and four cylinders in the case of minibuses and midibuses.

Overview

The LCTs thus formed a spectrum of technical and cultural adaptations. The becak was the traditional type suggestive of the rickshaw, the dolmus the "quick-fix" on imported cars, and the jeepney the transitional form combining folk art with foreign technology. Their physical features would also suggest varying operating ranges, capacities, and roles in their cities' transport systems. The pedal-powered becak had the smallest driving radius and passenger capacity. The motorized LCTs, running on gasoline or diesel engines of various capacities, had more scope but also varied in passenger capacity, from the dolmus operating as a taxi to the intercity silor and the midibus.

Institutional, economic, and social factors, however, also helped determine the performance of the LCTs, as becomes apparent in their service patterns.

Service Patterns

The operations of jeepneys, minibuses, and the Bandung becaks were legally restricted to designated traffic routes and service zones, while the silors, dolmus, and Yogyakarta becaks were relatively freer ranging. Whether they complied with formal regulations strictly, however, the LCTs tended to follow certain patterns in terms of the areas and groups they served, the places at which they stopped or waited, etc. They operated throughout most of the hours of each work week, with drivers often working in shifts. Fares, vehicle ownership, and other aspects of LCTs were also subject to both legal restrictions and nonformal factors.

Becak

Becak services in Bandung were daily 10–12-hour operations accounting for about 9–10% of total person trips (including walking) in the city and up to 21% of person trips by vehicle alone. An individual becak trip seldom went beyond 5 km and the average distance traveled by a becak in 1 day was only 20 km. When taken together, however, becak services extended toward (and even beyond) the circular perimeter of the city from a broad central area in the southern portion. Since 1974, becak operations had been prohibited from certain areas and permitted only in designated "becak-free zones." However, becaks had not strictly followed restrictions, their zones of operations were usually based on drivers' preferences, and they had no legally fixed routes nor fixed places to stop. "Usually," however, "each driver has his regular spot" near markets, shopping centres, or residential areas.

Becaks in Bandung traveled shorter distances per trip than other transport modes except walking. They were used for shorter trips, mostly in the 1.0–2.4-km range, than MPTs (motorized public transport, Colts, etc.) 2.5 km or more, in terms of both distance and time (10–20 minutes). They operated from Monday to Sunday, typically during the daytime (60% of responses), but in some instances both day and night (22%) or at nighttime only (18%). According to over 43% of the driver respondents, each driver would work 10–12 hours (13–15 hours for day-and-night drivers) with a break of 1–1.5 hours. Each work period involved taking 10–12 trips. Sundays were considered by nearly a third of the respondents as a peak day, and 7:00-9:00 am was regarded by most respondents as the peak hours of service.

Becaks were most often used for "home trips" (46%) and trips to school (24%), and less frequently for work (12%) and shopping (10%) trips. This pattern is similar to the trip purposes in other modes as well, but becaks seemed to be preferred for trips to school and shopping compared to other modes. This suggests that school children, students, and housewives were among the most frequent users of becaks. As a result of its survey of users, the Bandung team also indicates that becaks were considered the most important means of transport by middle and high expenditure groups (i.e., households spending over $62.50/month). For trips to work, however, it was the low-expenditure groups (below $12.50) that considered becaks as the most important means of transport.

In Yogyakarta, becaks showed similar service patterns, except that their operation had not yet been legally restricted to any area. Accounting for 12% of all trips, becaks in this city also provided daily service with similar peak days and hours, and tended to travel short distances per trip (2 km on the average). Their usual passengers were also students and housewives, with trips to school being by far the most frequent in the use of becaks except on Sundays. Becaks in Yogyakarta also ranked fourth in terms of the most frequently used travel mode, next to walking, bicycles, and motorcycles, whereas in Bandung becaks ranked fourth with MPTs being the second most often used mode. If walking were not counted, becaks in Bandung would account for about 21% of daily person trips as against 13% or less in Yogyakarta. The Yogyakarta report also notes that the high percentages of use of the becak on Saturdays and Sundays were mostly for recreation trips.

Silor

In Chiang Mai, silors operated 6 days/week for 8–10 hours/day, usually from 6:00 am to 8:00 pm, with a lunch break of about 1 hour. Like the Indonesian becaks, they generally had no fixed routes, except those between the city centre and the university and those used by "queue" silors, which traveled out of town from queuing points in the city. Otherwise, silors operated within the city like shared taxis providing door-to-door service, their actual routes depending on the destination of the first passengers they picked up. In this respect, at least in concept, the silor is reminiscent of the smaller AC jeepneys in Metro Manila before they were gradually phased out in favour of the fixed-route PUJs.

Unlike the becaks, however, the silors traveled longer distances and provided transport service for the great majority of the city population.

According to the study by Fouracre and Maunder (1977), silors averaged 160 km/day (urban silors), and accounted for 84% of daily passengers, while the regular buses and samlors accounted for only 7% and 6%, respectively. Like the buses, "urban" silors served users with higher educational attainments, while "queue" silors more often served users who had less education (4 years of education or less), were older, and typically engaged in farming and trade. City buses, compared to silors, had a much more pronounced tendency to serve male, unskilled, and student passengers, although urban silors also accounted for 25% of student passengers and 32% of unskilled passengers.

Silors averaged about 120 passengers per vehicle per day. According to the IDRC-sponsored study, they usually carried more passengers than were legally allowed. For example, 58% of the silors surveyed typically carried 12 passengers each, when only 16% of such vehicles had this legal passenger capacity.

Jeepney

In Metro Manila, jeepneys operated for about 12 hours/day during the weekdays, Saturdays and Sundays being nonschool and nonworking days for most establishments. Their operations tended to be localized within municipal jurisdictions (39%) and broad zones in the metropolitan area, especially for marketing and shopping trips. However, some zonal "interchanges" did occur among adjacent municipal jurisdictions and between the metropolitan core and the suburbs due to the extended journey patterns induced by the central-area concentration of work places and schools (especially in Manila and Quezon City) and the outward spread of residential development.

Most jeepneys worked fixed routes of various lengths of 1–20 km or more, but few routes were more than 20 km for the round trip. In most cases, a peak-hour round-trip might take less than 1 hour although longer trips of up to 2 hours or more were not uncommon, and off-peak-hour trips might take longer due to the efforts of drivers to collect a full load along the way. Users indicated that a trip might take 1.5–2 hours, and usually entailed at least one transfer. On the average, however, a one-way trip to work or school covered less than 5 km and took 0.5 hour.

Jeepney drivers worked in fulltime or half-day shifts; there were usually two drivers per vehicle. Fulltime drivers worked 3–4 full-days or 6 half-days per week and put in an average of 12 hours/day, with breaks only for meals and (in the case of those with queuing stations) for queuing. Peak-hour passengers numbered 21 or more per round-trip for each vehicle; off-peak-hour ridership was considerably less. Jeepneys carried two passengers for every passenger carried by buses, and they appeared to be preferred by more of the survey respondents (48%) than those who expressed preference for buses (32%). Jeepneys served various trip purposes and groups (employees, students, and shoppers, in this order of frequency).

Dolmus and Minibus

LCT vehicles in Istanbul generally followed the linear pattern of the metropolitan area's development, but their operation tended to be localized within three major zones: the Istanbul–Beyoglu sections on the west, the

Uskudar and Bosphorus sections along both sides of the channel, and the Kadikoy-Kartal-Pendik sections along the east Marmara coast. The dolmus units were allowed to operate freely around the metropolitan area but concentrated on the Istanbul-Beyoglu sections. Minibuses were more strictly confined to designated routes in the outlying areas, though some of them would enter the central sections during the early hours of the day "when there are not enough officers to catch and fine the drivers."

The Istanbul LCTs probably traveled longer average distances than the Manila jeepneys, but shorter distances than the Chiang Mai silors. The Istanbul vehicles traveled a daily average total distance of 137 km (127 km for dolmus units and over 200 km for minibuses) and made about nine trips per day. These figures would imply a daily average of 15 km/*vehicle trip*. They were, of course, not strictly comparable with those in Manila, where 54% of the routes were 15 km or less, while daily average *passenger trip* lengths were less than 5 km. A dolmus round trip might take 0.5-1.5 hours, while a minibus round trip might take more than 2 hours. Unlike in Manila, LCT trips in Istanbul took a shorter time during the slack periods than the peak hours.

LCTs in Istanbul operated for 6-8 "busy hours" from 5 am to 10 pm each average working day and during the weekend. The busiest hours were 7-10 am and 5-8 pm. However, LCT drivers might work 14-19 hours/day, in violation of regulations limiting them to not more than 9 hours of continuous driving. Dolmus operations took place mostly during the weekdays and slackened off during the weekend. Minibuses were busier than dolmus units during weekends, according to the Istanbul report, probably because minibuses were used for longer-distance social visits and recreation trips.

Legal capacities were typically exceeded by LCTs in Istanbul. On the average, LCT vehicles carried 35 passengers per trip (14 for the dolmus). The minibuses alone carried 50% more passengers than the municipal bus system, or than the dolmus units. Although the dolmus vehicles served all income groups within the central sections of the metropolis, the minibuses served the new growth and squatter areas and lower income groups.

Overview

In sum, LCT transport services were available throughout most of the day and week, but peaked or slackened with demand. LCT drivers worked at least 8 hours/day. With some exceptions, they had flexible routes that generally followed the development patterns of their cities, but they traveled short distances "localized" within certain service zones. LCTs served various groups and trip purposes and, in some instances, served certain groups and areas more than others, though such orientations were not always marked or consistent. Their share of vehicle ridership also varied from 21% or less in the case of the Indonesian becak to over 90% in the case of the Istanbul LCTs.

LCT Interactions with Other Traffic

The flexible, short-distance, localized yet broad-based character of most LCTs suggest that they were probably better able to penetrate residential

neighbourhoods and to link them with activity centres than larger public conveyances confined to fixed channels of urban transport. This might suggest that they generally complemented other modes of transport. However, the LCTs might also compete with these modes to the extent that they shared routes or areas and passenger groups.

Bandung

Becaks and MPTs performed complementary roles. Although MPTs were used more frequently by vehicular passengers (26% of daily trips vs 21% for becaks, not counting trips by walking), "the difference is not too significant." They complemented each other probably in the sense that MPTs were used more often for longer-distance trips and for work and "home" trips, whereas becaks were used typically for shorter trips to school, shopping, etc. Conflict between these modes, however, was not entirely absent.

Based on the Bandung survey of drivers, the report also observes briefly that "Relationships of becak drivers with passengers, owners, and other becak drivers and drivers of other modes of public transportation were generally good. Once in a while, arguments did occur over such topics as passengers and fares but they could always be solved peacefully." The report notes further that "On other road-users, the becak drivers did not have any complaints. As regards bicyclists, motorcyclists, and pedestrians this answer might be true, but becak drivers must surely resent the loss of passengers to the motorized public transport."

