

Analysis of the Effect of Individual and Enterprise Specific Factors on the Pay of Starting Workers in the IT Sector

Young-Ki Kim

Department of Convergence Security, Industry Graduate School, Myongji University, Youninsi, Gyeonggido, South Korea

Abstract: This research analyzes the decision of pay level of starting workers in the information and telecommunication field using individual factors on the personal characteristics and institutional factors on the enterprise characteristics. The difference in the pay level among the starting workers in the IT area is the result of a complex combination of enterprise specific factors (enterprise scale, enterprise location, occupation type, employment type, enterprise type) and individual factors (major and job suitability, age, gender and ending from day or night school). However, these factors are largely unrelated to one's productivity and do not explain individual productivity which suggests that wages in the IT area are not reasonably determined. Particularly, non-engineering majors and night school graduates, information system operators and repair workers, employees of domestic private companies, workers in the Seoul and Gyeonggido area, workers employed at a company with <99 people face discrimination in their pay and an integrated pay system necessarily needs to be established to address the problem.

Key words: Starting worker, information and telecommunication area, determinants of pay, individual factor, enterprise specific factor, system necessarily

INTRODUCTION

In the information and communications industry which requires creativity and expertise, the workplace satisfaction, job satisfaction and motivation of employees are particularly important. In general, wage levels are important factors in job satisfaction and workplace satisfaction and many discuss how it has a positive effect on motivation (Young, 2008). In addition, researches that have demonstrated the correlation between pay and job performance have shown that productivity, motivation to work and job satisfaction increases when job performance and pay are positive related (Ryang, 2007; Jae, 2011). On the other hand, there are many researches that have criticized pay as decided by differential factors not correlated to labor productivity (Chai, 2007; Hwang and Baek, 2008; Lee and Kim, 2003). These studies claim that pay are determined by variables that are not related to individual productivity indicators such as gender, age, length of employment or service, marital status, income of parents, parental education level, enterprise location and number of employees in its (Kim, 2018).

In the similar line as such arguments, attempts to diversify wage decision factors have been appearing (Park and Cho, 2015; Jangsoo and Jangsik, 2016). It is structured, including productivity factors and discriminatory factors, into the first level of the individual

level and the second level of organizational level. They criticize existing studies for overlooking the way in which individual wages are changed by the characteristics of the industry. Specially designated industries include a large number of employed persons and a large number of employed persons belong to the same business type, thereby sharing characteristics. In addition, discussions regarding wage have been actively conducted in other industries and fields but the factors influencing wage decisions have not been analyzed for starting workers in the IT area. Therefore, this research aims to provide suggestions for career development of starting workers on IT field by identifying the factors that cause the difference of pay level among starting workers in information and telecommunication field.

Theoretical background

Characteristics of the wage structure in South Korean:

The wage structure utilizes seniority-based pay and job-based pay. While job-based pay has become the representative wage system of the west through its history and tradition of rationalism, the wage system of Korea has long been seniority-based pay. Seniority-based pay is a compensation system in which the base salary is decided according to the individual factors of the person such as education, age and years of service, regardless of the contents and tasks of the work to be performed.

Seniority-based pay has the advantage that it can foster a cooperative organizational atmosphere but is disadvantaged as the labor cost increases rapidly and it lowers the equity perception of competent workers. Therefore, it can be said that seniority-based pay system assumes the existence of a strong internal labor market enabling employees to acquire and share firm-specific knowledge, thereby improving the competitiveness of the company (Young, 2011).

On the other hand, the typical wage system of developed countries in Europe and America is job-based pay. Job-based pay is a system that determines wages based on job performance. This is based on the assumption that the relative value of the job is determined according to the importance, difficulty and risks of the job and it is based on the logic of paying employees and workers according to their jobs. In the case of the job-based pay, its advantages are motivating workers by attracting excellent talents from the external labor market to companies or rewarding them for productivity, without being heavily dependent on the internal labor market. However, its disadvantage is that it is difficult to operate a flexible workforce due to economic fluctuations, since, wages may be changed and complaints arise when workers are reallocated to different positions or roles. However, under the job-based pay system, there is an advantage that human capital investment or competition of better performance is encouraged to gain promotions among the employees, thereby improving the competitiveness of the company (Jang, 2011).

