

## CHAPTER 3

## TRAFFIC STUDY

## Traffic Studies for the Ban Khai-Ban Bung Feeder Road

To understand the movement of existing traffic on the Ban Khai-Ban Bung Feeder Road, a traffic census was conducted at a station 300 meters north of the Ban Khai market. The station was situated at the intersection of the feeder road with a road which serves an irrigation project; the site is identified in Fig. 2. The reason for selecting this site was to ensure that the traffic travelling on the irrigation project road, as well as that moving on the Ban Khai-Ban Bung feeder road, would be studied. A manual traffic volume count recorded the two-direction traffic volumes from 0530 to 2230 hrs over a four-day period. Traffic was classified into nine types of vehicles: motorcycles, passenger cars, light buses (minibuses), heavy buses, light trucks (4-wheel trucks or pick-ups), heavy trucks (6-wheel trucks), 3-axle heavy trucks (10-wheel trucks), farm tractors, and oxcarts. Recording of the traffic volumes continued for 24 hours on the first survey day to provide for expansion of the subsequent 17-hour counts to 24-hour volumes. The manual counting was done from Friday, 26<sup>th</sup> November 1976, through Monday, 29<sup>th</sup> November 1976; the

data are shown in Tables 5, 6, 7, and 8. The percentage distribution by type of vehicle for each day was calculated and is shown in the same tables. Table 9 is a summary of the traffic volumes occurring each day during the survey period with the volumes expanded to 24-hour values.

It was found that traffic on the Ban Khai-Ban Bung feeder road at the study site was dominated by motorcycles. On average, 60.7 percent of the total volume were motorcycles. The second most significant type of vehicle on this road was light trucks, averaging 20.5 percent of the total volume. Heavy trucks were the third most significant type, this class accounted for 9 percent of the total traffic volume. During the four-day survey period -- Friday, Saturday, Sunday, and Monday -- the 24-hour volume on Monday (2220 veh./day) was higher than those of the other days; next in rank was Friday (2147 veh./day). Traffic volumes on the weekend days, Saturday (1913 veh./day) and Sunday (2071 veh./day), were lower than those of the two working days.

From Fig. 5, the traffic patterns on the Ban Khai-Ban Bung feeder road displayed three peak periods on Friday: 08.00-09.00 hrs, 13.00-14.00 hrs, and 16.00-17.00 hrs. On Saturday, the traffic volume seemed not to vary much between 07.00 and 17.00 hrs. The greatest volume was in 17.00 to 18.00 hrs period. The traffic volume on Sunday showed some

Table 5 - Traffic Volume Record by Manual Count: Friday 26<sup>th</sup> November 1976

| Time        | MC    | PC  | Light Buses | Heavy Buses | Light Trucks | Heavy Trucks | 3-axle Trucks | Farm Tractors | Oxcarts | Total |
|-------------|-------|-----|-------------|-------------|--------------|--------------|---------------|---------------|---------|-------|
| 0530 - 0600 | 3     | 0   | 1           | 0           | 1            | 1            | 1             | 0             | 0       | 7     |
| 0600 - 0700 | 55    | 0   | 8           | 0           | 18           | 6            | 1             | 0             | 0       | 88    |
| 0700 - 0800 | 96    | 0   | 2           | 1           | 49           | 5            | 5             | 1             | 0       | 159   |
| 0800 - 0900 | 131   | 3   | 18          | 3           | 32           | 7            | 0             | 4             | 0       | 198   |
| 0900 - 1000 | 98    | 4   | 4           | 7           | 39           | 8            | 1             | 2             | 0       | 163   |
| 1000 - 1100 | 66    | 2   | 12          | 2           | 27           | 10           | 0             | 0             | 0       | 119   |
| 1100 - 1200 | 71    | 0   | 6           | 4           | 29           | 7            | 0             | 2             | 0       | 119   |
| 1200 - 1300 | 77    | 1   | 2           | 2           | 35           | 7            | 0             | 1             | 0       | 125   |
| 1300 - 1400 | 104   | 1   | 6           | 4           | 44           | 15           | 0             | 3             | 0       | 177   |
| 1400 - 1500 | 83    | 4   | 10          | 3           | 28           | 13           | 0             | 0             | 0       | 141   |
| 1500 - 1600 | 75    | 5   | 4           | 2           | 26           | 5            | 0             | 1             | 0       | 118   |
| 1600 - 1700 | 120   | 3   | 7           | 3           | 36           | 13           | 0             | 1             | 0       | 183   |
| 1700 - 1800 | 98    | 3   | 10          | 0           | 26           | 14           | 0             | 0             | 0       | 151   |
| 1800 - 1900 | 104   | 7   | 4           | 2           | 24           | 16           | 2             | 2             | 0       | 161   |
| 1900 - 2000 | 39    | 2   | 4           | 0           | 18           | 11           | 0             | 2             | 0       | 76    |
| 2000 - 2100 | 26    | 0   | 1           | 0           | 9            | 10           | 0             | 1             | 0       | 47    |
| 2100 - 2200 | 10    | 1   | 1           | 0           | 4            | 8            | 0             | 1             | 0       | 25    |
| 2200 - 2300 | 11    | 0   | 1           | 0           | 5            | 5            | 0             | 0             | 0       | 22    |
| 2300 - 2400 | 4     | 0   | 0           | 0           | 1            | 0            | 0             | 0             | 0       | 5     |
| Totals      | 1,271 | 36  | 101         | 33          | 451          | 161          | 10            | 21            | 0       | 2,084 |
| Percent     | 61.0  | 1.8 | 4.8         | 1.6         | 21.6         | 7.7          | 0.5           | 1.0           | 0       | 100   |

Table 6 - Traffic Volume Record by Manual Count: Saturday, 27<sup>th</sup> November 1976

| Time        | MC    | PC  | Light Buses | Heavy Buses | Light Trucks | Heavy Trucks | 3-axle Trucks | Farm Tractors | Oxcarts | Total |
|-------------|-------|-----|-------------|-------------|--------------|--------------|---------------|---------------|---------|-------|
| 0000 - 0100 | 8     | 0   | 1           | 0           | 1            | 3            | 0             | 0             | 0       | 13    |
| 0100 - 0200 | 8     | 0   | 0           | 0           | 1            | 0            | 0             | 0             | 0       | 9     |
| 0200 - 0300 | 16    | 1   | 1           | 0           | 2            | 0            | 4             | 0             | 0       | 24    |
| 0300 - 0400 | 4     | 0   | 0           | 0           | 2            | 0            | 0             | 0             | 0       | 6     |
| 0400 - 0500 | 1     | 0   | 1           | 0           | 2            | 0            | 0             | 0             | 0       | 4     |
| 0500 - 0600 | 6     | 0   | 2           | 0           | 3            | 4            | 0             | 0             | 0       | 15    |
| 0600 - 1700 | 53    | 0   | 2           | 0           | 14           | 6            | 0             | 2             | 0       | 77    |
| 0700 - 0800 | 99    | 3   | 6           | 1           | 25           | 10           | 0             | 1             | 0       | 145   |
| 0800 - 0900 | 80    | 6   | 9           | 5           | 25           | 16           | 1             | 0             | 0       | 142   |
| 0900 - 1000 | 76    | 6   | 7           | 3           | 30           | 9            | 0             | 1             | 0       | 132   |
| 1000 - 1100 | 68    | 5   | 6           | 3           | 34           | 8            | 0             | 3             | 0       | 127   |
| 1100 - 1200 | 77    | 4   | 5           | 3           | 23           | 13           | 1             | 0             | 0       | 126   |
| 1200 - 1300 | 69    | 5   | 7           | 2           | 25           | 11           | 1             | 0             | 0       | 120   |
| 1300 - 1400 | 70    | 7   | 3           | 4           | 26           | 14           | 0             | 0             | 0       | 124   |
| 1400 - 1500 | 77    | 1   | 5           | 2           | 19           | 11           | 0             | 1             | 0       | 116   |
| 1500 - 1600 | 80    | 0   | 4           | 1           | 29           | 5            | 0             | 2             | 1       | 122   |
| 1600 - 1700 | 85    | 5   | 11          | 3           | 21           | 6            | 0             | 1             | 0       | 132   |
| 1700 - 1800 | 96    | 11  | 5           | 2           | 35           | 9            | 0             | 0             | 0       | 158   |
| 1800 - 1900 | 65    | 4   | 5           | 1           | 23           | 17           | 0             | 1             | 0       | 116   |
| 1900 - 2000 | 54    | 3   | 3           | 0           | 17           | 9            | 0             | 1             | 0       | 87    |
| 2000 - 2100 | 32    | 2   | 3           | 0           | 9            | 9            | 0             | 1             | 0       | 56    |
| 2100 - 2200 | 16    | 3   | 3           | 0           | 5            | 7            | 0             | 0             | 1       | 35    |
| Totals      | 1,140 | 66  | 89          | 30          | 371          | 167          | 7             | 14            | 2       | 1,836 |
| Percent     | 60.4  | 3.5 | 4.7         | 1.6         | 19.7         | 8.9          | 0.4           | 0.7           | 0.1     | 100   |

