

CHAPTER 5

CONCLUSIONSUMMARY OF THE FINDINGS1. Partial Equilibrium Approach of the Theory of Location

(i) Based on the conceptual framework of classical and neo-classical economists, Johan Weinrich Von Thuren and Alfred Weber originated the least cost theory approach related to the economics of location. The purpose of the two is to find out the least cost site of the production unit. The mainsteam of the theory covers the variation of transportation cost at each determined location; the most favoured location is at the site of minimum transportation cost. At this minimum transportation cost point, the production unit can maximize profit due to the assumption of equal prices throughtout the system.

The weakness of this theory is that the factor of demand has been abstracted. Variations in demand will obviously affect the profit-maximization problem. The least cost site may not provide the maximum profit level. Thuren's and Weber's theories are correct only in the special case where demand is a spatial constant.

(ii) To be more effective, Palander, Hoover and Losch introduced another type of locational theory related to the market

area analysis. The theory is based on the assumption of monopolistic competition where identical production costs at all locations. Transportation cost is the most significant factor of the market area analysis, playing a decisive role as a determinant of the market share. Profit depends on the magnitude of the market share held by the producer. In short, the spatial pattern of plant location and market area is thus a product of variation from place to place in demand and the locational interdependence of firms. The weakness of the market area theory is the abstraction of the production cost variation.

(iii) To study the effect of locational variation, Harold Hotelling approached the problem of locational interdependence by postulating the following assumptions (a) production costs are equal everywhere (b) for each unit of distance, freight rates are equal everywhere, (c) the consumer pays transport costs because goods are sold on an f.o.b. price basis and (d) there is a limit on demand. With these assumptions, the considerations are given to the inter-relationship of dynamic location and market share of product (demand) under monopolistic competition.

2. General Theory Approach of the Problem of Location

The conceptual framework of classical and neo-classical general theory completely neglects the locational factor. Andrea Predohl, August Losch, Melvin Greenhunt and Walter Isard have attempted to modify general equilibrium analysis as a basis for developing a general theory of location.

To date, not much success has been achieved in the construction of a satisfactory general theory. This is not surprising when one bears in mind that such a theory must satisfy two conflicting requirements. The first requirement is that the spatial element must be successfully integrated into a dynamic general equilibrium model. The second requirement is that such a model must be operational. It is clear that, given the present state of the arts, such objectives are not yet attainable.

Because of these insurmountable difficulties, interest among scholars and practitioners have in recent years shifted to the development of macro-analysis in the regional criteria. The field of regional economics appears to have a much greater promise of providing analytical tools which are operational and can be very useful for policy decision-making.

3. Analysis of the Cement Industry in Thailand

In Chapter 3, the location of the cement industry was analyzed using the Weberian framework of analysis. The results clearly shows, as is to be expected, that the industry is heavily material-oriented. Raw material costs, which include the costs of transportation, proved to be of decisive importance. Labor costs are only of secondary importance. Furthermore, because of the fairly fixed capital output ratios at the plants studied, cost variations can be accounted for largely by variations in material costs. This result indicates that the advantage of one plant over another plant should stem from a difference in material cost rather than from variations in the amount of materials consumed or in labor costs.

In conclusion, it may be said that the result of our analysis tends to support the traditional view concerning the desirability of locating cement plants near sources of material deposits. This view may be at variance with that of some writers who hold that the modern trend is to locate nearer major markets rather than new material sources. In this study, it has not been found possible to determine conclusively the causes of these different conclusions. However, it appears that a likely explanation would be found in the different market structures of various countries concerned. Where the market is dominated by a few major consumption centers characterized by intense competition among a large number of suppliers, it may indeed be more advantageous to locate nearer to the major markets. Such location would reduce both delivery time and inventory costs. However, in a situation

where demand is more diffused and there are few suppliers, such as in the case of Thailand, these factors would tend to be of less significance so that it would still be more advantageous to locate near sources of materials as shown by our analysis.

4. The Impact of the Cement Industry on the Local Economies

The impact of the location of cement plants on the local economies was examined by analyzing the consumption patterns at Ban Morr and Takli. Field data were obtained by the use of questionnaires supplemented by interviews where appropriate. The results indicate that both plants have had considerable impact on the economy of the localities concerned.