In general, job-based-pay views that the wage is determined by the labor productivity of the worker and the seniority-based pay determines wages by discriminatory variables. Therefore as South Korea utilizes seniority-based pay to determine wages, it cannot be free from criticism of the effects of discriminatory variables on wages.

Determinants of wage: As there is very little research on the pay of workers in the information and telecommunication field, we want to deduce factors affecting pay provided from previous studies that mainly deal with other fields. When analyzing previous studies, the factors affecting wages are diverse and can be divided into individual factors and enterprise specific factors.

Individual factors that affect pay are educational level, major, age, marital status, lengths of service, years of experience and employment type. First, there are researches concerned with the influence of education and the impacts of major and job similarity on pay (Hersch and Reagan, 1990). These researches shown the higher the

education level and the many similar between one's major and job, the longer the salary. Second, there are researches that show a strong correlation between age, lengths of service and pay (Altonji and Shakotko, 1987; Abraham and Farber, 1987). Although, there are researches which report that the pay gap depends on individual productivity such as personal knowledge or ability level, it is generally provided that South Korea has a system that fix pay where the longer the tenure, the higher the pay.

The pay decide which garner the most interest in previous researches is the pay differentials based on gender and employment type such as regular and irregular workers. Researches that have reported that men receive very significantly more than women are commonsensically accepted in academia. Given that the information and telecommunication industry is a manufacturing industries, the gender pay differentials between men and women is small because of the small gap in human capital between men and women (Heo, 2009). In addition, studies provide that regular workers earn more pay than non-regular workers, providing the biggest insights of the current industry (Baek, 2013; Giseung and Myounghwan, 2016). Since, the IMF economic crisis, the number of non-regular workers which increased to 32.0% from 2015 and continues to rise is being paid by irrational pay systems that are disconnected to their productivity.

The next influence on wage is the enterprise specific factors of size, company location, personnel systems and practices, organization type and the presence of unions. First, there are some studies that report that company factors affect wages rather than individual factors. Some studies have reported that company size has a positive effect on wages (Young, 2018) and some studies have reported higher wage rates in the capital metropolitan areas. There are also studies in which wages differs depending on the type of company (Jaimie and Sukchun, 2006). Secondly, there are also studies on the empirical analysis on how the personnel system or practices of the corporation plays an important role in determining the wage (Dongwook, 2007) how the wages of companies with trade unions is high (Cho, 2008) and there is also a research where there is no statistically significant difference in wages as the union wage premium incurs for union members and non-members alike (Ryu and Cho, 2016).

Based on prior studies on wage determinants, the factors used in this research are summarized in Table 1.

Table 1: Wage determinants based on previous studies

Factor category	Determinant
Individual factors	Gender, age, education, major-job match, day or night school graduate, work experience
Enterprise specific factors	Occupation, enterprise type, enterprise location, enterprise scale, employment type, position

As the variables on the individual level and the company level are mutually influencing variables and because there is a research explaining that the model including both of them is the most improved model fitness compared to other models (Sungik and Jangsik, 2015), it is necessary to explore wage determinants considering these variables. However, as this research focuses on starting workers who have worked for 1-3 years, since, graduating, work experience and position are excluded.

MATERIALS AND METHODS

Research contents and methodology

Research subjects: This research use the content and data from the ‘Graduate Occupation Mobility Survey (GOMS)’ investigated by the Korea Employment Information Service on September, 2014. As a statistically representative data survey that has been conducted every year, since, 2006, it can provide both the personal and enterprise specific factors necessary for estimating the wage gap. In addition, this data collects data through questionnaires of university graduates who have been working for 2 or 3 years or more which is considered to be stable period of time in the labor market after graduation. In this research, the data where the occupation subcategories were the following were selected: computer hardware and communications engineer/researcher, computer systems design expert, software development specialist, web specialist, database and information system operation specialist.

