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EFFICIENCY OF THE MARKET PARTICIPANTS IN AGRICULTURAL AND FISHERY MARKETING

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I . Introduction

Marketing activities like production activities, are aimed at achieving efficient allocation of resources through the price formation function of markets. They include effective price formation as well as efficient transfer of the products from the producer to the consumer. In other words, market efficiency is divided into two parts: the price formation efficiency and productivity efficiency.

This study is concentrated only on the analysis of the productive efficiency which will show whether the market participants are carrying out their functions with minimum cost, using the facilities and the manpower available to them under the assumption that the price is given. In order to examine this, both the cost function and the financial structure analyses are made.

II . Estimation of Cost Function

In order to estimate the cost functions of the market participants which are necessary to evaluate efficiency, TC(Total Cost Functions) are first estimated and from the TC, related costs functions are derived. If $TC = a_0 + a_1X + a_2X^2 + a_3X^3$, then TFC(Total Fixed Costs) are a^0 , and TVC(Total Variable Costs) are $a_1X + a_2X^2 + a_3X^3$. Therefore, ATC(Average Total Costs), AFC(Average Fixed Costs), and AVC(Average Variable Costs) can be derived by dividing TC, TFC, TVC by X(Transaction Volume) respectively. Data was collected by the interviews with individual participants in 1984. The estimated cost functions are shown in Table 1.

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TABLE I The Estimated Result of Total Cost Functions, 1984

dependent variables : TC(won/month)
X : monthly transaction volume(kg)

Market Participants	Samples	Estimated Coefficients of			R ²		
		X ³	X ²	X		Constant	
Vegetable	Wholesaler	328	0.42 × 10 ⁻⁹ (0.38 × 10 ⁻¹⁰)	-0.17 × 10 ⁻³ (0.2 × 10 ⁻⁴)	26.16 (2.57)	384,498.36 (88,028.31)	.86
	Retailer	161	0.77 × 10 ⁻⁶ (0.12 × 10 ⁻⁶)	-0.10 × 10 ⁻¹ (0.22 × 10 ⁻²²)	45.12 (11.6)	76,700.13 (14,573.17)	.76
	Assembler	96	5.47 × 10 ⁻⁸ (0.92 × 10 ⁻⁸)	-2.88 × 10 ⁻³ (0.64 × 10 ⁻³)	64.17 (12.02)	39,304.66 (50,038.6)	.91
	Shipping agent	36	2.74 × 10 ⁻⁹ (0.6 × 10 ⁻⁹)	-3.48 × 10 ⁻⁴ (1.2 × 10 ⁻⁴)	18.20 (6.32)	44,552.60 (71,597.97)	.93
Fruit	Wholesaler	342	0.18 × 10 ⁻⁸ (0.24 × 10 ⁻⁹)	-0.40 × 10 ⁻³ (0.5 × 10 ⁻⁴)	34.92 (2.07)	78,682.21 (9,824.35)	.45
	Retailer	104	0.22 × 10 ⁻⁵ (0.58 × 10 ⁻⁶)	-0.18 × 10 ⁻¹ (0.06 × 10 ⁻¹)	53.08 (16.44)	47,108.41 (10,946.8)	.66
	Assembler	39	1.01 × 10 ⁻⁸ (0.9 × 10 ⁻⁸)	-7.32 × 10 ⁻⁴ (7.62 × 10 ⁻⁴)	34.63 (17.6)	49,739.62 (98,449.7)	.86
	Shipping agent	32			21.48 (2.97)	17,850.35 (62,264.9)	.64
Fishery	Wholesaler	96	0.27 × 10 ⁻⁶ (0.07 × 10 ⁻⁶)	-0.12 × 10 ⁻¹ (0.0027)	186.57 (35.62)	30,619.21 (22,754.4)	.45
	Retailer	186	0.32 × 10 ⁻⁴ (0.85 × 10 ⁻⁵)	-0.17 (0.038)	263.17 (35.62)	52,032.69 (3,664.5)	.72
	Shipping agent	19		3.48 × 10 ⁻⁴ (2.9 × 10 ⁻⁴)	31.42 (26.13)	533,378.11 (375,228.2)	.84
Food-grain	Retailer	142	0.20 × 10 ⁻⁵ (0.37 × 10 ⁻⁶)	-0.28 × 10 ⁻¹ (0.0045)	144.32 (13.04)	35,801.22 (5,048.3)	.67
	Assembler	55	2.59 × 10 ⁻⁸ (0.55 × 10 ⁻⁸)	-1.92 × 10 ⁻³ (0.35 × 10 ⁻³)	49.87 (42.22)	7,150.43 (3,279.58)	.74
Flower	Wholesaler ¹⁾	55		0.16 × 10 ⁻¹ (0.0022)		278,880 (36,036)	.50
	Retailer ¹⁾	49		0.22 × 10 ⁻¹ (0.0031)		195,190 (26,885)	.51
Packed meat	Producer	16			3,910 (1,542)	9,809,790 (6,398,297)	.92
Livestock products	Retailer	215	0.28 × 10 ⁻⁴ (0.66 × 10 ⁻⁵)	-0.12 (0.035)	391.90 (47.29)	49,570.06 (12,611.1)	.31

