

## APPENDIX A – Application of the methodology of Chapter 3

### <Predicting the Future of the Entire Industry>

Table A-1 allocates competition coefficients to each company. Both sides of the diagonal line in the middle of the table are symmetrical. This is because if one company affects another, the opposite is also a possibility. Competition is fierce within each strategic group, and the more similar the product or service from each company within each group is, the fiercer the competition becomes. In this case, the competition between them and other groups decreases, to the point where some products and services do not have any effect.

Strategic Group	Competition Coefficient
Same strategic group (Similar product)	→ 0.20
Same strategic group	→ 0.10
Other group (When the effect can't be ignored)	→ 0.02 ~ 0.05
Other group (When the effect can be ignored)	→ 0.00
Other group (When companies cooperate with each other)	→ -0.05 ~ -0.10

Table A-1

	a	b	c	d	e	f	g	h	i
a		0.10	0.20	0.10	0.05	0.02	0.10	0.00	0.00
b	0.10		0.20	0.20	0.05	0.02	0.02	0.00	0.00
c	0.20	0.20		0.10	0.10	0.02	0.02	0.00	0.00
d	0.10	0.20	0.10		0.10	0.02	0.02	0.00	0.00
e	0.05	0.05	0.10	0.10		0.20	0.20	-0.05	-0.05
f	0.02	0.02	0.02	0.02	0.20		0.20	0.00	0.00
g	0.10	0.02	0.02	0.02	0.20	0.20		-0.10	-0.10
h	0.00	0.00	0.00	0.00	-0.05	0.00	-0.10		0.20
i	0.00	0.00	0.00	0.00	-0.05	0.00	-0.10	0.20	

The growth coefficient and management vision was determined as below (Table A-2) based on the time passed since entering the market and the results of a survey that was conducted in 2001. For the management vision, suppliers *d*, *e* and *g* were focused on expanding internationally, which is represented here as  $K_3$ . Supplier *d* is a new entrant in the Japanese market, which is reflected by its low starting value (no profits yet), however  $K$  was increased to reflect their significant performance overseas. Other suppliers were only focused on the domestic market, and so they were given  $K_2$

Table A-2

Supplier	Growth Rate		Management Goal (hundred million yen)	
	$r_1$	0.20	$K_1$	15
b	$r_2$	0.60	$K_2$	20
c	$r_3$	0.20	$K_3$	12
d	$r_4$	0.70	$K_4$	30
e	$r_5$	0.50	$K_5$	15
f	$r_6$	0.40	$K_6$	3
g	$r_7$	0.60	$K_7$	15
h	$r_8$	0.50	$K_8$	5
i	$r_9$	0.50	$K_9$	4

With this, all the necessary parameters are in place. The differential equation (3.1) can be applied to the nine companies and expanded as in (a-1). While it looks complex, the competition coefficients are simply increased by the number of players ( $x_1 \sim x_9$ ), and are fundamentally the same as (2.1) in Chapter 2.

$$\begin{aligned}
 dx_1/dt &= r_1 x_1 (1 - (x_1 + b_1 x_2 + c_1 x_3 + d_1 x_4 + e_1 x_5 + f_1 x_6 + g_1 x_7 + h_1 x_8 + i_1 x_9) / K_1) \\
 dx_2/dt &= r_2 x_2 (1 - (a_2 x_1 + x_2 + c_2 x_3 + d_2 x_4 + e_2 x_5 + f_2 x_6 + g_2 x_7 + h_2 x_8 + i_2 x_9) / K_2) \\
 dx_3/dt &= r_3 x_3 (1 - (a_3 x_1 + b_3 x_2 + x_3 + d_3 x_4 + e_3 x_5 + f_3 x_6 + g_3 x_7 + h_3 x_8 + i_3 x_9) / K_3) \\
 dx_4/dt &= r_4 x_4 (1 - (a_4 x_1 + b_4 x_2 + c_4 x_3 + x_4 + e_4 x_5 + f_4 x_6 + g_4 x_7 + h_4 x_8 + i_4 x_9) / K_4) \\
 dx_5/dt &= r_5 x_5 (1 - (a_5 x_1 + b_5 x_2 + c_5 x_3 + d_5 x_4 + x_5 + f_5 x_6 + g_5 x_7 + h_5 x_8 + i_5 x_9) / K_5) \\
 dx_6/dt &= r_6 x_6 (1 - (a_6 x_1 + b_6 x_2 + c_6 x_3 + d_6 x_4 + e_6 x_5 + x_6 + g_6 x_7 + h_6 x_8 + i_6 x_9) / K_6) \\
 dx_7/dt &= r_7 x_7 (1 - (a_7 x_1 + b_7 x_2 + c_7 x_3 + d_7 x_4 + e_7 x_5 + f_7 x_6 + x_7 + h_7 x_8 + i_7 x_9) / K_7) \\
 dx_8/dt &= r_8 x_8 (1 - (a_8 x_1 + b_8 x_2 + c_8 x_3 + d_8 x_4 + e_8 x_5 + f_8 x_6 + g_8 x_7 + x_8 + i_8 x_9) / K_8) \\
 dx_9/dt &= r_9 x_9 (1 - (a_9 x_1 + b_9 x_2 + c_9 x_3 + d_9 x_4 + e_9 x_5 + f_9 x_6 + g_9 x_7 + h_9 x_8 + x_9) / K_9)
 \end{aligned}
 \tag{a-1}$$

Figure A-1 shows the results of substituting the parameters from Table 14 into the equations (3.2) and calculating the results in Excel. The initial value was set as the sales revenue in 2001, which was between 1 and 9 hundred million yen for all of the companies. However, 10 years later it can be seen that each company had varying results, and the results vary between 0 and 2.5 billion yen. Table A-3 shows the results of the calculation compared to the results of a survey conducted of actual results in 2011. The calculated trends and the real life trends are more or less the same, and it seems to be possible to predict the sales of each company 10 years in advance.