The report cites no specific evidence or instances of such conflict. This may be inferred, however, from the lag of road construction behind the continued increase in the number of transport vehicles, including the faster MPTs, and from the restrictions on the operation and manufacture of becaks in Bandung. Another sign of the competition and specialization that had developed was the formation of separate "informal" terminals for becaks and their taking on functions, e.g., carrying goods, that other modes were less willing to assume. However, competition from other modes has not been perceived as sufficiently threatening, for instance, to induce becak drivers to band together. Few of the driver respondents (4%) had joined the Becak Drivers and Owner Association of Bandung.

Yogyakarta

In Yogyakarta, competition between the becaks and other modes of transport, especially motorized, might just be beginning to grow. Becak drivers did not welcome the prospect of being replaced by motorized modes and having their incomes eroded. However, conflict between modes had been even less apparent here than in Bandung. To use the organizational "indicator" again: most (60%) of the Yogyakarta becak drivers interviewed knew that a drivers' union existed in their city, but only 3% had joined it at the time of the study.

Although they were slightly outnumbered by private cars and public motor vehicles taken together, becaks in this city were still fairly ubiquitous and their operations had not been restricted to any areas, so that it was easy for a user to hail a becak in front of his house or just a short distance from it. They had unofficial terminals on most street corners — often marked by small stands

selling tea, coffee, light food, and cigarettes — and near markets, bus stops, and shopping places as well. Regular occupancy of terminals or waiting stations was regulated by the becak drivers themselves, sometimes through "syndicates" formed by groups of drivers.

As in Bandung, licensing as well as traffic regulation in Yogyakarta did not seem to be strict, so that more than 40% of the becak drivers interviewed got their licenses without taking an examination by the police. Most of them (78%) claimed never to have had an accident since driving a becak, although the rest admitted to having been involved in one or more accidents, e.g., collisions with other becaks or other vehicles. (The Bandung report does not report any accident experience.)

Chiang Mai

In Chiang Mai, the silors had experienced little competition with the limited bus service available and dominated the streets as far as public conveyances were concerned. Traffic counts conducted in the course of the IDRC study showed that only the motorcycles outnumbered the silors on the roads in the city. The silors made up about 20–30% of the vehicular traffic volume, whereas the buses (2%) and samlors (3%) seldom made up 5%. Silor drivers informally regulated their operations, including the queuing stations. An initial queue membership fee of $10 was usually required, but some queue stations were formed on a voluntary basis and did not require fees and dispatchers.

On the other hand, conflicts arose among the silor drivers themselves, due to competition for passengers; between silor drivers and passengers; and between silor drivers and the regulatory authorities. Silor drivers complained that their fellow drivers became reckless when competing for passengers, that the fares were too low compared to increasing costs, and that there were passengers with bad manners. They also complained about abusive policemen, narrow roads, absence of parking places, and too-frequent changes in traffic flow regulations.

From the viewpoint of passengers, silor drivers were not very law-abiding. To make matters worse, transport and traffic regulations were not strictly enforced. Users gave the drivers positive points for speed, comfort, and reasonable fare, but frequently complained of their reckless driving and disregard for passengers' convenience. Many driver respondents (43%) admitted having violated regulations during the previous year, especially parking traffic signs and license requirements. About 18% of the driver respondents said that they had been involved in accidents at least once during the previous year. Few of these accidents, however, were serious.

Istanbul

The situation in Istanbul was not much different from that in Manila or Chiang Mai, but conceivably it was worse in terms of the negative public attitudes that the dolmus–minibus system had generated. As elsewhere, Istanbul roadways were "indiscriminately" shared by LCTs and other types of vehicles, including the municipal bus and trolley systems. The LCTs outnumbered the units of the trolley system by about 20 to 1, but were outnumbered by private cars (at 19 cars per 1000 population and a population of

about 3.5 million in 1973, there would have been 66 500 cars in that year). Only 4% of regular "passenger cars" were legally authorized to operate as dolmus units. Yet over 80% of the 19 497 LCT units actually operated as dolmus. Of this total, 78% were "dolmus-taxi" and 4% were "dolmus only." These units could switch from one type of operation to another to exploit demand situations and maximize fare. For example, a vehicle might leave as a dolmus and return as a taxi; it might go as an "express dolmus" and charge twice the usual fares; or it might operate as a "shared taxi." The dolmus units ranged freely in the central sections of Istanbul. The minibuses and midibuses themselves did not always stick to their prescribed routes and would make sorties into other sections when the conditions were right. LCTs were usually overloaded. The typically four-seater vehicle used as a dolmus often accommodated more than five passengers. The 10-seat minibuses carried as many as 20 and averaged 18 passengers per trip.

The flexibility of the LCTs in Istanbul made their operations profitable and responsive to demand, but it also gave them a reputation for exploiting traffic conditions at the expense of the public. They were thus given what the study team regards as more than their due share of the blame for the "anarchy" that generally characterized the transport situation, especially "the alarmingly increasing levels of accidents" in Istanbul.

> That the LCT vehicles contributed to the anarchic traffic situation cannot be denied. The apparently unscrupulous driving habits, the constant rush and the generally "tough" or aggressive behavior of the (LCTs) — presumably a product of the "tough" nature of the profession and the constant struggle and competition for the limited road surface — is visible as is the system throughout the city.

In this connection, however, the report notes that only 30% of the drivers surveyed admitted involvement in accidents (29% for minibuses), and most of them were involved only once. Still, that was a larger percentage than that observed in Chiang Mai. Moreover, 17% of the Istanbul drivers involved in accidents were disabled as a result for less than 1 week, but 14% were disabled for more than 2 months. About half (49%) of all the respondents (including 68% of the minibus drivers) had been fined for traffic violations, and 29% were fined for violations of bus-stop regulations (often over 30% on the part of dolmus drivers).

The Istanbul team attributes the erratic driving habits of LCT drivers to their long working periods and long rush hours, which were often relieved only by waiting at the queue stations (the queuing system is not described in any detail by the report). Most LCT drivers owned their vehicles and rarely employed any other drivers (28%, however, did). According to the study, aggressive driving was induced by their efforts to recover the high cost of acquiring the vehicles and the profitability of operations.

Metro Manila

In Metro Manila, public transport franchises were issued on the basis of zones, so that "most of the jeepney routes are those not served by bus lines." Occasionally, measures were taken or pressed to relegate jeepneys to secondary streets and routes. Nonetheless, they shared many major thoroughfares and routes with buses and other vehicles. Thus competition for

passengers was frequent between different modes as well as among the same modes. This was mitigated only by the preference of short-haul passengers for jeepneys, when demand conditions gave them any choice. Jeepneys were notorious for weaving in and out of traffic, speeding, and otherwise aggravating traffic congestion and creating hazards for passengers, pedestrians, and other motorists.

On the average, jeepney speeds seemed moderate enough — below 30 km/hour — but they apparently fluctuated with demand. Their turnaround time was somewhat shorter during peak hours than during slack periods, when full loading became more difficult and took more time, and competition for fares along the way or at waiting stations became more intense. During rush hours, on the other hand, jeepneys sometimes would not even come to a full stop when picking up or letting off passengers, and they practiced "trip-cutting" and similar route violations more frequently than buses.

Problems arising from competition and drivers' behaviour were often noted in the Manila research team's interviews with jeepney operators, traffic officers, transport officials, and users. Traffic congestion and journey delays, according to its report, were traceable to the use of the same routes and road lanes by different modes. However, the jeepneys were not necessarily singled out as the only or even primary culprits.

4 Economic Aspects of LCTs

A central hypothesis implicit in the very name low-cost transport was that the modes studied in this research were a cheap and useful means of travel and were, in the final analysis, socially beneficial. In the preceding chapter, the LCTs were shown to provide a necessary service, but not to be an unmitigated benefit to the public. This chapter presents the findings of the study teams relating to the issue of whether the LCTs were indeed low-cost from the view points of users, drivers, and vehicle owners.

A more comprehensive economic and social analysis of LCTs would have examined a wider range of variables — from the methods, organization, and costs of producing or converting the vehicles, to the costs and benefits that their services imparted to various groups. A greater amount of objective data, allowing comparisons with other modes, would have been collected.

However, the research project was not intended for such a comprehensive analysis, and none of the study teams in the five cities collected information for that purpose. Rather, they focused on a few critical items about LCTs: their ownership, acquisition and running costs, fare rates, and the revenue that they generated. Even on these points, the data presented are often uneven.

From the results of the studies, it would seem that the LCTs were tolerably "affordable" but not decidedly low-cost from the viewpoint of the drivers, owners, or users. Again, however, differences in kind and degree must be noted between the cities, and, as on other aspects, strict comparisons are often difficult to make (e.g., on net income from LCTs) due to differences in the specific variables or categories used by the study teams.

Vehicle Ownership and Acquisition Costs

Since the becak was a much simpler device, one would have expected that it was easier for drivers to own than the motorized vehicles. This was not entirely so. The becaks did cost the least to acquire, and like most other LCT vehicles, they were usually purchased secondhand by their owners. Most becak drivers, however, rented their vehicles, as did most jeepney and mini-midibus drivers. On the other hand, most silor and dolmus drivers owned the vehicles they were driving.

In Bandung, only 18% of the becak drivers surveyed owned their vehicles, and only 9% of these owner-drivers bought their becaks brand new. Renter-drivers paid daily rents of $0.45–0.75 for the use of the vehicles. The vehicles purchased by owners were usually paid for in cash, although 25% were

paid for in monthly installments of $2.50–20.00. According to the 21 becak nondriver-owners interviewed in Bandung, a new becak — typically bought directly from the manufacturer — would cost about $189 cash or $250 if paid in installments. The price of a secondhand becak was around $75. The owners surveyed usually owned more than one vehicle; nine of them owned three to nine units.

The Yogyakarta team reports data on becak ownership but not acquisition or rental cost. In that city, becaks were even more frequently rented by their drivers than in Bandung. Only 13% of the drivers questioned owned their vehicles, less than 4% were owned by the drivers' relatives or friends, and the balance were being rented from "becak companies."

Similarly, few of the 578 jeepney drivers in Metro Manila owned the vehicles they were driving (9%). The majority (91%) were renting the vehicles, generally (90%) at a fixed daily rate of $4.40 and rarely for a daily commission or wage. Drivers usually (76%) took turns at driving the same vehicle. The few drivers who owned their jeepneys seldom had more than one vehicle, while the "operators" (nondriver-owners) typically owned more than two units; 40%, in fact, owned at least six units.

According to the sample drivers, 85% of their jeepneys had been converted. Half of them apparently underwent further modification with their present owners, whereas 44% were purchased "as is." The Metro Manila report, however, does not explicitly indicate how many of the vehicles were bought new or secondhand. Purchase prices ranged from less than $810 to about $4049, with 42% of the vehicles costing less than $1890 and 25% from $1890 to over $4049. According to the smaller sample (75) of operators, however, the purchase prices of their jeepneys were lower: $675 in the case of 41%, and $675–2699 for another 41% of the operators. They usually paid cash (72%) for their vehicles. Owner-drivers paying in installments paid an average of $6.34/month.

"Jeepneys hardly depreciate in value," the Manila team observes; on the contrary, their estimated current values tended to be somewhat higher than their original prices (as indicated by the sample operators). The drivers said that more than a third of their vehicles had been first registered for public use at least 4 years before the survey. A quarter were registered less than 4 years before. The year of registration was not known for 39%.