Notes : 1) The unit is 1,000 won(monthly transaction amount) for flower market participants

2) The number in parentheses indicate standard error

III . Evaluation of Efficiency

1. Calculation of the Optimum Size

The optimum size, *ceteris paribus*, can be drawn from the minimum ATC derived from the TC. In calculating the optimum size, mangement scale should be considered in the long term. The ATC line will be

downward to the right if the economies of scale occurs due to the improved labor productivity or the advancement in technology. On the other hand, the ATC line will be upward to the right if the diseconomies of scale occurs due to the maladministration.

At the minimum ATC point which represents the optimum size, productivity and other efficiency are at the optimum level. The optimum sizes for each market participant are shown in Table 2.

TABLE 2. Optimum Size and the Level of Concentration

	Samples	Optimum size (kg/month)	Average transaction volume (kg/month)	Number of samples within the interval of the optimum scale	Concentration (%)
Vegetable wholesaler	328	212,516	115,064	46	14
Vegetable retailer	161	7,402	4,876	25	16
Vegetable assembler	96	26,815	15,930	9	9
Vegetable shipping agent	36	65,494	48,370	7	19
Fruit wholesaler	342	112,817	61,062	42	12
Fruit retailer	104	4,597	3,741	22	21
Fruit assembler	39	38,016	26,094	6	15
Fruit shipping agent ¹⁾	32		16,310	4	13
Fishery wholesaler	96	22,335	13,121	15	16
Fishery retailer	186	2,762	1,635	27	15
Fishery shipping agent	19	39,149	34,579	1	5
Grain retailer	142	7,173	4,917	36	25
Grain assembler	55	37,137	20,879	6	11
Flower wholesaler	55	4,137 ²⁾	2,701 ²⁾	7	13
Flower retailer	49	2,798 ²⁾	2,125 ²⁾	10	20
Packed meat producer ¹⁾	16		56,812	4	25
Livestock retailer	215	2,308	2,022	58	27

Notes : 1) The ATC line of the fruit shipping agent and the packed meat producer is L-shaped. There fore, the optimum size could not be defined.

2) unit : 1,000 won.

2. Comparison of Average Costs among the Market Participants.

To compare the derived average costs among the market participants within a group commodity marketing, the market participants were classified into vegetables, fruit, fisheries, foodgrains, flowers and livestock marketing (Fig.1). The comparison with other commodity groups has little meaning because of difference in price per unit, volume and characteristics of each item. Among the market participants of the livestock industry, the retailer and the packed meat producer have completely different activities. Therefore, the comparison of the two is very difficult.

A. The Market Participants of the Vegetable Marketing

Below the size of 105,000 kg, the shipping agent shows the lowest average cost which represents the highest market efficiency, and above the size of 105,000kg, the wholesaler shows the lowest average cost among the market participants of the vegetable industry.

