The Effect of Interpersonal Skills on Worker Performance

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Abstract

Despite a great deal of narrative and anecdotal evidence that communication and interpersonal skills are important for workplace success, little is known about why those skills are important and how possibly to train those skills. This study uses personnel records of a Japanese manufacturing company as well as its training attendance records, and examines the relationship between participation in their interpersonal skills training program and job performance. We compare those who participated in the training program with those who did not using propensity score matching and difference-in-difference method. The results show that experience in the training program was significantly associated with post-training evaluation and promotion probability, suggesting that improving interpersonal skills through participation in off-the-job training programs may improve worker's post-training performance and lead to future promotion.

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1 Introduction

A great deal of narrative and anecdotal evidence that communication and interpersonal skills are widely considered to be critical for workplace success. According to Singh (2014), interpersonal communication is, by definition, "the process of transmitting information and common understanding from one person to another." (p.1). Nevertheless to say, a person with profound interpersonal skills may help to get along with others, removes conflicting perceptions, build trustworthy relationships and function as a productive member of a team. According to the recent survey conducted by Hart Research Associates (2015), executives at private sector and nonprofit organizations, who actually hired or are willing to hire recent college graduates, place a greater priority on demonstrated competence of potential employees' communication and interpersonal skills and they firmly believe that those skills are essential to perform well in a wide variety of organizational settings. Employees themselves also perceive acquiring interpersonal skills as important for their career success.

In recent studies in the field of economics, such as Heckman and Kautz (2012), "soft skills", including interpersonal skills, are paid to considerable attention because those skills can predict the higher labor market performance of an individual. Humburg and van der Velden (2015) focus on the graduate recruitment process and find that employers' hiring decisions is mostly influenced by interpersonal skills as well as graduates' occupation-specific skill profiles. Girsberger et al. (2018) estimate how interpersonal skills are valued in terms of job offers, unemployment, and wages, relative to cognitive or manual skills on average. According to their empirical findings, what the firms demanded most is cognitive skills, rather than interpersonal skills, but it is strongly complementary. Hoffman and Tadelis (2018), using personnel records from a large high-tech firms, reveal that interpersonal skills negatively affect the employees' turnover. The result can be interpreted as the causal effect because the authors took an advantage of exploiting the

unique variations in moving in or out of new employee and managers.

The main channel through which interpersonal skills affect performance may be effective communication. Giri and Kumar (2010) measure "Organizational Communication Scale" originally developed by Rodwell, et al (1998) and prove that communication among members in the organization had a significant effect on their satisfaction and job performance using a sample of 380 employees working at different managerial levels in India. Ibrahim (2015), by examining school records, find that the intra-team communication is positively associated with job performance at school. However, as Payne (2005) suggests that productive workers are more likely to acquire higher level of communication competence, the observational link between interpersonal skills and job performance may not be causal. Further, despite the widespread value of interpersonal skills in workplace, little is known about how possibly to train those skills. To our best knowledge, there is no research or practice to present the effective firm-sponsored training to help workers acquire interpersonal skills, although implementing the firm-sponsored training program in organization is one of the most pervasive ways to invest in employee's human capital.

Our goal of this study therefore uses personnel records of a Japanese manufacturing company as well as its training attendance records, and examines the relationship between training of interpersonal skills for selected employees and performance indicators, including evaluation, and promotion probability. The data used in our empirical investigation is provided by a large Japanese manufacturing company with about 20,000 regular employees world-wide including affiliated firms. The company started the firm-sponsored training program, developed and provided by Coach A Co., Ltd., to improve employee's interpersonal skills in 2012. In this program, Coach A sent certified coaches to the company every year to teach selected managers coaching skills and techniques for 8 months. In the first year, 239 managers participated. Since the participants were selected by the division managers, the assignment

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of this program is far from random. To estimate an average treatment effect of this program by comparing trained employees and untrained employees, this paper employs the propensity score matching and difference-in-difference method (PSM-DID). The effect of being selected for this training program in 2012 is estimated by using the post-treatment periods, 2013 and 2014. Further, We have two different treatments, "coachers" are those who received managerial coaching training as trainees and "stakeholders" are those who were chosen from different workplaces to receive coaching sessions from coachers. We apply PSM-DID to identify the effects on both. The results show that managers who received managerial coach training in 2012 tend to perform significantly better than other comparable managers who did not receive the training until 2014 where the performance evaluation and promotion are used as the outcome variables. However, when looking at the effect on stakeholders, the results are less pronounced. Although those who received the coaching sessions tend to perform better than their counterparts in two out of five post-treatment evaluation periods, there is no significant difference in promotion.

This paper contributes to the growing literature on the effect of non-cognitive skills on job performance and that on the return to firm-sponsored training. Even if we find that interpersonal skills improve job performance, it does not suffice to justify the firm-sponsored training intended to improve interpersonal skills. A firm should provide such training only if: (1) the training is effective to improve interpersonal skills; and (2) the firm can recoup the return to its investment. Interpersonal skills training introduced at our focal company helps develop both general human capital component (e.g. coaching skills) and firm-specific human capital component (e.g. network and broader functional knowledge learned through coaching stakeholders). If both components are complements, the employer may be able to recoup sufficient return to the investment as suggested by Acemoglu and Pischke (1999). The study might add to the rationale of why firms offer interper-

sonal skills training to their employees.