Table 7 - Traffic Volume Record by Manual Count: Sunday, 28<sup>th</sup> November 1976

| Time        | MC    | PC  | Light Buses | Heavy Buses | Light Trucks | Heavy Trucks | 3-axle Trucks | Farm Tractors | Oxcarts | Total |
|-------------|-------|-----|-------------|-------------|--------------|--------------|---------------|---------------|---------|-------|
| 0530 - 0600 | 4     | 0   | 1           | 0           | 7            | 2            | 1             | 0             | 0       | 15    |
| 0600 - 0700 | 55    | 4   | 5           | 0           | 17           | 10           | 0             | 2             | 0       | 93    |
| 0700 - 0800 | 90    | 1   | 3           | 0           | 23           | 7            | 1             | 1             | 0       | 126   |
| 0800 - 0900 | 107   | 1   | 10          | 5           | 36           | 11           | 0             | 1             | 0       | 171   |
| 0900 - 1000 | 94    | 7   | 5           | 6           | 37           | 10           | 0             | 0             | 0       | 159   |
| 1000 - 1100 | 99    | 0   | 4           | 2           | 28           | 9            | 0             | 2             | 0       | 144   |
| 1100 - 1200 | 75    | 6   | 2           | 2           | 17           | 11           | 0             | 0             | 0       | 113   |
| 1200 - 1300 | 81    | 1   | 2           | 3           | 31           | 21           | 0             | 2             | 0       | 141   |
| 1300 - 1400 | 84    | 8   | 5           | 3           | 24           | 12           | 0             | 0             | 0       | 136   |
| 1400 - 1500 | 95    | 4   | 9           | 4           | 29           | 20           | 0             | 0             | 0       | 161   |
| 1500 - 1600 | 79    | 5   | 3           | 3           | 24           | 8            | 0             | 1             | 0       | 123   |
| 1600 - 1700 | 94    | 4   | 7           | 1           | 28           | 14           | 0             | 2             | 0       | 150   |
| 1700 - 1800 | 99    | 4   | 9           | 3           | 31           | 18           | 0             | 1             | 0       | 165   |
| 1800 - 1900 | 74    | 3   | 6           | 1           | 30           | 10           | 0             | 0             | 0       | 124   |
| 1900 - 2000 | 42    | 0   | 1           | 0           | 17           | 8            | 1             | 1             | 0       | 70    |
| 2000 - 2100 | 36    | 0   | 3           | 0           | 9            | 6            | 0             | 0             | 0       | 54    |
| 2100 - 2200 | 14    | 3   | 2           | 0           | 2            | 9            | 0             | 1             | 0       | 31    |
| 2200 - 2230 | 8     | 0   | 2           | 0           | 3            | 3            | 0             | 0             | 0       | 16    |
| Totals      | 1,230 | 51  | 79          | 33          | 393          | 189          | 3             | 14            | 0       | 1,992 |
| Percent     | 61.6  | 2.6 | 4.0         | 1.7         | 19.7         | 9.5          | 0.2           | 0.7           | 0.0     | 100   |

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Table 8 - Traffic Volume Record by Manual Count: Monday, 29<sup>th</sup> November 1976

| Time        | MC    | PC  | Light Buses | Heavy Buses | Light Trucks | Heavy Trucks | 3-axle Trucks | Farm Tractors | Oxcarts | Total |
|-------------|-------|-----|-------------|-------------|--------------|--------------|---------------|---------------|---------|-------|
| 0530 - 0600 | 5     | 0   | 0           | 0           | 5            | 4            | 3             | 0             | 1       | 18    |
| 0600 - 0700 | 81    | 1   | 2           | 0           | 14           | 10           | 0             | 0             | 0       | 108   |
| 0700 - 0800 | 126   | 3   | 7           | 1           | 29           | 11           | 6             | 1             | 0       | 184   |
| 0800 - 0900 | 128   | 4   | 7           | 4           | 27           | 9            | 0             | 2             | 0       | 181   |
| 0900 - 1000 | 120   | 0   | 5           | 4           | 41           | 13           | 1             | 1             | 0       | 185   |
| 1000 - 1100 | 77    | 2   | 5           | 1           | 35           | 16           | 0             | 2             | 0       | 138   |
| 1100 - 1200 | 67    | 2   | 5           | 3           | 33           | 14           | 0             | 2             | 0       | 126   |
| 1200 - 1300 | 76    | 4   | 5           | 3           | 24           | 12           | 4             | 1             | 0       | 129   |
| 1300 - 1400 | 71    | 2   | 3           | 3           | 39           | 12           | 3             | 2             | 0       | 135   |
| 1400 - 1500 | 64    | 3   | 4           | 3           | 25           | 7            | 2             | 1             | 0       | 109   |
| 1500 - 1600 | 74    | 3   | 9           | 1           | 28           | 16           | 5             | 2             | 0       | 138   |
| 1600 - 1700 | 118   | 0   | 11          | 2           | 29           | 16           | 5             | 2             | 0       | 183   |
| 1700 - 1800 | 111   | 2   | 9           | 2           | 33           | 14           | 0             | 3             | 0       | 174   |
| 1800 - 1900 | 67    | 4   | 1           | 1           | 37           | 17           | 3             | 2             | 0       | 132   |
| 1900 - 2000 | 48    | 3   | 9           | 1           | 26           | 22           | 2             | 0             | 0       | 111   |
| 2000 - 2100 | 27    | 0   | 0           | 0           | 13           | 7            | 0             | 2             | 0       | 49    |
| 2100 - 2200 | 15    | 0   | 1           | 0           | 8            | 8            | 0             | 1             | 0       | 33    |
| 2200 - 2230 | 4     | 0   | 0           | 0           | 1            | 3            | 0             | 0             | 0       | 8     |
| Totals      | 1,279 | 33  | 83          | 29          | 447          | 211          | 34            | 24            | 1       | 2,141 |
| Percent     | 59.7  | 1.5 | 3.9         | 1.4         | 20.9         | 9.8          | 1.6           | 1.1           | 0.1     | 100   |

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Table 9 - Summary of Daily Traffic Volumes\*

| Date                                     | Time, hrs   | Hours | Traffic Volume, veh/period |
|--|-------------|-------|----------------------------|
| Friday, 26 <sup>th</sup> November 1976   | 0530 - 2400 | 18.5  | 2,084                      |
|  | 0000 - 2400 | 24    | 2,147 <sup>a</sup>         |
| Saturday, 27 <sup>th</sup> November 1976 | 0000 - 2200 | 22    | 1,886                      |
|  | 0000 - 2400 | 24    | 1,913 <sup>b</sup>         |
| Sunday, 28 <sup>th</sup> November 1976   | 0530 - 2230 | 17    | 1,992                      |
|  | 0000 - 2400 | 24    | 2,071 <sup>c</sup>         |
| Monday, 29 <sup>th</sup> November 1976   | 0530 - 2230 | 17    | 2,141                      |
|  | 0000 - 2400 | 24    | 2,220 <sup>d</sup>         |

\* Survey station situated 300 meters north of the Ban Khai market on the Ban Khai-Ban Bung feeder road.