As the size increases, the retailer shows the highest average costs which shows inefficiency.

B. The Market Participants of the Fruit Marketing

The market participant of the fruit industry shows a similar pattern to that of the vegetable marketing in efficiency comparison. Below a certain level of size (about 48,000 kg), the shipping agent shows the lowest cost per unit, which means the highest market efficiency.

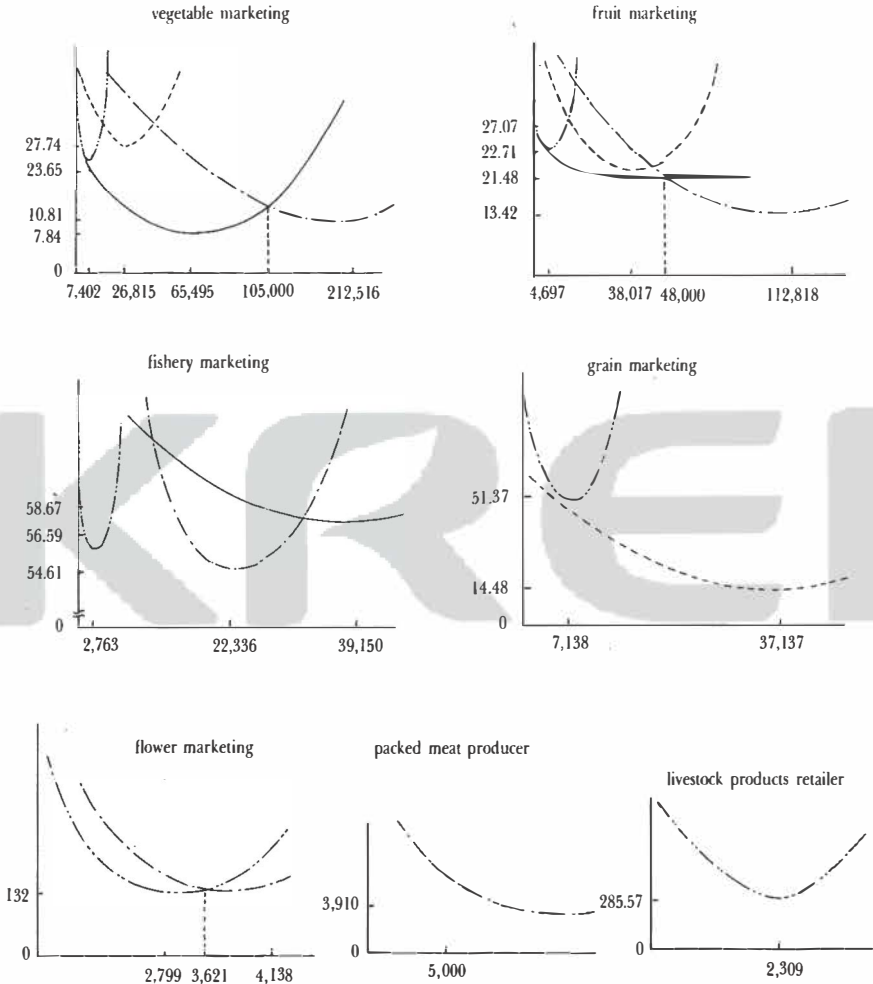
As the size increases, the retailer shows the most unfavorable average costs and the assembler shows the second most unfavorable average costs which indicate an inefficient operation. The only difference between the market participants of the vegetable marketing and the fruit marketing is that the fruit wholesaler is the one who transacts products in the lowest cost per unit among the market participants of the fruit marketing. As the optimum size increases, the minimum cost per unit decreases.

C. The Market Participants of the Fishery Marketing

The retailer shows minimum cost at the 2,763kg per month. After passing that point, it shows a dramatic increase in the ATC. It shows the lowest cost level per unit in a small scale transaction. The wholesaler shows a different pattern from that of vegetable and fruit industries, which shows a steep slope of the ATC.