Unlike the becak and jeepney drivers, over three-quarters of the silor drivers in Chiang Mai owned their vehicles, while the rest rented their vehicles. (No data are reported by the Chiang Mai team on rental arrangements.) Most owner-drivers (98%) had only one vehicle each. The vehicles were frequently (65%) bought secondhand, but a greater percentage (28%) of the vehicles were acquired brand new in Chiang Mai than in the other cities. A third were paid for in cash, with a price range of $1000–2000 for 63% of the vehicles. Silors bought on installment (62%) cost $1000–2750 in most cases (55% of installment silors). Monthly payments were $50–75 for 45% of these vehicles and $75–125 for 40%.

Another source reports higher prices for urban silors, $3750 cash or up to $4500 if by installment. Rents were $2.50–3.50/day or $875/year (Fouracre and Maunder 1977:3). The estimated current resale values of most silors generally conformed with their cash and installment prices. This suggests that silors, like the jeepneys and Istanbul LCTs, had not depreciated in value; silors, however, were often newer than the other vehicles.

Like the silor drivers, two-thirds of the 1846 LCT drivers surveyed in Istanbul owned the vehicles they were operating. Renter-drivers were hired either on a daily-wage basis (39%) or percentage-share or commission basis (30%), although a few (8%) received fixed monthly salaries — the actual amounts involved are not given in the Istanbul report. The daily wage arrangement was most often (72%) the case with the bus drivers, whereas the dolmus and taxi drivers were more often on commission. Owner-drivers usually followed these practices whenever they hired other drivers, but LCT owner-drivers (86%) usually operated their own vehicles and did not hire others.

Ownership was far more frequent among the taxi (73%) and dolmus (68–70%) drivers than among the LCT bus (49%) drivers. Most of the owners (87%) were the sole proprietors, while a few (8%) jointly owned the same vehicle. The latter was especially true of the minibus drivers, because they came onto the scene only recently and their vehicles cost more to acquire. Unlike the jeepney owners, most LCT owners in Istanbul acquired their vehicles by installment (76% of all LCTs and 82% of minibuses). Monthly payments were usually $51–206 (74% of all LCTs) and $103–360 for the buses.

Istanbul vehicles were seldom bought new (14%). As in Indonesia and Thailand, most of Turkish vehicles (70%) were acquired secondhand from individuals (60%) or from used-car dealers (10%). The license plates were usually (76%) purchased along with the vehicles. Restrictions on transactions in license plates for taxis and dolmus (since 1961) and minibuses (since 1968) had put a premium on license sales, so that sometimes the license cost more than the vehicle itself. Thus, without the license, vehicle prices generally (84%) ranged from less than $1234 to $7661, and averaged $5141. With the license, prices usually (91%) ranged from $2519 to $10 231, and three times as many vehicles were priced over $7728 (22% vs 7% without license). In many cases (48%), buses without licenses cost $11 592 "or more" at the maximum; whereas of those with licenses, 51% cost $10 283 or more including 31% priced between $10 283 and $23 085.

As in Manila, resale values remained high in Istanbul. In general, the team report notes, "the selling price is significantly more than [the vehicle's] purchasing price." Without the license, the selling prices of 72% of vehicles were $1205–6375 (vs buying prices of $1234–7661 in 84% of the sample); with the license, 90% of the LCTs were valued at $2571–20 514 vs buying prices of $2519–10 231 in 91% of the sample. The study team attributed such high resale values to some "exaggerations" by the owners — a reflection of the profitability of the LCTs — and to the high rates of inflation in Turkey (15–20%/year).

In sum, most of the LCT drivers in the Indonesian cities, in Metro Manila, and the mini/midibus drivers in Istanbul rented the vehicles they were operating, while the silor drivers in Chiang Mai and most other LCT drivers in Istanbul owned their own vehicles. Renter-drivers either "rented" their vehicles for fixed daily sums ($0.45–0.75 for becaks, $2.50–3.50 for silors, and $4.40 for jeepneys) or were paid daily commissions or wages. Acquisition costs varied widely between cities, depending on the kind and "age" of vehicles and on types of payment (cash or installment, with or without licenses) — from as low as $188 cash for a new becak to more than $23 000 for an Istanbul LCT bus with a license. The values of the motorized vehicles tended to remain the same or to appreciate, as indicated by current resale prices.

Fare Rates

It would thus seem that the cost of acquiring LCT vehicles was low only for becaks — and yet most becak drivers could not afford to own their own vehicles. This suggests a correspondingly low profitability of becak operations — something that fare levels could probably help explain. Yet becak fare rates tended to be higher than most of the silors and jeepneys (not reported in the case of the Istanbul LCTs).

According to most users (53% of the household heads and 55% of the random respondents), becak fares in Bandung ranged from $0.13 to $0.25 per trip, although according to others (24–32%) they paid less than $0.13. The latter was more usual with users of motorized public transport (MPT). "However," the Bandung report notes, "for short distances, the becaks, could still be considered relatively cheaper, since they are usually used by two passengers so the fare could be shared (Rp25 [$0.06] per person, while on MPT the fare is Rp40 [$0.10] per person)." Besides, becaks also carried goods with passengers, which was hard to do in MPT vehicles.

In Yogyakarta, the fares appeared to be higher but usually fell within the same range as in Bandung. The drivers interviewed usually reported $0.19 as the fare they received per trip, while 34% received about $0.25. The user respondents tended to confirm this by citing $0.18 as the average fare. It is not clear from the Yogyakarta report, however, whether these figures pertained to per person per trip, and in its concluding section there is the unexplained statement that "one trip of about 1 km distance by becak costs the same amount of money as the daily wage of a laborer, i.e. Rp200 [$0.50]." MPTs charged lower fares on the average ($0.15); covered longer average distances (3.73 km vs the becak's 2.13 km); but took longer to get to their destinations (28 minutes vs the becak's 19 minutes).

In both Indonesian cities, the fare rates for becaks were set by the becak drivers themselves. Neither report mentions regulations governing such rates. Although licenses were legally required in Bandung, only 31% of the driver respondents obtained licenses legally, 12% did so illegally, and the rest operated without any license at all. As a basis for determining fares beyond a minimum, drivers considered mainly the distance covered and the number of passengers. The trip's origin, "the condition/appearance of the passenger," and route conditions also counted to some extent. The "condition of passenger" factor is not explained by the Bandung report; route condition, in the case of Yogyakarta, referred to certain routes going uphill.

In Chiang Mai, silors charged a flat rate of $0.10 per adult passenger, while schoolchildren were charged $0.05 and university students $0.08–0.10. According to Fouracre and Maunder (1977), "For trips beyond the environs of the city centre or during night time hours, the fare must be negotiated with the driver." In the case of queue minibuses, they observe, "There is a stage fare structure which works out at approximately 2 bahts [$0.10] for any journey up to 10 km and 1 baht for each succeeding 10 km. A small fee is usually charged for goods." Apparently, fare rates for silors were not regulated by the government, although the queue silors were probably better organized in their operations. Conventional bus fares were a flat $0.05 (half fare for children), whereas samlor fares were usually negotiated and were generally $0.10–$0.15 per trip.

For the Metro Manila jeepney, fare rates at the time of the survey were, as in the case of buses, legally set at a minimum of 0.25 pesos ($0.03) per adult

passenger for the first 5 km plus 0.05 pesos for each additional kilometre. Lower minimum rates (0.20 pesos) were set for schoolchildren. Such rates were set by the government's Board of Transportation for all public passenger vehicles and could be changed only with its approval. However, fares for special trips involving longer distances, different routes, or the delivery of goods might be negotiated, and some jeepneys would often engage in "trip-cutting," overcharging, or both, during peak periods or bad weather.

The Istanbul report does not indicate the legal or actual fares charged by LCT vehicles in that city. Dolmus fares were negotiated at certain prevailing rates; and a dolmus could switch to metered taxi operations.

> There are other peculiar systems of operation such as "Express-Dolmus", provided occasionally at high demand situations at twice the regular dolmus fare; [and] "shared taxi" which involves sharing the taxi fare among the riders. Even private passenger cars may occasionally perform dolmus service ... illegally. Similarly, some midibuses operated in the outlying sections ... without minibus plates — to escape ... the municipal shares from the earnings.

From the data available, it would seem that, in terms of fare rates, the LCTs were probably not any cheaper than conventional modes, although comparable intermodal data are lacking on this point. On the contrary, it could cost more for users due to the negotiated nature of some fares and the lack of effective rate regulations.

Operating Revenues and Profitability

Although "entry" and "exit" data are not available, the fact that many people had been engaged for fairly long periods in the LCT business would suggest that it had been a gainful-enough occupation. However, although some LCTs might be thriving, others appeared to be merely surviving. Incomes from LCT operations ranged from marginal (the becaks) to "profitable" (the Istanbul LCTs). Variations between and within cities were due to the rates of vehicle ownership by drivers, running and acquisition costs, and fare levels. Unfortunately, data on operating costs as well as on fares are not always reported, and even the income data are uneven between the cities.

LCTs seldom earned $10/day, with the exception of the owner-driven Istanbul minibus, and the becaks were earning the lowest revenues (Table 5). The Indonesian studies — which report only the ranges of gross incomes —show that the becak drivers in Bandung averaged $1.13-1.88/day and the maximum gross revenues were $1.88-3.75 (65% of the sample drivers). Their average daily operating expenses (including rentals) ranged from $1.50 to over $2.00 (64%). Under the best conditions ($3.75 minus $1.50) therefore, a driver would net $2.25 daily or $67.50 during a 30-day month.

The Bandung report concludes that the becak drivers' income "is barely enough, although there is some 'profit' left." Many of them (45%) managed to save $0.19-0.50, but presumably as a result of having other income sources, not from becak operations. Consequently, most of the drivers (over 70%) were dissatisfied with their strenuous yet low-paying job. Nonetheless, 37% of them still wanted to own becaks to improve their economic condition.

Table 5. Reported gross income, operating cost, and net income per driver (daily or daily equivalents — in 1977 US dollars).

Vehicle	Gross income	Operating cost	Net income
Becak (Bandung)[a]	1.13–1.88	—[b]	—
Becak (Yogyakarta)	1.00–2.50[c]	—	—
Bemo	12.50	11.00	2.50
Opelet	16.25	12.50	3.75
Honda	19.50	12.00	7.50
Colt	30.00	20.00	10.00
Silor	8.39	2.00–2.25	3.61
Samlor	1.90	0.60	1.30
Jeepney[d]	8.10–12.02	11.89	2.03–3.24
Dolmus[e]	—	0.89–4.46	5.14–15.42
Minibus[e]	—	3.57–7.14	10.28–20.56

[a]Operating cost and net income varied widely.
[b]— denotes data not available.
[c]$1.00 was the maximum of the minimum daily *range* reported, which was $0.25–1.00. $2.50 was the upper limit of another range, $1.50–2.50.
[d]Gross and net values are on a shift basis.
[e]Owner-drivers.