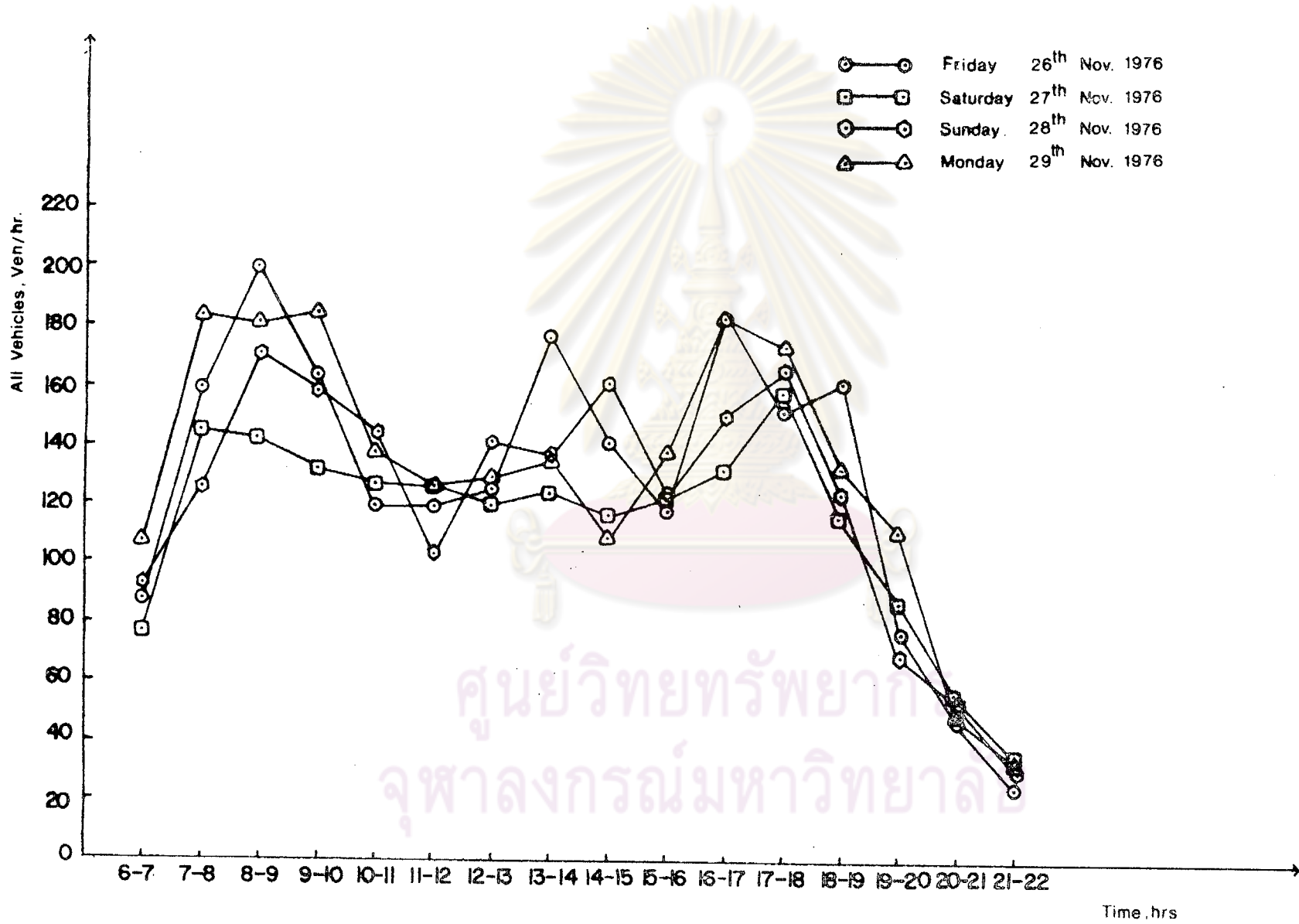
Incremental volumes for expansion

<sup>a</sup> Table 2: from 0000 hrs to 0530 hrs, traffic volume = 63 vehicles(est.)

<sup>b</sup> Table 1: from 2200 hrs to 2400 hrs, traffic volume = 27 vehicles

<sup>c,d</sup> [ Table 2: from 0000 hrs to 0530 hrs, traffic volume = 63 vehicles  
 Table 1: from 2230 hrs to 2400 hrs, traffic volume = 16 vehicles(est.) ]

Fig 5 - Traffic Patterns on the Ban Khai - Ban Bung Feeder Road



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evidence of peaking three times, as occurred on Friday. On Monday, there were two peak periods, 0700 to 10.00 hrs and 16.00 to 17.00 hrs. The two peak periods on the working days were likely caused by trips generated by government offices, schools, and markets in the study area.

Traffic volumes on the Ban Khai-Ban Bung feeder road from 1974 to 1976 were recorded by the Highway Department. Surveys were conducted in March and August of each year; thus, two sets of traffic volumes were available for each year. The traffic volume data for 1974 through 1976 as reported by the Highway Department are shown in Appendix A, Tables A1 through A6. From these data, it was found that traffic volumes in March were higher than those in August of every survey year. Traffic volume in the same month in each of the three survey years did not vary greatly. About 53 percent of the total volume was reported to be motorcycles.

Caution must be exercised in using these data because there are two suspicious points in this information. First, the numbers of passenger cars on 10<sup>th</sup> - 11<sup>st</sup> August, 1976 seems unreasonably low, compared to the data for passenger cars reported in the other five surveys. Second, traffic volumes reported for several types of vehicles in March 1976 are identical in part with those shown for March 1975. Such strong similarity raises questions of accuracy or integrity of the observers.

## Vehicle Registration

For analysis of vehicle registration in the changwads traversed by the Ban Khai-Ban Bung feeder road, vehicles were grouped into three classes: (1) cars and taxis, (2) trucks and buses, and (3) motorcycles. Data on vehicle registration in the whole Kingdom of Thailand, the seven changwads comprising Eastern Thailand, and Changwads Rayong and Chonburi are tabulated in Tables 10 through 13. Figs. 6 through 19 are graphs showing the growth indices of registered vehicles from 1967 through 1974 or 1975. Table 14 summarizes the vehicle registration growth factors for 1974 as compared to 1967. The following results are drawn from these data.

### Registrations in the Whole Kingdom

The growth of vehicle registration in the whole Kingdom increased by a factor of 2.28 for the seven-year period from 1967 to 1974. The growth is characterized by an increasing annual registration. Car and taxi registrations in the Kingdom increased at nearly the same rate as that of trucks and buses in the seven-year period: 2.48 for cars and taxis; 2.47 for trucks and buses. Motorcycle growth was 2.08 for the period 1967 to 1974.

Table 10 - Vehicle Registration: Kingdom of Thailand

| Year | Cars and<br>Taxis | Index | Trucks and<br>Buses | Index | Motorcycles | Index | Total<br>Vehicles | Index |
|------|-------------------|-------|---------------------|-------|-------------|-------|-------------------|-------|
| 1967 | 115,394           | 1.00  | 99,537              | 1.00  | 212,808     | 1.00  | 427,739           | 1.00  |
| 1968 | 125,574           | 1.09  | 102,397             | 1.03  | 248,028     | 1.17  | 475,999           | 1.11  |
| 1969 | 167,715           | 1.45  | 119,754             | 1.20  | 282,915     | 1.33  | 570,384           | 1.33  |
| 1970 | 212,881           | 1.84  | 146,152             | 1.47  | 333,708     | 1.57  | 692,741           | 1.62  |
| 1971 | 199,396           | 1.73  | 154,642             | 1.55  | 348,801     | 1.64  | 702,839           | 1.64  |
| 1972 | 207,382           | 1.80  | 167,694             | 1.68  | 361,718     | 1.70  | 736,794           | 1.72  |
| 1973 | 225,221           | 1.95  | 192,634             | 1.94  | 389,811     | 1.83  | 807,666           | 1.89  |
| 1974 | 286,225           | 2.48  | 245,723             | 2.47  | 442,636     | 2.08  | 974,584           | 2.28  |
| 1975 | NA                | -     | NA                  | -     | NA          | -     | -                 | -     |

Source: National Statistical Office, Bangkok.



Table 11 - Vehicle Registration: Seven Changwads in Eastern Thailand\*

| Year | Cars and<br>Taxis | Index | Trucks and<br>Buses | Index | Motorcycles | Index | Total<br>Vehicles | Index |
|------|-------------------|-------|---------------------|-------|-------------|-------|-------------------|-------|
| 1967 | 5,388             | 1.00  | 14,535              | 1.00  | 22,222      | 1.00  | 42,145            | 1.00  |
| 1968 | 6,777             | 1.26  | 11,025              | 0.76  | 26,600      | 1.20  | 44,402            | 1.05  |
| 1969 | 6,831             | 1.27  | 13,918              | 0.96  | 29,753      | 1.34  | 50,502            | 1.20  |
| 1970 | 8,433             | 1.57  | 22,648              | 1.56  | 41,163      | 1.85  | 72,244            | 1.71  |
| 1971 | 8,771             | 1.63  | 23,618              | 1.62  | 42,737      | 1.92  | 75,126            | 1.78  |
| 1972 | 9,566             | 1.78  | 26,814              | 1.84  | 43,753      | 1.97  | 80,133            | 1.90  |
| 1973 | 9,837             | 1.83  | 30,358              | 2.09  | 41,915      | 1.89  | 82,110            | 1.95  |
| 1974 | 11,600            | 2.15  | 41,121              | 2.83  | 55,167      | 2.48  | 107,888           | 2.56  |
| 1975 | 11,994            | 2.23  | 42,617              | 2.93  | 54,577      | 2.46  | 109,188           | 2.59  |

\* Rayong, Chonburi, Chantaburi, Trad, Chacheongsao, Nakorn Na-Yok, and Prachinburi.

Source: National Statistical Office, Bangkok

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Table 12 - Motor Vehicle Registration: Changwad Rayong

| Year | Cars and Taxis |       | Trucks and Buses |       | Motorcycles |       | Total Vehicles |       |
|------|----------------|-------|------------------|-------|-------------|-------|----------------|-------|
|      |                | Index |                  | Index |             | Index |                | Index |
| 1967 | 429            | 1.00  | 1,875            | 1.00  | 3,803       | 1.00  | 6,107          | 1.00  |
| 1968 | 530            | 1.24  | 2,297            | 1.23  | 4,509       | 1.19  | 7,336          | 1.20  |
| 1969 | 698            | 1.63  | 3,182            | 1.70  | 6,709       | 1.76  | 10,589         | 1.73  |
| 1970 | 875            | 2.04  | 4,261            | 2.27  | 9,245       | 2.43  | 14,381         | 2.35  |
| 1971 | 747            | 1.74  | 3,597            | 1.92  | 8,576       | 2.26  | 12,920         | 2.12  |
| 1972 | 753            | 1.76  | 4,159            | 2.22  | 7,065       | 1.86  | 11,977         | 1.96  |
| 1973 | 748            | 1.74  | 5,700            | 3.04  | 10,825      | 2.85  | 17,273         | 2.83  |
| 1974 | 740            | 1.72  | 5,852            | 3.12  | 11,996      | 3.15  | 18,588         | 3.04  |
| 1975 | 791            | 1.84  | 6,013            | 3.21  | 10,149      | 2.67  | 16,953         | 2.78  |

