

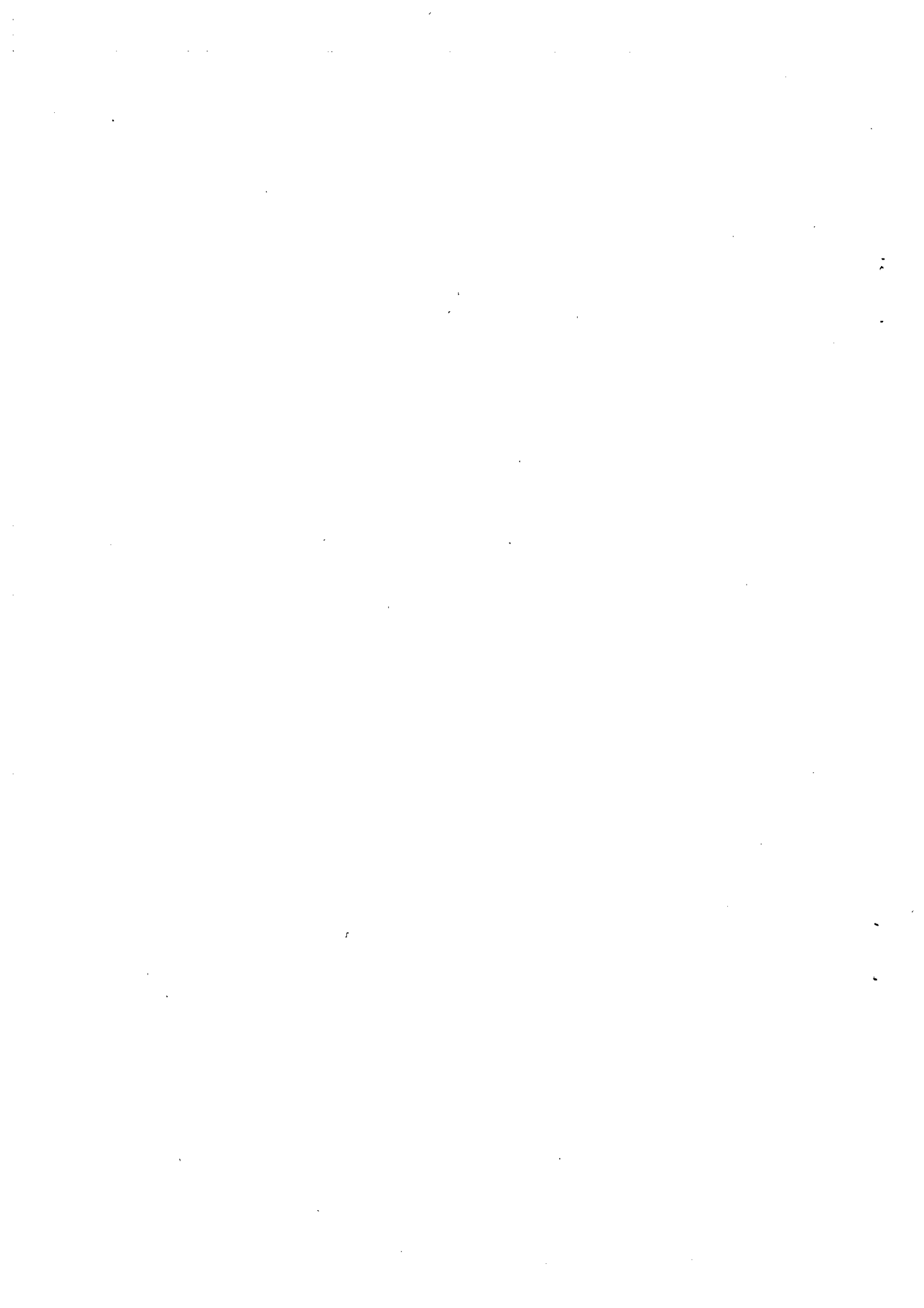
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Continuous Learning as a Mediator of the Relationship  
between Personality and Sales Performance:  
An Empirical Study  
on a Japanese Information System Company

by

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Relationship between Personality and Sales  
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## Abstract

The importance of continuous learning for achieving sales success in ever-changing competitive environment is increasingly being recognized. In the present study, we hypothesized that the positive relationship between conscientiousness and sales performance, which had already been recognized in several literatures, would be mediated by continuous learning. We tested the hypothesis by the structure equation model with latent variable using the data gathered from the 139 sales representatives working for a large Japanese information system company listed on the Tokyo Stock Exchange, Part I. We found that conscientiousness significantly affected on continuous learning, but that continuous learning did not significantly influence sales performance. These findings indicated that our hypothesis was not supported by the data. We also found that openness to experience and the degree of the sales representative's perception of competitiveness in the market environment were positively correlated with continuous learning. We discuss implications of the study and give suggestions for future research.

## 1 Introduction

The importance of continuous learning for achieving sales success in ever-changing competitive environment is increasingly being recognized. Especially in high-tech industries, new products and services are unceasingly developed and put on the market, and their paces of vicissitude are becoming more rapid. Furthermore, new automatic channels such as the Internet have appeared and become competing with sales representatives' channels. In order to survive in such an environment, sales representatives must move away

from “selling” toward “serving” as customer consultants and business partners. That means they must continuously acquire not only up-to-the-minute knowledge about their products and services but also must be continuously aware of their customer’s changing needs. That is to say, they must “continuously learn.” An extensive literature exists that establishes the direct relationship between the sales performance and some of the personality variables. The main objective of this study is to investigate if this relationship is mediated by continuous learning behavior on the part of sales representatives working for a large Japanese company that designs, manufactures, and markets information systems.

This article is organized as follows. In section 2, we review related literature. In section 3, we formulate hypotheses. In section 4, we explain the data in detail. In section 5, we present the result, and in section 6 we discuss theoretical and practical implications of our findings and we give suggestions for future research.

## **2 Review of Literature**

Over the past several decades, a considerable number of studies have been conducted in the hope of finding determinants of the sales performance. According to the large-scale meta-analysis conducted by Vinchur, Schippmann, Switzer, and Roth (1998), there exist eighty-two published and sixteen unpublished studies dealing with determinants of sales performance from 1918 to 1996. Some individual difference variables have been shown to be valid predictors of sales performance. Above all, direct relationships between sales performance and some of the Big Five personalities were well documented.

Barrick and Mount (1991) in their large-scale meta-analysis investigated

the relation of the Big Five personality dimensions to the three job performance criteria for five occupation groups. Although there is some disagreement regarding the names and content of the Big Five personality dimensions (see Goldberg, 1993, for example), the definition given by Barrick and Mount after Digman (1990) has been used by many researchers. They found that there were statistically significant and positive correlations between sales performance and two dimensions of the Big Five personalities—conscientiousness and extraversion. Their result was confirmed by the Vinchur, Schippmann, Switzer, and Roth's (1998) meta-analysis focusing on the predictor of the sales performance. In the 129 independent samples, they selected 85 that were in accordance with their framework. They used the definitions by Barrick and Mount and they found the significant correlations between conscientiousness or extraversion and sales performance.