Finally, only the data where responses were provided regarding their present income and wage were selected and processed.

Also, the majors of Engineering, Natural Sciences and Medicine were recoded as engineering and the Humanities, Social Sciences, Education, Art, Music and Physical Education were recoded as non-engineering. Computer hardware engineers and researchers, communications engineers and researchers, computer system designers and analysts, network system developers, computer security experts, system software developers, application software developers, web developers, web and multimedia planners and database developers were recoded as ‘developers and researcher’s and information system operators, communication and broadcasting equipment engineers, communication broadcasting and internet cable installation and repair personnel were re-coded as ‘operations and repair’. Private companies operated by a domestic citizen were recoded as a ‘domestic private company’ and foreign companies, foundations and corporations, government agencies (civil servant, soldier, etc.) and educational institutes were recoded as ‘other organizations’. The content of the variables used for this study and their descriptive statistics are shown in (Table 2).

Analysis method: In order to analyze factors influencing pay among individual and enterprise specific factors of starting workers in information and telecommunication field, multiple regression analysis. SPSS 18.0 for Windows was used for data analysis.

Table 2: Content and descriptive statistics of the variables used for study

Category	Factors/Variables	Index	N(%)	Monthly pay (10,000 won) M(SD)		
Independent variable	Individual factors	Gender	Female (0)	573 (23.8)	169.25 (57.87)	
			Male (1)	1832 (76.2)	178.71 (57.73)	
		Age	Age	21.8-40.2 years	176.45 (57.97)	
		Education	2 years college graduate (0)	781 (32.5)	161.74 (43.13)	
			4 years university graduate (1)	1625 (67.5)	183.52 (62.67)	
		Major	Non-engineering and Technology (0)	607 (25.3)	136.97 (32.07)	
			Engineering and Tehcnolgy (1)	1798 (74.7)	189.79 (58.68)	
		Day or night school	Night course (0)	231 (9.6)	174.16 (37.75)	
			Day course (1)	2174 (90.4)	176.70 (59.71)	
		Enterprise specific factors	Occupation type	Operations and repair (0)	1024 (42.6)	162.79 (56.84)
			Developers and researchers (1)	1381 (57.4)	186.59 (56.71)	
		Enterprise type	Domestic private enterprise (0)	2134 (88.7)	174.90 (53.02)	
			Other organization (1)	272 (11.3)	188.67 (86.76)	
		Enterprise location	Seoul and Gyeonggido (0)	1894 (78.7)	173.00 (53.76)	
			Other region (1)	511 (21.3)	189.25 (70.02)	
		Enterprise scale	1-99 people (0)	1516 (63.0)	178.74 (61.78)	
			100-1000 people (1)	889 (37.0)	172.55 (50.60)	
	Employment type	Non-regular (0)	332 (13.8)	160.75 (78.24)		
		Regular (1)	2073 (86.2)	178.97 (53.61)		
Dependent variable	Pay	Average monthly wage (10,000 won)	2405 (100.0)	176.45 (57.97)		

Table 3: Results of multiple regression analysis of wage determinants

Contents	Dependent variable (average monthly wage/ 10,000 won)				
	B	β	t-values	Tolerance	VIF
constant	109.718		7.730***		
Individual factors					
Major-job similarity	62.876	0.471	24.888***	0.820	1.220
Age	7.445	0.362	15.947***	0.571	1.750
Gender	-27.594	-0.203	-9.767***	0.682	1.466
Day or night school	39.111	0.199	10.002***	0.745	1.343
Enterprise specific factors					
Scale	11.707	0.098	5.102***	0.805	1.242
Location	14.908	0.105	5.649***	0.847	1.180
Enterprise type	10.037	0.086	4.619***	0.856	1.169
Employment type	12.493	0.074	4.017***	0.857	1.166
Enterprise type	10.794	0.059	3.141**	0.835	1.198

R² = 0.296; Adj. R² = 0.293; F = 111.64***; df = 9; *p<0.05; **p<0.01; ***p<0.001

RESULTS AND DISCUSSION

Wage level determinants of starting workers in the IT area: Before conducting a regression analysis to determine the influence of variables effecting pay, a correlation analysis was acted to confirm the problem of multicollinearity between the correlation of each of the independent variables and dependent variables.