Another characteristics of the wholesaler is that the optimum size is smaller than that of the shipping agent. In the middle-size transaction, however, the wholesaler is the one who participates in the market most efficiently and the average costs shows the lowest level.

FIGURE 1 Average Total Costs Curves of Market Participants



Notes: (1) ——— ATC of the wholesaler ——— ATC of the retailer

----- ATC of the assembler ——— ATC of the shipping agent

(2) The horizontal line indicates the monthly transaction volume (kg), whereas the vertical line indicates ATC(won/kg). (But for the market participants of the flower industry, the horizontal line indicates the monthly transaction amount (1,000 won), whereas the vertical line indicates ATC(won / 1,000won))

The shipping agent's performance improves gradually, compared with other participants, as the transaction scale increases. Above a certain level, the shipping agent can maintain a comparatively lower cost.

D. The Market Participants of the Food-Grain Marketing

The retailer shows the optimum size in a small scale. As the size increases, it shows rapid change in its cost level. The assembler shows more efficiency than the retailer.

E. The Market Participants of the Flower Marketing

The retailer shows more favorable costs below the level of 3,621,000 won sales and the wholesaler shows more favorable costs above the level. One particular characteristics is that the minimum cost level per unit is the same for both retailer and wholesaler. It is evident, therefore, that the retailer is more efficient on a small size and the wholesaler, on a comparatively large size

3. Comparison of the Optimum Size with the Present Size

By comparing the estimated optimum size with the present average transaction volume, an improvement of the market efficiency can be groped (Table 2).

A. The Market Participants of the Vegetable Marketing

The optimum size calculated is the biggest for the wholesaler, the second biggest for the shipping agent, the third biggest for the assembler and last for the retailer. The present transaction volume of the wholesaler is only half of the optimum scale. The market efficiency, therefore, can be increased until the wholesaler expands its transaction volume twice as much as the present level. The shipping agent, the assembler and the retailer also show a similar patterns to the wholesaler.

B. The Market Participants of the Fruit Marketing

The Market participants of the fruit industry show a similar patterns to those of the vegetable industry. The optimum size is the largest for the wholesaler, the second largest for the assembler and the third largest for the retailer. When the optimum size and the present transaction volume are compared, it is concluded that the wholesaler, the assembler and the retailer can reduce their per-unit costs by expanding their transaction volumes. It can be said that the present market participants of the fruit industry are inefficiently managing themselves at present.

C. The Market Participants of the Fishery Marketing

The optimum size is the largest for the shipping agent, the second

largest for the wholesaler and last for the retailer. The reason why the shipping agent represents the largest optimum size is that it consists of the "Gae"(a traditional cooperative form in Korea) and participates in the market on a large scale through a cooperative shipping organization which is different from the wholesaler and the retailer. When the optimum size and the present transaction volume are compared, it is concluded that the market participants of the fishery industry can increase their efficiency by expanding the transaction volume.

D. The Market Participants of the Food-Grain Marketing

Only the assembler and the retailer has been estimated due to the lack of available data. The assembler shows about 5 times as much transaction volume as that of the retailer. The result is the same for the optimum size. Therefore, the market participants of the food-grain industry can improve their market efficiency by expanding the transaction volume.

E. The Market Participants of the Flower Marketing

The cost analysis of the market participants of the flower industry also shows that the wholesaler has a higher optimum size than the retailer. One particular point to notice in this industry is that the per unit cost at optimum size is the same for both the wholesaler and the retailer. Therefore, wholesaler performs efficiently at large transaction volume and retailer at small volume. By expanding the transaction volume, both can improve the market efficiency.

F. The Market Participants of the Livestock Marketing

There is no much difference between the optimum size and the present transaction volume of the livestock retailer. But the expansion of the transaction volume can be more efficient. The ATC curve of the meat packer forms a L-shape. The expansion of the size is desirable.

