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Research on the Quality of Employment Centered on Information Communication Technology Industry

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Abstract

This study has a purpose to analyze quantitatively whether ICT industry provides the qualitative indicator of employment to attract excellent human resources. We investigate the relationships of labor market conditions among ICT manufacturing, non-ICT manufacturing, ICT services, non-ICT services. Therefore, the quantitative and qualitative indicators of employment (wages, working hours, admission and turnover, involuntary retirement, and the duration years of job) are analyzed for the ICT industry and IT workers. In order to quantitatively analyze qualitative indicators such as employment status and longevity, we used employment statistics. In order to compensate for the limitations of employment insurance data, the comparison analysis with the survey data of economically active population of the National Statistical Office was conducted. As a result of this research, ICT service industry has to improve the working conditions of employees and establish an ecosystem for a lifelong career base to grow as a specialist, need to pursue an investigation for ICT worker career shift, and promote standard labor contracts. In addition, protection of employees, ICT-related job vision and social respect have to be perused.

Keywords: *ICT Industry, Employment Quality, Labor Market, ICT Service, ICT Worker, Involuntary Retirement*

1. Introduction

The ICT (Information & Communication Technology) industry is expected to generate a huge demand for human resources in the process of the fourth industrial revolution. If the demand of labor force continues to grow and the supply of high-quality workforce is not guaranteed, the mismatching of labor supply and demand might be clear. The vicious circle of employment structure due to job mismatching among job seekers and the entrepreneurs is highly likely to lead to weakening industrial competitiveness and weakening national competitiveness.

In Korea, the ICT service industry has grown into an infrastructure industry such as information system construction rather than development of core products in the process of short-term compression growth. This contributed to the quantitative growth of employment in the industrial growth period, but as a result, the labor

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quality has been deteriorated by inducing the low-skilled workers to enter the labor market.

Unlike the ICT manufacturing industry, which competes for facility investment competitiveness, the competitiveness of the ICT service industry is derived from the workforce, which has led to the production of unstable jobs by preferring to employ low-skilled beginner laborers for unit price competition-oriented workforce [1].

This study starts from the question of whether the problems of employment environment of ICT industry such as job mismatching were originated from employment quality rather than job shortage. In this study, the qualitative indicators of ICT industry (ICT service industry and ICT manufacturing) are analyzed comparatively with other industries and employments.

2. Literature Review

Lee and Park (2007) proposed the indicator regarding "employment quality" indicator to analyze comparatively and evaluate the indicator of employment quality presented by the international institutes including ILO (International Labor Organization), ISO (International Standard Organization), and GRI (Global Reporting InICTiative). They indicated that providing a good quality job is aligned with "corporate social responsibility" [2].

According to Yoon (2013), who conducted a case study on the environment of the retail business in relation to the quality of the employment, the indicators for the analysis of job quality are as follows: working time type, job-skill formation, shift, compensation, and so on. Thus the quality of employment could be deteriorated via these factors. Pointing out that 'working time type' is closely related to the demographic composition of the labor force, this study presented that flexibility of working hours is inevitable in order to cope with changes in customer demand due to the characteristics of retail business [3].

Ministry of Employment and Labor Internal Affairs (2018) examined the work situation of ICT workers through group interviews in order to initiate a system to improve the quality of employment of ICT workers. ICT workers are more likely to quit than other industrial workers because of the high percentage of working hours. In particular, freelancers' awareness level of the taxpayer status is recognized as a part time worker that is not a self-employed person operating a business with a business license and does not use labor contracts, adding to the seriousness of the problem. In fact, according to experts familiar with ICT worker environments, ICT practitioners often do not know that they are the workers' status [4].

Jang (2016) analyzed that the declining trend of ICT-related majors is due to the widespread negative perception of job factors. This is because the industrial structure is not developed as a high-level professional manpower due to poor working hours, low economic compensation, scarce learning and training opportunities, poor career path planning, etc. [5].

Kim (2005) defined the Korean software industry as a SI (System Integration) industry rather than technology development, and defined the industry as a labor-intensive computing service [1]. It criticized the monopoly structure of the large corporation and the industry characterized by internal transactions. In the stage of going through the party, the working time of the fifth subcontracted vendor is 67.8 hours more than the first vendor (bidder) in the subcontracting process, 15.3 hours longer than that of the big companies. The wage of enterprise having 30 members below is only 57.5% level of the big company's average wage [1].