Table 3 shown the results of the regression analysis of the factors effecting the pay of starting workers in the IT area, showing nine of the ten independent variables, excluding the education level were included in the regression equation. This shows that when other variables are included in the regression equation, one's education does not have a significant impact on wages. First, the coefficient of determination (R²) which is one way to test the suit of the estimated regression line to the observed values from the sample data is 0.296. In other hands, the regression analysis can be seen that 29.6% of the variance of the dependent variable of wages is explained by independent variables. Second, the F-value for the regression model of the independent variable was 111.64 which turn out to be significant.

As a result of investigating the determinants of pay according to individual factors, major-job similar, age, gender and day or night school are significant when other variables are included in the regression equation. It was found that the average monthly wage is 0.471 of 10,000 won higher for starting workers in a job that matches their major when they are an engineering and technology major than a non-engineering and technology major. The average monthly income increases by 0.362 of 10,000 won for each monthly wage of age and graduates of a day course is 0.199 of 10,000 won higher than night course graduates. On the other hand, although, men receive more than women as shown in Fig. 1, the results of the regression analysis are negative (-), indicating that the average monthly income of men is 0.203 of 10,000 won lower than the average monthly income of women. The

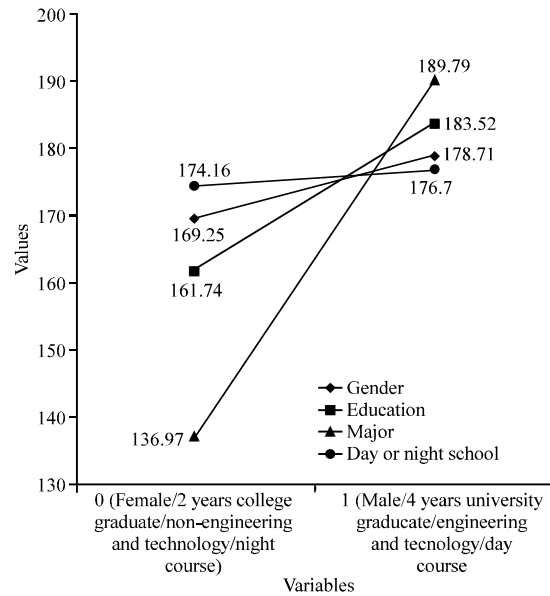


Fig. 1: Differences in income based on individual characteristics (10,000 won)

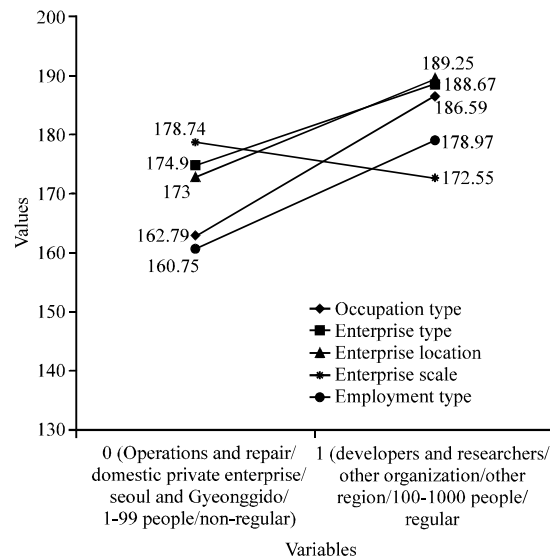


Fig. 2: Differences in wage level based on enterprise specific factors (10,000 won)

results of this research show that the influence of variables such as major-job similar, age and the type of college one graduates from is greater than that of gender. In particular as shown in Fig. 1, the largest difference in average monthly wage can be seen between non-engineering and technology graduates and engineering and technology graduates.