Various hypotheses with more complex structures have since been examined in several studies to better understand the latent structures in the relationship between the sales performance and the two relevant dimensions of the Big Five personality. McManus and Kelly (1999) examined the effects of the Big Five personality and biodata measures in predicting sales performance validity. They found that there were significant correlations between the biodata and the task rating; as for the personality measures, however, extraversion, but not conscientiousness, was significantly correlated to the criterion. They reasoned that this is due to their "weak measure of conscientiousness." They also found that no dimensions of the Big Five personality traits could significantly increase the amounts of variance explained in the task rating over or above that was explained by the biodata alone. The results strongly indicated that the Big Five personality could not be regarded as the predictor of the sales performance in the presence of the biodata.

Stewart (1996) examined a hypothesis that the reward structure of management would moderate the effects of extraversion and conscientiousness on two criteria (new sales and customer relation). He used a sample consisting of two groups. One was primarily rewarded for new sales, and the other for retaining customers. He found that extraversion related only to the criterion rewarded by their management. He also found that conscientiousness was significantly and positively correlated with new sales but not with customer relation, but moderating effect of the reward structure were not observed in either case. His result implied that the extraversion might be stronger predictor of sales performance when it was used together with the reward structure.

Stewart (1999) also examined the relationships between sales performance of employees at different stages of tenure (newly hired employees and veteran employees) and two narrower subtraits of conscientiousness (order and achievement). He found that order was correlated more strongly with sales performance of the newly hired employees, while achievement was correlated more strongly with that of the veteran employees. He also found that "in the respected samples, order and achievement also provided incremental validity beyond conscientiousness."

Although each of the above three studies dealt with more complex hypotheses between some dimensions of the Big Five personality and derived informative results, what seems to be lacking and more interesting is a consideration of the outer most layer structure, namely the structure consisting of the path from the personality to behavior and the path from the behavior to the result or outcomes. In fact, Mount, Barrick, and Strauss (1993) already examined the mediating effects of goal setting and goal commitment behaviors on the relationship between conscientiousness and sales performance.

They concluded that these behaviors could partially mediate the relationship between conscientiousness and sales performance, but not completely. There could be other behavioral factors that can mediate the relationship between conscientiousness and sales performance.

### **3 Hypotheses**

In this study, we consider a possibility of “continuous learning” as a mediator of the effect of conscientiousness on sales performance. We define continuous learning after London and Mone (Ilgen, and Pulakos Ed., 1999): “continuous learning is the process by which one acquires knowledge, skills, and abilities throughout one’s career in reaction to, and in anticipation of, changing environment of performance requirements.” To establish the mediation, we hypothesize two models—unmediated and mediated models, following the steps recommended by Baron and Kenny (1986) and Judd and Kenny (1981) in establishing mediation.

#### **3.1 Unmediated Model (Model 1)**

First, we hypothesize the unmediated model (Model 1) in order to establish that there exists an effect that may be mediated. As seen in section 2, it has been recognized that there exists a direct path from conscientiousness to sales performance. We accept the path because as Barrick, Mount, and Strauss (1993) points out: “Research has indicated that the Big Five personality dimensions are quite robust, as demonstrated by longitudinal and across-observer studies; in different age, sex, race, and language groups; and across different theoretical perspectives.” Thus we hypothesize that conscientiousness will be positively related to sales performance (H1: conscientiousness →



sales performance).

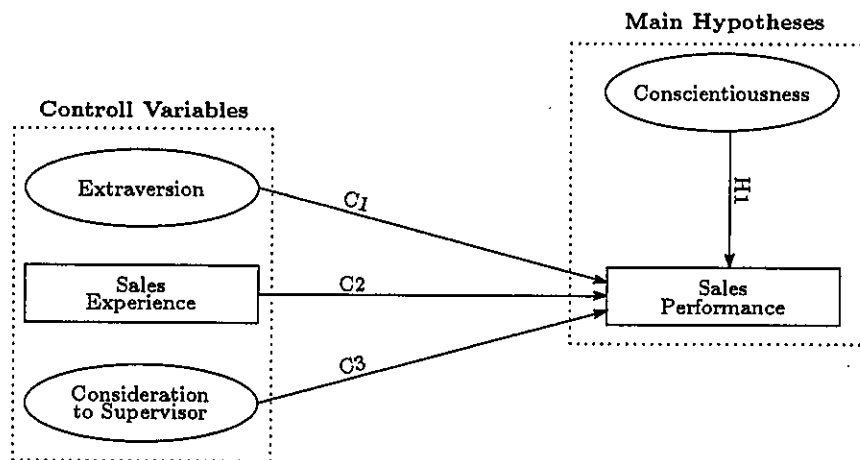
We control the effects of several variables on sales performance. First we accept a direct effect of extraversion on sales performance for the same reason of accepting the path from conscientiousness to sales performance. We would have preferred to use extraversion with reward structure as moderating factor taking into consideration the result of Stewart (1996). The taxonomy of the reward structure, however, was not available in the organization used in our study. Thus only the direct effect of extraversion will be controlled (C1: extraversion  $\rightarrow$  sales performance).

We add a path from sales experience to sales performance because an experienced sales representative may have higher levels of sales skill to accomplish the higher performance (C2: sales experience  $\rightarrow$  sales performance).

We also need to control the effect of one variable that measures whether the particular sales representative has “shown considerate behavior to his or her supervisor,” on sales performance. In this study, we use as the performance ratings of sales representatives evaluations by his immediate supervisor, not self-reported, but could still be subjective. Inclusion of the consideration factor would presumably be able to control any biases shown by the supervisors in the ratings. We call this factor as “consideration to supervisor” for the rest of this article (C3: consideration to supervisor  $\rightarrow$  sales performance).

We remove the effects on sales performance by the differences in sales representatives' gender and educational levels by concentrating male college-educated sales representatives, an overwhelming (86%) majority in our data. Finally we admit the existence of correlations among conscientiousness, extraversion, and consideration to supervisor. Model 1 is shown in Figure 1.

Figure 1: Path diagram of the unmediated model (Model 1). The manifest variables are in boxes and the latent variables are in ovals. All effects are hypothesized to be positive. Correlations among conscientiousness and the three control variables are admitted.



### 3.2 Mediated Model (Model 2)

We next hypothesize the mediated model (Model 2) including continuous learning as a mediator of the effect of conscientiousness on sales performance. According to Barrick and Mount (1991), traits frequently associated with conscientiousness include being careful, thorough, responsible, organized, planful, hardworking, achievement-oriented, and persevering. We hypothesize that an organized, planful, hardworking, and achievement-oriented sales representative—a conscientious sales representative—tends to “continuously learn.” (H2: conscientiousness → continuous learning).