Source: National Statistical Office, Bangkok

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Table 13 - Motor Vehicle Registration: Changwad Chanburi

| Year | Cars and<br>Taxis | Index | Trucks and<br>Buses | Index | Motorcycles | Index | Total<br>Vehicles | Index |
|------|-------------------|-------|---------------------|-------|-------------|-------|-------------------|-------|
| 1967 | 3,656             | 1.00  | 9,120               | 1.00  | 7,726       | 1.00  | 20,502            | 1.00  |
| 1968 | 4,560             | 1.25  | 4,951               | 0.54  | 8,743       | 1.13  | 18,254            | 0.89  |
| 1969 | 3,905             | 1.07  | 5,850               | 0.64  | 8,892       | 1.15  | 18,647            | 0.91  |
| 1970 | 5,053             | 1.38  | 13,060              | 1.43  | 15,796      | 2.04  | 33,909            | 1.65  |
| 1971 | 5,322             | 1.46  | 14,075              | 1.54  | 18,100      | 2.34  | 37,497            | 1.83  |
| 1972 | 5,456             | 1.49  | 15,366              | 1.68  | 20,300      | 2.63  | 41,122            | 2.01  |
| 1973 | 5,776             | 1.58  | 16,698              | 1.83  | 23,250      | 3.01  | 45,724            | 2.23  |
| 1974 | 7,363             | 2.01  | 25,648              | 2.81  | 25,610      | 3.31  | 58,621            | 2.86  |
| 1975 | 7,693             | 2.10  | 26,237              | 2.88  | 26,576      | 3.44  | 60,506            | 2.95  |

Source: National Statistical Office, Bangkok



Table 14 - Vehicle Registration and Growth Factors: 1967 and 1974

| Area                       | Cars and Taxis |         |                | Trucks and Buses |         |                | Motorcycles |         |                | Total Vehicles |         |                |
|----------------------------|----------------|---------|----------------|------------------|---------|----------------|-------------|---------|----------------|----------------|---------|----------------|
|                            | 1967           | 1974    | Growth Factors | 1967             | 1974    | Growth Factors | 1967        | 1974    | Growth Factors | 1967           | 1974    | Growth Factors |
| Kingdom                    | 115,394        | 286,225 | 2.48           | 99,537           | 245,723 | 2.47           | 212,808     | 442,636 | 2.08           | 427,739        | 974,584 | 2.28           |
| Seven Eastern<br>Changwads | 5,388          | 11,600  | 2.15           | 14,535           | 41,121  | 2.83           | 22,222      | 55,167  | 2.48           | 42,145         | 107,888 | 2.56           |
| Rayong                     | 429            | 740     | 1.72           | 1,875            | 5,852   | 3.12           | 3,803       | 11,996  | 3.15           | 6,107          | 18,588  | 3.04           |
| Chonburi                   | 3,656          | 7,363   | 2.01           | 9,120            | 25,648  | 2.81           | 7,726       | 25,610  | 3.31           | 20,502         | 58,621  | 2.86           |

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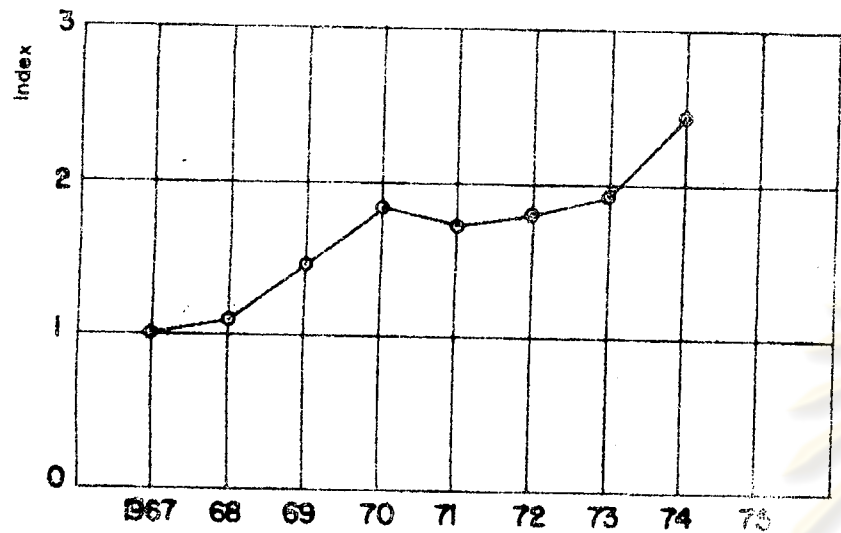