Nahm (2011) analyzed the indicator of employment quality through the Korean labor panel data from 2001 to 2008 and concluded that inequality of the period has been intensified over the time in the industry. The increase in the elderly and irregular workers was the main factor that deepened the polarization. The decrease in skilled manufacturing jobs and the increase in the number of personal service industries indicated that the middle class in income level was decreased and the lower class was increased. It emphasized that the policy

focus on the areas of employment stability, skill and development rather than economic compensation [6].

3. Research Methodology and Data Collection

In order to quantitatively analyze qualitative indicators such as employment status and longevity, employment insurance statistics were used. Employment insurance is the administrative statistics for 2.2 million businesses and 13.3 million insured (as of September 2018). Employment insurance has the advantage of being able to grasp the employment structure in the current system most accurately with administrative statistics. However, employment insurance has a limitation to measure part-time worker and freelancer because it is for the people joined in the employment insurance. This study was analyzed comparatively with the Survey of Economy Activity Population from Korean Statistical Agency to complement the prior shortage. However, it needs to analyze cautiously that the Survey has a difference with the Employment insurance because it is a household survey through samples.

In order to analyze quantitatively employment quality of each classification for ICT industry, ICT industry for total industries is divided into ICT manufacturing (C26 ~ C28) and ICT service industry (J58 ~ J63), and the remaining industries are classified into non-ICT manufacturing, non-ICT service industry and other industries. ICT manufacturing and ICT service industry of each classified industry are analyzed according to mid-classification for the purpose of comparing each

In order to estimate the trend of ICT industry and related manpower, we used the actual condition of ICT manpower trend provided by Ministry of Science, Technology and Information. However, the report focuses on the ICT workforce, which limits the analysis of the employment structure of each industry.

Information communication related job category among job categories of the Employment insurance is used to analyze quantitative quality-indicators of information communication manpower for each industry (ICT manufacturing, ICT service, non-ICT manufacturing, and non-ICT service). It should be noted that the interpretation of employment insurance statistics may not be representative of the total ICT employment force. This study' information communication related job category means "13. Information communication R&D job and technical job of engineering" of the Korean Employment Category of Occupation (KECO, 2018).

The survey on the actual conditions of employment by employment type from Ministry of Employment and Labor is used to refer to the indicators of employment quality related working state of wages, working hours, job placement, and turnover rate for each industry [7]. In addition, it is used to compare wage and working hour of information communication job related manpower. This survey [7] is the national statistics presenting working hour and wage of 33,000 samples.

4. Results

Labor polarization can be interpreted as the phenomenon that the income and the working conditions of the workers are shifted to the upper and lower extremes along with the reduction of the middle class [8]. In this section, we compare the polarization trends of labor market conditions (wages and working hours) for each industry group and size, and compare the quantitative and qualitative indicators of employment (wages, working hours, job placement, turnover, involuntary retirement, and service years) [2, 7].

4.1 Comparative Analysis of Labor Polarization by Industry

4.1.1. Bipolarization Index by Industry Status

Table 1 compares the average wage and average working time published in the workforce survey of the enterprises by defining the magnification of the highest percentile value for the minimum wage (average wage

/ average working time) as the polarization index. Compared to 2013, the polarization index for total wage / working time in 2017 was increased from 212% to 216%. The polarization of the ICT service industry has increased by 14% point from 211% to 225%. Next, the non-ICT manufacturing sector was the second highest in the industry with an increase of 13% point from 223% to 236%. On the other hand, ICT manufacturing and non-ICT service industry appeared to be gradually diluted from polarization [7].

From the perspective of manufacturing and service industries, the polarization of ICT service industry has been intensified and the polarization of non-ICT service industry has been resolved, while the polarization of ICT manufacturing industry has been decreased and the polarization of non-ICT manufacturing industry has been intensified. The ICT service industry, which is operated by technology and people, indicates that polarization is intensifying depending on the size. In the manufacturing industry where facility investment is important, the non-ICT manufacturing industry is more polarized than the ICT manufacturing industry.

In the ICT industry, the polarization of ICT service industry has intensified, and polarization has increased in both regular and temporary workers as shown in Table 1. In particular, the polarization of regular workers has become more severe. The polarization index of ICT manufacturing decreased from 224% to 219%, indicating that polarization was relatively less in the industry.