The rest of this article is organized as follows: the next section introduces the empirical models to be estimated. The third and fourth sections introduce data collection strategies and variables defined for empirical analyses. The fifth section presents the empirical results and identifies the key empirical issues emerging in the econometric analysis. The final section provides conclusions.

2 Institutional Setting and Data

2.1 Institutional Setting

This paper uses the personnel records provided by a Japanese manufacturing company, J Corporation (hereafter J-Corp), which is a fictitious name used to conceal its identity, and analyzes the effect of improved interpersonal skills on workers' performance. J-Corp was established in the post-war period and employs about 20,000 regular employees including affiliated firms. J-Corp started the firm-sponsored managerial coaching training in 2012. The reason behind this decision stems from the management's concerns about its organizational capability in cross-departmental collaboration. According to the in-house survey conducted in 2016, approximately 70 percent of employees pointed out the lack of inter-departmental supports and communications, which may cause inefficient overall operation, while a majority of them believed teamwork and collaboration as very important. The objective of this training program is thus to promote substantive communications among employees not only within the department but also across departments in the firm. The training program was originally developed by Coach A Co., Ltd. More specifically, selected employees receive one-to-one training, 30-minute direct meetings every other week for eight months (ten times in total), from professional coaches with International Coach Federation (ICF) credentials sent by Coach A. They are also required to participate in 50-minute online

web meetings with professional coaches and other participants every week during the same time period (twenty five times in total). The program is designed to improve interpersonal skills, which is here defined as a set of skills to interact with others in a workplace or with clients. Basically, it includes leadership skills, communication skills, conflict management skills, and team-building skills. At the meetings with professional coaches, participants were expected to acquire skills and knowledge on goal setting, feedback, self-management and evaluation, etc. The employees who participate in this program, called "coachers", are also given immediate opportunities to practice what they learned in the process. Specifically, they give 30-minute coaching sessions to at least five other employees from other departments, called "stakeholders", ten times for each. On April 2012, J-Corp selected 172 employees to participate in this program.

The selection process at this very first round was not well-structured and participants were not necessarily chosen with reference to past performance records or competency assessment. Instead, the division heads decided who should attend the training program from his/her subordinates. Some senior managers may have selected most productive managers with future prospect of promotion to the top positions whereas others might have chosen those with lower level of interpersonal skills. Simply regressing the training status on job performance may be subject to upward or downward bias, but the predicting the direction of the bias from this selection is difficult. The training attendance records showed that 116 participants, out of 172 in total in 2012, are managers or deputy managers, and a majority of them are in late 30s or early 40s.

By repeating this process, eventually, every manager of this firm would participate in this program as a coacher-trainee. Until 2014, 1,014 of employees received this training as "coachers" and 2,484 as "stakeholders" in total. This means that a majority of middle managers have participated in the training program as coachers by 2014. For this reason, we focus on those

who received the training in 2012 as our treatment group while those who did not either in 2012 or 2013 as our control group.

According to the in-house survey, 82 percent of coachers assigned to this training program became to realize the improvement in inter-departmental communications and their own interpersonal skills, although it is still anecdotal evidence.The assignments to this training program may be endogenously determined by participants' observable characteristics. Therefore, just simply comparing performance between employees who were assigned to take this program at the time of 2012 and others who were not is not sufficient to identify the causal effect of this program. To address this potential endogeneity, this paper employs the propensity score matching and difference-in-difference method, which will be fully explained in later section.

2.2 Data

We obtained from J-Corp training attendance records for the managerial coaching training as well as the firm's personnel records from 2011 to 2014 including: (1) basic employee characteristics (gender, age, education and marital status etc.); (2) employees' monthly attendance/time records; (3) performance evaluation records; (4) job assignment history records starting from job entry. The training attendance records include the following information: the start and end date of the training, coachers' and stakeholders' employee ID, the number of coaching session for each coacher-stakeholder pair. We explain the major variables used for our empirical analysis below.

As we have explained, we have two treatment variables, coacher and stakeholder. coacher is a binary variable which takes a value of one when the employee participated in the managerial coaching training as a coacher in 2012, and a value of zero when the employee did not in either 2012 or 2013. stakeholder is a binary variable which takes a value of one when the employee received coaching sessions a stakeholder in 2012 but did not participate as a coacher in either 2013 and 2014, and takes a value of zero when the employee

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had no experience as a coacher or a stakeholder between 2012 and 2014.

We use two types of outcome variables, semi-annual evaluation by superior and the incidence of promotion. Every J-Corp employee receives performance rating evaluated by his/her superior twice a year, in June and in December. The rating scales of this evaluation varies from 90 to 115. The evaluation score indicates the extent to which the employee has accomplished his/her objectives set under the firm's management by objectives (MBO) at the beginning of the year and those who met their objectives but did not exceed them are supposed to receive the score of 100. We use evaluation results in June and December of 2011 in the propensity score matching and those from December 2012 to December 2014 as the outcome variables in the post-treatment period.

We next define promotion. J-Corp has the ability-based grading system, most common employee grading system among Japanese firms. Based on the evaluation of his/her latent ability, each employee is entitled to a specific job grade, which is separated from positions. Each job grade corresponds to a certain pay range. We then ordered all positions in accordance with job grades and identify career ladder based on transitions among positions, which gives nine "job level" shown in 1. Therefore, promotion in this paper takes a value of one in the year when the employee moves up to a higher job level, typically followed by an increase in wages, and takes a value of zero otherwise.