Fig. 6 - Registration of Cars and Taxis :  
Kingdom of Thailand

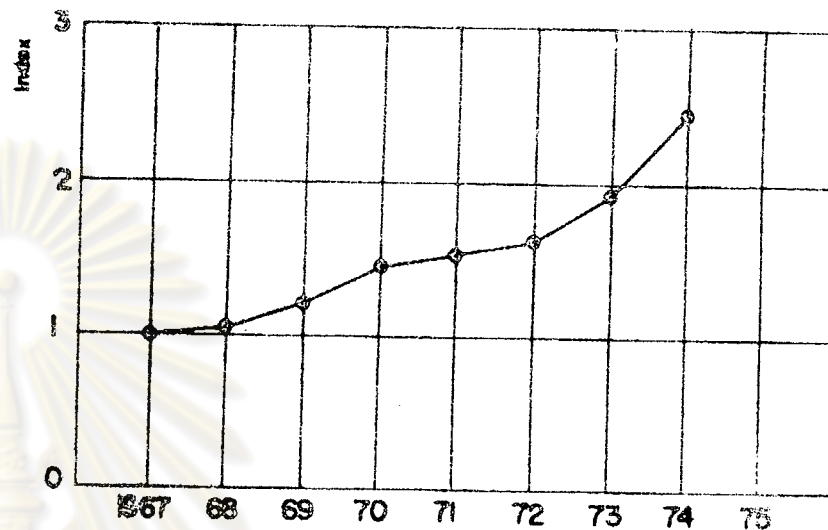


Fig. 7 - Registration of Trucks and Buses :  
Kingdom of Thailand

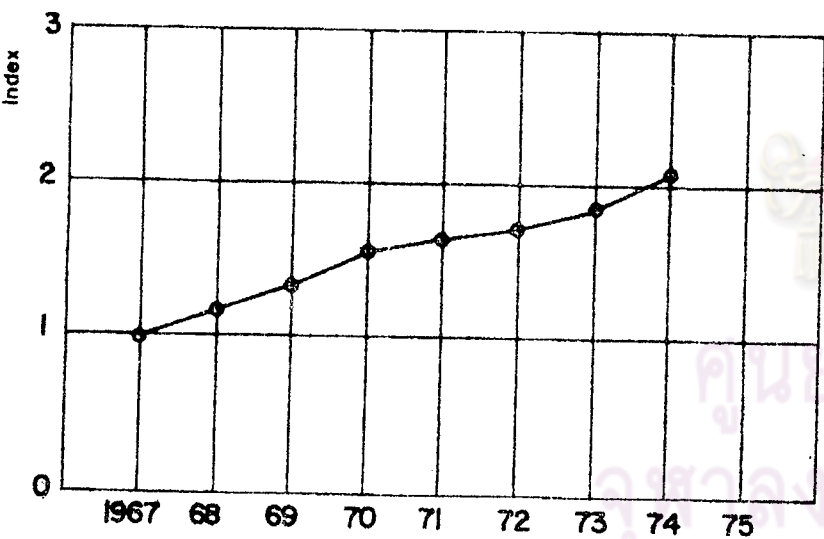


Fig. 8 - Registration of Motorcycles :  
Kingdom of Thailand

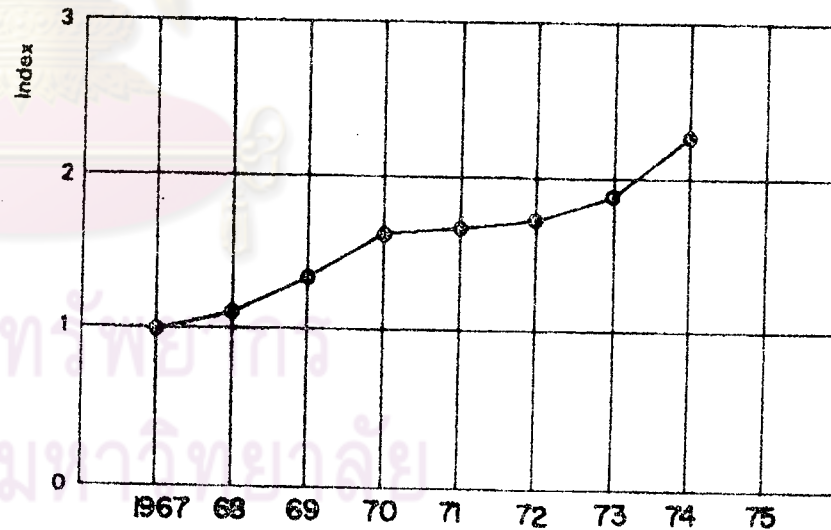


Fig. 9 - All Vehicle Registration :  
Kingdom of Thailand

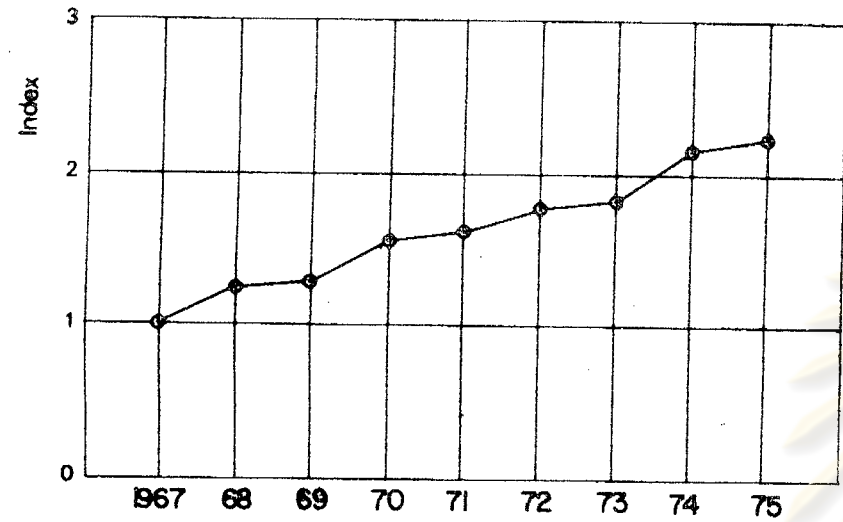


Fig. 10 — Registration of Cars and Taxis :

Seven Changwads in Eastern Thailand

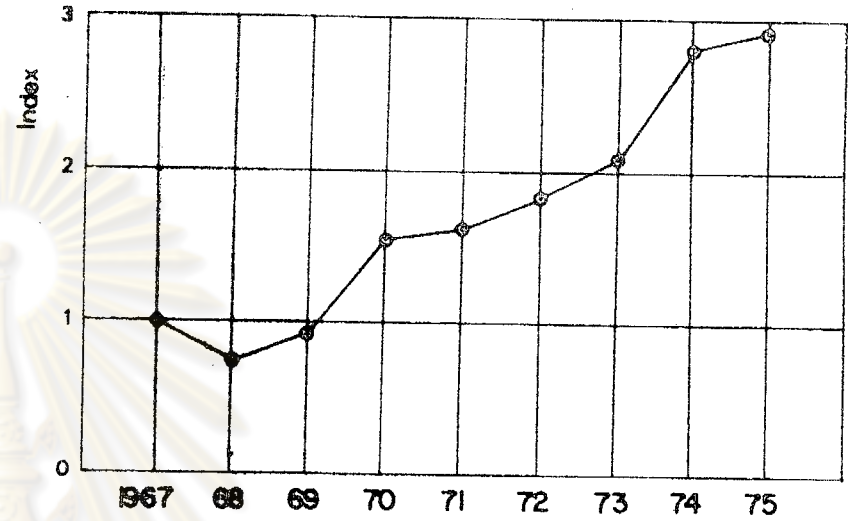


Fig. 11 — Registration of Trucks and Buses :

Seven Changwads in Eastern Thailand

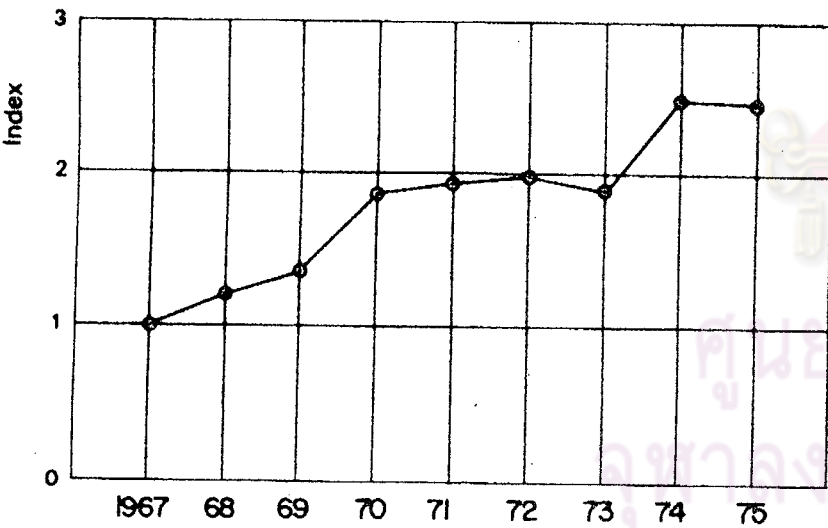


Fig. 12 — Registration of Motorcycles :

Seven Changwads in Eastern Thailand

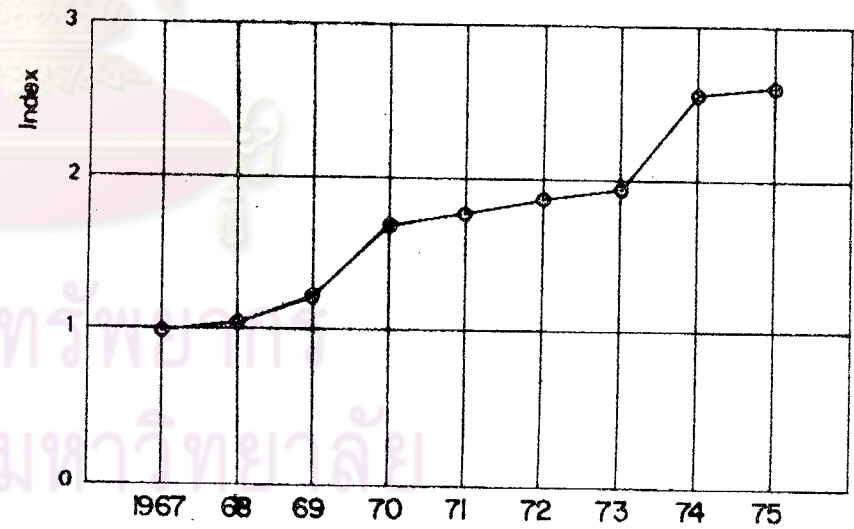


Fig. 13 — All Vehicle Registration :