As is shown above, most of the market participants in the agricultural industry manage themselves inefficiently in a small scale. Therefore, an improvement of the market efficiency by expanding the scale is the prerequisite which leads to the market modernization. This leads an acceleration of marketing speed and is helpful for settlement of fair trade.

4. The Level of Concentration around the Optimum Size

The distribution of the samples around the optimum size is suggested as a means to evaluate the efficiency of each market participant. The optimum interval is defined as the scale which adds or subtracts 20% to/ from the optimum size. The level of concentration of the samples was calculated only for this interval. The result of this analysis is shown in

Table 2.

The result shows that the shipping agent among the market participants of the vegetable marketing, the retailer among the market participants of the fruit marketing, the wholesaler among the market participants of the fishery marketing, the retailer among the market participants of the flower industry show comparatively a higher level of concentration. The fishery wholesaler among the wholesalers, the livestock retailer among the retailers, the fruit assembler among the assemblers and the vegetable shipping agent among the shipping agents show relatively a higher level of concentration. The livestock retailer shows the highest level of concentration among all the market participants.

IV . Financial Structure Analysis

With the collected data, each market participant has been compared with each other by classifying its financial structure (Table 3).

1. Own-Capital Ratio

The result of the own-capital ratio analysis shows that most samples have an own-capital ratio of more than a standard ratio of 50% (Table 4). Only less than 10% of the samples have an own-capital ratio of lower than the standard. It can be said, therefore, that the financial structure of the sample group is generally stable.

The average own capital ratio of the meat packing industry, however, is 61.5% which represents the lowest ratio among the market participants surveyed. Especially 33.3% of the samples in this industry belong to a lower ratio group than the standard ratio of 50%, which denotes a comparatively unstable financial structure.

The own - capital ratio of the retailer is in all cases higher than that of the wholesaler. It can be said, therefore, that the retail industry is financially stable. The own - capital ratio of the assembler is the lowest.

2. Debt Ratio

Only the debt ratio of the meat packing industry exceeds the average standard debt ratio of 100%. Other industries such as flower wholesale (53.9%), vegetable assembling (51.9%), and fishery retail industry (51.9%) show the level of 50% of the debt ratio. In general, most of the industries have a stable financial structure and show low dependency on the outside capital (Table 5).

In the meat packing industry, the debt consists mostly of the fixed-debt with a long term and low interest rate, while the flexible debt with a short term and high interest rate occupies only a small portion of total debt. The flexible debt ratio is 72.1% which is not considered danger-

TABLE 3 The Current Financial State of Market Participants, 1984

(1,000 Won / Person)

	Number of samples	Fixed capital (A)	Flexible capital (B)	Fixed debt (C)	Flexible debt (D)	Total capital (A+B)	Total debt (C+D)	Monthly total cost	Monthly net profit
Vegetable wholesaler	328	15,653	49,977	869	12,583	65,630	13,452	1,101.6	691.1
Vegetable retailer	161	4,379	1,877	200	283	6,256	483	158.8	282.5
Vegetable assembler	96	15,717	11,316			27,033	4,259	672.1	297.9
Fruit wholesaler	342	12,411	22,774	653	4,646	35,185	5,299	584.5	625.5
Fruit retailer	104	3,351	1,554	246	230	4,906	476	130.4	314.6
Fruit assembler	39	18,750	14,357			33,107	3,804	672.8	303.8
Fishery wholesaler	96	15,113	33,355	1,921	9,262	48,468	11,183	1,021.7	638.9
Fishery retailer	186	4,421	2,098	319	639	6,519	958	407.1	296.7
Grain retailer	142	10,020	5,542	326	964	15,562	1,290	162.8	289.2
Grain assembler	55	40,568	10,534			50,922	5,115	503.7	385.0
Flower wholesaler	55	7,855	6,693	1,813	907	14,548	2,720	436.9	498.7
Flower retailer	49	7,967	2,000	1,276	339	9,967	1,615	267.3	443.8
Packed meat producer	16	234,530	122,228	90,137	175,022	356,758	265,159	218,664.8	513.2
Livestock retailer	215	12,055	4,934	1,072	828	16,989	1,900	407.1	422.4

Note : 1) For the assembler, only the total debt was calculated.