Becak ownership, however, was no guarantee of much better income. The sample owners themselves were apparently not doing better on a per-unit basis. The Bandung team, assuming a whole-day rental income of $1.25 times 25 working days ($31.25) minus $6.25 for monthly maintenance expenses and $1.25 for "tax," estimated a net monthly revenue of $23.75 per becak for the owner. This would be less if amortization and monthly dues for drivers' emergency and health insurance were considered. An owner of several units of course could earn more due to economies of scale. Recently, however, "there is not much incentive to enlarge business" due to increasing taxes, growing competition from other modes, and the drivers' irregular work habits.

The story in Yogyakarta was, if anything, sadder. Maximum gross earnings there were reported by 68% of the respondent drivers to be $1.50–2.00/day. The Yogyakarta team does not present data on operating costs and net income. However, even fewer drivers in that city than in Bandung owned the vehicles they were using. "A renter-driver's income," the report observes, "is considered insufficient because the rental fee [unspecified] must be paid ...."

Moreover, fewer Yogyakarta drivers (14%) had other income sources to fall back on. The majority made it a point to save part of their earnings, but most drivers also borrowed money — resulting in net indebtedness. Again, fewer drivers in that city (7%) were saving to buy a becak and the great majority (74%) had no intentions of owning one. Nonetheless, the team thinks that "economically a becak driver is better off than if he has stayed in the village where employment is difficult to find."

The Bandung team's special study of motorized public transport (Kusbiantoro and Ro'yat 1981) shows that MPTs were clearly doing better than becaks — at fare rates that were as low or even lower ($0.10–0.19) than what the becaks charged per trip ($0.13–0.25). The MPTs were grossing $12.50–30.00/day, and earning monthly net incomes of $62.50 (Bemo) to $250.00 (Colt), when a month is more realistically computed at 25 working days. Variations in total

number of working days, which have been used to "standardize" the income data, reflect the typical practices described in the study cities.

The LCTs in Istanbul, Chiang Mai, and Metro Manila were roughly in the same income league as the Indonesian MPTs, or at least were better off than the becaks. Silors in Chiang Mai were grossing an average of $8.39/day[18] and netting $3.61/day or $97.47/month (27 working days). About 53% of the drivers surveyed reported net daily incomes of $2.00-3.95, while 16% earned less than $2.00 and another 16% earned more than $5.00. The operating costs would be about $2.00-2.25/day, excluding the driver's personal expenses of about $1.00 for food, cigarettes, etc., but including maintenance, tires, and spare parts ($25-125/year). No data are presented on fuel costs. Daily queue fees and monthly payments for life and accident insurance could amount to an additional $5/day, but very few silor drivers (7%) joined insurance schemes, which required considerable premiums ($7.48/month).

In addition to their net gain from silor operations, 25% of the drivers were earning an income from other sources. Installment payments for vehicles being acquired by drivers, however, were a substantial outflow in many cases. Of the 700 driver respondents, 278 or nearly 40% were in debt, and 78% of these 278 drivers had incurred debts amounting to more than $300 to be able to purchase vehicles. Moreover, although they were earning more than the becak drivers, silor drivers were hardly more optimistic about their future income. They frequently complained that the prevailing fare rates were too low relative to the increasing cost of fuel; however, the contribution of fuel to running costs is not specified in the report.

In Metro Manila, the gross and net earnings of jeepney drivers were about the same as those of the silor drivers in Chiang Mai. Their daily gross revenues per shift often ranged from $8.10 to $12.02 for 42% but for 29% exceeded $13.50. Their daily net earnings were between $2.03 and $3.24 per shift in most instances (52%), over $3.37 in some (29%), and less than $2.03 in other cases (19%). The difference would be accounted for by daily "boundary" or rent payments averaging $4.40, fuel costs of $4.98, and expenses for food, drinks, cigarettes, and "daily collections" — a euphemism that might include protection money. In addition, there might be cooperative or association fees and medical and life/accident insurance premiums to pay — monthly premiums together amounted to $7.21. The Metro Manila study team notes that, in view of the size of the operating costs, gross earnings were probably under-reported.

Jeepney owner-operators usually paid for monthly vehicle maintenance, repair and related services (oil, wash, grease, etc.), and spare parts. Nearly half of the smaller sample of jeepney operators (47%) indicated that they were grossing $135-540/year or $5.67-22.54/day (based on a 24-day month). Another 29% reported gross revenues equivalent to $28.07-33.74 or more per day. Their daily incomes varied widely, however — $1.35-5.40 per jeepney (61%); for all vehicles owned, 41% of the sample netted less than $5.67 and 39% netted $5.67-16.87. Their expenses amounted to $405-540/year ($1.35-1.89/day) but 16% reported annual expenses of $540-1215. In addition to maintenance costs, operators paid $40.50-135 for each permit or franchise obtained (each permit was good for 5 years). There would also be some personnel costs, as most operators hired employees other than drivers.

[18]Fouracre and Maunder (1977) estimated that an urban silor driver was grossing $9.00 daily and a queue silor, $12.50. A wage earner, however, was paid only $1.25/day.

Between jeepney operators and drivers, the former were getting the lion's share of gross revenues, with only 16% of the sample operators indicating that they were getting less than half and their drivers getting the larger share of total earnings. Jeepney drivers were able to save $6.28/month from their operating incomes. However, few drivers had other gainful occupations and, although most drivers liked their job, they viewed it as a hard, insecure one whose future earnings were uncertain (39%) or were likely to decline (33%).

In Istanbul, incomes from LCT operations appeared to be at least as high as the best that jeepney operators in Metro Manila were making. Owner-drivers indicated annual net incomes equivalent to $257-386/month — $10.71-16.07/day on the basis of a 24-day month. Income and cost are also reported in ranges without average figures. Daily net revenues were $5.14-15.42 for most LCTs (80% of the sample) and, for minibuses in particular, $10.28-20.57. Renter-drivers, however, were getting only half these amounts ($5.14-7.66 for 48% and $2.57-5.09 for 37% of the sample of renter-drivers). "It is conceivable," the Istanbul report observes, "that the driver ... works harder or longer hours," and it presents data to show that nondriver-owners of LCT vehicles "receive only slightly lower earnings than the owner-drivers," but the report surmises that this might have been due to underreporting.

Operating costs in Istanbul were probably about $7.71/day for all LCT types, using the midpoints of the modal size-classes. Daily expenditures for "food, etc." were $1.03-3.03 (73%) and for gasoline $2.06-4.06 (57%) for all LCTs. Annual repair and maintenance costs, using a 24-day month, amounted to $0.89-4.46/day. The expenses of minibuses tended to be higher, e.g., at least $5.14 for 65% of minibuses, because of their longer operating hours and the greater distances covered and because they used lower-quality roads in the peripheral sections of the metropolitan area.

Amortization was another important recurring cost for more than half of vehicle owners (57%), especially of minibuses (73%), who had vehicle-related debts of $1234-11 568. Despite this burden of ownership, nearly half of the renter-drivers (49%) in the survey expressed a desire to own vehicles, especially minibus and dolmus-taxi drivers. This seemed to be their way of wishing for greater economic security. Although other members of their households might be employed and they might have property such as land, few of the drivers (8%) had other jobs or sources of income. Those owner-drivers who did were earning about $6.43/day.

The LCT drivers in Istanbul were almost equally divided about the prospects of their occupation, however. Just over half (51%) of the sample of 1850 respondents said that they were not satisfied with their jobs, whereas 48% said they were. Dissatisfaction stemmed from the difficult life, low income, and hazards of their occupation, while satisfaction derived in many instances from a lack of alternative occupation (34%) and from the drivers' enjoyment of their present work (17%). The report concludes that LCT operations were, on the whole, profitable enough to provide middle-income status and savings to repay debts, although efforts to repay these debts might result in disregard for vehicle repair, maintenance, and traffic regulations. Moreover, the high rates of vehicle ownership assured the existence of a stable group of operators who were likely to resist drastic change in the system.

5 Socioeconomic Characteristics and Perceptions of LCT Drivers, Owners, and Users

The findings presented previously about the operating characteristics of the so-called LCTs in Bandung, Yogyakarta, Chiang Mai, Metro Manila, and Istanbul have cast some doubt on their cost, benefit, and quality of service. At the same time, from a wider angle, these LCTs — the becak in Indonesia, the silor in Thailand, the jeepney in the Philippines, and the dolmus and mini-midibuses in Turkey — were an important and, in some of these cities, even a dominant form of public transport that was serving a wide variety of groups and movement purposes. For the people directly involved, the LCTs may be said to be performing a vital economic and social function. From what has been presented, however, it would appear that the LCTs afforded a precarious existence for some of them.

Just how important the LCTs were to these groups may be gleaned from their socioeconomic characteristics, perceptions, and, in the case of consumers, their travel patterns as well. In their surveys, the research teams in these cities collected demographic, economic, and social data from samples or smaller groups of drivers, owners, and users as a matter of intrinsic interest in the way-of-life involved in the LCTs and also for the light that they shed on the processes and problems of urban growth and development. The researchers also questioned their respondents about their organizational affiliations, occupational outlooks, and views of government policies relating to LCTs. The last item is discussed briefly in the next chapter.

As on other aspects of the LCTs, the different study teams did not inquire into the circumstances of these groups to the same extent, nor do they report the same kinds of data on those people that they did survey. The caveat about comparability, therefore, should be kept in mind.

LCT Drivers

Age and Household Status

LCT drivers probably formed a dynamic segment of their cities' populations, depending on and reflecting the dynamism of the transport modes in which they were engaged. Most of the drivers in the five cities were of active working age (20–25 years old), married, male, and typically heads of their households. Not all of the reports affirmed the preponderance of males in the

driving profession in the study sites. In Metro Manila, casual observation would suggest that women jeepney drivers are rare, if at all existent, but women are typically employed as bus conductresses.

Drivers less than 20 or more than 50 years old were in the minority but were substantial in number. Younger people comprised less than 7% of the becak drivers in Bandung and Yogyakarta. It is worth noting that the population as a whole in Bandung was characterized as relatively young, with 48% being less than 20 years old in 1974. In Yogyakarta, 12% of the drivers were at least 50 years old and 41% had been driving becaks for at least 10 years. In Chiang Mai, on the other hand, 21% of the 700 silor drivers surveyed were under 25 — and therefore not legally qualified to drive silors — and 29% were bachelors. There were far fewer young jeepney drivers in Metro Manila (the average age was 35, and only 1% of the sample of 578 were under 20), but 20% were single. As in Yogyakarta, a number of the Metro Manila drivers (10%) were at least 50 years old and 44% had been driving jeepneys for at least 10 years. Of the 1861 LCT drivers surveyed in Istanbul, 19% were less than 24 years old and 10% were at least 50 years old, but 30% were bachelors (including 5% who were serving as household heads).

Migration Background

Although most of the LCT drivers were migrants to their cities, judging by their place of birth, most of the migrants were from the surrounding region or province. Not all the drivers had quite settled in the cities at the time of the surveys. Over 80% of all the drivers in Bandung were born and raised in West Java, particularly in Bandung Regency, but only 13% were born in the city itself. In Yogyakarta, about 70% were born and raised in the Special Territory of Yogyakarta, including some drivers who were born (16%) or raised (23%) in the city. Similarly, 76% of the silor drivers were born in Chiang Mai Province (the Thai report does not give the percentage of those born in the city), and most of those who moved to the city did so during the last 5 years. Almost the same proportion among the Istanbul drivers came from within the metropolitan area; 24%, however, came from rural areas outside the metropolis. A much greater percentage of Metro Manila drivers were migrants: 60% were born outside the metropolitan area, especially from the adjacent Southern and Central Luzon regions, and 76% had resided in the area after reaching the age of 20.