As discussed previously, in high-tech industries with rapid products turnovers and in a new competitive market environment where sales representatives need to “serve” as customer consultants, a successful sales representatives must continuously acquire up-to-the-minute knowledge on their products and

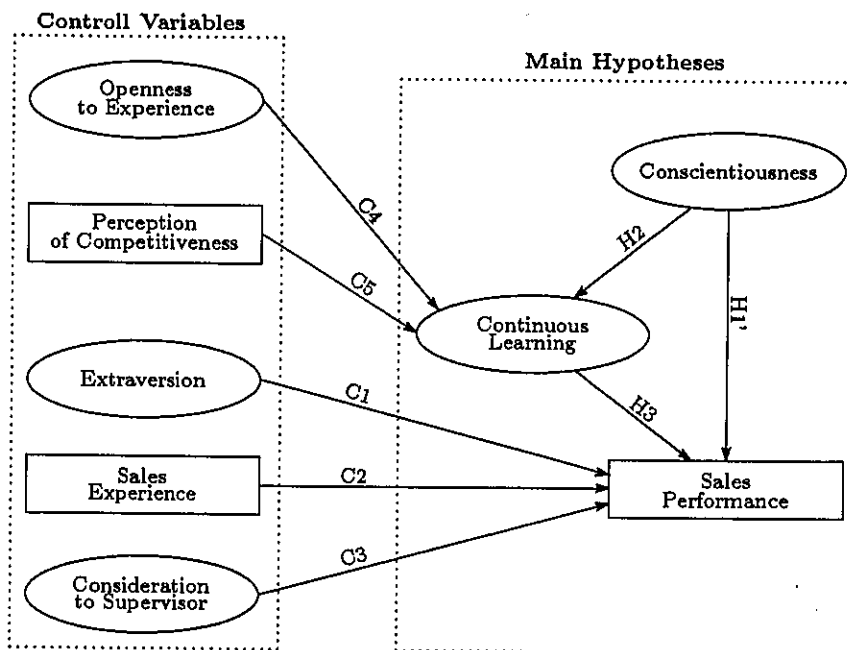
services at the same time they must be aware of changing customer's business needs. Therefore we hypothesize that sales representative who "continuously learns" will perform better (H3: continuous learning  $\rightarrow$  sales performance).

It is, however, not sufficient just to correlate continuous learning with sales performance in order to establish the mediation; continuous learning and sales performance may be correlated because they are both caused by conscientiousness. Thus, conscientiousness must be controlled in establishing the effect of continuous learning on sales performance (H1': conscientiousness  $\rightarrow$  sales performance). If the path coefficient of H1' is reduced in absolute size compared with that of H1, but is still different from zero, continuous learning will be "partial mediator." On the other hand, if the path coefficient of H1' is zero, then continuous learning will be "complete mediator."

We control the effect of other variables on continuous learning. We control the effect of openness to experience on continuous learning. According to Barrick and Mount (1991), traits frequently associated with openness to experience include being imaginable, cultured, curious, original, broad-minded, intelligent, and artistically sensitive. It seems quite likely that a sales representative with these traits will have a tendency to learn continuously (C4: openness to experience  $\rightarrow$  continuous learning).

A sales representative finding or perceiving his market environment as very competitive will be more likely to be committed into continuous learning to survive. We control the degree of the sales representative's "perception of competitiveness" in the market environment on continuous learning (C5: perception of competitiveness  $\rightarrow$  continuous learning). We also admit the existence of correlations among conscientiousness and the five control variables. Model 2 is shown in Figure 2.

Figure 2: Path diagram of the mediated model (Model 2). The manifest variables are in boxes and the latent variables are in ovals. All effects are hypothesized to be positive. Correlations among conscientiousness and the five control variables are admitted.



## 4 Method

### 4.1 Sample

The participants for this study were sales representatives working for a large Japanese company that designs, manufactures, and markets information systems, power and industrial systems as well as business systems. The company is listed on the Tokyo Stock Exchange, Part I. We selected the study site, because their products and services are continuously evolving and requires customization. These features are more likely to make its sales representatives committed to continuously learn about their products and services. We distributed 217 questionnaire sets made up of two mutually exclusive parts, ones designed to be filled out by sales representatives and the other by their immediate supervisors. The questionnaire for the sales representatives consists of a demographic-data form, a personality test, a self-evaluation on two behavioral factors—continuous learning and consideration to supervisor, while the questionnaire for supervisors asks multi-dimensional as well as overall performance rating of the sales representative under his immediate supervision. Of the 217 sets distributed, 166 were completed and mailed back to us (76.5% response rate). Of the 166 respondents, approximately 91% were male; 93% had a college of degree; 42% were either sectional chief or manager; their ages distributed from 23 to 56 and the median age was 32; their sales experiences were from 6 months to 25 years and the average was 9.8 years. Of the 143 male college-educated sales representatives, we selected 139 whose records are complete.

## 4.2 Measures

All measurement items composing the questionnaire are translated into English in Appendix A.

**Sales Performance.** We used overall ratings of sales representatives on a three-point scale: *the high performer* (3), *the average performer* (2), and *the low performer* (1). These overall ratings assess sales representatives' performance on various aspects: (a) how much revenues was he able to generate?; (b) how many products and services was he able to sell?; (c) how much profits was he able to generate?; (d) was he able to increase the market share of their products and services?; (e) was he able to add new customers?; (f) was he able to retain his regular customers?; and (g) was he able to earn customer's trusts?; (h) factors other than those listed above. The overall ratings were strongly influenced by two of the individual ratings, (a) revenue and (d) market share. See appendix B for detail.

**Personality.** To measure conscientiousness, extraversion, and openness to experience factors of personality, we extracted 37 measures from McCrae and Costa's (1985) eighty bipolar adjective scales on the basis of the results of their factor analytic study. The ten to thirteen trait descriptors with the highest factor loadings were selected to represent each of the three personality factors. Next, we converted those bipolar adjective scales into five-point Likert scales, ranging from *strongly disagree* (coded as 1) to *strongly agree* (coded as 5). For example, a bipolar adjective scale to assess the level of conscientiousness, "hardworking vs. lazy" was modified to "I work hard." Conscientiousness was measured with thirteen items, extraversion with eleven items, and openness to experience with ten. The Cronbach's (1951) coeffi-

cient alphas are .90, .88, and .82 respectively. These all exceeded the .70 level recommended by Nunnally (1978).

**Continuous Learning.** As discussed previously, continuous learning refers to the process by which one acquires knowledge, skills, and abilities throughout one's career to keep up with changing performance requirements (see, London & Mone, 1999). In accordance with this conceptualization, seven items were formulated to measure the levels of sales representative's continuous learning (see Appendix A). Each of the items included five response alternatives ranging from 1 (*strongly disagree*) to 3 (*neither*) to 5 (*strongly agree*). Sample items included "I spontaneously acquire the knowledge and skill required in my job," and "I continuously update the knowledge throughout the experience of working." It is important to note that the items were written based on our interviews with several sales representatives with over 20 years of sales experience on the research site. The Cronbach's alpha for the scale was .83.

**Consideration to Supervisor.** We developed three measurement items for measuring consideration to supervisor. Each of the items included five response alternatives ranging from 1 (*strongly disagree*) to 3 (*neither*) to 5 (*strongly agree*). The Cronbach's coefficient alpha was .73.

**Perception of Competitiveness.** Each of the sales representatives evaluated competitiveness in his market environment in five-point ordinal scale ranging from *very competitive* (5) to *almost no competition* (1).

**Sales Experience.** Each of the sales representatives were asked how many years he was involved in sales activity in the demographic-data form. We

converted years into months.

## 5 Results

We tested Model 1 and Model 2 by using the structural equation model with latent variables in the LISREL 8.10 (Jöreskog & Sörbom, 1993). We simultaneously estimated both parameters for the measurement models and the structural equation models by maximum likelihood (ML) method using correlation matrix of the manifest variables.

### 5.1 Pre-analytical Procedure

The ML method needs an assumption that a set of manifest variables forms the multivariate normal samples. Sales performance ratings were measured on three-point ordinal scale. One way to analyze such data is the weighted least square methods with the polychoric or polyserial correlations and the asymptotic covariance matrix (see Aish & Jöreskog, 1990; Jöreskog, 1990 for reviews). Estimating the asymptotic covariance matrix, however, needs so large a sample that we could not employ the method. Instead, we checked the skewness and kurtosis for the variables using the PRELIS 2.10 (Jöreskog & Sörbom, 1992). When some of the variables were found heavily skewed, we transformed them so that we were able to meet the assumption and avoid biased estimation. We found that no variable registered kurtosis significantly different from that obtained from the normal distribution after the transformation.