Seven Changwads in Eastern Thailand

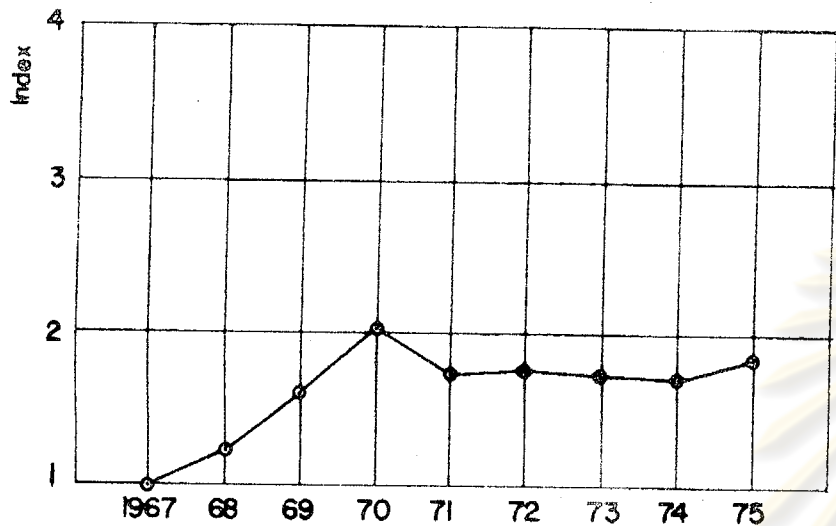


Fig. 14 - Registration of Cars and Taxis :  
Changwad Rayong

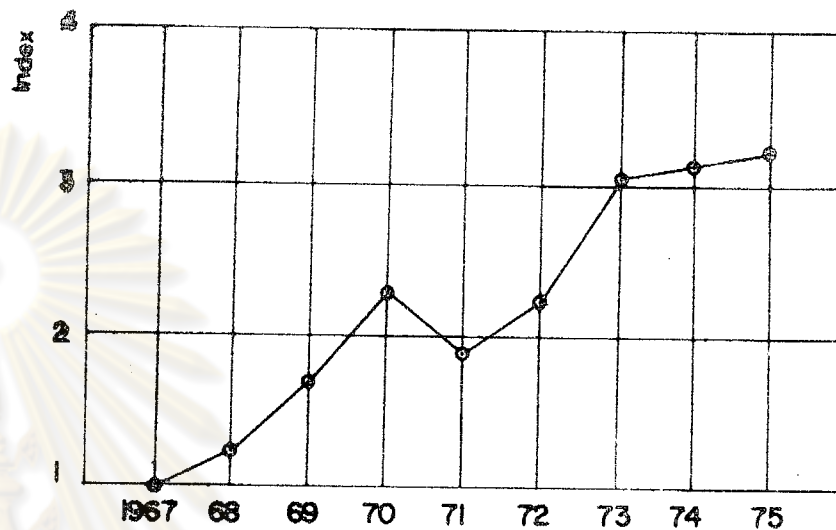


Fig. 15 - Registration of Trucks and Buses :  
Changwad Rayong

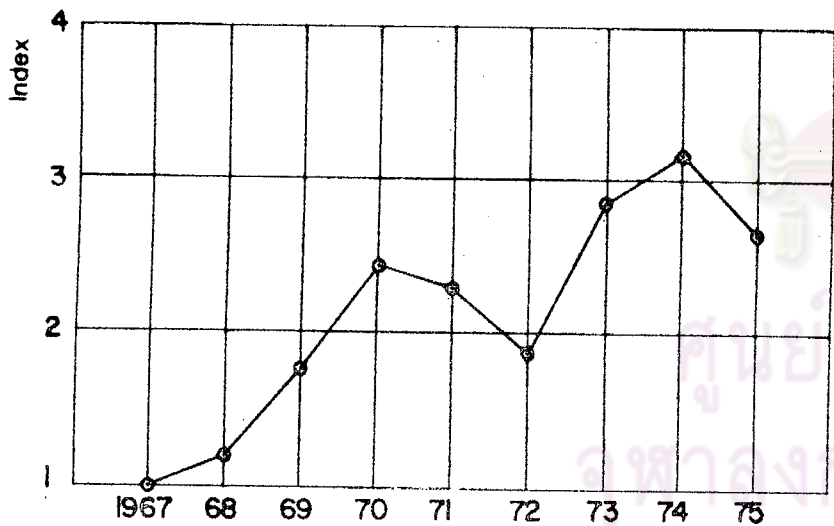


Fig. 16 - Registration of Motorcycles :  
Changwad Rayong

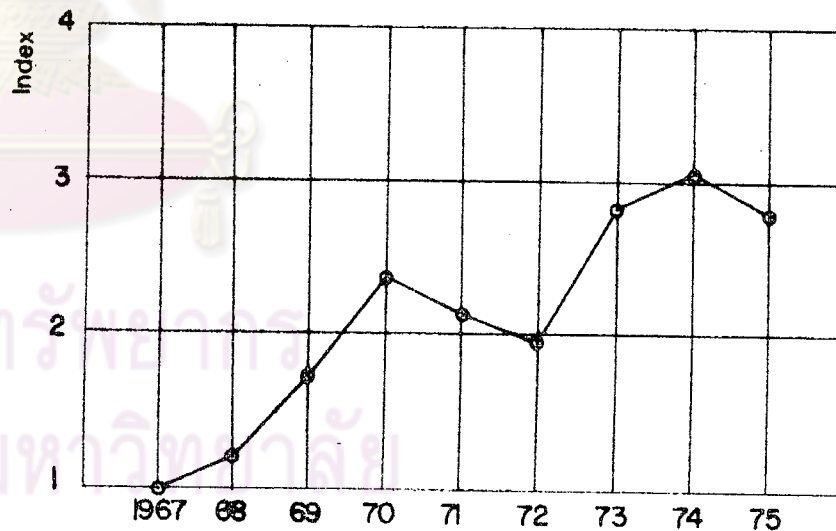


Fig. 17 - All Vehicle Registration :  
Changwad Rayong

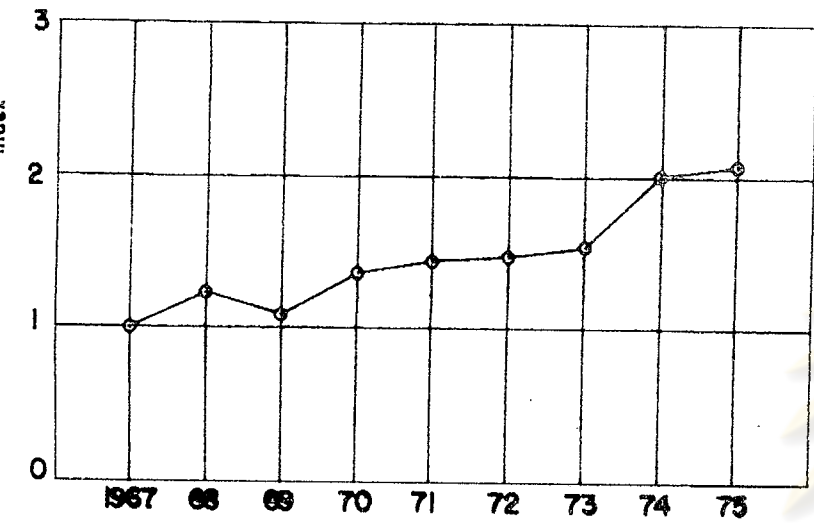


Fig. 18 — Registration of Cars and Taxis :

Changwad Chonburi

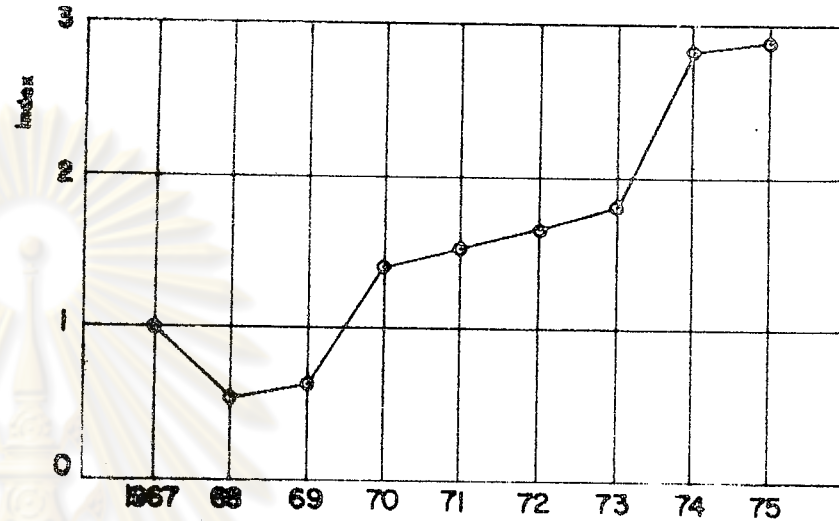


Fig. 19 — Registration of Trucks and Buses :

Changwad Chonburi

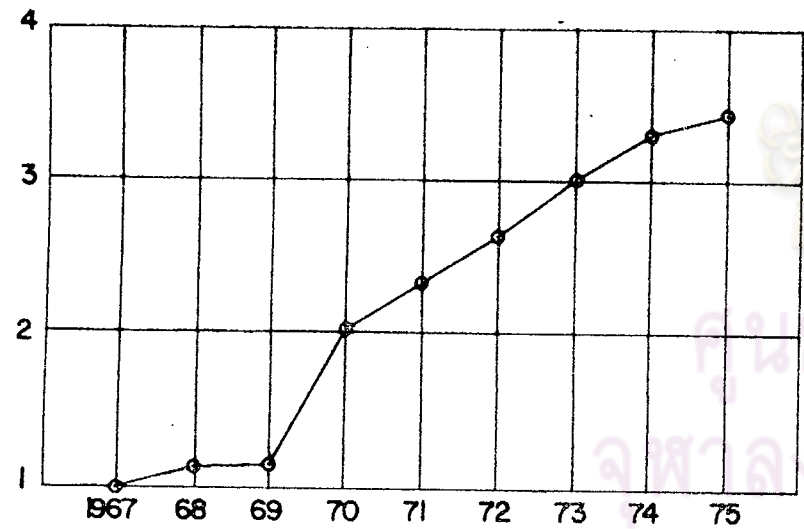


Fig. 20 — Registration of Motorcycles :

Changwad Chonburi

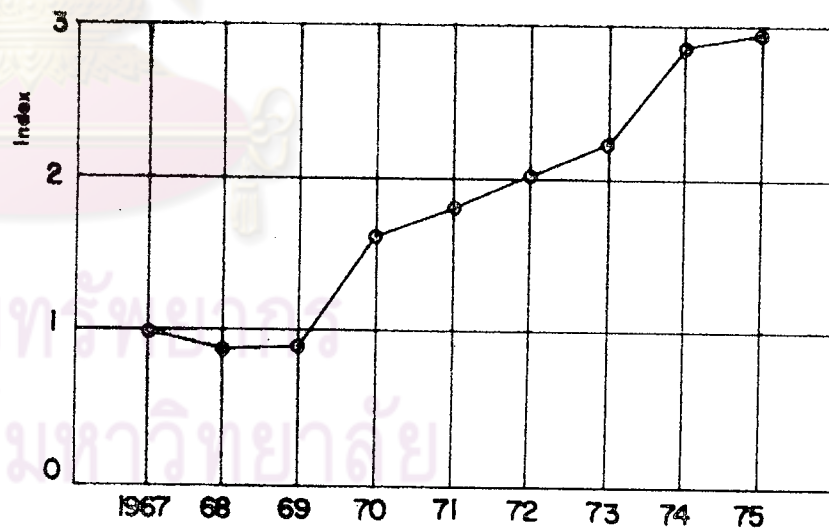


Fig. 21 — All Vehicle Registration :

Changwad Chonburi

## Registrations in the Seven Changwads of Eastern Thailand

In the seven changwads comprising Eastern Thailand (Rayong, Chonburi, Chantaburi, Trad, Chacheong Sao, Nakorn Na Yok, and Prachinburi), the growth factors of all vehicles, of trucks and buses, and of motorcycles, over the period of study, were higher than for the whole Kingdom, but the registration of cars and taxis was somewhat lower than that for the Kingdom. The most significant increase in registration was for trucks and buses. However, from the graph in Fig. 11 it may be seen that truck and bus registrations fell significantly in 1968. This decrease in truck and bus registrations probably reflects that appearing in Fig. 19 for Changwad Chonburi. This decrease may be attributed to the completion of construction of U-Ta-Pao Airfield and the port at Sattahip. The construction of these two large military projects began in 1965 and was finished in 1968. After the construction was completed, trucks were moved from Changwad Chonburi; this departure likely caused the dip in truck registrations in the seven changwads of Eastern Thailand in 1968.