As mentioned above, we have two treatment variables. Therefore, we have to estimate two different propensity scores to construct two different control groups for each treatment. To estimate the propensity score for selection of coacher-trainees, we include employees' job rank as a conditioning variable because they were selected from specific job grades and age range. We chose the control group from the sample of those who did not participate in the managerial coaching training in 2012 or 2013. Table 1 shows the distribution of coachers by job rank in 2011, when the selection of participants in the

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training started. According to the training assignment policy, most coachers were selected from the job ranks of five, seven, and nine, which correspond to team sub leader, assistant section chief, and section chief.

As is the case of coachers, we include employees' job rank as a conditioning variable in estimating the propensity score. We chose the control group for the stakeholders from the sample of those who did not receive coaching sessions as stakeholder or participate in the managerial coaching training as a coacher during the peiod between 2012 and 2014. Table 2 shows the distribution of job rank in 2011 for the stakeholder. Most stakeholders are selected from the job rank below 10, which corresponds to section chief.

2.3   Sample Restriction

We restrict the sample to regular employees for whom performance evaluation is available although some non-regular employees participated as stakeholders. Those who do not have all of information necessary to construct our outcome variables–evaluation and job rank from 2011 to 2014–and conditioning variables are dropped from the sample.

For the sample for coacher analysis, we also exclude female employees because there were only a few female participants in the managerial coaching training and their career is more likely to be interrupted by family events. Furthermore, since most coachers are selected from the employees whose job rank is between two and the section chief level (9 13) according to the selection criterion set by the management, we additionally restrict our analysis to these ranks. Our sample restrictions result in the final samples that have 141 employees in the treatment group and 892 employees in the unmatched comparison group for our coacher analysis.

Similarly, most stakeholders are chosen from the employees whose job rank in 2011 is under twelve. Therefore, we additionally restrict the sample for the analysis of stakeholders to the job rank below ten. Unlike the sample for coacher analysis, the sample for stakeholder analysis include female par-

ticipants because a substantial number of female employees are selected as stakeholders. Our restrictions result in final samples that have 183 employees in the treatment group and 378 employees in the unmatched comparison group.

2.4   Descriptive Statistics

For our coacher analysis, summary statistics are presented in Table 3. For the treatment group, the mean tenure is sixteen years, the mean age is forty, and about seventy seven percent of coacher-trainees have university degrees or higher education. On the other hand, the mean tenure and the mean age for the unmatched comparison group is longer and higher, respectively, than those of the treatment group. Furthermore, in all sample years, the mean evaluation score of the treatment group is higher than that of the unmatched comparison group. It is clear from this comparison that relatively younger and more productive employees in each job rank group are systematically selected for the training.

For the stakeholder analysis, summary statistics are presented in 4, whose figures again show very different distributions between the treatment group and the unmatched comparison group on age, tenure, education and evaluation scores. The characteristics of stakeholders are more or less similar to those of coachers although the former are slightly younger. Since coachers were given discretion on whom they choose as their stakeholder, they might have selected those who have the same background but are a couple of years younger.

2.5   Empirical Strategy

Our objective in this paper is to estimate an average treatment effect of the managerial coaching training program by comparing trained employees and untrained employees. However, when evaluating the effect of training pro-

gram in non-experimental setting, there is a problem of selection bias resulting from non-random participation of individuals in training programs (Heckman et al. 1999). This paper examines the effect of the managerial coaching training using propensity score matching and difference-in-difference method to correct for these endogeneity biases.

Propensity score matching method allows us to compare those who participated in the the managerial coaching training with those who had not yet participated correcting for the bias due to confounding factors. We match those who have similar observed characteristics in the comparison group to the treatment group using the predicted probability (propensity score) for training participation. However, there might still remain the bias from unobserved heterogeneity which affects training participation decision, for example, ability and motivation. Therefore, we use propensity score matching with difference-in-difference (PSM-DID) method to control for remaining unobservable characteristics (Heckman et al. 1998, Blundell and Costa Dias 2002). We estimate the average treatment effect on the treated (ATT). Because the managerial coaching training for the coachers aim to identify the future executive candidates and foster their managemental capability, we have to focus on the effect on those employees whom the training program is actually targeted. We apply the same analytical framework of PSM-DID to the two different treatments, participation as a coacher and receiving coaching session as a stakeholder.

As mentioned above, we intend to estimate ATT and this estimator is presented as the following equation.

$$\Delta_{ATT} = E(\Delta|D=1) = E(Y^1|D=1) - E(Y^0|D=1) \qquad (1)$$

D indicates the dummy variable for training participation. $E(Y^1|D=1)$ is the expected outcome value, which includes the evaluation score and the incidence of promotion in this paper, when participating in the training program. $E(Y^0|D=1)$ is the expected outcome value when not partici-

pating in it for the actual participants, which is a counterfactual. When $E(Y^0|D=1) = E(Y^0|D=0)$ is hold, non-participants of the training can serve as an appropriate control group. In order to hold this condition, we have to assume the following two assumptions.

