Spurious Correlation between Self-Determination and Job Satisfaction: A Case of Company X from 2004–2013

Nobuo TAKAHASHI, Hirofumi OHKAWA, and Nobuyuki INAMIZU

Abstract: In most Japanese companies, regular employees work under a lifetime employment system and a seniority-based pay system. Under such conditions of no contingent money payments, we can accurately observe the phenomena associated with intrinsic motivation. Therefore, we conducted Survey X, an exhaustive survey for all employees of Company X carried out once a fiscal year, during the fiscal years 2004–2013. Using the total 13,019 employees’ data of Survey X, we test a version of Deci’s (1975) hypothesis that if a person’s feeling of self-determination is enhanced, his or her job satisfaction will increase. As a result, there is a strong linear relationship between the job satisfaction ratio and the degree of self-determination. However, occupation and rank tend to
determine the band of fluctuation with respect to the degree of self-determination. This indicates a strong likelihood that there is a spurious correlation between a degree of self-determination and a job satisfaction ratio.

Keywords: self-determination, intrinsic motivation, job satisfaction, white-collar workers

1. Introduction

According to expectancy theory, the most popular and most sophisticated theory on work motivation, the force to perform an act should be formulated in a similar manner to the expected utility theory in economics. The present well-known expectancy theory of work motivation was completed by Vroom (1964), while the prototype of the similar model dates back to the 1930s. Vroom’s theory is fundamentally based on the assumption that a person is calculating and rational. Thus, motivating that person to engage in a particular act is formulated as like “dangling a carrot in front of a horse’s nose.” However, based on the results of a comprehensive survey of literature, Vroom suggests that “performance may be an end as well as a means to the attainment of an end” and that “individuals may derive satisfaction from effective performance and dissatisfaction from ineffective performance, regardless of the externally mediated consequences of performance” (Vroom, 1964, p. 267).

In fact, although job performance and job satisfaction have stuck together, external rewards such as money have an overwhelming impact and separate job satisfaction from job performance. Thus, monetary rewards compel satisfaction to be driven by rewards. In other words, monetary rewards have a separating effect: job performance → monetary rewards → job satisfaction. If workers
working solely for money receive no monetary rewards, they lose their satisfaction and their willingness to work (Takahashi, 2004). On this point, Deci (1975) states that external rewards have a greater salience and impact, and “they can ‘co-opt’ intrinsic motivation” (Deci, 1975, p. 139). Actually, there is no additional relationship between intrinsic motivation and motivation by external rewards; many experimental studies prove that in many cases, external rewards reduce intrinsic motivation (Deci, 1975, chap. 5).

According to Deci (1975), intrinsically motivated activities are “ones for which there is no apparent reward except the activity itself” (Deci, 1975, p. 23). In contrast to expectancy theory which, supposes that the activities are done as means to external rewards, intrinsically motivated activities are “ends in themselves rather than means to an end”; “the person is deriving enjoyment from the activities” (Deci, 1975, p. 23).

Deci (1975) defines intrinsically motivated behaviors as “behaviors which a person engages in to feel competent and self-determining” (Deci, 1975, p. 61). The concept of competence here was originally used by White (1959) in a much broader meaning than its everyday usage. White refers to it as the ability of an organism to react effectively with its environment. The behaviors of visual exploration, grasping, crawling, walking, thinking, exploring novel objects and places, and producing effective changes in the environment are supposed to have a common biological significance: they all form part of the process whereby the animal or child learns to react effectively with its environment. White chooses the term “competence” to indicate this common property. In other words, when people can deal effectively with their environment on their own and produce “changes” effectively, they feel competent;¹ this is surely a sense of

¹ The challenge concept is very significant in intrinsic motivation theory represented by Atkinson’s (1957) theory of achievement motivation; this is closely connected to “propensity to change” (Takahashi, 1997; Takahashi,
self-determination. If we take White’s definition of competence, we are essentially saying it is the same as self-determination. Thus, we shall use only the term “self-determination” here.