In this analysis, we set the variances of the measurement errors for the sales performance, the sales experience and the perception of competitiveness to be zero, because they were manifest variables.



## 5.2 Test of Model 1

We tested Model 1 as shown in Figure 1 in order to establish that there exists an effect of conscientiousness on sales performance that may be mediated. We first set all covariances between the measurement errors to be zero. We then modified the model by relaxing the restrictions of no correlations on the measurement errors according to the modification indices in LISREL for the following reason: If the correlations among the measurement items are induced by a set of latent variables, then when all latent variables are accounted for, the measurement errors will be uncorrelated. Since we assume one latent variable for a group of measurement items, it is expected that the measurement errors are likely to be correlated.

We report the completely standardized estimates of loadings ( $\hat{\lambda}$ ),  $t$ -values, and  $R^2$  for the measurement model in Table 1. As shown in table, all measurement items were significant ( $p < 0.01$ ). We judged that the three latent variables—conscientiousness, extraversion, and consideration to supervisor—were well measured.

Having checked the result of the measurement model, we then focused on the result of the structural equation model. We report the completely standardized estimates of the path coefficients and the overall goodness-of-fit statistics in Figure 3. As shown in the figure, the path coefficient from conscientiousness to sales performance (H1) was .37 and significant ( $t$ -value = 3.42 and  $p < .01$ ). On the other hand none of the coefficients for the three control paths—C1, C2, and C3—was significant ( $t$ -value = .17, -.18, and -.60, respectively and for all  $p > .10$ ). Only one of the overall goodness-of-fit statistics, comparative fit index significantly supported the model (CFI=.90).

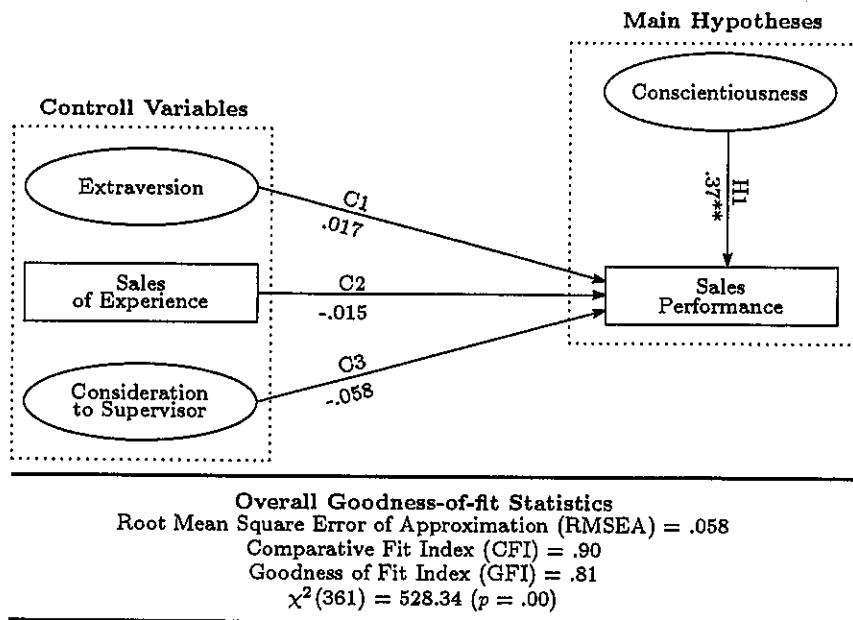
We then modified Model 1 by removing the three insignificant control paths—C1, C2, and C3. We call the modified model as Model 1'. We report

Table 1: Completely standardized estimates of loadings ( $\hat{\lambda}$ ),  $t$ -values, and  $R^2$  for the measurement model in the test of Model 1

Latent Variables	Item	$\hat{\lambda}$	( $t$ -value)	$R^2$	Latent Variables	Item	$\hat{\lambda}$	( $t$ -value)	$R^2$
Conscientiousness	C-1	.75	(10.09)**	.57	Extraversion	E-1	.73	(9.60)**	.53
	C-2	.67	(8.62)**	.45		E-2	.70	(9.03)**	.47
	C-3	.46	(5.48)**	.21		E-3	.67	(8.63)**	.45
	C-4	.58	(7.57)**	.35		E-4	.67	(8.62)**	.44
	C-5	.52	(6.34)**	.27		E-5	.73	(9.66)**	.54
	C-6	.58	(7.23)**	.34		E-6	.82	(11.40)**	.68
	C-7	.74	(9.77)**	.54		E-7	.54	(6.51)**	.29
	C-8	.70	(9.29)**	.49		E-8	.65	(8.17)**	.42
	C-9	.67	(8.64)**	.45		E-9	.52	(6.61)**	.28
	C-10	.61	(7.81)**	.38		E-10	.40	(4.61)**	.16
	C-11	.76	(10.19)**	.58		E-11	.39	(4.59)**	.16
	C-12	.65	(8.38)**	.43	Consideration to Supervisor	CS-1	.47	(5.44)**	.22
	C-13	.46	(5.48)**	.21		CS-2	.92	(11.15)**	.85
				CS-3		.76	(9.04)**	.58	

Note. \* $p < .05$ . \*\* $p < .01$ .

Figure 3: Completely standardized estimates of the path coefficients and the overall goodness-of-fit statistics in the test of Model 1



Note. \* $p < .05$ . \*\* $p < .01$ .

Table 2: Completely standardized estimates of loadings ( $\hat{\lambda}$ ),  $t$ -values and  $R^2$  for the measurement model in the test of Model 1'

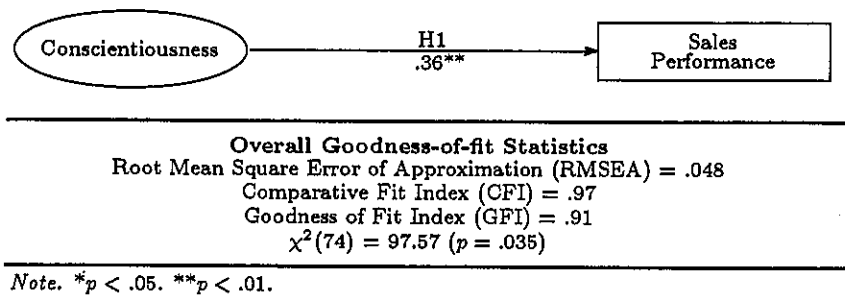
Latent Variables	Item	$\hat{\lambda}$	( $t$ -value)	$R^2$
Conscientiousness	C-1	.76	(10.16)**	.58
	C-2	.67	(8.65)**	.46
	C-3	.45	(5.34)**	.20
	C-4	.61	(7.64)**	.38
	C-5	.52	(6.34)**	.27
	C-6	.58	(7.21)**	.34
	C-7	.74	(9.79)**	.55
	C-8	.70	(9.17)**	.50
	C-9	.68	(8.70)**	.46
	C-10	.62	(7.71)**	.38
	C-11	.76	(10.24)**	.58
	C-12	.64	(8.01)**	.40
	C-13	.41	(4.76)**	.17

Note. \* $p < .05$ . \*\* $p < .01$ .

the completely standardized estimates of loadings  $\hat{\lambda}$ ,  $t$ -values, and  $R^2$  in Table 2. As shown in table, there were not notable changes and all measurement items were significant.