Current Residence

Most of the drivers lived in the cities, but in some cases a substantial number of other drivers resided outside. Over 80% of the Bandung drivers were residents, and about half of these had lived there for at least 10 years, whereas 9% of the sample were staying in the villages nearby. Some drivers in Yogyakarta represented something of a split-residence situation: 62% of the drivers were city residents, the wives and children of 37% were living in the villages and the remainder (34%) of the drivers were also residing with their families outside the city. Among those who had houses, nearly half (48%) still had their houses outside Yogyakarta. About the same proportions are reported for the Chiang Mai drivers: 47% living in the city, 35% in the surrounding

amphoes, 13% in the outer districts, and 5% in the nearby provinces. Of the Metro Manila drivers, 75% were residents of the metropolitan area. The Istanbul report does not indicate the current residence of its LCT drivers.

Household Size and Housing

The households of the LCT drivers were small by traditional standards, something that tight housing conditions in the city might have induced. The average household size was not reported for Yogyakarta but was 4.9 persons in Bandung, 4.5 in Chiang Mai, and 4–5 in Istanbul. In Metro Manila, household size seemed to be larger: 4–7 for 52% of the sample and 8–12 for 30%. The average size of the Bandung drivers' families was smaller than that of the sample of user households (5.9) surveyed in that city. This must also be partly due to split residence. Although most of the drivers (57%) had their own houses in Bandung or outside, only 31% were occupying their own houses, 32% were living in rented or leased dwellings, and the rest were staying in the houses of their relatives, other drivers, or becak owners. Similarly, 64% of the Yogyakarta drivers were house owners, but 35% had no houses of their own and had to rent, lease, or otherwise live with others. This situation was of considerable economic importance, since leases typically required advance payments for at least 6 months. For want of any such lodging, some drivers would sleep in their becaks to spend the night.

Chiang Mai's silor drivers apparently had no housing problem: 53% had their own houses, 34% were living in rent-free dwellings, and only 12% had to pay rent (about $11/month). In Metro Manila, 49% of the jeepney drivers had their own houses (an unspecified proportion of these were located outside the metropolis), and 44% were living in houses solely occupied by their families, but the others had to rent (43%) or otherwise share dwellings with other families. Comparatively fewer drivers in Istanbul owned their own houses (39%); most (59%) were tenants paying monthly rents of $10–50 in most instances.

Education

Educational attainment among the LCT drivers was usually low, seldom exceeding the elementary school level, except in Metro Manila. Most becak drivers in Bandung (81%) and Yogyakarta (77%) had reached only primary school, or did not have any formal schooling at all. Some others (13% and 18%, respectively) managed to get to the intermediate stage, however. Compared to the becak drivers, the user respondents of the Bandung study reported a higher level of educational achievement, with 17% reaching high school and 12% getting as far as college. The silor drivers in Chiang Mai were only slightly better off, with 71% having attained the primary level and 20% the intermediate level. Of the Istanbul LCT drivers, 51% had primary education. A greater percentage than in the Indonesian and Thai cities went on to the next stage, but 23% dropped out of middle school and only 9% graduated and continued to high school, with only 5% graduating. Metro Manila's jeepney drivers reported the highest levels of educational achievement: about 50% completed high school, 37% completed elementary school, and 8% finished college.

Migration Motives and First Jobs

Driving was not necessarily the primary or immediate occupational choice of the LCT drivers. The migrants among them usually came to the city for economic reasons, but some took up other jobs before becoming professional drivers. In Bandung, the "custom" of young men leaving their home villages to earn a living or gain experience was cited by 66% as their motive for coming to the city, whereas 24% gave general "economic reasons" and 3% cited "education purposes." Nearly 80% said that they did not come to be becak drivers, but rather hoped to become vendors, mechanics, or employees. Unfortunately, they did not have the capital or the "right connections" to get the kind of jobs they wanted. In Yogyakarta, 38% of the drivers came to work as becak drivers, but the rest had less definite jobs in mind (traders, construction workers, or office or factory employees). More than half (54%) of them tried other jobs first, but were dissatisfied with the income they received or were not hired at all. A third (33%) worked as farmers, and others had been semiskilled labourers, vendors, or "coolies" carrying goods at the Yogyakarta railway or bus stations, before turning to becak driving as their source of livelihood. In Istanbul, few of the respondents (8%) started as LCT drivers as their first job; more frequently, they began as apprentices, unskilled workers, or (especially in the case of the minibus drivers) as drivers' aides. However, among the drivers born outside Istanbul, 42% came directly into LCT driving, whereas 38% had had some other first job.

The Chiang Mai and Metro Manila reports do not indicate the migration motives of their driver respondents. The Chiang Mai report states, however, that most of the silor drivers who settled in the city had already been in the driving profession, and that many of them had been samlor drivers. In Metro Manila, driving was the first job ever held by 28% of the jeepney drivers; the rest indicated "others."

Family Income and Assets

The previous chapter showed that the LCT drivers were making modest to good incomes from their occupation, with the Indonesian and Turkish groups representing the extremes and the Philippine and Thai drivers falling generally in the middle. The becak drivers were earning marginal incomes from their occupation but were probably better off on the basis of income than the typical uneducated kampong resident. The Istanbul drivers, on the other hand, are described by the Istanbul study team as being in the "middle income" bracket "with above-average dwelling conditions" because of their profitable occupation. The study reports supply additional income and asset information, but do not provide any more complete data about the family incomes of the drivers and the populations of their cities. Thus, it is hard to describe more exactly the economic situation of the drivers and other LCT groups.

Many drivers in Bandung and Chiang Mai derived income from other jobs, but this was less frequently the case in Yogyakarta, Metro Manila, and Istanbul where LCT-driving was usually their only gainful occupation. Other sources of family income — apart from those of the drivers themselves — were probably available, but are not precisely indicated. Of the Bandung drivers who had "side jobs," 56% would fall in the lower monthly family income bracket, below $18.75. These same drivers would seem to be much better off on the basis of income

from side jobs — 39% were in the $19–38 income class and 23% earned over $38. This apparent discrepancy between the total family income and side-job income data is not explained or even noted by the Bandung report.

Most of the drivers had household or personal assets in addition to houses, but only 21% owned land. The Yogyakarta drivers were poorer in terms of income, but better off in terms of assets than the Bandung group. Three-quarters of the former earned less than $19/month, but about two-thirds of all Yogyakarta drivers had houses (64%) and garden plots (60%), 29% owned ricelands, and 10% owned "dry fields." These pieces of land were usually no more than 1 ha. Again, a separate monthly income table for the drivers' "nuclear families" shows the drivers to be better off than their "nuclear families," 87% of whom earned below $19. As in Yogyakarta, the combined total family incomes of the Chiang Mai drivers are not reported, but the Thai study indicates that most of the silor drivers who had other income (70% of 84 cases) were earning less than $100/month from work other than driving, and that one to three other family members were contributing an average of $52 to family incomes.

Neither total family income nor "other income" data are reported for Metro Manila. The Manila team reports, however, that one or two other members could be counted on to contribute to the jeepney driver's family income. In addition, some of the 578 drivers surveyed owned lots (27%), houses (49%), or motor vehicles (8%; "most probably," the Manila team notes, "the jeepneys which they drive"). Some of the LCT drivers in Istanbul (8–12%) had other sources of employment apart from LCT driving — including driving other vehicles — and were earning an average of $154/month from such sources. Although no total family income data are shown by the Istanbul report, it observes that the monthly earnings of the drivers alone — frequently in the $154–180 range, and above this for 50% of the respondents — "compare favorably with those of regular workers and the majority of governmental officials." One (66%) or two (23%) other members of the drivers' household were usually employed, and there might also be household income from sources other than regular employment (19%). Many Istanbul drivers owned land in their places of origin (38%) or in the city (13%). Most were living in apartments (55%), while others occupied stone houses (23%) or "squatter" dwellings (11%).

Occupational Outlook

Although some of them liked their jobs, LCT drivers generally had a rather dim outlook about driving as an occupation for themselves and even more for their children. This view seemed to agree with the approach of many drivers to their occupation as a second-best job and a migration motive, and their dissatisfaction with the conditions and rewards of the job. Some drivers might have come to like their jobs, whereas others may have been "locked" into this occupation for want of any better opportunities or capabilities, or as a result of having made investments in the acquisition of a vehicle. Thus, despite their wishes to change occupations, they expected to stay on as drivers in the near future. However, few drivers in the five cities would have their children follow in their footsteps.

In Bandung, over 70% of becak drivers were dissatisfied with their work due to its strains and limited income. Only 20% of the drivers had other members of their families who were engaged in becak-driving. "None," the report states, "wanted their children to become becak-drivers." They would rather leave this

matter to their children to decide (37%), or, if they had a choice, they would rather have their children work for university degrees (9%). Becak drivers in Yogyakarta, although happier with "living conditions" in the city than in the village, felt no more satisfied with their jobs. Few (7%) intended to acquire a becak as the road to higher income and status, and fewer still (2%) would want their children to become becak drivers as against other occupations (37% for government employment, 13% for trade, and 24% "up to the children").

Although 68% of silor drivers in Chiang Mai preferred driving to other occupations, 60% would not advise their children to take up their work due to its physical hazards, hardships, uncertainties, low income, and lack of promise. They would rather have their children get a higher education, vocational training, or a government or commercial job. In Metro Manila, 85% of jeepney drivers said they liked their jobs; yet 62% indicated an intention to change jobs and only 32% expected to stay on as drivers. An even greater proportion (87%) would not like their children to become jeepney drivers for the same reasons as those given by the silor drivers, including the low status of jeepney driving. In Istanbul, 51% of all LCT drivers were satisfied with their profession on grounds that they had no choice (34%) or that they simply enjoyed driving (17%). Slightly less than half (48%) of the respondents were dissatisfied (50–59% in the case of dolmus drivers), mainly because the job was dangerous and difficult (45%). Almost the same proportions expected to stay on the job (51%) or were considering other jobs (47%), including government employment as IETTA drivers. Only 8% of the LCT drivers, however, would have their children follow them in their career; the rest did not regard driving as a good profession and would rather see their children go to college and get into some small business (42%) or other jobs related or unrelated to the automotive industry. In fact, like 28% of the Thai silor drivers, most of the Istanbul drivers would not even approve of their daughters' marrying other LCT drivers because they were in a "bad profession" (32% of responses) or were not trustworthy (16%).

The Istanbul drivers' description of their occupation conformed with their self-image as "tough masters of a profession." According to the report from that city, this characterization was something with which many people would agree, and it was enough to deter any argument from the public. Much the same stereotype could apply to the jeepney driver in Metro Manila. This suggests that the LCT driver was typically low in social status and prestige. For whatever it was worth, however, he had to make the best of his current situation, physically and otherwise. The study in Metro Manila showed that 51% of the jeepney drivers preferred the metropolis as a better place to live and work (vs 47% who would rather be outside the area), and 63% had no intentions of "changing residence" (vs 35% who did).