$$(Y_1, Y_0) \perp D \mid X \tag{2}$$

$$0 < P(D = 1 \mid X) < 1 \tag{3}$$

Equation (2) is called a strongly ignorable treatment assignment (Rosenbaum and Rubin, 1983). Conditioning on the value of the individual attribute X, which is a covariate, means that the joint distribution of the potential outcome Y_1 in participating the training (D=1) and the potential outcome Y_0 in the case of non-participating in the training does not depend on the outcome of training participation. Equation (3) is called an common support assumption, which means that there are employees who have not participated in the the training but have similar attributes to those who have done it. Under the assumption (2), with conditioning the participation probability $Pr(D = 1 \mid X_i)$, whether or not employees participate in the training become independent of potential outcomes Y_1 and Y_0. This $Pr(D = 1 \mid X_i)$ is estimated from data and defined as the propensity score. We use the following probit model to estimate the propensity score.

$$P(X_{i,2011}) = Pr(D = 1|X_{i,2011}) = \Phi(X_{i,2011}\beta) \tag{4}$$

As mentioned above, D is a dummy variable indicating participation in the training program. $X_{i,2011}$ represents a vector of pre-treatment control variables including age (quadratic), tenure (quadratic), education (category dummies), marriage, evaluation score (June and December), the number of transfer across establishment (between 2009-2011), overtime working hours (quadratic), job rank, job type, an interaction term of headquarter dummy with job rank, that of headquarter dummy with job type, establishment

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location, and experience of studying overseas. In the case of analysis for the stakeholders, female dummy is also added to the above control variables. We estimate the propensity score in equation (4) and subsequently conduct the estimation for the ATT using propensity score matching DID (PSM-DID). The PSM-DID estimator for the ATT can be represented as the following equation:

$$\Delta^{PSM-DID}{}_{ATT} = \frac{1}{N} \sum_{i \in I_1} \left[\Delta Y_{i,t+s}(1) - \sum_{j \in I_0} W\Big(P(X_{i,t-1}), P(X_{j,t-1})\Big) \Delta Y_{j,t+s}(0) \right]$$

(5)

$W\Big(P(X_{i,t-1}), P(X_{j,t-1})\Big)$ is the weight placed on the matched nontreated employee j which corresponds to treated employee i. N represents the number of participants in the treatment group and $\Delta Y_{i,t+s(1)} = Y_{i,t+s} - Y_{i,t-1}$ represents the difference in the outcomes between year (t+s) and year (t-1). I_1 represents the participants and I_0 represents the non-participants of the training program. We use kernel matching method and bootstrapping standard errors in implementing PSM-DID. For evaluation scores, we implement adjustment for potential differences in criteria across job ranks because employees typically receive lower evaluation right after getting promoted due to tougher performance requirements for higher positions. Detailed procedure for the adjustment is explained in the Appendix A.

3   Empirical Results

3.1   Effect of the managerial coaching training on the coachers

First, we explain the result of estimating propensity score. Table 5 shows the results of the probit model estimating for the probability of participating in the coaching training as a coacher. Although the coefficient of the evaluation in December in 2011 is positive but not significant, that of June 2011 is significant at 10 percent level. The coefficients of overtime working hours

and its squared term in 2011 were not significant. Among control variables, the coefficients of age and the square of age are significant, but those of tenure, education, job type, and having experience of studying abroad were not significant. These results imply that those who had higher evaluation score were likely to be selected as the participants for the managerial coaching training as a coacher.

The estimated propensity score allows us to construct the matched control group. We now estimate the treatment effect of becoming a coacher-trainee using PSM-DID. Table 7 shows the results of the balancing test. Comparing the mean values of the pre-treatment characteristics between the treatment and the matched control group, there are no significant differences in the two groups. Table 9 shows the ATT on the evaluation scores and promotion measured by job levels resulting from PSM-DID method. For evaluation scores, in all post-treatment years, the values of ATT are positive and those of the evaluation in June 2012, 2014, and those in December 2013 are statistically significant. The values of ATT on promotion are all significantly positive in all post-treatment years.

These results indicate that managers who have received managerial coach training tend to perform significantly better than other comparable managers who did not during the post-treatment period. This association, however, should not necessarily be interpreted as the causal relationship. The superiors who recommended the managers for the coaching training may have private information about their subordinates' managerial capacity that is not fully captured by the observables but would be reflected in the error term in the performance equation. Then, the error term would be correlated with the participation in the training, leading to endogeneity bias. Or, the superiors who gave evaluation to or promoted the treated may be the ones who recommended them for the training in the first place. In this case, bias in their evaluation (i.e. favoritism) as well as private information would cause the participation and the performance measures to be correlated with each

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other. One fact may indicate the sign of the endogeneity bias. Although the training has not yet started for most in June 2012, there is a significant difference in performance evaluation already in June 2012. The ability difference recognized by the superiors may have started showing up in the evaluation.

Nonetheless, our results are consistent with the management's perception that the managerial coaching training is effective in raising the participants' leadership, communication and coordination skills. One may wonder why the effect on evaluation is not persistent as for promotion. The ATT is significantly positive only in December 2013 and June 2014 but not in December 2014. There are a few factors that are likely to be contributing to this result. First, managers who received training were more likely to be promoted or transferred to other departments, which would make their performance to deteriorate in the first year in a new workplace. Although we make reasonable efforts to adjust for the drop as explained earlier, the adjustment made in a linear form may not be sufficient to correct for the short-term bias. Second, our control group is selected from the managers who did not receive the managerial coaching training in 2012 and 2013, and a substantial portion of them received the training in 2014, which would make the ATT smaller in December 2014.