Figure A-1

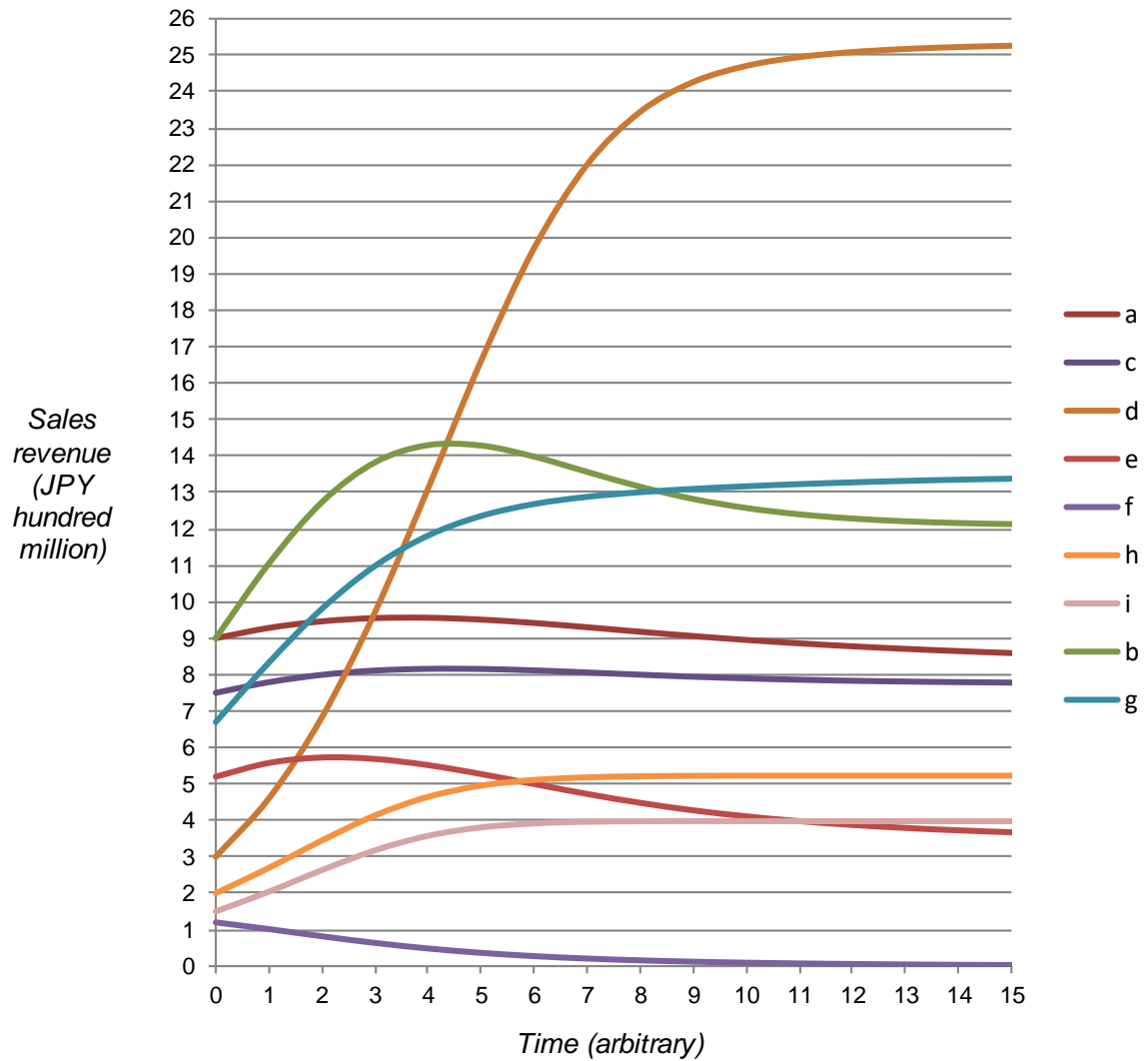


Table A-3

2001 Sales (hundred million yen)		2011 Sales (hundred million yen)				
Supplier	Performance Value	Calculated value ①	Calculated trend	Performance value ②	Actual trend	Difference ①-②
a	9.0	10.2	→	9.0	→	1.2
b	9.0	12.6	↑	12.0	↑	0.6
c	7.5	3.7	↓	5.0	↓	-1.3
d	3.0	24.6	↑	25.0	↑	-0.4
e	5.2	8.2	↓	4.0	↓	4.2
f	1.2	0.0	↓	0.0	↓	0.0

<i>g</i>	6.7	→	13.4	↑	11.3	↑	2.1
<i>h</i>	2.0	→	5.8	↑	4.5	↑	1.3
<i>i</i>	1.5	→	4.6	↑	3.0	↑	1.6

The results of the survey gave insight into the reasons behind the larger discrepancies between calculated and actual values.

- ① *Supplier b* was significantly impacted by *supplier d* entering the market, and the discount sale tactics employed by another company that was not part of the survey.
- ② The calculated value for *supplier e* was several times higher than the actual value. This was because the supplier was developing sales in South East Asia in 2001, but control of this region was relinquished and the supplier became limited to the Japanese domestic market.
- ③ For *supplier g*, the calculated value was about 20% higher than the actual value. This was found to be because they had stopped expanding into overseas markets.

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