We report the completely standardized estimates of the path coefficients and the overall-of-fit statistics in Figure 4. As shown in the figure, the path coefficient of H1 was .36 and significant ( $t$ -value = 4.19 and  $p < .01$ ). Chi-Square test supported Model 1' ( $\chi^2(74) = 97.57$  and  $p = .035$ ). Goodness-of-Fit Index reached an adequate level (GFI=.91). The Root Mean Square Error of Approximation (RMSEA) was .048. According to Browne and Cudeck (1993. p.144), the RMSEA of about .05 or less would indicate a close fit of the model. Comparative Fit Index (CFI) was .97, an adequate level in our judgment. We judged that Model 1' reasonably supported by the data and that there existed the significant effect of conscientiousness on sales

Figure 4: Completely standardized estimates of the path coefficients and the overall goodness of fit statistics in the test of Model 1'



performance that may be mediated.

### 5.3 Test of Model 2

We next tested Model 2 as shown in Figure 2. We, however, excluded the three control paths to sales performance—C1, C2, and C3, because they were found insignificant in Model 1'. We report the completely standardized estimates of loadings ( $\hat{\lambda}$ ),  $t$ -values,  $R^2$  for the measurement model in Table 3. As shown in table, all measurement items were significant at the  $p < 0.01$  or  $p < 0.05$  levels. We judged that the three latent variables—conscientiousness, continuous learning, and openness to experience—were well measured.

We report the completely standardized estimates of the path coefficients and the overall goodness-of-fit statistics in Figure 5. As shown in the figure, the path coefficient from conscientiousness to continuous learning (H2) was .33 and significant ( $t$ -value = 3.52 and  $p < .01$ ). While the path coefficient from continuous learning to sales performance (H3) was .001 and not significant ( $t$ -value = .011 and  $p > .10$ ). The unmediated path coefficient from conscientiousness to sales performance (H1') was .37 ( $t$ -values = 3.66

Table 3: Completely standardized estimates of loadings ( $\hat{\lambda}$ ),  $t$ -values,  $R^2$  and coefficient alphas for the measurement model in the test of Model 2

Latent Variables	Item	$\hat{\lambda}$	( $t$ -value)	$R^2$	Latent Variables	Item	$\hat{\lambda}$	( $t$ -value)	$R^2$
Conscientiousness	C-1	.75	(10.11)**	.57	Openness to Experience	O-1	.46	(5.29)**	.21
	C-2	.66	(8.37)**	.43		O-2	.65	(8.25)**	.42
	C-3	.44	(5.52)**	.19		O-3	.19	(2.11)*	.04
	C-4	.62	(7.80)**	.39		O-4	.64	(8.02)**	.42
	C-5	.54	(6.61)**	.29		O-5	.67	(8.15)**	.45
	C-6	.57	(7.09)**	.33		O-6	.72	(8.99)**	.51
	C-7	.73	(9.83)**	.54		O-7	.64	(7.73)**	.40
	C-8	.69	(9.13)**	.48		O-8	.58	(6.97)**	.33
	C-9	.67	(8.58)**	.45		O-9	.49	(5.95)**	.24
	C-10	.63	(8.09)**	.41		O-10	.72	(9.29)**	.50
	C-11	.77	(10.60)**	.59	Continuous Learning	CL-1	.74	(9.00)**	.55
	C-12	.66	(8.37)**	.43		CL-2	.57	(6.71)**	.33
	C-13	.44	(5.20)**	.19		CL-3	.77	(9.35)**	.59
				CL-4		.68	(8.05)**	.46	
				CL-5		.62	(7.39)**	.38	
				CL-6		.47	(5.35)**	.22	
				CL-7		.71	(8.56)**	.51	

Note. \* $p < .05$ . \*\* $p < .01$ .

and  $p < .01$ ) and was not reduced in absolute size. According to Baron and Kenny (1986) and Judd and Kenny (1981), these findings indicated that there was no mediation by continuous learning on the effect of conscientiousness on sales performance. The two control path coefficients to continuous learning were both significant ( $p < .01$ ): from openness to experience to continuous learning (C4) was .33 ( $t$ -value = 3.42); from perception of competitiveness (C5) was .23 ( $t$ -value = 2.86).

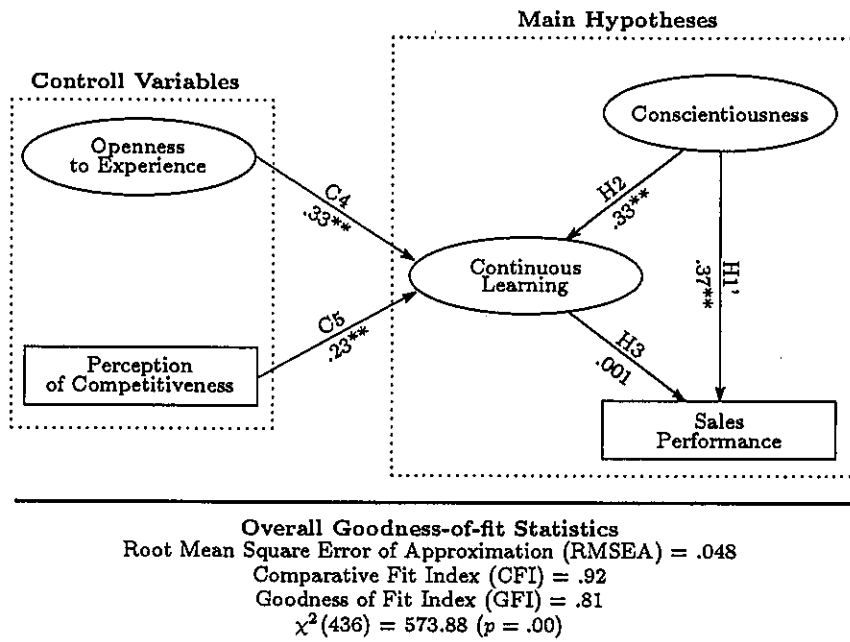
Two of the overall-of-fit statistics—RMSEA = .048 and CFI = .92—supported Model 2, while the other two— $\chi^2(436) = 573.88$  with  $p = .00$  and GFI=.81—did not. In Model 2, however, we used many manifest variables for the measurement model and the degree of freedom was large. In such a case,  $\chi^2$  test and GFI might not always be appropriate indicators. We tentatively accept Model 2.

Finally we show the result of the test of modified Model 2 by removing the non-significant path from continuous learning to sales performance in Figure 6. As shown in the figure, there is no remarkable change other than the degree of freedom of the  $\chi^2$  test.