In terms of employment, both Ban Morr and Takli showed a rapid rate of increase in the employed labor force from the time of plant location as well as during periods of plant expansion. Income of workers at both plants was higher than the average in other regions as well as the average for other towns in the regions concerned. The higher levels of income also led to higher expenditures with a larger proportion spent on discretionary expenditure items.

Most of the expenditures of cement workers were made locally with the place where the factories were located and the central cities of the changwats concerned accounting for a major share of the expenditures. This indicates that the income generated by the employment of cement workers has resulted in a considerable stimulus to the local economies. However, the expenditure patterns at Ban Morr and Takli showed a marked difference. At Takli, almost 96% of all expenditures was made in Takli where the plant was located, while

only 53% was expended locally at Ban Morr. This difference indicates that the location of a cement plant near a major town will have significantly more impact for the growth of the local economy than in the case of locating near smaller urban center.

APPENDIX I

Questionnaire for Cement Workers

Location of Plant _____

Company _____

I. Background of Workers

1. Name _____ Second Name _____
2. Marriage Status _____ Son _____ Daughter _____
3. Age _____ Education _____
4. Sex _____
5. Past Profession _____
6. Present Status _____
7. Job Obligation _____
8. Date of Recruitment _____

II. Income

1. Wage and Salary
 - A. Rate per hour _____
 - B. Rate per day _____
 - C. Rate per Week _____
 - D. Rate per month _____
2. Total Income (included part-time, bonus, security payment) _____

3. Number of working day per month _____
4. Number of working hour per day _____
5. Permanently or occasionally _____
6. If it is occasional; what is your permanent job _____
7. Do you open any account in banks _____

III. Expenditure

Household Expenditure of Cement Workers in 1971

| Items | Amount | Place of Payment | Notification |
|--------------------------------------|--------|------------------|--------------|
| 1. Food and Beverage | | | |
| 2. Clothing and Materials | | | |
| 3. Housing and Furnishing | | | |
| 4. Household operation | | | |
| 5. Medical and Personal Care | | | |
| 6. Transportation | | | |
| 7. Reading, Recreation and Education | | | |
| 8. Tobacco and Alcoholic Drinks | | | |
| 9. Contribution | | | |
| 10. Gifts | | | |
| 11. Miscellaneous | | | |

APPENDIX II*

Questionnaire for Cement Company

I. Background of Cement Company

1. Name of the Company..... Jalapraphan Cement Co., Ltd.
 2. Number of Plant..... 2 plants
 3. Location of Plant..... Takli and Cha-Am
 4. Capital and Equipment..... 40 million baht
 5. Number of Workers..... 518 persons

II. Productivity and Process at Takli cement plant

1. Total Output per day..... 1,000 tons
 2. Number of kiln and size..... 2 kiln, each about 500 ton/day
 3. Process in Production..... Semi-dry process
 4. Classification of output.....
 1) Naga brand normal portland cement
 2) Naga brand moderate heat portland cement
 3) Naga brand rap hardening portland
 4) Shark brand high sulphate resistance portland cement
 5) Cobra brand normal portland cement

* In the Appendix II, the survey data of a certain cement plant has been completed for illustration by the form of questionnaire.

III. Wage and Salary since 1961 - 1971

| Year | Direct Labor Cost | | Indirect Labor Cost | | Part-time | Bonus | Security |
|------|-------------------|-----------|---------------------|---------|-----------|-----------|----------|
| | No. of Person | Value ₪ | No. of Person | Value ₪ | Value ₪ | Value ₪ | Payment |
| 1961 | 80 | 2,400,000 | 156 | 330,000 | 1,656,000 | 432,450 | 30,000 |
| 1962 | 173 | 2,448,600 | 180 | 285,000 | 1,658,000 | 665,650 | 30,000 |
| 1963 | 169 | 2,668,700 | 190 | 287,900 | 1,792,000 | 877,700 | 30,000 |
| 1964 | 185 | 3,451,800 | 237 | 290,100 | 2,260,000 | 1,060,000 | 30,000 |
| 1965 | 166 | 4,937,800 | 187 | 297,600 | 2,908,000 | 1,042,000 | 30,000 |
| 1966 | 213 | 6,602,000 | 197 | 416,200 | 3,159,000 | 1,175,000 | 32,000 |
| 1967 | 319 | 8,033,200 | 212 | 450,000 | 4,230,000 | 1,259,520 | 32,000 |
| 1968 | 339 | 8,969,000 | 215 | 331,000 | 4,580,000 | 1,428,400 | 35,000 |
| 1969 | 361 | 8,882,000 | 215 | 387,700 | 5,560,000 | 1,490,000 | 65,000 |
| 1970 | 359 | 8,935,900 | 231 | 221,500 | 5,535,000 | 1,720,000 | 69,000 |
| 1971 | 339 | 8,890,000 | 161 | 338,000 | 5,530,000 | 1,795,920 | 69,000 |