3.2 Effect of the managerial coaching training on the stakeholders

Table 6 shows the results of the probit model estimation for the probability of becoming a stakeholder. Among the pre-treatment characteristics, the coefficients of the evaluation in December in 2011 is positive but not significant, that of June 2011 is significant at 10 percent level. This result is more or less similar to that for our coeacher analysis. The coefficients of overtime working hours and its quadratic term are also significant. As is the case of the probability of being a coacher, those who had the higher evaluation and

those who had worked for long hours tend to be selected as stakeholders. It may seem that an able person who do not hesitate to work long hours are likely to be asked to take the role of a stakeholder.

We now estimate the average effect of receiving coaching sessions on evaluation scores and promotion by comparing the treatment group and the matched control group. According to Table 8 that shows the balancing test result, there are no significant differences in the treatment and matched control groups. Table 10 shows the ATT on the evaluation scores and promotion resulting from PSM-DID method. For evaluation, in all post-treatment years, the value of ATT is positive and those of the evaluation in December 2012, and 2013 are statistically significant. These results are consistent with the management view that the coaching training also helps the stakeholders to perform better by developing skills relevant for the present tasks. The result also reveals that the ATT is not statistically significant for promotion in all post-treatment years, indicating that receiving coaching sessions are not associated with future promotion for stakeholders.

Similarly to our analysis of the effect on coachers, the effect on stakeholder performance may be overestimated because coachers who chose the stakeholders for coaching sessions may have private information about the latter's growth potential that would cause the selection and the error term in the performance equation to be correlated. Therefore, the short-term effect of coaching sessions on stakeholders may be minimal at most

4 Conclusion

In this paper, we examine the relationship between training of interpersonal skills for selected employees and performance indicators including evaluation and promotion probability. We compare those who participated in the training program with those who did not using propensity score matching and difference-in-difference method. The results show that experience in the

training program was significantly associated with post-training evaluation and promotion probability, suggesting that improving interpersonal skills through off-the job training program may improve worker's post-training performance and lead to future promotion.

We attempt to contribute to the literature of human capital investment in two ways. First, we present the evidence of the effect of off-the-job training on productivity measures. Understanding the returns to corporate training would help firms to decide how much training they should offer to their employees. It is especially important for Japanese firms which are often criticized for not providing their employees with sufficient training opportunities. Second, interpersonal skills are regarded as increasingly more important in the era of advanced information and communication technology including artificial intelligence. But, at the same time, it is still unknown how much one can improve interpersonal skills as he/she gets old. Since coaching is a developmental method for interpersonal skills focusing on solving short-term and job-specific problems through communication, measuring the impact of the training should be relatively easier. We would like to show the early evidence of this form of human capital investment in the business setting.

This study has limitation in a number of aspects, however. First, since randomized assignment was not designed ex ante, propensity score matching alone would have not eliminated selection bias as the superiors who have private information should have chosen those who are likely to succeed in the future. The estimated effects are likely to be overstated. Second, we restricted our attention to relatively short windows (i.e. two years) because almost all middle managers received the managerial coaching training within five years. This restriction has made it difficult to examine the long-term effect of the training. This is a serious disadvantage given the fact that the capability to coordinate cross-functional activities and develop subordinates' skills enhanced by coaching may have long-lasting impact on the firm's competitive advantage. We hope that these issues are resolved in the future

research.

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Table 1: Distribution of Job Rank in 2011 among the Participants in the Coach Training Program

Job Rank	Title	Frequency
1	C3 Staff	1
2	C2 Staff	5
4	C1 Staff	4
5	C1 Team Sub-leader	46
7	Assistant Section Chief	76
9	LevelF Section Chief	26
10	LevelE Section Chief	3
11	LevelD Section Chief	1
15	LevelE Department Chief	4
16	LevelD Department Chief	5
17	LevelC Department Chief	1
	Total	172

Table 2: Distribution of Job Rank in 2011 among the Stakeholders

Job Rank	Title	Frequency
1	C3 Staff	27
2	C2 Staff	58
3	C2 Team Sub Leader	1
4	C1 Staff	5
5	C1 Team Sub-leader	38
7	Assistant Section Chief	34
9	LevelF Section Chief	12
10	LevelE Section Chief	2
11	LevelD Section Chief	1
15	LevelE Department Chief	3
16	LevelD Department Chief	12
17	LevelC Department Chief	2
	Total	195