## 6 Discussion

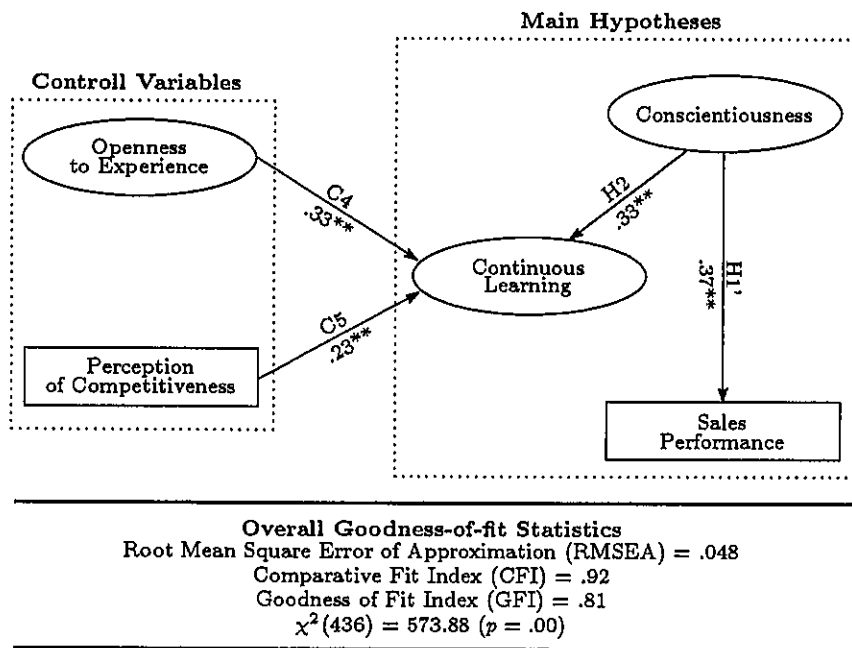
As discussed in section 2, some authors have argued that conscientiousness was a significant and positive direct predictor of sales performance (Barrick & Mount, 1991; Vinchur, Schippmann, Switzer, & Roth, 1998). Our Model 1' supported their hypothesis. Mount, Barrick, and Strauss (1993) found that goal setting and goal commitment could partially mediate the relationship between conscientiousness and sales performance. In the present study, we did not find that continuous learning as an additional mediating behavioral

Figure 5: Completely standardized estimates of the path coefficients and the overall goodness-of-fit statistics in the test of Model 2



Note.  $*p < .05$ .  $**p < .01$ .

Figure 6: Completely standardized estimates of the path coefficients and the overall goodness-of-fit statistics in the test of modified Model 2





factor contrary to our expectation. Instead what we found was that conscientiousness was significantly related to continuous learning but the path from continuous learning to sales performance was very weak at most when the direct effect of conscientiousness on sales performance was controlled.

A straightforward interpretation of our result would lead us to conclude that, to succeed, a similar organization must select from the pool of prospective sales representatives those who are conscientious on the basis of the personality test scores.

What happened is the following. The competitive environment in which these sales representatives—many with degrees in computer science and electrical engineering—were and are operating is such that the company must provide them with training opportunities, seminars, and self-improving educational opportunities on regular basis in order for it to stay competitive, but also for it to be able to retain and continuously attract these sales forces. In short many of the participants in this study did continuously learn and those who continuously learn tended to be evaluated as high performer in terms of sales performance. It is just that their sales performances correlated more with conscientiousness scores than with their continuous learning behavior scores, rendering the latter to be insignificant in the presence of the former. This is evidenced by the fact that without H1' path or conscientiousness  $\rightarrow$  sales performance path, H3 path or continuous learning  $\rightarrow$  sales performance would be significant in Figure 5.

A possible explanation for our not finding of continuous learning as a mediator on sales performance, however, may be due to the fact that we measure the relationship in one time point rather than serially in this study. Continuous learning could affect sales performance but with some time lag. Its effect on sales performance could also be cumulative in the sense that

how long a sales representative has been committed to continuous learning affect the sale performance. Some researchers already started examining sales performance as dynamic criterion by time series analysis (Hofmann, Jacobs, & Baratta, 1993; Harrison, Virick, & William, 1996; Ployhart & Hakel, 1999). It is worth considering to examine the effect of continuous learning on sales performance similarly in future research.

The present study extends the London and Mone's theory by providing with actual predictors of continuous learning, which they have mentioned but on whose existence they did not give empirical evidences. As expected, openness to experience was significantly and positively related to continuous learning. Barrick and Mount's (1991) explained that, in finding a valid predictor of training proficiency, "Individuals who score high on this dimension (e.g., intelligent, curious, broad-minded, and cultured) are more likely to have positive attitudes toward learning experiences in general." The same explanation may also be adopted to the relationship between openness to experience and continuous learning. We also revealed that perception of competitiveness was positively related to continuous learning. This indicates a sales representative recognizing his market environment as very competitive will be more likely to acquire new knowledge and skills. As consequence, he will be more committed into continuous learning.

In this study, we examined some control paths to sales performance. Contrary to the results of two meta-analyses (Barrick & Mount, 1991; Vinchur, Schippmann, Switzer, & Roth, 1998), we did not find significant direct effect of extraversion on sales performance. There exist two possible reasons for not finding of significant effect of extraversion on sales performance. First, our study site designs, manufactures, and markets information systems, its sales representatives are required to have broad technical skills and knowl-

edge in computer programming, system engineering as well as familiarity with clients' business needs. In these environments, traits frequently associated with extraversion such as being sociable, gregarious, assertive, and talkative (Barrick & Mount, 1991) may not be as important a factor in generating sales as these technical skills and knowledge. Second, our study site is a Japanese company, while the above meta-analyses were on American companies. The difference in the national characteristics may account this lack of relationship between extraversion and sales performance on the part of the Japanese sales representative.

We also ascertained that sales experience did not affect sales performance. This result is probably due to the fact that the ratings of sales representatives by their immediate supervisors take into consideration their sales experiences in the sense that the supervisory expectation of their subordinates might increase with increased sales experience.

We found that consideration to supervisor was not significantly related to sales performance. As seen in Appendix B, the overall sales performance rating of a sales representative were significantly affected by the amount of revenue he was able to generate and the market share he was able to increase. Since these figures—revenue and market share—are easy to quantify, we could argue that the supervisory ratings were objectively evaluated in the first place and thus were not affected by the variables measuring consideration to supervisor.

## References

- Aish, A. M. , & Jöreskog, K. G (1990). A panel model for political efficacy and responsiveness: An application of LISREL 7 with weighted least squares. *Quality & Quantity*, 24, 405-426.
- Anderson, R. E. (1990). Personal selling and sales management in the new millennium. *Journal of Personnel Selling & Sales Management*, 16, 17-32.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: a meta-analysis. *Personnel Psychology*, 44, 1-26.
- Barrick, M. R., Mount, M. K., & Strauss J. P. (1993). Conscientiousness and performance of sales representatives: Test of the mediating effects of goal setting. *Journal of Applied Psychology*, 78, 715-722.
- Bartholomew, D. J., & Knott, M. (1999). *Latent variable models and factor analysis*. 2nd ed. London: Arnold; New York: Oxford Univ.
- Bollen, K. A. (1989). *Structural equations with latent variables*. New York: John Wiley & Sons.
- Browne, M. W. & Cudeck, R. (1993) Alternative ways of assessing model fit. Chap.6 in *Testing structural equation models* ed. Bollen, K. A., & Long, J. S., 136-162. Newbury Park: Sage Publications.
- Campbel, J. P., Gasser, M. B., & Oswald, F. L. (1996). The substantive nature of job performance variability. Chap.7 in *Individual differences*

- and behavior in organizations, ed. Murphy, K. R., 258-299. San Francisco: Jossey-Bass Publishers.
- Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, 78, 98-104.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-334.
- Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, 41, 417-440.
- Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist*, 48, 26-34.
- Harrison, D. A., Virick, M., & William, S. (1996). Working without a net: time, performance, and turnover under maximally contingent rewards. *Journal of Applied Psychology*, 81, 331-345.
- Hofmann, D. A., Jacobs, R., & Baratta, J. E. (1993). Dynamic criteria and measurement of change. *Journal of Applied Psychology*, 78, 194-204.
- Hough, L. M. & Schneider, R. J. (1996). Personality traits, taxonomies, and applications in organizations. Chap.2 in *Individual differences and behavior in organizations*, ed. Murphy, K. R., 31-88. San Francisco: Jossey-Bass Publishers.
- Hunter, J. E., Schmidt, F. L., & Judiesch, M. K. (1990). Individual differences in output variability as a functions of job complexity. *Journal of Applied Psychology*, 75, 28-42.
- Jöreskog, K. G (1990). New developments in LISREL: Analysis of ordinal variables using polychoric correlations and weighted least squares. *Quality & Quantity*, 24, 387-404.
- Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago: Scientific Software

International.