2. Hypothesis and the Degree of Self-determination

In most Japanese companies, regular employees work under a lifetime employment system and a seniority-based pay system (Abegglen, 1958; Dore, 1973; Drucker, 1971). Under such conditions of no contingent money payments, we can accurately observe the phenomena associated with intrinsic motivation. Accordingly, using the data of a Japanese company, let us test the following hypothesis derived from Deci’s (1975) Proposition II (Deci, 1975, p. 141).

Hypothesis. If a person’s feeling of self-determination is enhanced, his or her job satisfaction will increase, and vice-versa.

Takahashi (1993) uses the following five questions as dummy variables and defines the combined total score as the degree of self-determination (DSD).

D1. “As you work on your job, do you continually keep in mind the policies of top management?” 1 = yes, 0 = no.
D2. “Has authority been delegated to you by your superior?” 1 = yes, 0 = no.
D3. “Do you believe your opinions are given due consideration?” 1 = yes, 0 = no.
D4. “Are you able to see the desirable shape which your company will take in the 21st century?” 1 = yes, 0 = no.
D5. “When you are thoroughly convinced that you have made a

Ohwaka, & Inamizu, 2014b).

2 In Survey X conducted in the 21st century, D4 is replaced by “Are you able to see the desirable shape which your company will take ten years from now?”
good decision, are you confident that the others will be as equally so?”  1 = yes, 0 = no.

For these questions, “yes” means a high degree of self-determination, and “no” means a low degree of self-determination. The yes/no answer to the question $D_i$ can be quantified and represented by a dummy variable $X_i$, $i = 1,...,5$. The dummy variable takes only two values, zero and one, which signify that the observation belongs to one of two possible categories. A dummy variable $X_i$ is coded as 1 for “yes” and 0 for “no.”

Therefore, the degree of self-determination ($D_{SD}$) is defined and calculated as the sum of the “yes” replies to all five questions:

$$D_{SD} = X_1 + X_2 + X_3 + X_4 + X_5.$$  

$D_{SD}$ of a person is an integer from 0 to 5.

The respondents are divided into six groups: “$D_{SD} = 0$,” “$D_{SD} = 1$,” and so on up to “$D_{SD} = 5$.” The job satisfaction ratio of a group is defined as the ratio of people in that group that answered “yes” to the following question Q1:

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

By determining the job satisfaction ratio of each group, the relationship between job satisfaction ratio and $D_{SD}$ can be examined.

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3 Although many researchers deal with job satisfaction as a pluralistic concept, they do not necessarily agree on the elements. Furthermore, typical measures such as the Job Descriptive Index (JDI) and the Minnesota Satisfaction Questionnaire (MSQ) use many questions for each of a broad range of job factors and define job satisfaction as composite variables of the factors (Sakashita, 1985). However, in an exploratory analysis, the more questions contained in the composite variable “job satisfaction” (dependent variable), the more effectively they might overlap with the questions of independent variables; nevertheless if we cautiously avoid this problem by redefining job satisfaction, the definition of job satisfaction is rather arbitrary and less objective. Actually, it is better that we simply express job satisfaction directly from a question Q1 alone without calculating a composite variable.
Takahashi (2002) examines 11 years of data gathered from 1990 to 2000 for 10,916 workers in the JPC Survey, a survey of white-collar workers in 46 Japanese companies involved in the Academy of Management Development. As shown by the red dashed line in Figure 1, the high value of 0.9881 of $R^2$ indicates a strong linear relationship between the job satisfaction ratio and DSD. Therefore, DSD can be used to forecast the job satisfaction ratio.

Accordingly, this paper examines the degree of self-determination

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4 The questionnaires of JPC Survey consist of over 50 questions, including questions on DSD as well as questions for other purposes. For example, Takahashi (1997, 2002, 2014) and Ando (2002) conduct analyses based on JPC Survey data.
(DSD) further, based on an annual survey, Survey X. Survey X is a survey for all employees of Company X, carried out once a fiscal year since 2004. The survey was conducted in October 2004, September 2005 and in February from 2007 to 2014. The questionnaires were distributed to all members of the company at once and collected once filled. Out of the 13,383 questionnaires distributed in Company X through fiscal years 2004–2013, 13,230 were collected, giving a response rate of 98.9%.