Table 3: Summary Statistics of for Analysis of Managerial Coach Training

Variable	Treatment					Control				
	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max
Age	141	40.093	3.877	31	50	892	44.941	5.768	31	56
Tenure	141	16.093	5.513	4	30	892	21.557	7.164	3	40
Studying overseas	141	0.036	0.186	0	1	892	0.017	0.129	0	1
High School	141	0.164	0.371	0	1	892	0.323	0.468	0	1
Vocational School	141	0.029	0.167	0	1	892	0.05	0.217	0	1
Tech College	141	0.043	0.203	0	1	892	0.094	0.291	0	1
University	141	0.284	0.453	0	1	892	0.279	0.449	0	1
Grad School	141	0.483	0.502	0	1	892	0.257	0.438	0	1
Transfer across establishments	141	0.128	0.356	0	2	892	0.12	0.342	0	2
Marriage	141	0.83	0.378	0	1	892	0.72	0.45	0	1
Job Level growth rate	141	0.202	0.85	-0.595	2.633	892	-0.12	0.746	-1.337	2.633
Job rank	141	6.837	1.52	4	11	892	6.813	1.771	4	11
Evaluation(June,2011)	141	102.518	3.361	95	115	892	100.477	4.065	90	110
Evaluation(December,2011)	141	102.518	3.666	90	115	892	100.404	4.035	90	110
Evaluation(June,2012)	141	101.915	2.717	95	110	892	100.443	3.842	90	110
Evaluation(December,2012)	141	102.66	4.207	95	115	892	100.314	4.757	90	115
Evaluation(June,2013)	141	102.376	4.375	90	115	892	100.382	4.788	90	115
Evaluation(December,2013)	141	102.376	4.613	90	115	892	100.057	4.762	90	115
Evaluation(June,2014)	141	101.773	4.711	90	115	892	99.748	4.846	90	115
Evaluation(December,2014)	141	97.341	6.256	90	110	892	96.968	5.825	90	110
Job rank(2009)	141	5.901	1.834	2	10	892	6.29	2.046	2	11
Job rank(2010)	141	6.447	1.593	2	11	892	6.582	1.957	2	14
Job rank(2011)	141	6.837	1.52	4	11	892	6.813	1.771	4	11
Job rank(2012)	141	7.249	1.527	4	11	892	6.976	2.004	4	16
Job rank(2013)	141	7.993	2.251	4	17	891	7.328	2.455	4	17
Job rank(2014)	141	8.341	2.613	5	18	891	7.481	2.602	4	17
Job level(2010)	141	4.688	0.847	2	7	892	4.714	1.038	2	8
Job level(2011)	141	4.894	0.772	3	7	892	4.838	0.89	3	7
Job level(2012)	141	5.1	0.769	3	7	892	4.907	0.942	3	8
Job level(2013)	141	5.291	0.825	3	8	891	4.995	0.99	3	8
Job level(2014)	141	5.412	0.879	4	8	891	5.057	1.024	3	8

Table 4: Summary Statistics of for Analysis of Stakeholders

| | Treatment | | | | | Control | | | | |
Variable	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max
Age	183	38.541	8.947	25	58	378	45.22	7.925	25	58
Tenure	183	14.487	9.882	1	37	378	22.178	9.092	1	39
Studying overseas	183	0.022	0.147	0	1	378	0.014	0.115	0	1
Female	183	0.104	0.306	0	1	378	0.038	0.19	0	1
Junior High School	183	0.011	0.105	0	1	378	0.032	0.176	0	1
High School	183	0.186	0.391	0	1	378	0.416	0.494	0	1
Vocational School	183	0.066	0.249	0	1	378	0.053	0.225	0	1
Community College	183	0.011	0.105	0	1	378	0.011	0.103	0	1
Tech College	183	0.017	0.128	0	1	378	0.077	0.267	0	1
University	183	0.279	0.45	0	1	378	0.223	0.417	0	1
Grad School	183	0.432	0.497	0	1	378	0.191	0.394	0	1
Transfer across establishments	183	0.164	0.4	0	2	378	0.101	0.335	0	2
Marriage	183	0.711	0.455	0	1	378	0.588	0.493	0	1
Job Level growth rate	183	0.13	0.973	-0.861	2.58	378	-0.231	0.683	-1.338	2.58
Evaluation(June,2011)	183	101.257	3.715	90	110	378	99.207	4.509	90	115
Evaluation(December,2011)	183	101.285	3.209	95	115	378	99.326	4.387	90	110
Evaluation(June,2012)	183	101.585	3.223	95	110	378	99.286	4.281	90	110
Evaluation(December,2012)	183	101.421	4.181	90	115	378	98.863	4.862	90	110
Evaluation(June,2013)	183	100.847	4.022	90	110	378	98.704	4.795	90	110
Evaluation(December,2013)	183	101.203	4.217	90	110	378	98.585	4.85	90	110
Evaluation(June,2014)	183	101.175	4.431	90	115	378	98.4	4.847	90	110
Evaluation(December,2014)	183	99.809	5.727	90	110	378	97.368	5.367	90	110
Job rank(2009)	166	4.561	3.877	1	17	360	5.714	3.257	1	16
Job rank(2010)	177	4.837	4.116	1	17	368	5.808	3.37	1	17
Job rank(2011)	183	4.946	4.117	1	17	378	5.807	3.377	1	17
Job rank(2012)	183	5.192	4.165	1	17	378	5.9	3.315	1	17
Job rank(2013)	183	5.58	4.166	1	18	377	6.043	3.334	1	17
Job rank(2014)	183	5.831	4.009	1	18	376	6.136	3.263	1	17
Job level(2010)	177	3.441	2.121	1	8	368	4.125	1.721	1	8
Job level(2011)	183	3.509	2.089	1	8	378	4.127	1.712	1	8
Job level(2012)	183	3.673	2.039	1	8	378	4.191	1.658	1	8
Job level(2013)	183	3.897	1.909	1	8	377	4.252	1.609	1	8
Job level(2014)	183	4.066	1.815	1	8	376	4.322	1.555	1	8

Table 5: Estimation for Probability of Participation in the Managerial Coach Training Program

