THE CURRENT SITUATION OF UNIT PRICES, ETC. IN SUBCONTRACTS OF REBAR WORK: A HISTORY BASED CASE STUDY OF A REBAR COMPANY

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Background & Object

- One of the major factors that affect the Japanese construction production system is the multi-layering of subcontractors. It has been pointed out frequently that business transactions in such multilayered systems often lead to pricing and scheduling difficulties due to the nature of the relationship between contractors and subcontractors.
- However, such circumstances have seldom been examined quantitatively. Therefore, it has been difficult to study them objectively and to improve the system.
- Nonetheless, we were able to obtain a set of relevant data, which we closely studied and analyzed to examine such transactions. The company that we examined, which we call Company A, is a rather large rebar company located near Tokyo.
- We statistically analyzed the firm's 650 contracts over the past decade and discovered useful facts.

Data for the Analysis

- In the fall of 2007, we obtained the contract history of one rebar firm.

Table 1: Profile of Company A

| Location: | Headquarters in Tokyo; Processing plants in 2 locations |
| Capital: | 50 million yen |
| Specialization: | Rebar work (Permit granted by the Governor of Tokyo) |
| Employees: | 160 (30 in processing plants, 100 on-site, 30 in other locations); 30 second-tier subcontractors (all numbers are approximate) |
| Work description: | Its principal client is one large general contractor. Its work consists primarily in building construction. |

1. Data: **650 contracts** (some small jobs were omitted)
2. Duration: **1997 - 2006** (ten fiscal years)

Table 2: Description of the Data in Company A's Contract History

<table>
<thead>
<tr>
<th>Year</th>
<th>Client</th>
<th>Project</th>
<th>Price (thousands of yen)</th>
<th>Quantity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1</td>
<td>4</td>
<td>1,200</td>
<td>300</td>
<td>12</td>
</tr>
<tr>
<td>2002</td>
<td>2</td>
<td>3</td>
<td>1,500</td>
<td>400</td>
<td>18</td>
</tr>
<tr>
<td>2003</td>
<td>3</td>
<td>2</td>
<td>2,000</td>
<td>500</td>
<td>24</td>
</tr>
<tr>
<td>2004</td>
<td>4</td>
<td>1</td>
<td>2,500</td>
<td>600</td>
<td>30</td>
</tr>
<tr>
<td>2005</td>
<td>5</td>
<td>5</td>
<td>3,000</td>
<td>700</td>
<td>36</td>
</tr>
</tbody>
</table>

Rebar Work in Cost books
Company A's Contract History

<table>
<thead>
<tr>
<th>年</th>
<th>件数</th>
<th>件名</th>
<th>金額</th>
<th>価格</th>
</tr>
</thead>
<tbody>
<tr>
<td>平成3年</td>
<td>532</td>
<td>窪川病院</td>
<td>530</td>
<td>9.1～10.3</td>
</tr>
<tr>
<td>平成4年</td>
<td>227</td>
<td>脚立市場</td>
<td>530</td>
<td>9.1～10.3</td>
</tr>
<tr>
<td>平成5年</td>
<td>500</td>
<td>丸子台市場</td>
<td>200</td>
<td>9.2～10.2</td>
</tr>
<tr>
<td>平成6年</td>
<td>774</td>
<td>岩手県庁</td>
<td>200</td>
<td>9.2～10.2</td>
</tr>
<tr>
<td>平成7年</td>
<td>400</td>
<td>岩手県庁</td>
<td>200</td>
<td>9.2～10.2</td>
</tr>
<tr>
<td>平成8年</td>
<td>342</td>
<td>岩手県庁</td>
<td>200</td>
<td>9.2～10.2</td>
</tr>
<tr>
<td>平成9年</td>
<td>342</td>
<td>岩手県庁</td>
<td>200</td>
<td>9.2～10.2</td>
</tr>
</tbody>
</table>

- Fig. 1: Fluctuations in Company A
- The rebar used in each contract is estimated to range between 50 and 200 tons, according to a journal on construction related pricing information (ex. Kensetsu-Bukka).
- However, Company A's Median 300 tons in their contracts.
  (This may be due to the fact that Company A is a favored subcontractor of a nation-wide large general contractor.)

Work Performance

- Fig. 2: Per-Contract Quantity and Price

Analysis of Clients

- 26 customer firms
- GC17 is the main general contractor

- Fig. 3: Company A's Statistics by 26 Contracting Firms

Quantity & Unit Price

- Unit prices in big contracts (more than 60 tons) become more or less fixed around 50,000 yen/ton, and thus no economy of scale is observed.

- Fig. 5: Quantity Contracted and Unit Price (Including only ordinary projects)
Unit Prices Over Time

- Starting in the latter half of the 1990's, the unit price of rebar declined, but it rebounded in 2006.

Fig. 7: Quarterly Fluctuations in Unit Prices in Contracts with GC17 (Box plot)

Rodman Shortages

- The rebound occurs following the shortage of rodmen in the Tokyo area (Kanto Region) in 2006.

Fig. 8: Fluctuations in Rodman Shortages (by National Average and Region)

Rate of surplus and shortage of Rodman is the highest (a reference)

Fig. 9-1: quantity of new contracts
Fig. 9-2: quantity of executed work

Seasonality of Quantity

- An analysis of work durations revealed little change in Company A's monthly number of finished projects (Fig.9-2), when compared with the number of projects begun (Fig.9-1).
- Operational resources are being effectively utilized.

Figures created from the monthly data in the Survey of Supply and Demand of Construction Labor compiled by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of JAPAN.

Note: Figures sourced from the monthly data in the Survey of Supply and Demand of Construction Labor compiled by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of JAPAN.
Work Duration

- While the duration of a job tends to increase with the cost and scale of the contract, this relationship is not precisely proportional. Actual durations vary greatly from case to case.

![Figure 11: Relationships between the Work Duration and the Quantity Contracted](image)

Conclusion

- Its analyses resulted in some interesting findings as described, but the scope of the results of this study is somewhat limited.
- The data used in this study has both strengths and limitations. Because the contract history that was analyzed in this study comes from a single rebar company.
- Nevertheless, this study provides a glimpse of the current situation in the rebar work sector in Japan and provides information that is virtually unknown outside the construction industry.
- We therefore believe that our results are valuable.