The results of the wage determinants according to the characteristics of the company or organization are shown in Fig. 2. The size of the company, its location,

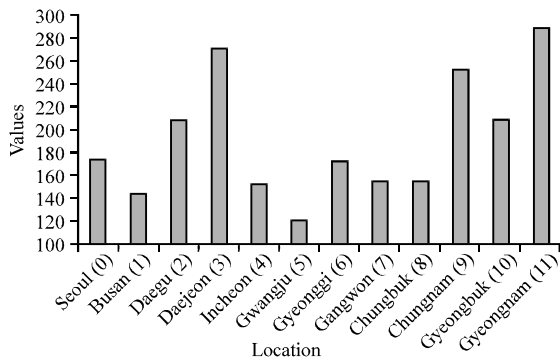


Fig. 3: Difference in wage level based on company location (10,000 won)

the type of occupation, employment type and the type of business are significant when other variables are included in the regression equation. The average monthly wage of ‘developers and researchers’ (computer hardware engineers and researchers, communication engineers and researchers, computer system designers and analysts, network system developers, computer security experts, system software developers, application software developers, web developers, web and multimedia planners, database developers) was found to be 0.086 10,000 won higher than ‘operators and repair’. In addition, the average monthly wage of full-time worker is higher than that of a non-regular worker by 0.074 10,000 won and monthly average income of a foreign company, foundation, corporation, government agency (civil servant, military etc.), educational institution, research institute is higher than the monthly average income of private company workers by 0.059 of 10,000 won.

The monthly average wage of workers in Busan, Daegu, Daejeon, Incheon, Gwangju, Gangwon, Chungbuk, Chungnam, Gyeongbuk, Gyeongnam and other areas was higher than the monthly average income of workers in the Seoul and Gyeonggi province by 0.105 of 10,000 won. By looking at Fig. 3 which examines income by company location, we can see this is because the Gyeongnam, Daejeon and Chungnam areas have high wages.

On the other hand while Fig. 2 shows the monthly average wage of the workers of companies with 100 or more employees is lower than a company with 99 employees or less but the regression analysis shows that workers at a company with more than 100 employees have higher average monthly incomes by 0.98 of 10,000 won. Fig. 4 shows the analysis of income by the size of the company or organization and it can be seen that this is due to organizations with 1-4 workers has a high income.

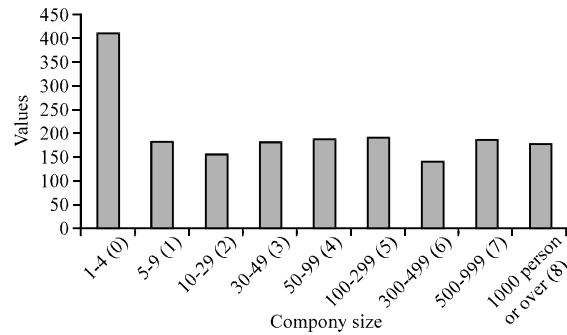


Fig. 4: Differences in wages based on company size (10,000 won)

CONCLUSION

This research analyzes the pay levels and their determinants of starting workers in IT area. The difference in pay levels among the starting workers in the IT area was found to be a result of the combination of the enterprise specific factors of company scale, company location, occupation type, employment type, enterprise type and the individual factors of major-job similar, age, gender and graduating from day or night course. However, as these factors are generally uncorrelated to productivity and fail to explain individual productivity, it shown that pay in the IT industry are not reasonably determined. However, in order to make certain an accurate comparison, it would be necessary to carry out a pay determination factor analysis research including more productivity related variables in the future. In addition, the difference in perception of pay level influences motivation, job satisfaction and continuous service of individual workers. Therefore, it is necessary to make efforts to determine reasonable pay in order to give acknowledge professionals with expertise and professional pride and to retain such professionals within an organization. Particularly, non-engineering and technology major, night course graduates, information system operators and repair workers, domestic private company workers, workers in the Seoul and Gyeonggi-do area and people in companies with <99 employees are paid differently, thus, an integrated pay system to solve this problem urgently needs to be established.