Organization

The desire and ability of LCT drivers to endure and prosper as an economic and social group may be seen in their degree of organization or affiliation. As suggested previously, they had developed informal associations for their immediate occupational or operating tasks, such as those involved in regulating queues or specific relations with vehicle owners and traffic authorities. However, membership in formal, larger-scale organizations to promote or protect their interest was substantial only in Istanbul and perhaps Metro Manila — and even here membership did not necessarily mean a satisfying association.

A Becak Drivers and Owners Association in Bandung was set up in 1975, but only 4% of the becak drivers surveyed had joined this organization and 57% did not even know that it existed. Many of them, however, had joined other organizations, especially night-watch (46%) and volunteer work (7%) groups. Membership in the older Yogyakarta Becak Drivers Union was also low: only 3% of those who knew of its existence had joined. Although most drivers (60%) knew of the Union, they did not have the interest (14%) or time (7%), or had never been asked (7%), to join.

The Chiang Mai and Metro Manila reports do not mention any organization of drivers. Philippine jeepney drivers and operators did have associations of their own and were being encouraged by the government to form cooperatives. Some of these associations had been involved in militant actions (including jeepney strikes) in the years preceding the proclamation of martial law in 1972. The data on operators suggest that organizational membership was wider in Metro Manila than in the Thai cities at the time of the surveys, with 41% (of the 75 operators) indicating membership in "any transport organization." Most (59%), however, were not members.

In Turkey, drivers were apparently well organized. In addition to a national Federation of Drivers and Automobile Operators, there was an Association of Minibus and Dolmus Operators that was aggressive enough to call strikes, challenge a government decision to lift license plate restrictions, and seek tax exemptions and other measures favourable to its members. Most of the Istanbul LCT drivers (63%) were members of this association, but were not contented with what it was doing for them. In fact, most of these members said that they had not received any benefits from their association (84%) and that they were having problems with it (61%). The minority view (12% of 1307 drivers), on the other hand, was that the association was serving as their channel for getting cheaper spare parts and mutual-aid activities, or as their advocate for raising LCT fares, restricting the entry of private cars and out-of-town vehicles into the city, and generally asserting their rights. On balance, however, the association left much to be desired, as the Istanbul study team infers from the readiness of most drivers to make recommendations for improvement.

Vehicle Owners

Among the samples of LCT drivers, most of those in Chiang Mai (78%) and Istanbul (66%) owned the vehicles they were driving, but a much smaller proportion did so in Bandung (18%), Yogyakarta (13%), or Metro Manila (9%). The socioeconomic characteristics of these owner-drivers are described in all the reports as part of the larger driver samples, and may be said to have been already well represented in the Chiang Mai and Bandung surveys of drivers. The research teams in Bandung and Metro Manila, however, collected information, and reported, on owners as a distinct group. From an original group of 54 becak owners — or 10% of 538 owners — the Bandung team reduced their sample to 21 respondents because the replies they were getting initially were so similar. The Metro Manila team examined a group of 75 jeepney operators from among 501 owners identified by its driver respondents.

The inquiry among these smaller groups pertained mostly to the acquisition, management, and economics of operations of LCT vehicles, with little attention to unrelated social characteristics of the owners.

The becak owners in Bandung had 3–40 vehicles each, 41% owning 3–9 vehicles, and 9% having more than 30 units. Most of these becaks were acquired secondhand, and were augmented as the owners' savings increased. From 75–80% of these vehicles were operating at any one time, the rest being out of order or having no driver for the moment. The owners were making a net monthly income of about $24/becak. Most of them were also earning income as barbers, foodstore owners, or repair-shop operators. They usually had a workshop for becak repair and maintenance, which might be done by a hired mechanic or by the drivers themselves. They recruited drivers through informal channels, usually through drivers' recommending friends. In considering a prospective driver for employment, owners required only a residence identification card, and might themselves supply the driver's license required by the authorities. Owners charged an estimated daily rent of $0.45–0.75/becak (or 25–30% of the driver's daily earnings). Drivers paid their rents for the becaks at the close of each day of operation, or the day after. Unlike the drivers, most becak owners were members of the Drivers and Owner Organization in Bandung. In return for "various services" from the association, member-owners paid monthly insurance premiums for their becaks, and another $1/month per becak into an emergency fund to cover accidents or death among drivers. As already mentioned, owners viewed their business future as unpromising, with taxes having risen and only half of their becaks currently in operation.

Of the sample jeepney operators in Metro Manila, 54% were natives of the metropolis, whereas 60% were born outside. According to 81% of the driver respondents, the operators of their jeepneys were currently residents of Metro Manila; only 12% indicated that their operators were living outside the area. At least 80% of the operators had lived there since reaching 20 years of age or had found their first jobs there. They were generally older than the drivers, 72% of the operators being in the 40–64 age range. They had been in the business for an average of 12 years, 11 of the 75 (15%) operators having been in it for more than 25 years. Rather than inheriting the business, they had started it themselves, primarily for income or profit (47%). Many operators held other concurrent jobs (39%), and had had one other job before (87%), but jeepney operations were probably a major source of their current income. Family income is not given by the Metro Manila report, but it shows that operators were netting a tidy $135/month (mode) and getting a share of more than half of the gross earnings from jeepney operations.

Operators typically started with one (52%) or two (29%) units, and now about one-third were operating 3–5 units and another third were operating 6–10 vehicles. A few of the sample respondents were themselves driving their jeepneys regularly (7%) or occasionally (16%), while two-thirds said they never did so (67%). They usually hired one (33%) or two (56%) drivers per jeepney. Hiring was on the basis of mutual agreement or benefit, without any written contract. Most operators preferred the "boundary" system (93%) as easier to manage (24%), more mutually beneficial (23%), or more beneficial to the operator (19%) than any other arrangement. As in Bandung, jeepney drivers were hired on the recommendation of other drivers (48%) or of friends or relatives (45%). Less frequently, the drivers were the operators' relatives (7%) or

friends (5%). The operators preferred drivers who would be careful with the vehicles (40%), or had a good character or background (37%), or experience or mechanical skill (25%). Most jeepney operators (55%) also hired employees other than drivers, although 41% of the respondents did not. A mechanic/welder/oiler was most frequently (52%) the other employee hired by the operators.

The low membership in a transport organization (41 vs 59%) is interpreted by the Metro Manila research team as indicating the operators were typically independent, small-scale entrepreneurs. Although some jeepney operators had expanded their fleet since they started their business, only 33% of the sample now intended expanding operations while 65% said that they had no such plans. Those intending to expand would do so through their own resources or through bank loans, but high operating or maintenance costs and lack of capital deterred the others from thinking of acquiring more vehicles.

Despite its profitability, owning and operating passenger jeepneys was apparently not too attractive as a future occupation even for the operators. To a leading question, "Why would you recommend the same job to your children?", 31 of the 75 jeepney operators surveyed usually cited its profitability. However, when asked if they would still recommend jeepney operation to their children if there was an alternative job or business, 49% would not and 41% would.

Transport Users

Larger samples of general transport consumers were surveyed in all the study cities except Istanbul. The results provide some basic information on user households and individuals, but largely as it relates to their travel behaviour and perceptions. This section concentrates on the findings of the Indonesian and Philippine study teams, although it also draws from a one-page narrative summary on passengers in the Chiang Mai report and from the Istanbul team's observations. The sample sizes were: 1000 households in Bandung, 750 in Yogyakarta, 1011 in Metro Manila, and 100 passengers in Chiang Mai. After initial inquiries about household composition, the Indonesian researchers drew a "random respondent" from each of their sample households. Thus, in their reports, they sometimes present distinct sets of data about their household and random respondent samples. Similarly, in Metro Manila, four "commuter" members were selected from each sample household, so that a total of 3930 individual respondents were drawn for interviews on travel patterns and preferences. The Chiang Mai report does not say how its 100 "passengers" were selected or what their characteristics were.

The household sizes were generally larger and home ownership rates higher for the users than for the LCT drivers. The average size of user households in Bandung was almost six members, and the median size in Yogyakarta was between four and six. Metro Manila's average user household was even bigger (eight members) than its average driver household and the typical user family in the other cities. Users' home ownership rates in Bandung and Manila were slightly higher than those of their LCT drivers: 61% in Bandung (vs 57% for becak drivers) and 54% in Metro Manila (vs 49% for jeepney drivers). In Yogyakarta, the reverse was true (61% for users vs 64% for drivers), but what has been called "split residence" among the drivers may help explain their greater ability to own their own homes.

In terms of occupation, government employees ranked highest in frequency (21%) among the household heads in the Indonesian samples, with traders or small businessmen, service workers, and labourers trailing behind. Among Yogyakarta's random respondents, traders (19%) and students (16%) figured more prominently, and in terms of age the "more mobile" groups (20–49 years old) predominated (63%). Typically, at least one member in each family was employed, although retired and unemployed individuals together formed about 15% of the household heads in the Indonesian samples. The more mobile age groups also formed the bulk of Metro Manila's sample household population of 8080 persons: 39% were of school age (5–19 years) and 54% were of working age (20–64 years).

The user samples were thus groups who were likely to generate a significant amount of trips and traffic. In Bandung, more than half of the members of each household made regular trips for various purposes. In Metro Manila, on the average, five members of each household were commuters or regular travelers to work, school, or other places in the area. To determine their broader travel patterns, the Manila team selected the sample households from the 17 localities in the metropolitan area with the following aggregate distributions: 34% in the central city of Manila, another 34% in three other adjacent cities, and the rest proportionally distributed among the 13 remaining towns.

Data on users' household incomes and expenditures are reported in terms of their relation to transportation expenses. In Metro Manila, over 88% of the commuter respondents usually spent at least $5.53 on household fares. That percentage tended to increase with household income size, of which, however, only three classes are given in the report. In Bandung, 5% of total household expenditures was normally devoted to transportation, except at the highest total expenditure level (over $62.50/month), where transport took up 10–20% of total expenses. The latter was the most frequent range for Yogyakarta users (46%), but the next largest group in this city fell in the category of respondents who reported no transport expenses. In general, the Philippine and Indonesian reports suggest that transport expenses correlated positively with household income and total expenditures.

Regarding expenses for the use of LCTs, the Yogyakarta report presents averages to show that next to the taxi ($0.26), the becak cost the most ($0.18) followed by MPT ($0.15), motorcycle ($0.09), and private car ($0.07). Elsewhere, LCT fares were generally regarded as fair (Chiang Mai) or minimal (Metro Manila), though sometimes subject to demand conditions (Istanbul).

Other travel-related characteristics of users, especially those having to do with their use and views of the LCTs may be mentioned. As already mentioned, user trips in Metro Manila were most frequently during weekends (62% on Saturdays and 18% on Sundays). Trips to and from home also registered the highest frequencies, which otherwise varied according to purpose or destination. In Yogyakarta, journeys to school were the most frequent (15%); shopping (10%) and work (9%) trips were next. In Metro Manila, on the other hand, journeys to work predominated (nearly 50%, not counting home trips); next were trips to school (39%) and for shopping (12%).