Table 1. Polarization index change by industry group / Job position status

(unit: %)

	Polarization index (average wage / average working time)					
	Total		Full time Job		Part time Job	
	2013	2017	2013	2017	2013	2017
Total	212	216	217	222	135	137
ICT service	211	225	216	230	123	131
ICT manufacturing	224	219	213	219	164	123
Non-ICT service	189	186	232	209	119	149
Non-ICT manufacturing	223	236	221	239	131	150

Source: [7] Survey on the Actual Conditions of Employment by Employment Type, Ministry of Employment and Labor (2017)

4.1.2. Wage and Working Time Gap by Industry Status

As a result of comparing the wages per unit time of each industry in 2017, the average total wage per hour was 26,900 won. ICT manufacturing was higher than non-ICT industries but was lower than ICT services industry by 22.9 thousand won. Non-ICT industry wages per unit hour showed an average of 21.0 thousand won and 20.7 thousand won for non-ICT manufacturing industry. By job status, ICT service industry was 31.8 thousand won for regular workers, followed by non-ICT service industry 29.5 thousand won [7]. ICT service industry worker receives more wages per unit hour than the manufacturing industry.

4.1.3. The Proportion of Wages by Industry Status

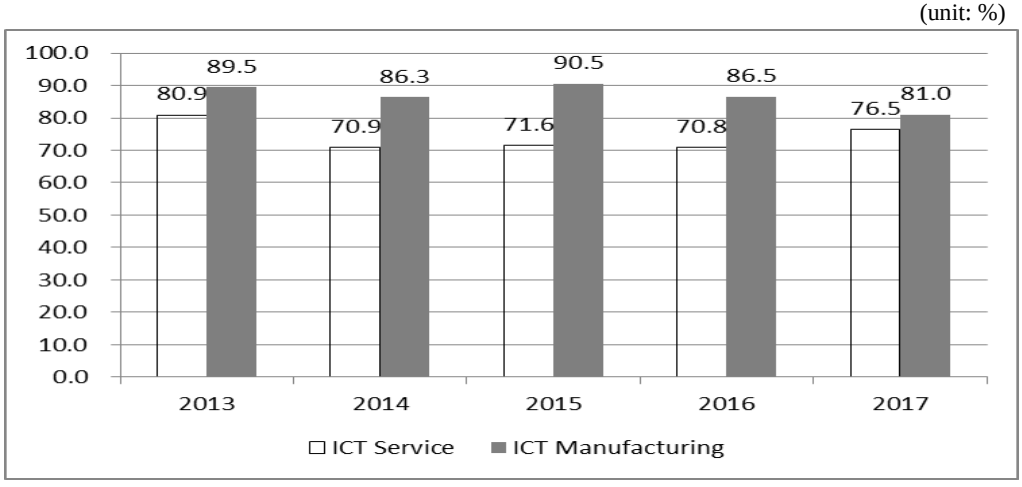
In terms of the average wage per company, the ICT service industry has relatively higher wages than other industries of the same size. In non-ICT service industry, the average wage is paid to 100 employees or less, while the number of employees with 100 or more is below average. The ICT manufacturing industry has received below-average wages for businesses with less than 300 employees, while non-ICT manufacturing companies have received below-average wages for companies with fewer than 100 employees. The average

wage multipliers for the same size of ICT manufacturing and non-ICT manufacturing companies were not higher than those for ICT services and non-ICT services. Although the manufacturing industry is an important industry responsible for future fruits, the wage level is not high compared to the same sized business. Wage and other traditional qualitative indicators indicate that the working conditions of the manufacturing industry are not better than those of the service industry.

The ICT service industry has received high wages than average wages in all size businesses (i.e. number of employees) and ICT manufacturing industry has received more than average wages in businesses with more than 300 employees. Non-ICT service industries have shown that they earn average wages in the workplaces with less than 100 employees, while those in the workplaces with more than 300 workers receive lower wages than the average wages. ICT manufacturing and non-ICT manufacturing have received wages as low as those of the same scale service business, similar to the overall trend.

4.2 Changes in Employment Insurance by ICT Industry

Employment insurance is one of the four social insurance schemes in Korea, and it can be assumed that the higher the employment insurance coverage rate, the more the workers are protected within the system. Figure 1 shows ICT service industry and ICT manufacturing by 2013 to 2017 by industry segment. This is a comparison of trends. It can be seen that the employment insurance coverage of the ICT manufacturing industry is higher than the ICT service industry. In other words, workers who are engaged in ICT manufacturing are more protected than those who are engaged in the ICT service industry in case of unemployment. The gap between the ICT service industry and the ICT manufacturing employment, which was nearly 9% below point 2013, showed a slight disparity (4.5% p) in 2017 as shown in Figure 1, while the portion of the ICT manufacturing industry's participation was declined from 89.5% to 81.0% [8]. It suggested that employment conditions in the ICT manufacturing industry have been deteriorated recently.