Source : KREI, NMMPS Survey.

ous. The foodgrain retailer has the most stable financial structure, with an average debt ratio of 19.9% and flexible debt ratio of 18.2% which represents a short term debt-ratio that may give pressure to the management.

Now the management state of the market participants from the viewpoint of the standard ratio of 100% of both debt and flexible debt is explained in this study.

The meat packing industry has the most unstable financial structure, showing that 22.2% of the total samples have a higher ratio than the standard ratio in both debt and flexible debt ratio. The fishery wholesaler has the second unstable financial structure(12.0%), the flower wholesaler, the third (9.1%), and the fruit wholesaler, the fourth(6.4%). The vegetable wholesaler(6.4%), has the fifth unstable

TABLE 4 Own-Capital Ratio, 1984

	Samples	The average of the ratio(%)	Distribution for each interval (%)			
			0-30%	30-50%	50-80%	80-100%
Vegetable wholesaler	328	83.1	1.5	4.5	28.6	65.4
Vegetable retailer	161	91.2	3.7	2.5	9.3	84.5
Vegetable assembler	96	78.5	4.3	5.8	31.9	58.0
Fruit wholesaler	342	85.7	3.2	2.4	22.0	72.4
Fruit retailer	104	91.8	2.6	1.8	11.4	84.2
Fruit assembler	39	83.8	0	7.1	28.6	64.3
Fishery wholesaler	96	77.6	3.0	9.0	32.0	56.0
Fishery retailer	186	87.2	5.7	3.1	11.5	79.7
Grain retailer	142	90.0	2.5	0.8	17.2	79.5
Grain assembler	55	88.0	2.3	0	15.9	81.8
Flower wholesaler	55	77.2	7.3	5.5	29.1	58.2
Flower retailer	49	79.2	8.2	6.1	22.4	63.3
Packed meat producer	16	61.5	33.3	0	33.3	33.3
Livestock retailer	215	85.8	2.5	5.1	17.8	74.5

Note : Own-capital ratio=(own-capital / total capital)× 100 (%).

financial structure.

Compared with other industries, a smaller percentage of the retail industry has a higher ratio than the standard ratio both in the debt and flexible ratio. The result of this analysis shows the same patterns as that of the own - capital ratio.

3. Capital-Profit Ratio

Considering the net profit to total capital and to own-capital, the wholesaler more than the assembler, the retailer more than the wholesaler manages its capital efficiently. On the other hand, the meat packing industry is in a poor condition with its management (Table 6).

Among the items, the food-grain shows the lowest net profit to total capital. That is because the marketing of the food - grain, compared with other items, receives much restriction from the government. The

TABLE 5 Debt Ratio, 1984

	samples	Debt ratio				Flexible-debt ratio				Fixed-debt ratio			
		Intervals(%)				Intervals(%)				Intervals(%)			
		Average (%)	0% - 80%	80% - 100%	above 100%	Average (%)	0% - 80%	80% - 100%	above 100%	Average (%)	0% - 80%	80% - 100%	above 100%
Vegetable wholesaler	328	32.6	90.2	3.0	6.8	30.7	91.0	2.6	6.4	1.9	100	0	0
Vegetable retailer	161	35.3	93.8	0.6	5.6	16.1	95.7	0.6	3.7	19.2	97.5	0	2.5
Vegetable assembler	96	51.9	82.6	5.8	11.6								
Fruit wholesaler	342	37.8	92.0	0.8	7.1	26.7	92.4	1.2	6.4	11.1	99.2	0	0.8
Fruit retailer	104	22.9	91.2	0.9	7.9	11.2	96.5	0	3.5	11.7	95.6	0.9	3.5
Fruit assembler	39	27.7	92.9	0	7.1								
Fishery wholesaler	96	44.1	85.0	2.0	13.0	42.0	86.0	2.0	12.0	2.1	99.0	1.0	0
Fishery retailer	186	51.9	88.5	2.1	9.4	38.1	93.2	0.5	6.3	13.8	95.8	1.0	3.1
Grain retailer	142	19.9	94.5	0.8	4.9	18.2	94.3	0.8	4.9	1.7	100	0	0
Grain assembler	55	44.2	95.4	2.3	2.3								
Flower wholesaler	55	53.9	80.0	1.8	18.2	21.9	90.9	0	9.1	32.0	85.5	3.6	10.9
Flower retailer	49	41.3	83.7	0	15.3	7.7	98.0	0	2.0	23.6	93.9	0	6.1
Packed meat producer	16	152.1	66.7	0	33.3	72.1	66.7	11.6	22.2	80.0	72.7	0	27.3
Livestock retailer	215	32.1	89.2	1.3	9.6	13.0	95.5	0.6	3.8	19.1	95.5	0.6	3.9