The green line in Figure 1 shows the relationship between the job satisfaction ratio and DSD. The high value of 0.9625 of the coefficient of determination $R^2$ indicates a strong linear relationship. Both the JPC data and the Company X data show a similar job satisfaction ratio at DSD 3, 4 and 5, while the job satisfaction ratios of Company X data at DSD 0, 1 and 2 are higher than those of the JPC data. The coefficient of determination for the Company X data is slightly lower, and the incline of the line is less steep.

3. The Degree of Self-determination Banded by Occupation and Rank

Why does the Company X data show higher job satisfaction ratios than the JPC data at DSD 0, 1 and 2? One difference is that all of the JPC respondents were white-collar workers, while the Company X respondents included blue-collar workers as well. Let us divide occupational categories into OC1, OC2, OC3 and OC4, where OC4 is white-collar workers, while the other categories are blue-collar workers.

Figure 2 shows the annual trend of occupational categories (OC1, OC2, OC3, and OC4), rank categories (ordinary, chief, and manager), and total. This figure clearly demonstrates that the band of DSD fluctuation stayed almost the same within each occupational category and rank category. The job satisfaction ratio varies by year...
due to wide-scale organizational restructuring that occurred in 2005 and 2006. This trend is particularly visible in OC1, which comprises about 50% of the entire workers, and the “ordinary” rank, which comprises about 80% of OC1. DSD for OC1 is narrow, ranging from 2.68 (2006) to 2.97 (2013). The DSD for the ordinary rank is also narrow, from 2.80 (2006) to 3.03 (2013). Within this narrow band, OC1’s job satisfaction ratio varies from 45% to 75%, and that of the ordinary rank varies from 45% to 68%. Even the relatively wide band of DSD fluctuation for OC3s and chiefs did not really overlap other occupational or rank categories.

In the case of Company X, half of the respondents were in OC1, with ordinary workers making up 80% of respondents as well.
Spurious correlation between self-determination and job satisfaction

Consequently, the categories of OC1 and ordinary somewhat overlap. In 2013, 635 out of 1046 ordinary workers were in OC1 (60.7%), while 635 out of 637 OC1 workers were ordinary workers (99.7%). Since ordinary workers and OC1 workers not only follow similar trends but also make a large proportion of the respondents, it is completely reasonable that the narrow job satisfaction ratio band for DSD 0, 1 and 2, are largely composed of these two groups, could differ from JPC figures composed only of the white-collar worker. If data includes a high proportion of blue-collar and ordinary workers, such as that from Company X, the job satisfaction ratio will be on the higher end, where DSD is low and the regression line for the entire set of data will have less of an incline.

In addition, DSD is greatly limited by occupation, particularly by rank. Common sense dictates that different ranks such as ordinary, chief, and manager will have different degrees of self-determination. Naturally, higher-level positions have greater authority and autonomy, leading to a higher degree of self-determination. Even so, in the event of wide-scale organizational restructuring, such as that seen in Company X in 2005 and 2006, the job satisfaction ratio varies greatly, causing a drop in the coefficient of determination of the regression lines and a more gradual slope.

In this manner, the band of the DSD as set for each occupation and rank, and the job satisfaction ratio varied within the band. In other words, it is highly likely that there is a relationship between occupation/rank and DSD, but there is no direct correlation between the job satisfaction ratio and DSD (Takahashi, Ohwaka, Inamizu, & Akiike, 2013). Based on Figure 2, there may be a relationship between occupation/rank and job satisfaction ratio “occupation/rank → job satisfaction ratio” judging from the relatively high ratio of satisfied managers. However, in the case of those in the ordinary category, the job satisfaction ratio varies greatly, making possible the existence of an undiscovered variable t that is more
applicable than either occupation or rank.