VARIABLES	Model1
Evaluation(June,2011)	0.059**
	[0.026]
Evaluation(December,2011)	0.03
	[0.024]
Transfer across establishments	-0.049
	[0.183]
Job Level growth rate	-0.071
	[0.094]
Overtime(2011)	-0.001
	[0.001]
$Overtime^2$(2011)	0
	[0.000]
Vocational School	-0.401
	[0.429]
Tech College	-0.182
	[0.327]
University	0.122
	[0.304]
Grad School	0.323
	[0.349]
Job Rank, Job Type	Yes
Head Quarters×Job Rank	Yes
Head Quarters×Job Type	Yes
Location, Studying overseas	Yes
Age, Tenure,Marriage	Yes
Observations	1033

[a] * p<.1; ** p<.05; *** p<.01
[b] Refference:Education(High School)

Table 6: Estimation for Probability of Receiving Coaching Session

VARIABLES	Model1
Evaluation(June,2011)	0.047**
	[0.023]
Evaluation(December,2011)	0.01
	[0.026]
Transfer across establishments	0.119
	[0.192]
Job Level growth rate	-0.005
	[0.087]
Overtime(2011)	0.005***
	[0.001]
$Overtime^2(2011)$	-0.000***
	[0.000]
Junior High School	-0.281
	[0.520]
Vocational School	0.122
	[0.312]
Community College	0.761
	[0.596]
Tech College	-0.529
	[0.386]
University	-0.03
	[0.226]
Grad School	0.284
	[0.283]
Job Rank, Job Type	Yes
Head Quarters×Job Rank	Yes
Head Quarters×Job Type	Yes
Location, Studying overseas	Yes
Age, Tenure,Marriage,Female	Yes
Observations	561

[a] * p<.1; ** p<.05; *** p<.01
[b] Refference:Education(High School)

Table 7: Balancing Test for Analysis of ATT on Evaluation in Coachers

	Treated	Control	Bias	T-value	P-value
Age	40.140	40.461	-6.500	-0.660	0.509
Tenure	16.154	16.212	-0.900	-0.090	0.932
Transfer across establishments	0.133	0.141	-2.300	-0.180	0.857
Evaluation(June,2011)	108.420	108.630	-5.600	-0.510	0.614
Evaluation(December,2011)	111.960	112.050	-2.100	-0.190	0.850
Overtime(2011)	307.480	289.610	9.700	0.750	0.453
Studying overseas	0.037	0.030	4.300	0.310	0.756
Education	5.699	5.793	-4.800	-0.440	0.664
Job rank	6.831	6.997	-10.100	-0.880	0.381
Job level growth rate	0.198	0.198	0.100	0.000	0.997
Marriage	0.824	0.863	-9.300	-0.870	0.384

Table 8: Balancing Test for Analysis of ATT on Evaluation in Stakeholders

	Treated	Control	Bias	T-value	P-value
Age	39.252	38.873	4.500	0.380	0.707
Tenure	15.245	14.737	5.300	0.460	0.647
Transfer across establishments	0.166	0.157	2.600	0.210	0.835
Evaluation(June,2011)	105.620	105.440	4.000	0.370	0.712
Evaluation(December,2011)	108.350	108.440	-1.600	-0.140	0.885
Overtime(2011)	297.660	302.450	-2.900	-0.290	0.772
Studying overseas	0.019	0.011	6.000	0.600	0.551
Education	5.295	5.506	-10.100	-0.940	0.348
Job rank	5.411	5.422	-0.300	-0.020	0.982
Job level growth rate	0.116	0.153	-4.500	-0.350	0.729
Marriage	0.712	0.723	-2.300	-0.220	0.825

Table 9: Estimate for ATT of Managerial Coach Training

	Year	ATT	SE	Treated	Observation
Evaluation(June)	2012	0.738*	[0.428]	136	1027
	2013	0.402	[0.542]	136	1027
	2014	1.255**	[0.607]	136	1027
Evaluation(December)	2012	0.267	[0.436]	136	1027
	2013	1.139**	[0.565]	136	1027
	2014	0.282	[0.839]	136	1027
Job Level	2012	0.117***	[0.043]	136	1027
	2013	0.176***	[0.060]	136	1027
	2014	0.191***	[0.070]	136	1027

ᵃ * p<.1; ** p<.05; *** p<.01

Table 10: Estimate for ATT of Receiving Coaching Session

	Year	ATT	SE	Treated	Observation
Evaluation(June)	2012	0.52	[0.426]	163	539
	2013	0.725	[0.542]	163	539
	2014	0.782	[0.599]	163	539
Evaluation(December)	2012	1.166**	[0.493]	163	539
	2013	1.101**	[0.551]	163	539
	2014	1.332	[0.877]	163	539
Job Level	2012	-0.024	[0.061]	163	539
	2013	0.087	[0.078]	163	539
	2014	0.097	[0.081]	163	539