Notes : 1) Total debt = flexible debt + fixed debt.

Therefore, debt ratio = flexible debt ratio + fixed debt ratio.

2) For the assembler, fixed debt and the flexible debt were not examined. AS a result, flexible ratio and fixed ratio remain in the table as blank.

3) Debt ratio = (debt / own capital) × 100(%).

Filexible ratio = (flexible debt / own capital) × 100(%).

Fixed ratio = (fixed debt / own capital) × 100(%).

food - grain assembler shows the lowest net profit to total capital among all the market participants with an average net profit to total capital of 16.2% and average net profit to own - capital of 20.3% .

Among the market participants of the fruit and vegetable industry, the gap in net profit to total capital between the assembler, the wholesaler and the retailer is very wide. The average net profit to total capital of the vegetable, fruit and fishery retail industry exceeds 200% which denotes a high net profit to total capital.

TABLE 6 Capital- rofit Ratio, 1984

	Samples	Total capital-profit ratio			Own-capital-profit ratio		
		Average (%)	intervals(%)		Average (%)	intervals(%)	
			0-20%	20%(above)		0-20%	20%(above)
Vegetable wholesaler	328	88.8	37.5	62.5	110.2	32.7	63.3
Vegetable retailer	161	248.8	13.7	80.3	363.4	12.4	87.6
Vegetable assembler	96	21.1	60.8	39.2	38.2	49.3	50.7
Fruit wholesaler	342	141.6	29.8	70.2	162.3	25.2	74.8
Fruit retailer	104	230.4	9.6	90.4	270.7	8.8	91.2
Fruit assembler	39	31.8	67.8	32.2	39.3	50.0	50.0
Fishery wholesaler	96	72.8	28.8	71.2	102.1	22.0	78.0
Fishery retailer	186	223.1	16.1	83.9	300.6	15.6	84.4
Grain retailer	142	33.2	51.6	48.4	41.4	45.9	54.1
Grain assembler	55	16.2	72.8	27.2	20.3	65.9	34.1
Flower wholesaler	55	73.2	23.3	76.7	101.5	23.3	76.7
Flower retailer	49	86.4	8.2	91.8	119.8	12.2	87.8
Packed meat producer	16	18.0	83.3	16.7	65.5	60.0	40.0
Livestock retailer	215	49.4	38.2	61.8	71.8	34.4	65.6

Note : Total capital - profit ratio = (annual net profit / total capital) × 100(%).

Own capital - profit ratio = (annual net profit / own capital) × 100(%).

It can be said, therefore, that the retailer has the highest, wholesaler the second highest, and the assembler the third highest efficiency in net profit to total capital.

V . Summary and Conclusion

Market participants are performing their functions efficiently, which results in improvement of marketing business. The size of the participants are found to be too small to increase the marketing efficiency. But they have trend to be increased. For the efficient management by the participants, several factors can be recommended.

High manageability, adoption of advanced technology, confidential free environment for middlemen, fair trade and free competition mar-

ket system, and social understandings and customs are the factors which influence the marketing efficiency of the participants. Educational and training opportunity should be provided for them to have self-developments.

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