A single trip in Metro Manila was usually sufficient to reach one's destination (56%), but some trips required one (32%) or more vehicle transfers. Averaging less than 5 km, trips were localized within the core, intermediate, and peripheral zones into which the metropolitan area was divided for purposes of

the study. They also tended to be short-distance between adjacent zones, with less than 20% of trips taking place between the core and the periphery. Shopping trips were the most localized, work trips were the least localized and the most interzonal, while school trips were the most long-distance, although work journeys took place between core and periphery almost as frequently. In general, trips towards the core outnumbered outbound journeys 9 to 1; this pattern was most pronounced for trips to school and least so for work trips.

When all kinds of modes are considered, as they usually were in trip counts, walking would still seem to be the most popular means of travel, at least in Yogyakarta and Metro Manila. Vehicle ownership rates were probably limited but growing, although only the Bandung team reports on this specific point. Nearly 53% of the Bandung sample households had no vehicles of any kind, while the rest did so, including motorcycles (19%), cars (9%), and bicycles. The car ownership rate in Bandung, when converted to 15 cars per 1000 population, is lower than the city's apparent rate in 1976 (35 per 1000). According to a World Bank report on urban transport, Istanbul had 21 cars per 1000 population in 1970, when Manila had 35 (World Bank 1975b). The latter had increased to about 38 in 1974. The Istanbul report indicates only 19 in 1973, but suggests that the rate could have risen to 26 by 1976.

Among the public transport modes, the LCTs were the most popular in Metro Manila but not in the Indonesian cities. The commuter respondents in Manila preferred the jeepneys (48%) and the regular buses (32%) to special buses or service vehicles (16%). Next to walking (95% of multiple responses), the jeepneys (76%) and buses (34%) were also the most often used. In Bandung, MPTs were the most frequently used (11%); next were motorcycles (9%), becaks (9%), cars (6%), and bicycles (5%). MPTs and other vehicles were used for work trips, whereas becaks tended to be used for shopping trips and were most popular among middle and higher income groups, mothers, and those in the 20–49 age brackets. Yogyakarta becaks did not lead in any trip-purpose category; they were next to motorcycles in school trips, but even here Colt minibuses were gaining on the becaks.

Views about Transport Conditions and LCTs

Users' opinions on general transport or traffic conditions were elicited only in Metro Manila and Bandung, but the other reports do have some observations to offer, especially on the LCTs. According to the Manila commuters, traffic along their routes was light (44%) or medium (36%), but 19% described it as heavy. Despite the localized patterns of their trips, they would prefer to have their work places (35%), schools (28%), and public markets (10%) within walking distance. Opinion on the existing supply of transport facilities was divided among occupational groups, the employer and self-employed groups (58%) tending to find the supply adequate and the wage earners saying it was inadequate. On the whole, traffic problems were not considered critical and, as indicated, jeepneys were favourably viewed by the sample commuters as a public transport mode.

In Bandung, most respondents regarded transport conditions as better than 5 years earlier, especially in terms of the time involved in waiting for public vehicles (82%); however, quality of service left something to be desired (52%

"better" vs 10% "worse"). On becaks, consumer "opinions are moderate with a positive tendency." Nonetheless, 54% of the Bandung respondents favoured banning the becak (although 22% were against) and replacing it with other modes such as the helicak, Bemo, Colt, or motorized becak. Fewer respondents ventured an opinion on the MPTs, but those who did commented positively. The Yogyakarta study concluded that the becak had its advantages and disadvantages — its main failing being its slowness.

Users in Chiang Mai seemed to be divided in their opinion of silors. According to the research report from that city, the sample passengers preferred the silors for two main reasons: their great number, which reduced users' waiting time, and their flexible routes, which permitted shared service. Users also rated silors favourably in terms of trip duration (96%), comfort (76%), and fairness of fares (58%). They also gave silors some negative ratings, however — mainly for the drivers' behaviour and disregard for passengers' safety. By comparison, the samlor drivers were considered more helpful (44%) than the silor drivers (40%), while the street buses were the safest (54%) and the silors the least safe (17%) among the transport modes. In contrast to the positive comments, the respondents suggested reducing the number of silors in favour of the buses to help reduce traffic congestion in the city.

At many points in its report, the Istanbul team stresses the public's largely negative perceptions of the dolmus-minibus system. In sum, the public viewed the system as inadequate, especially in terms of the quality of minibus service and the intentional scarcity of dolmus service during peak-demand periods. Overcrowding, discomfort, and unsavoury behaviour on the part of LCT drivers led the public to see the system as a problem. Lower-income users of minibuses seemed to have little choice but to accept the system, but higher-income dolmus users and private car owners could be more vocal in their dissatisfaction with or opposition to the LCTs.

6 Conclusions and Recommendations

Relying chiefly on the final reports of the five research teams, the preceding chapters describe the settings, physical and operating features, and socioeconomic characteristics of the LCTs and the groups involved in their development and operations. This chapter recapitulates the major objectives, findings, conclusions, and recommendations of the studies, including the suggestions of transport officials whose views were also sought but have not been presented in this report.

The Problems and Aims of the Studies

The Indonesian becak, the Philippine jeepney, the Thai silor, the Turkish dolmus, and other LCTs have played a significant role in providing a locally adapted means of public transport in Asian cities. In the years preceding the studies, however, they had been the object of persistent public criticism, government restrictions, and proposals to phase them out in favour of more modern modes of transport. In the larger cities especially, they were viewed as an uneconomical, unruly, and hazardous means for moving the growing masses of urban populations. Like Western students of traditional and intermediate public transport, however, those engaged in the IDRC studies suspected that LCTs were more beneficial than transport modernizers often assumed, although they could stand some improvement along with other elements of urban transport. As one research team suggested at the start of the project, LCTs might be a solution to be improved rather than a problem to be removed.

The investigations were undertaken to test this hypothesis. Although other studies had preceded the IDRC project or were concurrent with it, little was known at the outset of the LCTs with which the project was most concerned. The research was thus both open-ended and policy-oriented: it was designed to throw light on key aspects and functions of the LCTs and LCT-related groups and thereby provide a baseline for (as well as directly elicit) policy suggestions regarding their role in transport and development in their respective settings.

Strictly speaking, the "before" studies were devoted primarily to the social rather than the technical and economic aspects of LCTs, although some attention was necessarily paid to certain of their physical and "microeconomic" features, e.g., vehicle design, operating capacities, acquisition and running costs, fare structure, and revenues from LCT driving.

For the purposes of this comparative report, a common outline and core questionnaire — based on drafts that the teams prepared earlier — were

developed to guide the studies in the different cities. The researchers were otherwise free, however, to pursue their inquiries into special aspects of their LCTs and to collect, analyze, and report their information as they saw fit. In fact, the objects and methods of their researches and reports did differ in some important respects, e.g., the kinds and sizes of groups sampled, the topics of special studies, and the data and details they presented. Consequently, the results embodied in the five main reports were of varying scope, uneven depth, and limited comparability, so that caution is advisable in drawing conclusions and generalizations across the study cities.

Findings and Conclusions

The results could hardly have been expected to be the same for all the studies, given the differences in their settings and in the specific nature of the LCTs studied as well as in the methods of inquiry used. However, this does not mean that similar observations and conclusions cannot be derived from them.

The LCTs emerged at various times during the postwar period. At the time of the studies, they were operating in cities in different locations and of different sizes, structures, transport systems, and institutional environments. The LCTs themselves had certain obvious physical and technical differences. They had different passenger capacities, operating ranges, service patterns, and regulatory frameworks. The becak had the least carrying capacity, although along with the dolmus and silor it was freer to ply its routes and service areas than the jeepney and buses.

The varying rates and patterns of expansion of the five cities exerted different amounts of public demand for, and regulatory pressures on, the LCTs. One thing they shared, however, was essentially the growing problems of transport resulting from increasing pressure by the urban population on inadequate public transit facilities and by traffic on limited road space. The LCTs bore an important portion of the burden of moving people and goods between the centres and peripheries of these cities and even between the cities and their rural hinterlands. They served various groups and trip purposes, although some LCTs tended to have some detectable specialization in clientele. In Chiang Mai, Metro Manila, and Istanbul, the LCTs accounted for larger proportions of daily ridership than the regular buses, whereas the becak had a smaller and probably declining share as motor vehicles, including private cars, increased in number. Incidentally, the LCTs had also generated an important source of employment and income for considerable numbers of people.

The LCTs had thus gained a significant measure of popularity as a means of transport and source of jobs. However, the studies also suggest that they were by no means without serious shortcomings as adaptations and responses to transport needs and demands. The becaks were apparently becoming outmoded as a public vehicle for larger Indonesian cities and were declining in number and patronage. The jeepney has undergone some technological transition, in terms of size, design, and manufacture, that has made it more tolerable from the Philippine government's standpoint.

As a private business, the LCTs were typically small-scale, independent enterprises managed and operated on an informal basis, with the vehicles either

rented or owner-operated. They had limited capacity for expansion and for higher-level organization. As a public service, their entry and operations were difficult to regulate, although the formal regulations themselves might be absent or unenforced sometimes and LCTs displayed some ability for self-regulation (e.g., in queueing for fares). In plying their trade, the LCTs tended to compete with each other and with other modes for passengers, pickup points, and road space, especially in cities where the routes of different modes were not effectively segregated. Thus, traffic congestion, "anarchy," and hazards resulted, or at least were associated by the public with the LCTs.

The survey findings also cast doubt on the "low-cost" character and economic and social advantages of the LCTs for the groups directly involved. The rates of fare that they charged were generally moderate, but becak fares were high by any standard of comparison. On the other hand, the costs of acquiring, operating, and maintaining LCT vehicles were also high and usually left only small margins of profit. This was especially true for becak and jeepney drivers, most of whom rented the vehicles from their owners. The Chiang Mai and Istanbul drivers, who typically owned their vehicles, seemed better off, although the former had to operate under a cloud on the legal status of their vehicles and the latter had to contend with inflation in the trade of license plates. In general, vehicle drivers and owners regarded LCTs as a financially uncertain business and LCT driving as a hard, low-status occupation. Finally, the quality of their service left something to be desired. By choice and usage, riders clearly preferred LCTs to other modes only in Metro Manila; elsewhere, opinion was divided or negative, particularly in view of their drivers' indifference to public comfort and safety.

As small entrepreneurs, LCT drivers and owners were poorly organized professionally to protect their own interests, except probably in Istanbul and Metro Manila, where mutual-benefit associations and cooperatives existed. Even in these cities, the surveys showed that the associations were far from satisfying to their members and LCTs were facing mounting threats to their role and existence. The becaks had been restricted to certain areas in Bandung, and users there favoured their replacement with the medium-sized MPTs (motorized public transport vehicles such as Colts). In Chiang Mai, users would also like the number of silors reduced in favour of buses and their routes and stations fixed; the authorities had not even legally recognized them as public conveyances and many silor drivers were oblivious of permit requirements. In Istanbul and Metro Manila, official proposals had been made to relegate LCTs to a minor role or, at least on occasion in the case of the jeepney, to phase them out to make way for mass transit systems.

