Perspective Index of Production Workers: Analysis of “Gemba Capabilities in Electrical and Electronics Industry”

Nobuyuki INAMIZU^{a)}

Abstract: In this study, data was obtained from a questionnaire of 354 workplace leaders and 3,116 workers at 97 workplaces in Japan's electrical and electronics industry, which was used to examine relationships among a perspective index, job satisfaction, and desire to leave one's job (i.e., turnover candidacy). Takahashi, mainly targeting white-collar workers, noted that a perspective index has a mostly linear, positive relationship with job satisfaction, and a mostly linear, negative relationship with turnover candidacy. In this study, a similar relationship is identified in leaders and workers on the shop floor (*gemba* in Japanese). The job satisfaction level of the *gemba* leaders was almost the same as that realized by Takahashi (1997), but the job satisfaction level among manufacturing workers generally tended to be higher. Moreover, turnover candidacy among manufacturing workers was lower than that realized by Takahashi (1997).

^{a)} Faculty of Business Sciences, University of Tsukuba, 3-29-1 Otsuka, Bunkyo-ku, Tokyo, Japan, inamizu@gssm.otsuka.tsukuba.ac.jp
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Introduction

Using data obtained from a questionnaire of 354 workplace leaders and 3,116 workers at 97 factories in Japan's electrical and electronics industry, this study examines relationships among a perspective index, job satisfaction, and desire to leave one's job (i.e., turnover candidacy) (Okada & Inamizu, 2014; Takahashi, 1997, 2002, 2013a, 2013b; Takahashi, Ohkawa, & Inamizu, 2009, Takahashi, Ohkawa, Inamizu, & Akiike, 2013). A perspective index shows the awareness level of one's future or the organization future to which one belongs, as well as how engaged a person is in his/her work from a long-term perspective. Takahashi's (1997) survey, mainly targeting white-collar workers, showed that a perspective index has a mostly linear, positive relationship with job satisfaction, and a mostly linear, negative relationship with turnover candidacy.

The main factors involved in this study are the subjects, leaders on the shop floor (*gemba* in Japanese), and *gemba* workers involved in manufacturing. Few studies are performed to determine whether a perspective index can verify the effects exerted on job satisfaction and turnover candidacy in the abovementioned roles. In addition, the *gemba* in Japan's electrical and electronics industry in recent years has been competing with emerging countries. While this is likely to make it difficult to have a perspective on one's own future or that of one's company, examining the results that perspective indices hold is essential.

The results of the analysis are as follows:

- (1) There is a mostly linear, positive relationship between the

perspective index and job satisfaction.

- (2) There is a mostly linear, negative relationship between the perspective index and turnover candidacy.
- (3) The job satisfaction level of the gemba leaders was almost the same as that realized by Takahashi (1997), but the job satisfaction level among manufacturing workers generally tended to be higher. Moreover, turnover candidacy among manufacturing workers was lower than that realized by Takahashi (1997).

Research Method

Data used in this study's analysis is from a survey entitled "*Denki Sangyou no Genbaryoku Chousa*" ("A Survey of Shop Floor Capability in the Electrical and Electronics Industry;" Shintaku, Inamizu, Fukuzawa, Suzuki, & Yokozawa, 2014), where a questionnaire survey regarding the factory, gemba leaders, and workers was conducted. The subjects of the survey belonged to companies that are affiliated with the Japanese Electrical, Electronic, and Information Union and that have a shop floor.

In addition to considering measurements used in existing research regarding strategy and organization in Japanese companies, interviews were conducted at approximately ten companies. Points of interest identified during the interviews were incorporated in the questionnaires. Furthermore, feedback obtained from business experts regarding potential answers to questions and their significance was considered, and the questionnaire was completed at the end of November 2013. From December 2013 to January 2014, the questionnaires were distributed to the subjects and then collected.

The questionnaire types and response rate details are as follows:

Questionnaire A: Survey of the workplace and factory.