IV. Market of Cement Product and Price Level 1961 - 1971

1. Market in central part

| Year | Deliveried Price | Transfer Cost | Transit Charge | Market Price |
|------|------------------|---------------|----------------|--------------|
| 1961 | 504 | 55 | 5 | 520 |
| 1962 | 504 | 55 | 5 | 520 |
| 1963 | 504 | 55 | 5 | 520 |
| 1964 | 504 | 55 | 5 | 520 |
| 1965 | 500 | 55 | 5 | 518 |
| 1966 | 470 | 55 | 5 | 510 |
| 1967 | 470 | 55 | 5 | 510 |
| 1968 | 450 | 50 | 5 | 510 |
| 1969 | 450 | 50 | 5 | 510 |
| 1970 | 508 | 50 | 5 | 510 |
| 1971 | 508 | 50 | 5 | 510 |

Value: Baht per ton

Transfer Cost: Ton

Transit Charge: Ton

Deliveried Price: Net mill price plus transfer cost and transit charge

2. Market in northern part

| Year | Deliveried Price | Transfer Cost | Transit Charge | Market Price |
|------|------------------|---------------|----------------|--------------|
| 1961 | 564 | 60 | 5 | 580 |
| 1962 | 564 | 60 | 5 | 580 |
| 1963 | 564 | 60 | 5 | 580 |
| 1964 | 564 | 60 | 5 | 580 |
| 1965 | 560 | 60 | 5 | 578 |
| 1966 | 558 | 60 | 5 | 578 |
| 1967 | 558 | 60 | 5 | 578 |
| 1968 | 550 | 58 | 5 | 560 |
| 1969 | 550 | 58 | 5 | 560 |
| 1970 | 553 | 55 | 5 | 565 |
| 1971 | 553 | 55 | 5 | 565 |

Value: Baht per ton

Transfer Cost: Ton

Transit Charge: Ton

Deliveried Price: Net mill price plus transfer cost and transit charge

3. Market north-east part

| Year | Deliveried Price | Transfer Cost | Transit Charge | Market Price |
|------|------------------|---------------|----------------|--------------|
| 1961 | 550 | 40 | 5 | 570 |
| 1962 | 550 | 40 | 5 | 570 |
| 1963 | 550 | 40 | 5 | 570 |
| 1964 | 550 | 40 | 5 | 570 |
| 1965 | 550 | 40 | 5 | 570 |
| 1966 | 548 | 40 | 5 | 570 |
| 1967 | 548 | 40 | 5 | 570 |
| 1968 | 540 | 40 | 5 | 565 |
| 1969 | 540 | 40 | 5 | 565 |
| 1970 | 539 | 40 | 5 | 550 |
| 1971 | 539 | 40 | 5 | 550 |

Value: Baht per ton

Transfer Cost: Ton

Transit Charge: Ton

Deliveried Price: Net mill price plus transfer cost and transit charge

V. Locating Plant

1. The decision making in choosing the plant location
 - A. Administrative Committee
 - B. Advisory Board
 - C. Others

2. The following items are the factors effect the plant location, please list the priority accordance to your oppinion.
 - (1) Source of Material
 - (5) Fuel
 - (4) Labour
 - (6) Wage Rate
 - (7) Market
 - (3) Transfer Cost
 - (8) Electric Power
 - (9) Transportation of Equipment
 - (2) Procurement Cost

APPENDIX III

Size of Industry and Location 1972: The Whole Kingdom.