Takahashi’s (1996, 1997) “perspective index” makes a very strong explanatory variable. According to Takahashi, Ohkawa, & Inamizu (2014a), the perspective index explains the job satisfaction ratio since there was no band by occupation/rank as shown in Figure 2. However, whichever the case, combining both these makes it highly likely that there is a relationship between “the job satisfaction ratio ← occupation/rank → DSD” or perhaps by inserting the undiscovered variable $t$: “the job satisfaction ratio ← $t$ → occupation/rank → DSD.”

This shows that occupation/rank, or $t$, are antecedent variables for the two variables of DSD and job satisfaction ratio, and may be termed as explanatory variables. In this case, there is no direct causal relationship between the DSD and job satisfaction ratio. In actuality, the DSD for the most part does not change before and after wide-scale organizational restructuring, and the job satisfaction ratio alone fluctuates greatly. In other words, this shows that a correlation between the DSD and the job satisfaction ratio is spurious.

References

Abegglen, J. C. (1958). *The Japanese factory: Aspects of its social organization*. Glencoe, IL: Free Press.

Ando, F. (2002). The real relationship between organizational culture and organizational learning. *Annals of Business Administrative Science, 1*, 25–33. doi: 10.7880/abas.1.25

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review, 64*, 359–372.

Deci, E. L. (1975). *Intrinsic motivation*. New York, NY: Plenum Press.

Dore, R. P. (1973). *British factory-Japanese factory: The origins of national diversity in industrial relations*. Berkeley, CA: University of California Press.

Drucker, P. F. (1971). *What we can learn from Japanese
management. *Harvard Business Review*, (March–April, 1971), 110–122.

Sakashita, A. (1985). *Soshiki kodou kenkyu* [Organizational behavior]. Tokyo, Japan: Hakuto Shobo (in Japanese).

Takahashi, N. (1993). *Soshiki no nakano kettei riron* [Decision theory in organizations]. Tokyo, Japan: Asakura Shoten (in Japanese).

Takahashi, N. (1996). *Mitoushi to soshiki kinkou* [Perspective and organizational equilibrium]. *Soshiki Kagaku* [Organizational Science], 29(3), 57–68 (in Japanese).

Takahashi, N. (1997). *Nihon kigyou no ishikettei genri* [Principles of decision-making in Japanese firms]. Tokyo, Japan: University of Tokyo Press (in Japanese).

Takahashi, N. (2002). The degree of self-determination and job satisfaction of white-collar workers in Japanese firms. *Annals of Business Administrative Science*, 1, 1–7. doi: 10.7880/abas.1.1

Takahashi, N. (2004). *Kyomou no seikashugi* [Performance-based pay system of false and fancy]. Tokyo, Japan: Nikkei Business (in Japanese).

Takahashi, N. (2014). Future parameter explains job satisfaction and turnover candidates in Japanese companies. *Annals of Business Administrative Science*, 13, 129–140. doi: 10.7880/abas.13.129

Takahashi, N., Ohkawa, H., & Inamizu, N. (2009). *Soshiki no konaringu: oractika niyoru tsuishi to toresu* [Organizational cornering: Follow-up study and tracing by oractika]. *Akamon Management Review*, 8(8), 433–462 (in Japanese).

Takahashi, N., Ohkawa, H., & Inamizu, N. (2014a). Perspective index in Company X from 2004–2013. *Annals of Business Administrative Science*, 13, 231–242. doi: 10.7880/abas.13.231

Takahashi, N., Ohkawa, H., & Inamizu, N. (2014b). Lukewarm feeling in Company X from 2004–2013. *Annals of Business Administrative Science*, 13, 343–352. doi: 10.7880/abas.13.343

Takahashi, N., Ohkawa, H., Inamizu, N., & Akiike, A. (2013). *Soshiki no dashin chousahou* [Percussive methods of organization studies]. *Soshiki Kagaku* [Organizational Science], 47(2), 4–14 (in Japanese).
Vroom, V. H. (1964). *Work and motivation*. New York, NY: John Wiley & Sons.

White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review, 66*, 297–333.

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