Subjects: Factory manager, general manager, and others with an overall perspective of the factory and workplace.

Contents: Products manufactured at the factory and the state of human resources; the level of centralization of factory functions and the frequency and satisfaction of inter-department coordination; the state of organization at the factory level, namely the organizational climate at the headquarters and the factory; inter-site relationships; factory performance; overall factory strategy, etc.

Responses: 97 factories (questionnaires distributed to 163 factories, with 59.5% response rate).

Questionnaire B: Survey of workplace leaders.

Subjects: Leaders in workplace/factory manufacturing lines that were the targets of Questionnaire A.

Contents: Gemba-level staff rotation and personnel development, level of coordination with other departments, the organizational strength of the shop floor and the organizational climate, and attitude toward his/her own job such as job satisfaction.

Responses: 354 individuals (questionnaires distributed to 446 individuals, with 79.4% response rate).

Questionnaire C: Survey of workers.

Subjects: Workers under workplace leaders who were asked to respond to Questionnaire B (full-time employees only).

Contents: Organizational strength of the shop floor and the organizational climate and attitude toward his/her own job such as job satisfaction.

Responses: 3,116 individuals (questionnaires distributed to 3,990 individuals, with 78.1% response rate).

From questionnaires A, B, and C, this study uses data from questionnaires B and C. In addition, questionnaires B and C mainly use the same questions regarding the perspective index, job satisfaction, and turnover candidacy as those used by Takahashi and others. Data obtained from questionnaires B and C was used to examine relationships among the perspective index, job satisfaction, and turnover candidacy.

Supplementary Study of the Perspective Index

The perspective index of Takahashi (1997) included the following items:

- P1: Are you able to see the desired shape that your company will take in the 21st century? 1 = yes, 0 = no.
- P2: Do you spend most of your working hours on routine tasks? 0 = yes, 1 = no.
- P3: Are your job targets clearly specified by your superiors? 1 = yes, 0 = no.
- P4: Does your company have the atmosphere in which reaching short-term goals tend to have priority over achieving long-term goals? 0 = yes, 1 = no.
- P5: Ten years from now, can you visualize a positive future for yourself in this company? 1 = yes, 0 = no.

From the abovementioned items, P1 was modified as follows:

- P1': Are you able to see the desired shape that your company will take in ten years? 1 = yes, 0 = no.

As per Takahashi (1997), the perspective index has a mostly linear, positive relationship with job satisfaction, and a mostly linear, negative relationship with turnover candidacy. In other words, the perspective index increases with job satisfaction, and it decreases

with turnover candidacy. Takahashi (1997) measures job satisfaction and turnover candidacy using the following items. This survey used the same items (although in Questionnaire B only job satisfaction in Q1 is measured).

Q1: Are you satisfied with your job? 1 = yes, 0 = no.

Q2: If given an opportunity, would you like to change jobs? 1 = yes, 0 = no.

Tables 1 and 2 show the means, standard deviations, and correlations related to the perspective index, job satisfaction, and turnover candidacy in questionnaires B and C, respectively. In Takahashi (1997), the means of P1–P5 were 0.40, 0.56, 0.56, 0.25, and 0.29, respectively. Note that respondents answered “Most of my time at work is spent on routine tasks,” despite answering “My work goals are clearly specified by my superiors.” This was probably due to the subjects being at the gemba. Overall, workers perspective index (Questionnaire C) was not high (Table 2). Workers particularly did not seem to have much awareness of “the ideal state of my company in ten years’ time.”

In Takahashi (1997), the means of Q1 (job satisfaction) and Q2 (turnover candidacy) were 0.48 and 0.47, respectively. Questionnaire B did not show difference in the means of job satisfaction and turnover candidacy, whereas in Questionnaire C, which targeted workers, job satisfaction tended to be high, while turnover candidacy tended to be low.