- Jöreskog, K. G., & Sörbom, D. (1996). *LISREL 8: User's reference guide*. Chicago: Scientific Software International.
- Judd, C. M., & Kenny, D. A. (1981). Process analysis: Estimating mediation in treatment evaluations. *Evaluation Review*, 5, 602-619.
- London, M., & Mone, E. M. (1999). Continuous learning. Chap.5 in *The changing nature of performance. Implications for staffing, motivation, and development*, ed. Ilgen, D. R., & Pulakos, E. D., 119-153. San Francisco: Jossey-Bass Publishers.
- McCrae R. R., & Costa, P. T. (1985). Updating Norman's "adequate taxonomy": Intelligence and personality dimensions in natural language and in questionnaires. *Journal of Personality & Social Psychology*, 49, 710-721.
- McCullagh, P., & Nelder, J. A. (1989). *Generalized linear models*. 2nd ed. London: Chapman and Hall.
- McManus, M. A., & Kelly, M. L. (1999). Personality measures and bio-data: evidence regarding their incremental predictive value in the life insurance industry. *Personnel Psychology*, 52, 137-148.
- Mount, M. K., & Barrick, M. R. (1995). The Big Five personality dimensions: Implications for research and practice in human resources management. *Research in Personnel and Human Resources Management*, 13, 153-200.
- Mount, M. K., & Barrick, M. R. (1998). Five reasons why the "Big Five" article has been frequently cited. *Personnel Psychology*, 51, 849-857.
- Mount, M. K., Barrick, M. R., & Strauss J. P. (1994). Validity of observer of the Big Five personality factors. *Journal of Applied Psychology*, 79, 272-280.

- Murphy, K. R. (1996). *Individual differences and behavior in organizations*. San Francisco: Jossey-Bass Publishers.
- Ployhart, R. E. & Hakel, M. D. (1999). The substantive nature of performance variability: Predicting interindividual differences in intraindividual performance. *Personnel Psychology*, 51, 859-901.
- Stewart, G. L. (1996). Reward structure as a moderator of the relationship between extraversion and sales performance. *Journal of Applied Psychology*, 81, 619-627.
- Stewart, G. L. (1999). Trait bandwidth and stages of job performance: Assessing differential effects for conscientiousness and its subtraits. *Journal of Applied Psychology*, 84, 959-968.
- Vinchur, A. J., Schippmann, J. S., Switzer, F. S., & Philip, M. K. (1998). A meta-analytic review of predictors of job performance for sales representatives. *Journal of Applied Psychology*, 83, 586-597.

## A Measurement Items Composing the Questionnaires

### Items Evaluated by the Sales Representatives

The items for personality, continuous learning, and consideration to supervisor are evaluated in five-point Likert scales anchored: *strongly agree* (5), *agree* (4), *neither* (3), *disagree* (2), and *strongly disagree* (1). The item for perception of competitiveness is evaluated in five-point Likert scales anchored: *very competitive* (5), *competitive* (4), *undecided* (3), *a little competition* (2), and *strongly disagree* (1).

#### Conscientiousness

- C-1. I make thorough preparations.
- C-2. I do things methodically.
- C-3. I am diligent.
- C-4. I would be described by others as reliable and dependable.
- C-5. I am self-disciplined.
- C-6. I never fail to organize my thoughts before making a speech.
- C-7. When struggling to do something, I pay attention to the details.
- C-8. Others would describe me as planful.
- C-9. I tend to use a systematic approach to guide thinking.
- C-10. I tend to summarize the underlying relationships among separate issues according to established rules and principles.



C-11. I put effort into ensuring that I do not miss anything.

C-12. I tend to synthesize a variety of issues and phenomena according to established rules and principles.

C-13. When faced with a strange phenomenon, I always try to evaluate it in relation to existing frames of reference.

### **Extraversion**

E-1. I am friendly with anyone even at the first meeting.

E-2. I am very talkative.

E-3. I make people around me happy.

E-4. I like social functions such as parties very much.

E-5. I am cheerful.

E-6. I am sociable.

E-7. I am relatively sympathetic with others.

E-8. I always interact with others in a friendly manner.

E-9. I am said to be active.

E-10. I am more comfortable in others' company than in solitude.

E-11. I spontaneously do things.

### **Openness to Experience**

- O-1. I have various interests, knowledge and information on matters not directly connected to my job.
- O-2. I am interested in many things.
- O-3. I respect the others' opinion and values that are consisted with mine.
- O-4. I can see things from different perspective.
- O-5. I often come up with original ideas using my imagination.
- O-6. I always come up with creative and novel ideas by disregarding generally accepted norm.
- O-7. I like an environment in which I can show my creating.
- O-8. I like variety.
- O-9. I have great interests on novelties and unknowns.
- O-10. I am bold and adventurous.

### **Continuous Learning**

- CL-1. I tend to acquire job-related knowledge and skills on a voluntary basis.
- CL-2. I continuously improve my knowledge through work experiences.
- CL-3. I usually look ahead to see possible performance requirements and make effort to fill gaps, if any, between the requirements and my present knowledge, skills and abilities.

CL-4. I make effort regularly in order to be well versed in new skills.

CL-5. I would like a generous self-investment to enlighten myself.

CL-6. I always think about what I have learned from both daily activities and peculiar events and try to apply the knowledge to my job.

CL-7. I endeavor to improve my job performance by training and enlightening myself.

#### Consideration to Supervisor

CS-1. I demonstrate compassion toward my immediate supervisor.

CS-2. I behave with concerns for my supervisor's feelings and expectations.

CS-3. I speak with concerns for my supervisor's feelings and expectations.

#### Performance Ratings Evaluated by the Supervisors

##### The seven individual ratings

We asked the supervisors to evaluate the following seven aspects of sales performance for their immediate subordinates on three-point ordinal scale: *the high performer* (3), *the average performer* (2), and *the low performer* (1). If an aspect was not applicable, his supervisor checked "*not be applicable.*"

(a) How much revenues were he able to generate?

(b) How many products and services was he able to sell?

- (c) How much profits was he able to generate?
- (d) Was he able to increase the market share of the products and services?
- (e) Was he able to add new customers?
- (f) Was he able to retain his regular customers?
- (g) Was he able to cultivate customer's trusts?

**The overall ratings**

We also asked them to provide the overall ratings for their subordinates on three-point scale considering the above aspects and factors other than them.