## Registrations in Changwad Rayong

Changwad Rayong displayed growth in total vehicle registration somewhat greater than the value of the combined seven changwads. In turn, the growth factor of truck and bus registrations in Changwad Rayong was much higher than for the



entire Kingdom. The number of trucks and buses registered in Changwad Rayong in 1974 was more than three times that in 1967, but the registration of cars and taxis grew by only 72 percent from 1967 to 1974, this was the lowest growth factor of the several vehicle-type groupings.

#### Registrations in Changwad Chonburi

Comparing the growth factor of all vehicles in Changwad Chonburi with the other areas analyzed, motorcycles had the highest growth factor in Changwad Chonburi of the three vehicle-type groupings during the eight-year period. The registration of all vehicles and of trucks and buses dropped in 1968. As previously explained, this was likely due to the removal of trucks from Changwad Chonburi after completion of the U-Ta-Pao Airfield and Sattahip Port construction projects.

#### Buses and Minibus Serving in the Study Area

There are many bus service routes through the study area. Each route uses a part of the Ban Khai-Ban Bung feeder road, and some of them branch off the feeder road to serve farmers who live in the more remote areas. As the aim of the bus services is to take passengers from the villages to the market towns, one terminal of the bus routes is always in

a town -- like an amphoe town or a changwad town -- and the other end is at a village. Some service routes have only a few trips per day while others provide frequent service from early morning until evening.

#### Size and Kind of Buses

The main fraction of the feeder-road buses comprises 6-wheel medium-size buses similar to those shown in Fig. 21a. These are used on routes that are not so difficult to travel. Another common kind of bus is the composite bus, which uses the body of 6-wheel truck but is provided with seats for passengers. (See Fig. 21b). The composite bus is larger than the 6-wheel medium-size bus, and the power of engine is greater. Because of the design of the truck body, these composite buses have greater clearance above the road, so they are better suited for travelling in the remote areas where the roads are rougher. This kind of bus is only used on the routes through the hills and on roads which would be impassable for the ordinary buses.

The following paragraphs describe details of each bus service route. Included is information about the schedules of bus service, the number of buses in service, the bus fares along the route, and the level of service in the past.



Fig.21a- 6-wheel Medium-size Bus

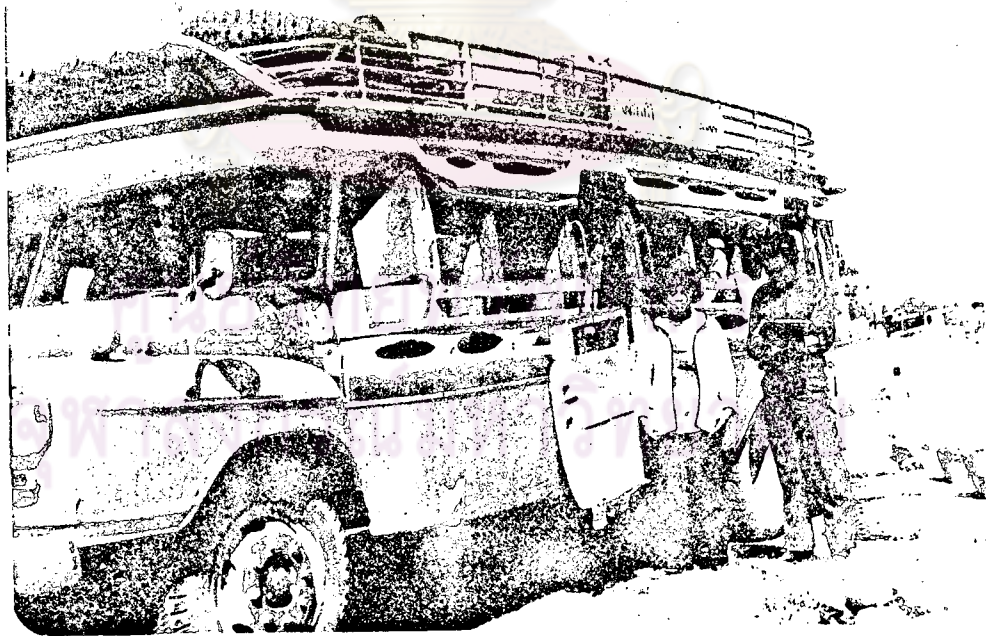


Fig.21b- Composite Bus

### Rayong - Eastern Sugar Mill Route

The origin starts at Rayong and runs to Amphoe Ban Khai, Hua Chuad, Nong Klab, Park Praek, Prong Lam Duan, Nong Bond, and the Eastern Sugar Mill. This service route is completely on the Ban Khai-Ban Bung feeder road. (See Fig. 2). There is a total of six buses which are owned and operated by the Kaset Pibal Company. The daily schedule starts at 0700 hrs from Rayong and at 0600 hrs from the Eastern Sugar Mill; there is a bus in each direction at hourly intervals until 1800 hrs in the evening. This bus service route has been in operation since 1972, though the numbers of buses and daily trips scheduled in former years were fewer than at present. Before 1972, there were minibuses serving this route, but only a few such vehicles were available. The bus fares at present, and in 1972, are shown in Table 15.

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## Rayong

|         |          |           |           |            |                |                      |
|---------|----------|-----------|-----------|------------|----------------|----------------------|
| 2 (5)   | Ban Khai |           |           |            |                |                      |
| 3 (8)   | 2        | Hua Chuad |           |            |                |                      |
| 5 (10)  | 4        | 2         | Nong Klab |            |                |                      |
| 6 (12)  | 5        | 4         | 2         | Park Praek |                |                      |
| 7 (14)  | 6        | 5         | 4         | 2          | Prong Lam Duan |                      |
| 8 (14)  | 7        | 6         | 5         | 4          | 2              | Nong Bond            |
| 10 (15) | 9        | 8         | 7         | 6          | 5              | 3 Eastern Sugar Mill |

Table 15 - Bus fare, Baht, on Rayong - Eastern Sugar Mill Route

( ) Bracketed figures were the bus fares in 1972

It is seen that the bus fares in 1972 were nearly double (ranging from 1.5 to 2.5 times) the present fares. This may be due to the improvement of the feeder road, which has reduced bus operating costs and enhanced mobility through reduced travel times, resulting in increased patronage and lowered bus fares. From Table 15, it may be noted that in almost all cases, the fare for a journey covering two or more segments is less than the sum of the fares for the individual segments. This is the ordinary concept of fare stages in bus fare tariffs.



### Rayong - Pluak Daeng Route

This service route does not run along the Ban Khai-Ban Bung feeder road, but it does serve passengers in the feeder-road study area. The route starts at Rayong and runs to Ban Khai, thence Nong La Lak, Nikom-KM 12, Mae Nam Koo, Mab Luk Chan, and terminates at King Amphoe Pluak Daeng. This is an alternative route from Ban Khai to the Eastern Sugar Mill, but such passengers must change buses at Pluak Daeng. This route is very useful for the farmers in Pluak Daeng and for some in Nong La Lok. There are nine 6-wheel medium-size buses that serve passengers from Rayong between 0700 hrs and 1730 hrs, and from Pluak Daeng between 0600 hrs and 1630 hrs. The headway between each pair of buses is about 45 minutes. This service began in 1972; before that there was a minibus service between Map Ta Put and Nikom-KM 12. The bus fares for this route are shown in Table 16.

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|        |          |             |             |             |               |
|--------|----------|-------------|-------------|-------------|---------------|
| Rayong |          |             |             |             |               |
| 2 (1)  | Ban Khai |             |             |             |               |
| 2 (1)  | 1        | Nong La Lok |             |             |               |
| 4 (3)  | 3        | 3           | Nikom-KM 12 |             |               |
| 6 (4)  | 5        | 5           | 3           | Mae Nam Koo |               |
| 8 (7)  | 7        | 7           | 5           | 2           | Mab Luk Chan  |
| 10 (8) | 9        | 9           | 7           | 5           | 3 Pluak Daeng |

Table 16 - Bus fare, Baht, on Rayong - Pluak Daeng Route

( ) Bracketed figures were the fares in 1972

It is very interesting to note that the bus fare in 1972 on the Rayong - Pluak Daeng route was less than at present. This may be partly due to the increased price of fuel which occurred in 1973. Another factor may be the condition of the road which is not much better than it was in 1972.