This study also examines the relationship between the perspective index and job satisfaction. Table 3 is a cross-table of the perspective index and job satisfaction. In Questionnaire B, when the perspective index is 0, the job satisfaction ratio of respondents who answered “yes” to Q1 was 16.70% (3 out of 18 answered “yes”). However, when the perspective index was 5, the job satisfaction ratio was 81.50% (22 out of 27 answered “yes”). In Questionnaire C, when the perspective

Table 1. Means, standard deviations, and correlations of questionnaire B

Variables	Means	Standard Deviations	Correlations				
			P1'	P2	P3	P4	P5
P1'	0.42	0.494					
P2	0.4	0.49	.152**				
P3	0.86	0.343	0.093	-0.004			
P4	0.25	0.436	.193**	.415**	0.042		
P5	0.41	0.492	.480**	.131*	.136*	.144**	
Q1	0.53	0.5	.172**	0.096	.192**	0.088	.235**

Note: * $p < 0.05$; ** $p < 0.01$

Table 2. Means, standard deviations, and correlations of questionnaire C

Variables	Means	Standard Deviations	Correlations						
			P1'	P2	P3	P4	P5	Q1	Q1
P1'	0.26	0.438							
P2	0.37	0.484	.169**						
P3	0.66	0.473	.185**	.199**					
P4	0.36	0.481	.194**	.192**	.403**				
P5	0.3	0.459	.450**	.234**	.227**	.246**			
Q1	0.62	0.485	.156**	.289**	.242**	.216**	.281**		
Q2	0.33	0.471	-.090**	-.148**	-.149**	-.160**	-.202**	-.307**	

Note: * $p < 0.05$; ** $p < 0.01$

index was 0, the job satisfaction ratio was 32.40% (176 out of 543 answered “yes”). However, when the perspective index was 5, the job satisfaction ratio was 95.30% (203 out of 213 answered “yes”). In other words, the perspective index has a positive relationship with the job satisfaction ratio.

Figure 1 plots the percentage of respondents answering “yes” to Q1 (job satisfaction) on the vertical axis and the perspective index on the horizontal axis. Regression analysis treating the job satisfaction ratio as a dependent variable and the perspective index as an explanatory variable was performed. The regression formula in Questionnaire B was $y = 0.110x + 0.250$, with a coefficient of determination of 0.873.

Table 3. Cross-table of the perspective index and job satisfaction

(a) Questionnaire B

		Q1		Total
		No	Yes	
Perspective Index	0	15	3	18
	1	58	38	96
	2	36	50	86
	3	32	47	79
	4	18	26	44
	5	5	22	27
Total		164	186	350

(b) Questionnaire C

		Q1		Total
		No	Yes	
Perspective Index	0	367	176	543
	1	354	412	766
	2	238	442	680
	3	118	379	497
	4	43	255	298
	5	10	203	213
Total		1130	1867	2997

The regression formula in Questionnaire C was $y = 0.120x + 0.380$, with a coefficient of determination of 0.987. While the number of samples in Questionnaire B was relatively low, reducing the coefficient of determination, as is strikingly clear from Questionnaire C, there is a mostly linear, positive relationship between the perspective index and Q1 (job satisfaction).

The results of the survey along with those of Takahashi (1997) are plotted in Figure 1. As can be seen from the figure, there is no significant difference in job satisfaction levels between the results of Questionnaire B and Takahashi (1997) (although there is a slight

Figure 1. Perspective index and job satisfaction ratio

divergence where the perspective index is 2). However, there is a major difference in job satisfaction levels between the results of Questionnaire C and Takahashi (1997).

Next, the relationship between the perspective index and turnover candidacy was examined. Table 4 is a cross-table of the perspective index and turnover candidacy. Turnover candidacy was not measured in Questionnaire B. However, in Questionnaire C, when the perspective index was 0, the percentage of respondents answering “yes” to Q2 (turnover candidacy) was 50.00% (277 out of 544 answered “yes”). When the perspective index was 5, the turnover candidate ratio was 8.00% (17 out of 213 answered “yes”). Thus, there is a linear negative relationship between the perspective index and turnover candidacy.