REFERENCES

Abraham, K.G. and H.S. Farber, 1987. Job duration, seniority and earnings. *Am. Econ. Rev.*, 77: 278-297.
 Altonji, J.G. and R.A. Shakotko, 1987. Do wages rise with job seniority?. *Rev. Econ. Stud.*, 54: 437-459.

- Baek, H.Y., 2013. The wage difference, inequality and poverty between regular work and Non-regular work: Focusing on the age group. *Korean Soc. Welfare Policy*, 40: 75-105.
- Chai, G.M., 2007. An analysis of the determinants of employment and wage of new college graduates. *Korean J. Soc. Welfare*, 59: 35-61.
- Cho, D.H., 2008. A longitudinal analysis of the union effect on the wages. *Nodong Kyoung Jae Nonjip Lab. Econ. J.*, 31: 103-128.
- Dongwook, E., 2007. Wage determination in firm internal labor market: An empirical study on personnel data of a Korean large firm. *Yonsei Econ. Stud.*, 14: 83-127.
- Giseung, K. and K. Myounghwan, 2016. Firm size wage structure analysis by employment form wage decomposition. *Korean J. Ind. Relat.*, 26: 141-161.
- Heo, S., 2009. An analysis of the determinants of wage and employment types in cultural industries: Comparisons between manufacturing and cultural industries in Korea. *J. Ind. Econ. Bus.*, 22: 2085-2108.
- Hersch, J. and P. Reagan, 1990. Job match, tenure and wages paid by firms. *Econ. Inq.*, 28: 488-507.
- Hwang, Y.J. and B.B. Baek, 2008. Determinants of employment status of university graduates youth. *J. Vocational Educ. Training*, 11: 1-23.
- Jae, L., 2011. Wage differentials between standard and Non-standard workers: Evidence from an Establishment-worker matched data. *Korean J. Lab. Econ.*, 34: 119-139.
- Jaimie, S. and Y. Sukchun, 2006. Determinants of vocational training teachers wage. *Korean J. Lab. Econ.*, 29: 171-199.
- Jang, S., 2011. A comparative study on Job-based pay systems of German and American subsidiaries in Korea. *Z. Koreanisch Deutsch. Ges. Sozialwissenschaften*, 21: 231-266.
- Jangsoo, R. and C. Jangsik, 2016. The wage determinants of the vocational high school graduates using mixed effects mode. *J. Korean Data Inf. Sci. Soc.*, 27: 935-946.
- Kim, Y.K., 2018. The effect of individual variables on the income of workers in the IT area. *World J. Accounting Finance Eng.*, 2: 1-6.
- Lee, K.Y. and Y.H. Kim, 2003. The determinants of youth labor market performance. *Q. J. Lab. Policy*, 3: 69-93.
- Park, S. and J. Cho, 2015. Determinants of employees wage using hierarchical linear model. *J. Korean Data Inf. Sci. Soc.*, 26: 65-75.
- Ryang, J.N., 2007. A panel data approach: Wage differentials between Non-regular and regular works. *Korean J. Labour Econ.*, 30: 1-31.
- Ryu, J. and J. Cho, 2016. The wage determinants of the vocational high school graduates using mixed effects mode. *J. Korean Data Inf. Sci. Soc.*, 27: 935-946.
- Sungik, P. and C. Jangsik, 2015. Determinants of employee's wage using hierarchical linear model. *J. Korean Data Inf. Sci. Soc.*, 26: 65-75.
- Young, C.L., 2008. The determinants of major-job mismatches and Major-job matching effectiveness on relations between tenure and wage. *Q. J. Lab. Policy*, 8: 95-123.
- Young, N.J., 2011. Trade union and pay structures for production workers in the Mid-2000s. *J. Korean Lab. Employment Relat.*, 21: 123-151.