ᵃ * p<.1; ** p<.05; *** p<.01

Table 11: Comparison Evaluation Score with Adjusted Evaluation Score

| Job Level	Evaluation(6)	Adjusted Evaluation(6)	Evaluation(12)	Adjusted Evaluation12)
1 C3 Staff	100.14	101.27	100.50	103.90
2 C2 Staff	101.21	103.46	101.35	108.16
3 C2 Team Sub Leader	100.24	103.61	100.34	110.54
4 C1 Staff	101.38	105.87	101.45	115.06
5 C1 Team Sub Leader	100.47	106.09	100.40	117.413
6 Team Sub Leader	100.57	107.31	94.90	115.31
7 Assistant Section Chief	102.50	110.37	95.00	118.81
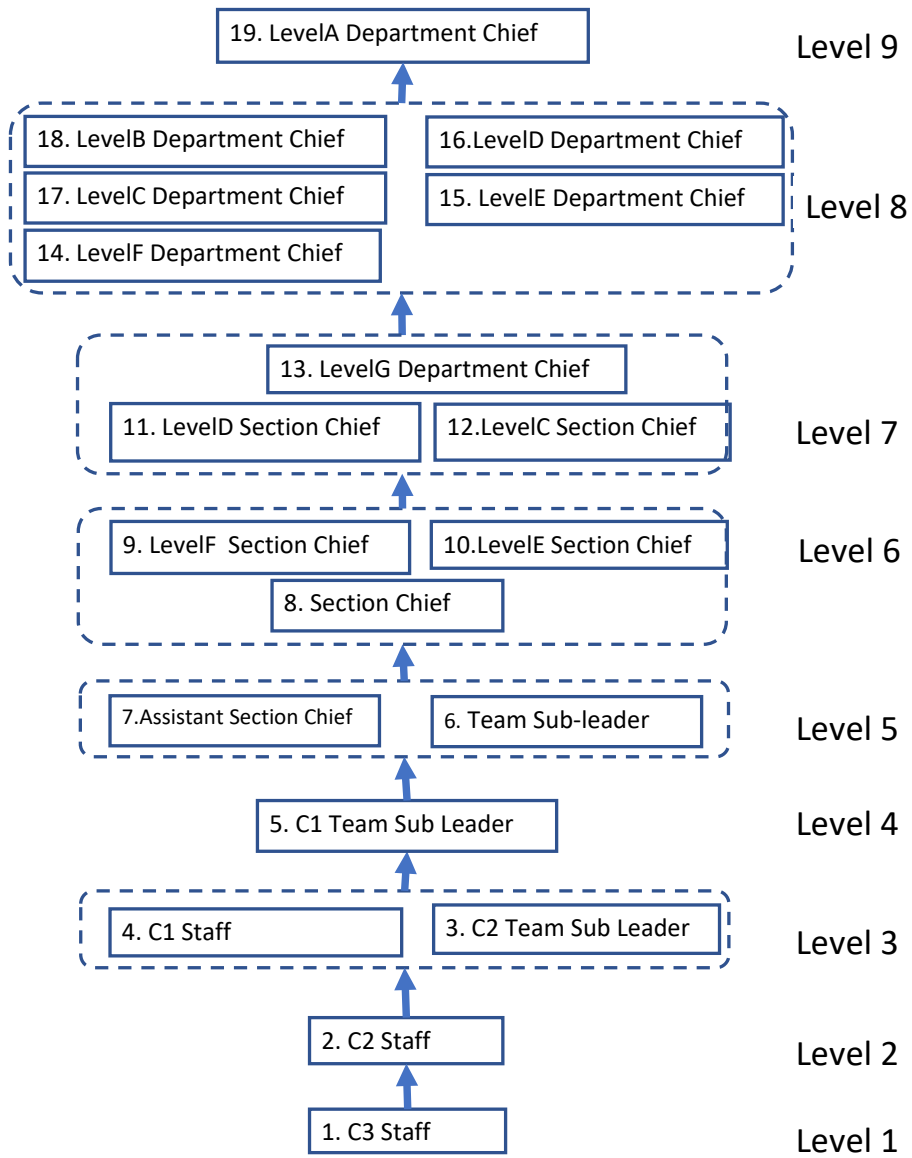
Figure 1: Job Level in J-Corp

Appendix A   Adjustment in the Evaluation Score

There is a trade-off between promotion and higher evaluation score where those who are promoted to higher job level are unlikely to get a high evaluation score since it gets harder to attain their objectives in the higher job level. Therefore, we adjusted the evaluation score in order to correct for a bias resulting from such a trade-off. First, we estimate the effect of job level on the evaluation score in the following linear model including individual fixed effects.

$$Evaluation_{i,t} = \beta X_{i,t} + \gamma JobLevel_{i,t} + \alpha_i + \varepsilon_{i,t} \tag{6}$$

$Evaluation_{i,t}$ indicates the evaluation score of employee i in year t. $X_{i,t}$ is the vector for the control variables including age, tenure, education, job rank, job type, establishment location , and overtime working hours. $JobLevel_{i,t}$ indicates the job level of employee i in year t. α_i is the individual fixed effect and $\varepsilon_{i,t}$ is the error term. Next, we calculate the adjusted evaluation score using the parameter   which is estimated in the equation (6) in the following equation.

$$AdjEvaluation_{i,t} = Evaluation_{i,t} - \hat{\gamma} JobLevel_{i,t} \tag{7}$$

$AdjEvaluation_{i,t}$ indicates the adjusted evaluation score of employee i in year t. $\hat{\gamma}$ is the estimated parameter from equation (6). Table 11 compares the raw evaluation score and the adjusted evaluation score by job level. For the raw evaluation score, the mean value in the higher job level becomes smaller. However, for the adjusted score, such relationship disappears in both June and December. These results indicate that bias from trade-off between job level and evaluation score is corrected in the evaluation score in both Jun and December. Thus, we use this adjusted evaluation score as the dependent variable in estimating the ATT in analysis for the effect of the managerial coaching training.