The reports of the study teams, while sympathetic with public complaints against the LCTs' quality of service, see some saving graces and staying power that should deter any drastic measures against these transport modes. They were providing a service that was responsive, flexible, and extensive. According to the Indonesian reports, the becaks complemented rather than competed with the MPTs and supplied a ready, if short-ranged and slow, taxi service for certain trip purposes, groups, and areas less accessible to the MPTs. The silors were given good marks by users for their shared passenger service. The Metro Manila team cites, along with other similar advantages, the adaptability of the jeepney to current community and commuter needs and resources and to the area's changing population and urban environment. It was more maneuverable

for operating and rerouting purposes than the larger public vehicles. To use a phrase applied by a previous student of the jeepney, the Istanbul LCTs were likewise "demand-responsive," although in the case of the "exploitative" dolmus, this was seen by the public as a vice rather than a virtue.

For all their faults, the LCTs were a culturally adapted and still socially necessary service, or so the research reports argue. To be sure, it is difficult to say from the limited evidence collected and presented whether they could withstand more systematic technical and economic analysis. One other socioeconomic demand that they have helped to meet, however, is that for jobs. Although the total numbers and proportions involved were not reported by the studies, the surveys strongly indicated that the LCTs formed a source of employment for a significant segment of the cities' populations, especially low-income and migrant groups with few job options in the modern economic sectors. Many LCT drivers had come to the cities to get jobs as drivers, took up driving as their first job, or eventually engaged in it as a long-term occupation. Weak and unsatisfying as the professional associations might be, those in Metro Manila and Istanbul sometimes demonstrated a capability for pressing or defending their occupational interests.

The dim outlook of LCT drivers and owners on their jobs or enterprises and public dissatisfaction with the quality of their service serve as reminders that LCTs have not been an unmixed blessing. Although they have no doubt contributed their share to transport traffic problems in their cities, the team reports could trace those problems to other causes and transport modes at least as well as to the LCTs. These include the geographic and urban development patterns constraining the operation of various transport modes, deficiencies in road and modal facilities, poor transport policies and traffic regulation or enforcement, and the increasing number and unrestricted use of cars and other private vehicles, which in the case of Istanbul and Metro Manila seem largely to have escaped public criticism.

Recommendations

Three of the five study teams sought the views of transport officials about LCTs, and two of those three also elicited suggestions for improvement from LCT owners and drivers. These are summarized below and the teams' own recommendations are presented where they were explicitly made.

The Metro Manila team interviewed 19 transport officials, from various government agencies and one private organization, and 51 traffic officers. The team in Istanbul queried 20 transport officials and, in addition, an unspecified number of officials involved in LCT in other major Turkish cities. The Thai team derived views about the silor from a "group discussion among Chiang officers" involved in transport regulation in that city.

In all the three cities, the respondents generally agreed that the LCTs played an important role in transportation and should be retained — provided they were improved and integrated in the larger transport system. Other suggestions were also made, especially in Metro Manila where the officials expressed views on various transport problems, including congested thoroughfares, uneven commuting patterns, defective routing and scheduling

of vehicles, irregularities in licensing, proliferation of small-scale operators, transport labour, the high cost of transport capital and operations due to reliance on imported fuels, pollution, organizational fragmentation of transport agencies, faulty traffic engineering and management, lack of training of traffic officers, and recruitment of poorly qualified drivers. The officials also noted that many jeepney owners and drivers were not receptive to the idea of forming cooperatives, probably because of a lack of clear guidelines and adequate funds.

Measures were recommended on most of these problems. Among the essential recommendations was the improvement of the road network in Metro Manila to account for the increasing number of transport vehicles. Another was the integration of both the transport system and the organization for making and implementing transport policies. The integrated transport system, the officials said, should have both "low and high cost components," in terms of the supply of vehicles and of fares, to regulate demand more effectively. Small-scale operators should be aggregated through consortia or cooperatives — some respondents opposed this idea on the ground that it would mix operators with capital debts with those without, and would invite government intervention. For their own part, government agencies engaged in transport planning and regulation should also be integrated, should work with the private sector in planning and development, and should formulate policies more responsive to public needs and demands. System design should consider users' comfort and individual preferences as important demand factors.

The main components of the public transport system in Metro Manila, the officials said, should consist of a railway system, buses, and jeepneys. Subways and monorails were suggested but were considered too expensive. They agreed that buses and jeepneys should continue as the mainstays of mass transit with the jeepneys complementing the buses. They regarded the idea of the jeepney as an LCT mode as practical, but said that it should satisfy at least four standards: it should be economical in terms of fare, efficient, reasonably fast, and safe.

The 51 traffic policemen, drawn from 51 of 476 traffic beats in the four police districts of Metro Manila, generally assessed public transport as adequate but judged the number of traffic personnel and amount of equipment as inadequate. They observed that traffic accidents and violations occurred on their beats, and characterized most drivers — whether jeepney, bus, or private vehicle drivers — as reckless and discourteous. Most of the officers liked their jobs, but thought them too hazardous for their children. Their principal recommendations were for better screening of drivers and improved law enforcement. They also suggested traffic education for commuters, pedestrians, and sidewalk vendors, increased traffic equipment, and wider streets. As in the case of the transport officials, the traffic officers did not seem to have singled out the LCTs as a primary source of problems.

Jeepney owners were also queried on needed improvements in Metro Manila. They considered that registration and licensing fees should be reduced, and traffic rules should be better enforced to ease traffic flow and minimize unnecessary apprehensions of jeepney drivers. They also suggested that extortion should be eliminated, that drivers should maintain their vehicles better, and that the riding public should be more cooperative, e.g., in paying

fares and getting off and on at jeepney stops. They also recommended the reduction in the total number of vehicles, especially cars, in favour of more public vehicles, widening of streets, separate routes for public vehicles, and price support for jeepney gasoline and spare parts.

In Istanbul, there was some variation in the views of officials about the dolmus-minibus system as a problem and as a solution. Transport specialists in the municipality of Istanbul recognized the importance of the LCTs' services, but suggested that they should be integrated within a larger and more effective transport system, preferably one that included rail transit. Traffic officials and IETTA, the municipal bus authority, regarded the LCTs as an effective solution under existing circumstances, but prescribed stricter regulation as well as improvements in mass-transport facilities and infrastructure. Representatives of an LCT drivers' organization agreed that better regulation was needed, but argued that LCTs should not be restricted in favour of private cars.

LCT drivers themselves did not necessarily see much better prospects from proposed changes in Istanbul's transport system. In fact, many of them expected the dolmus-minibus modes to be adversely affected by proposals for "metro" or rail mass transit and improved bus transport. Others, however, thought that these would not hurt the LCTs, or even expected benefits for them in the form of reduced congestion in the central sections of Istanbul. This would mean smoother flow of traffic and better business for LCTs, to the extent that they would retain a share of public transport routes.

In Chiang Mai, the government transport officials with whom the study team conferred likewise acknowledged the important role of the silor in city and intercity transport. They agreed that the silor service should be legalized and its providers organized as a cooperative. However, they also indicated that the silor's safety standards and quality of service should be upgraded. Moreover, its operations should be regulated by the provincial transportation office in cooperation with the provincial police department. Finally, traffic education and training are needed for silor drivers to minimize their bad driving behaviour, which stemmed from competition for fares and misunderstanding of traffic rules.

The various study teams generally agreed that the LCTs in their cities should be retained and improved with their transport systems. Only the Istanbul team, however, made any extensive recommendations of its own.

The Istanbul team stressed the negative perceptions that prevailed about the dolmus-minibus system but attributed them to rapid increases in the number of private cars, their unlimited use in the city, the inadequacy of the road network, and lack of respect for traffic regulations. On the other hand, LCTs were also seen as a positive element in mass transport given its present state and the level of development of Turkish society. In the study team's thinking, this positive view of LCTs was reinforced by the apparent difficulty in setting effective policies for an alternative transport system and in organizing suitable legal and administrative mechanisms to implement such policies.

The Istanbul report proposed both short- and long-term measures for improvement. The former would include physical and credit facilities for LCT vehicle repair and maintenance, and production facilities for the gradual replacement of the existing LCT stock with standard, locally made vehicles. This stemmed from the team's expectation that the older, imported, dolmus vehicles would eventually wear out, while the compacts being made locally were

not good substitutes. To improve LCT operations, service zones and routes, the road network and terminals, priorities among modes, parking facilities, restrictions on private cars, and staggered working hours should be established. The team also recommended enlargement of the bus fleet, integration of LCT, bus, rail, and ferry systems, assignment of enough vehicles to zones and routes, banning of private cars from operation as dolmus and taxis, prohibition of taxi operation by dolmus vehicles, and regulation of fare practices.

Other short-term prescriptions of the Istanbul team included traffic education for all groups concerned, an effective social security system to encourage more responsible people to enter and remain in the business, encouragement of closer ties between LCT drivers and their associations, and education of policymakers as well as academicians on the merits of the LCTs in the context of the larger transport system. The report pointed out that supplementary measures would be needed to effect those mentioned above; for example, expanding the traffic force, putting more "teeth" into penalties for traffic violation, and integrating the administrative machinery for urban transport in Istanbul.

The long-term measures for Istanbul would include formulation and implementation of plans and policies to ensure that land-use transport modes complement each other at various spatial scales; to channel growth away from pressure points in the city; to integrate residence, work, and other activities; and to interrelate LCT and other modes, so that travel is facilitated and unnecessary trips are minimized. According to the report, however, these proposals are based on the assumption that the LCTs would be retained. Although the case for retention has been presented, the team expected some reduction in the LCTs' role and profitability as a result of the introduction of alternative forms of transport and tighter regulation of LCT operations.

The concluding section of the Metro Manila report restated its findings that the jeepney had continued to be the mainstay of public transport in the area despite proposals to phase it out, that the real causes of the traffic problems lay in overconcentration of activities in small areas of the metropolis and in the proliferation of cars and other vehicles, and that it would not be easy to replace 17 000 jeepneys and the jobs of 34 000 drivers and 6000 operators depending on the jeepney for a living. The recommendations of its respondents aside, the Manila team's proposal was mainly to enhance the capacity of the existing transport system through more effective traffic management and regulation with the jeepney taken as an integral part of the transport system. It suggested that traffic policies could be made more comprehensive, consistent, and better enforced through a centralized traffic agency and more adequate control equipment.

In its concluding section, the Chiang Mai report first reviewed the transport situation and traffic problems in and around the city. It then briefly listed five recommendations: legalization of the silor as a public passenger vehicle by the provincial land transport office; stimulation of the silor cooperative; an intensive study of, and program to improve, the working conditions of silor drivers; institution of certain traffic rules, e.g., one-way streets and parking restrictions, to minimize congestion in central areas; and traffic and driving education for the public through mass media and interagency cooperation.

The Indonesian reports similarly concluded with the reaffirmation of the

values of the becak as well as its problems and circumstances. Their strongest suggestion was to consider this LCT as a still-useful form of transport for the public and a labour-intensive source of livelihood for many poor people.

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