Figure 2 plots the ratio of respondents answering “yes” to Q2 (turnover candidacy) on the vertical axis and the perspective index on

Table 4. Cross-table of the perspective index and turnover candidacy

		Q2		Total
		No	Yes	
Perspective Index	0	272	272	544
	1	480	291	771
	2	458	223	681
	3	355	144	499
	4	249	51	300
	5	196	17	213
Total		2010	998	3008

Figure 2. Perspective index and turnover candidate ratio

the horizontal axis. Regression analysis treating turnover candidate ratio as a dependent variable and the perspective index as an explanatory variable was performed. The regression formula used in

Questionnaire C was $y = -0.079x - 0.488$, with a coefficient of determination of 0.975. In this study, there was a mostly linear, negative relationship between the perspective index and Q2, that is, turnover candidacy. When we compare the results of our study with those of Takahashi (1997), it is clear that there is an overall tendency toward a low level of turnover candidacy.

Therefore, in this study, a mostly linear, positive relationship between the perspective index and job satisfaction and a mostly linear, negative relationship between the perspective index and turnover candidacy can be observed. Furthermore, the perspective index of Takahashi (1997) and its effects were confirmed. It is clear that there is an overall consistent tendency among gemba workers for job satisfaction level to be high and turnover candidacy level to be low.

Conclusion

This study analyzed relationships among the perspective index, job satisfaction, and turnover candidacy using data from a questionnaire targeting workplace leaders (Questionnaire B) and workers (Questionnaire C) in electrical and electronics industry.

The following points emerged from the results of this study:

- (1) There is a mostly linear, positive relationship between the perspective index and job satisfaction.
- (2) There is a mostly linear, negative relationship between the perspective index and turnover candidacy.
- (3) The job satisfaction level of the gemba leaders was almost the same as that realized by Takahashi (1997), but the job satisfaction level among manufacturing workers generally tended to be higher. Moreover, turnover candidacy among manufacturing workers was lower than that realized by Takahashi (1997).

Along with Takahashi (1997) and other studies, this study observed a linear positive relationship between the perspective index and job satisfaction, and a linear negative relationship between the perspective index and turnover candidacy. Takahashi (1997) mainly analyzed white-collar workers, and this study confirmed similar facts in blue-collar workers in the manufacturing gemba.

As mentioned above, those working in the manufacturing gemba of the electrical and electronics industry do not necessarily have a high perspective index. Thus, in practical terms, the impact of increasing the perspective index would be highly significant.

In addition, another important finding from this study was that compared with Takahashi (1997), the job satisfaction of gemba workers was high, and turnover candidacy was low. Okada and Inamizu (2014) analyzed part-time employees at Shinkin Bank, and they reported that part-time employees have a high job satisfaction level compared to full-time employees. However, the subjects of this study were full-time rather than part-time employees. Okada and Inamizu (2014) also noted that part-time employees have a greater tendency to be turnover candidates than full-time employees. They also hypothesized that part-time employees dissatisfied with their jobs would leave them, while satisfied part-time employees would remain. However, as shown in this study, there is a low tendency for gemba workers to be turnover candidates.¹ In other words, the

¹ Because there may be some influence of characteristics of our sample's demographic, an analysis was performed to determine whether job satisfaction and turnover candidate ratios differed according to these characteristics (i.e., gender, age, years employed, and whether they were executives). However, no major difference was observed. In this study, responses were collected from ten full-time employees at each workplace, with the selections being made either by the workplaces or workplace leaders. In this regard, there is a possible effect of bias due to the likelihood of good employees being chosen as respondents. In addition, in this industry, contract workers have been on the rise in manufacturing gemba from the mid-2000s (Shintaku et al., 2014). There is a possibility of organizational status ("full-time employees in a workplace with many

results of this study show that a different principle is at work than that of Okada and Inamizu (2014). The significance of this principle merits further research.

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