## B The Multiple Logistic Regression of the Overall Performance Ratings on the Seven Individual Ratings

### B.1 Estimation Approach

To understand how the seven individual ratings affected on the overall rating, we conducted the multinomial logistic regression of the overall rating on the individual ratings. Of the 143 cases selected, we used 114 cases completed in both the individual ratings and overall rating. The dependent variable or response  $Y$  (the overall performance rating) is measured in three-point ordinal scale. This eliminates the possibility of applying ordinal least squares (OLS). The standard approach (McCullagh and Nelder, 1989) is to transform the cumulative response probabilities  $\gamma_j = \Pr(Y \leq j)$ , where  $j = 1, \dots, J$  is the number of categories, rather than the category probabilities  $\pi_j = \Pr(Y = j)$ , by the logistic function  $\log\{\gamma_j/(1 - \gamma_j)\}$  and regress them on the explanatory variables  $x_k$ ,  $k = 1, \dots, K$  (the individual ratings), where in our case  $J = 3$  and  $K = 7$ .

The model we employed is referred as the proportional-odds model and involves parallel regressions on the chosen ordinal scale

$$\log [\gamma_j(\mathbf{X}) / \{1 - \gamma_j(\mathbf{X})\}] = \theta_j - \beta^t \mathbf{X}, j = 1, \dots, J - 1,$$

where  $\gamma_j(\mathbf{X}) = \Pr(Y \leq j | \mathbf{X})$  is the cumulative probability up to including category  $j$ , when the independent variable vector is  $\mathbf{X}$ . The name of the model originates from the fact that the odds of the event  $Y \leq j$  at  $\mathbf{X} = \mathbf{X}_1$  relative to those at  $\mathbf{X} = \mathbf{X}_2$  can be written as

$$\frac{\gamma_j(\mathbf{X}_1) / \{1 - \gamma_j(\mathbf{X}_1)\}}{\gamma_j(\mathbf{X}_2) / \{1 - \gamma_j(\mathbf{X}_2)\}} = \exp \{-\beta^t (\mathbf{X}_1 - \mathbf{X}_2)\},$$

and is independent of the choice of category ( $j$ ). The negative sign in front of the  $\beta$  is a convention that guarantees large values of  $\beta^t \mathbf{X}$  generated an increase in probability of the higher-numbered categories. Both  $\theta$  and  $\beta$  are unknown parameters to be estimated. The  $\theta$  must be satisfy  $\theta_1 \leq \theta_2 \leq \dots \theta_{J-1}$  because they represent the average values of cumulative response probabilities. We can use only  $J - 1$  categories out of the total  $J$  to estimate  $\theta$  and  $\beta$  because the cumulative probabilities adds up to unity by definition.

## B.2 Estimation Methodology

All regression coefficients are estimated by maximizing logarithm of the likelihood function

$$l(\gamma|\mathbf{Z}) = \sum_i l(\gamma_i|\mathbf{z}_i) = \sum_i \sum_j (z_{ij} - z_{i(j-1)}) \log(\gamma_{ij} - \gamma_{i(j-1)}),$$

where we suppose that there are  $n$  independent multinomial vectors, each with  $J$  categories. The  $i$ -th observations are denoted by  $\mathbf{y}_1, \dots, \mathbf{y}_n$ , where  $\mathbf{y}_i = (y_{i1}, \dots, y_{iJ})$ . The cumulative response vectors are  $\mathbf{z}_{ij} = \sum_{l=1}^j y_{il}$  and the binomial index  $\sum_j y_{ij} = m_i$  is fixed for each  $i$ . Differentiating the log likelihood with respected to  $\gamma_{ij}$  and the Lagrange multiplier  $\lambda$  subject to the constraint  $\sum_{j=1}^J (\gamma_{ij} - \gamma_{i(j-1)}) = 1$  gives

$$\frac{\partial l(\gamma|\mathbf{Y})}{\partial \gamma_{ij}} = m_i \Gamma^- \left( \sum_l^i y_{il} - m_i \gamma_i \right),$$

where the  $\Gamma^-$  is a  $J \times J$  symmetric Jacobi or tri-diagonal matrix as follows.

$$\Gamma^- = \frac{1}{m_i} \begin{bmatrix} \pi_{i1}^{-1} + \pi_{i2}^{-1} & -\pi_{i2}^{-1} & 0 & \dots & 0 \\ -\pi_{i2}^{-1} & \pi_{i2}^{-1} + \pi_{i3}^{-1} & \ddots & \ddots & \vdots \\ 0 & \ddots & \ddots & -\pi_{i(J-1)}^{-1} & 0 \\ \vdots & \ddots & -\pi_{i(J-1)}^{-1} & \pi_{i(J-1)}^{-1} + \pi_{iJ}^{-1} & 0 \\ 0 & \dots & 0 & 0 & 0 \end{bmatrix}.$$

It is the Moore-Penrose inverse of the covariance matrix  $\Gamma = \{\gamma_{rs}\} = m_i \gamma_r (1 - \gamma_s)$ .

Let  $\beta^* = (\theta_1, \dots, \theta_{J-1}, -\beta_1, \dots, -\beta_K)$ , then the proportional-odds model can be written as

$$\log [\gamma_{jj} / \{1 - \gamma_{ij}\}] = \sum_p x_{ijp}^* \beta_p^*$$

where  $x_{ijp}^*$  is the components of a matrix  $X^*$  of order  $n(J-1) \times K^*$  where  $P$  is the dimension  $P = (J-1) + K$  of  $\beta^*$ . The  $j$ -th row of in the  $i$ -th block of the matrix  $X^*$  can be written as  $(0, \dots, 1, \dots, 0, x_{i1}, \dots, x_{iK})$ , the first  $J-1$  columns are zero except the  $j$ -th, which has unity, and the remaining  $K$  columns has values of the independent or explanatory variables corresponding  $i$ -th cell count.

Finally differentiating the log likelihood with respect to  $\beta^*$  gives

$$\frac{\partial l}{\partial \beta_p^*} = \sum_i \sum_j x_{ijp} \gamma_{ij} (1 - \gamma_{ij}) \frac{\partial l}{\partial \gamma_{ij}}$$

Setting the derivatives equal to zero and solving with respect to  $\beta^*$  by applying iterative re-weighted least squares with starting values  $\hat{\beta}^{*(0)}$  until convergence obtains the result. The estimate  $\hat{\beta}^*$  of  $\beta^*$  are normally fairly accurate a few cycles of iteration.

Lack of convergence is seldom an issue unless at least one component of the estimate  $\beta^*$  is infinite, which usually implies that the data are sparse and  $y_i = 0$  or  $y_i = m_i$  for certain components of the response vector. Irregular convergence or oscillation could occur and normally indicates that the log likelihood is either very flat or has an asymptote. Three dimensional graphical representation of likelihood surface should detect such a phenomenon. A slight change in convergence criterion is often enough to address the problem.

Table 4: The result of the logistic regression

	$\theta_1$	$\theta_2$	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Estimates	13.37	19.87	-2.92	0.17	-1.15	-2.24	-1.04	-0.9	-0.47
( <i>t</i> -values)	(5.88)**	(6.56)**	(-4.11)**	(0.26)	(-1.99)*	(-3.27)**	(-1.96)*	(-1.58)	(-0.75)

Note. \* $p < .05$ . \*\* $p < .01$ .

### B.3 Result of the Estimations

We reported the estimates of the intercepts and the coefficients and *t*-values in Table 4. As shown in the table, the overall rating was not a well-balanced sum through the seven individual ratings but was so strongly affected by (a) revenue and (d) market share.