| No. | Chang Wat | Small Size | Medium Size | Large Size |
|-----|--------------------|------------|-------------|------------|
| 1 | Bangkok - Thonburi | 14,300 | 817 | 114 |
| 2 | Krabi | 292 | 8 | - |
| 3 | Kalasin | 755 | 3 | - |
| 4 | Kanchana Buri | 390 | 16 | 6 |
| 5 | Kumphang Phet | 365 | 3 | - |
| 6 | Khon Khan | 1,601 | 38 | 3 |
| 7 | Chan Thaburi | 991 | 11 | - |
| 8 | Chachoengsao | 494 | 11 | 3 |
| 9 | Chai Nat | 287 | 6 | - |
| 10 | Chum Phon | 49 | 10 | - |
| 11 | Chaiyaphum | 1,319 | 5 | - |
| 12 | Chiang Mai | 1,438 | 25 | 1 |
| 13 | Chon Buri | 1,088 | 38 | 11 |
| 14 | Chiang Rai | 2,233 | 15 | - |
| 15 | Tak | 339 | 2 | - |
| 16 | Trat | 186 | 6 | - |
| 17 | Trang | 546 | 22 | 2 |
| 18 | Nan | 825 | 1 | - |
| 19 | Nontha Buri | 251 | 38 | 15 |
| 20 | Nakhon Sithamaraj | 1,600 | 15 | 2 |
| 21 | Nakhon Rajasima | 2,087 | 34 | 8 |
| 22 | Nakhon Nayok | 114 | 3 | - |
| 23 | Nakhon Pathom | 484 | 40 | 7 |

Appendix III(Continued)

| No. | Chang Wat | Small Size | Medium Size | Large Size |
|-----|--------------------|------------|-------------|------------|
| 24 | Narathiwat | 714 | 12 | 2 |
| 25 | Nakhon Sawan | 944 | 2 | - |
| 26 | Nakhon Sawan | 598 | 6 | 3 |
| 27 | Buri Ram | 1,324 | 11 | - |
| 28 | Pathum Thani | 251 | 21 | 15 |
| 29 | Prachin Buri | 280 | 15 | - |
| 30 | Prachuapkhiri Khan | 121 | 13 | 1 |
| 31 | Pattani | 628 | 11 | - |
| 32 | Phichit | 578 | 7 | - |
| 33 | Panga | 138 | 3 | - |
| 34 | Phet Chaboon | 671 | 4 | - |
| 35 | Phet Chaburi | 432 | 4 | 2 |
| 36 | Ayuthaya | 359 | 14 | 7 |
| 37 | Phrae | 770 | 8 | - |
| 38 | Bhitsanulok | 964 | 4 | - |
| 39 | Phattalung | 872 | 1 | - |
| 40 | Phuket | 77 | 6 | - |
| 41 | Maha Sarakham | 980 | - | - |
| 42 | Mae Hong Son | 145 | 3 | - |
| 43 | Yala | 265 | 13 | - |
| 44 | Roi Ed | 1,449 | 2 | - |
| 45 | Rat Cha Buri | 688 | 26 | 8 |
| 46 | Ranong | 88 | 10 | 2 |
| 47 | Rayong | 792 | 28 | 1 |

Appendix III(Continued)

| No. | Chang Wat | Small Size | Medium Size | Large Size |
|-------|------------------|------------|-------------|------------|
| 48 | Loei | 594 | 13 | - |
| 49 | Lop Buri | 152 | 9 | - |
| 50 | Lum Poon | 464 | 8 | - |
| 51 | Lum Pang | 1,235 | 11 | 2 |
| 52 | Sisakat | 830 | 10 | 1 |
| 53 | Sukho Thai | 760 | 9 | 1 |
| 54 | Samut Songkhram | 167 | 7 | - |
| 55 | Samut Sakhon | 183 | 39 | 15 |
| 56 | Surat Thani | 867 | 11 | - |
| 57 | Saraburi | 392 | 16 | 9 |
| 58 | Suphanburi | 540 | 10 | - |
| 59 | Songkhla | 1,146 | 28 | 1 |
| 60 | Smut Prakan | 655 | 287 | 121 |
| 61 | Satool | 232 | 6 | - |
| 62 | Skol Nakhon | 1,293 | 4 | - |
| 63 | Sing Buri | 168 | 5 | - |
| 64 | Surin | 1,044 | 8 | - |
| 65 | Nong Khai | 826 | 12 | - |
| 66 | Ang Thong | 226 | 2 | - |
| 67 | U Thai Thani | 196 | 1 | - |
| 68 | Uttaradhit | 1,131 | 5 | - |
| 69 | Ubol Ratchathani | 2,124 | 28 | - |
| 70 | Udon Thani | 1,181 | 25 | 3 |
| Total | | 62,910 | 1,945 | 370 |

- Note
- S.S. = Capital Investment less than 1 million Baht
 - M.S. = Capital Investment not below 1 million Baht but
not over 10 million Baht
 - L.S. = Capital Investment over 10 million Baht.