#### Rayong - Rong Nam Tarn Rayong at Klong Ka-noon Route

About five years ago, there were three old buses and two pick-ups serving passengers along this route. Now, four new medium-size buses are in service. Each bus has different origins, but they have a common destination at Rayong. Each bus makes only two trips per day: from outlying villages to

Rayong in the morning and back to the villages in the afternoon. As the schedule of the bus service is fixed, farmers have a limited time to attend to their business in Rayong. Beginning at 0600 hrs, the first bus starts from Nong Kho; subsequently, other buses start from Rong Nam Tarn at 0700 hrs, from Klong Nam Daeng at 0730 hrs, and from Lum Ton Tarn at 0800 hrs. After making the trip to the Rayong market, these four buses make the return trips, leaving Rayong at 1100 hrs, 1200 hrs, 1330 hrs, and 1530 hrs, respectively. Table 17 shows the bus fares along the Rayong - Rong Nam Tarn at Klong Ka-noon route. The present bus fares are about 22 percent less (ranging from 18 percent to 25 percent) than the bus fares in 1971. The reduction in bus fares is surely due to the improvement of the roads which the route traverses.

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|         |          |           |           |               |                 |              |
|---------|----------|-----------|-----------|---------------|-----------------|--------------|
| Rayong  |          |           |           |               |                 |              |
| 2       | Ban Khai |           |           |               |                 |              |
| 3       | 2        | Hua Chuad |           |               |                 |              |
| 5       | 4        | 2         | Nong Klab |               |                 |              |
| 9 (12)  | 8        | 6         | 4         | Rong Nam Tarn |                 |              |
| 12 (15) | 11       | 10        | 8         | 4             | Klong Nam Daeng |              |
| 12 (15) | 11       | 10        | 8         | 4             | 1               | Lum Ton Tarn |
| 14 (17) | 13       | 12        | 10        | 6             | 3               | 3 Nong Kho   |

Table 17 - Bus fare, Baht, on Rayong - Rong Nam Tarn at  
Klong Ka-noon Route

( ) Braketed figures were the bus fares in 1971

#### Rayong - Klong 18 Route

There are only two buses serving the Rayong-Klong 18 route. The first bus starts at Klong 18, the second at Kao Ta In, both leaving at 0600 hrs for the inbound trip. These two buses leave Rayong for their return trips at 1100 hrs and 1230 hrs, respectively. Each bus makes only two trips a day (one inbound and one outbound trip). The bus service was inaugurated in 1975; before this, there was minibus service between Rayong and Lang Kao, but now the minibuses have ceased operation along this route. The buses used on

the Rayong - Klong 18 route are the composite buses, from which one can judge that the route is along a rough road in mountainous terrain. The total distance between Rayong and Klong 18 is about 38 kilometers; the bus fares are shown in Table 18.

Rayong

|    |          |          |            |           |                 |            |           |            |            |        |          |
|----|----------|----------|------------|-----------|-----------------|------------|-----------|------------|------------|--------|----------|
| 2  | Ban Khai |          |            |           |                 |            |           |            |            |        |          |
| 2  | 2        | Bang But |            |           |                 |            |           |            |            |        |          |
| 4  | 3        | 2        | Nong Pa Wa |           |                 |            |           |            |            |        |          |
| 5  | 5        | 4        | 3          | Lang Khao |                 |            |           |            |            |        |          |
| 10 | 9        | 8        | 7          | 5         | Klong Yai Meung |            |           |            |            |        |          |
| 11 | 10       | 9        | 8          | 6         | 1               | Wang Plong |           |            |            |        |          |
| 12 | 11       | 10       | 9          | 7         | 2               | 1          | Wang Purg |            |            |        |          |
| 12 | 11       | 10       | 9          | 7         | 3               | 2          | 1         | Khao Ta In |            |        |          |
| 14 | 13       | 12       | 11         | 9         | 5               | 4          | 3         | 2          | Chum Saeng |        |          |
| 16 | 15       | 14       | 13         | 11        | 7               | 6          | 5         | 4          | 2          | Pa Yub |          |
| 18 | 17       | 16       | 15         | 13        | 9               | 8          | 7         | 6          | 4          | 2      | Klong 18 |

Table 18 - Bus fares, Baht, on Rayong-Klong 18 Route

## Rayong - Bung Ta Ta Route

This route is along a terrible road, like the Rayong-Klong 18 route; thus, composite buses are used on the Rayong-Bung Ta Ta route. The beginning of service was in 1974; before that time there was no bus service. At present, there is only one composite bus which makes one round trip each day. This bus starts from Bung Ta Ta at 0630 hrs bound for Rayong; the return trip leaves Rayong at 1115 hrs. Table 19 shows the bus fares for this route.

|        |          |           |            |          |            |
|--------|----------|-----------|------------|----------|------------|
| Rayong |          |           |            |          |            |
| 2      | Ban Khai |           |            |          |            |
| 5      | 4        | Nong Klab |            |          |            |
| 6      | 5        | 2         | Park Praek |          |            |
| 9      | 8        | 5         | 4          | Nong Rai |            |
| 12     | 11       | 8         | 7          | 4        | Bung Ta Ta |

Table 19 - Bus fare, Baht, on Rayong-Bung Ta Ta Route

#### Hua Khun-Jae -- Pluak Daeng Route

In the northern part of the Ban Khai-Ban Map Pu feeder road, there is only one bus service on the study feeder road. The route starts at Hua Khun-Jae, a village in Amphoe Ban Bung, and runs to Ban Marp Lam Bid, Ban Kao Kan Song, Ban Surasak, Ban Nong Kang Kao (Eastern Sugar Mill), Ban Klong Klam, and terminates at King Amphoe Pluak Daeng. From Hua Khun-Jae to the Eastern Sugar Mill, the road surface is black-top, but it is not in good condition. There are many potholes in the road surface that may have been caused by overloaded sugar-cane or cassava trucks. On the segment from the Eastern Sugar Mill to King Amphoe Pluak Daeng, there is a laterite surface. This section presents difficulties in the rainy season because erosion due to the flow of water across the road leaves deep ruts and gullies.

There are ten buses serving this route; these are owned by a private company. To provide convenience in changing buses at the transfer point, the company operates another route with 36 buses from Hua Khun-Jae to Changwad Chonburi. So, it is very easy to travel from King Amphoe Pluak Daeng to Changwad Chonburi. The time of the first daily bus is 05.45 hrs, leaving both from Hua Khun-Jae and Pluak Daeng. The scheduled headway is every 15 minutes until 1800 hrs. The



first year of this bus service was 1973, the year that the Hua Khun-Jae-Eastern Sugar Mill section was paved with asphalt. Before 1973, there were no buses operating, but Jeeps were used to serve passenger in this area. The bus fares for the Hua Khun-Jae - Pluak Daeng route are shown in Table 20.

## Hua Khun-Jae

|   |              |              |         |                    |            |             |
|---|--------------|--------------|---------|--------------------|------------|-------------|
| 3 | Marp Lam Bid |              |         |                    |            |             |
| 4 | 1            | Kao Kan Song |         |                    |            |             |
| 5 | 3            | 2            | Surasak |                    |            |             |
| 5 | 4            | 3            | 1       | Eastern Sugar Mill |            |             |
| 6 | 5            | 4            | 2       | 1                  | Klong Klam |             |
| 7 | 6            | 5            | 4       | 3                  | 2          | Pluak Daeng |

Table 20 - Bus fares, Baht, on Hua Khun-Jae-Pluak Daeng Route

## Hua Khun-Jae-Bung Ta Ta Route

This bus service does not run on the study feeder road, but it does serve the influenced area in the vicinity of Ban Bung Ta Ta. The route starts at Hua Khun-Jae and runs to Marp Kla, thence Ban Som, Ban Muen Chit, Ban Chaleomlarp, and terminates at Ban Bung Ta Ta. There are three buses serving

passengers along this route. The first bus starts from Ban Bung Ta Ta at 06.30 hrs, the second at 07.30 hrs, and the third at 08.30 hrs. These three trips serve to bring passengers from the outlying farming villages to the market at Hua Khun-Jae. For the return trip, the first bus leaves from Hua Khun-Jae for Ban Bung Ta Ta at 09.30 hrs; subsequent return trips leave at 11.00 hrs and 12.30 hrs. The vehicles used on this route are composite buses, because they travel on roads which are in a terrible condition. The bus service route was inaugurated in August 1976; before that date there was no bus service. The bus fares for the Hua Khun-Jae - Bung Ta Ta route are shown in Table 21.

| Hua Khun-Jae |          |         |               |                  |                |
|--------------|----------|---------|---------------|------------------|----------------|
| 3            | Marp Kla |         |               |                  |                |
| 3            | 1        | Ban Som |               |                  |                |
| 4            | 3        | 1       | Ban Muen Chit |                  |                |
| 6            | 4        | 3       | 2             | Ban Chaleom Larp |                |
| 8            | 6        | 5       | 4             | 3                | Ban Bung Ta Ta |

Table 21 - Bus fares, Baht, on Hua Khun-Jae-Bung Ta Ta  
Route

### Seasonal Changes in Bus Fares

In the study area, there is no increase in bus fares in the wet season; they are constant for all periods of the year. This may be due to the relatively high levels of bus fare charged for travel along the remote area routes, these being something of an average for all seasons.

The bus fares on the remote area routes are established by the bus companies. These fares must be reasonable and acceptable to the passengers. There is no regulation of such bus fares by the Changwad Transport Officers, nor by other agencies of the central Government.



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