Note: The average weighting of employment insurance for each industry

Source: [9] Employment Insurance, [10] Economically Active Population Survey December of each year

Figure 1. Employment insurance coverage rate by year (ICT service industry vs ICT manufacturing industry)

The ICT manufacturing industry showed a 4% p decrease in ICT services compared to the ICT industry,

which was affected by a decrease in the employment rate of electronic components, computers, video, sound and communication equipment, and medical, precision, optics and watch manufacturing. On the other hand, the number of employment insurance of ICT service industry in publishing and information service industries shows a trend exceeding the economically active population [10].

4.3 Qualitative Indicators of the Employment of ICT Industry Workers and IT Workers

Lee and Park (2007) analyzed the global indicators related to the quality of employment and proposed indicators suitable for Korean firms [2]. This part compares and analyzes the ICT industry, focusing on industry-specific qualitative indicators that can be found in national statistics. Table 2 presents data structure including main category and lower classes for evaluating ‘employment quality’ of Korean firms based on the previous research [2].

Table 2. Data for evaluating 'employment quality' of Korean companies

Main Category	Middle class	Small class
Employment conditions	**Working hours**	Workers' average weekly working hours
		Ratio of shift worker to non-shift worker
	Employment scale	The number of workers created and maintained by enterprises
Employment stability	**Ratio of non-regular workers**	Ratio of direct and indirect employment and non-regular workers
	Average of duration year of work	Average of duration years by workers
	Experience of workforce reduction	Experience of forced labor reduction for the past five years
Wages and welfare	**Wage level**	Whether the wage level is above the average wage level in the same industry
	Welfares	Percentage of workers covered by health insurance
Training and education	**Training time**	Annual training hours per worker
	Career development	Average career development time for employment potential increase
Health and stability	**Occupational Health**	Whether a program related to occupational health is or not
	Safe working environment	The rate of incidence of industrial accident (past one year)
Employment equality opportunity	**No discrimination (Employment, promotion)**	Percentage of female managers among managers
		Percentage of older workers over 50
		Percentage of disabled workers

Fair conflict-solving system	**Labor relations**	Frequency of infringements of freedom of association during past five years
		Whether the labor-management council is operated or not
	Internal communication system	Operational rational disciplinary procedures
Human rights	**Privacy Protection**	Whether privacy protection is operated or not

Source: [2] Y. M. Lee and S. E. Park (2007)

4.3.1. Wage

The monthly total wage (average) trend for more than one person in the industry has been increased by about 500,000 won to KRW 3,843,000 won in 2017 compared to KRW 3,373,000 won in 2013 [8]. Comparing the gross wages by industry group, ICT service industry is above the average wage and superior to other industries. The ICT manufacturing industry showed a slightly higher wage than other industries. The non-ICT service industry has the lowest wage in all industries. From 2013 to 2017, the wage gap between industry groups has been continued.

Comparing the wage of ICT related persons in 2013 and 2017, the wage of ICT related personnel in 2013 increased by about 500,000 won from KRW 4,017,000 per month to KRW 4,501,000 per month in 2017. The overall average rose from KRW 3,092,000 per month in 2013 to KRW 3,569,000 in 2017 [7]. The wages of information and telecommunication-related occupations belong to the upper group except those in the financial, electronic, and gas-water industries.

4.3.2. Working Hours

The total working hours (average) of more than one person in the industry decreased by 5 hours in 2018 (169 hours) compared to 2013 (174 hours) [7]. Comparing the total working hours for each industry group, both the ICT service industry and the ICT manufacturing industry were found to work less than the average working hours of companies having one or more employees. The ICT service industry has the lowest working hours among all industries.

The average working hours of IT related workers increased over 14 hours from 158.9 hours in 2013 to 173 hours in 2017. However, it was about 10 hours less than the average of 182.7 hours.

4.3.3. Involuntary Retirement Rate

In order to receive unemployment insurance benefits, ① you must have more than 180 days of employment insurance before leaving the job, ② have the ability and willingness to work, and ③ have to be retired involuntarily. That is, voluntary retirement such as turnover is excluded. We compared the number of unemployment benefits in 2013 and 2017 to estimate the retirement rate for manufacturing and service industries in the ICT industry. The ICT service industry showed an increase in involuntary retirement rates over a five-year period across all business sites. In the case of the ICT service industry, the employment situation is worse for five years [7].

In ICT manufacturing industry, the larger firm size, the greater employment stability. This implies that the employment situation in the midsize firms is worsening, suggesting that the polarization of employment is getting worse.

The comparison of non-voluntary retirement rate by ICT service industry (unemployment benefit payment rate) by total size of unemployment benefit payers was conducted. The involuntary retirement rate of small

firms was decreased and the involuntary retirement rate of all firms with more than 70 employees was increased. Considering that the employment of ICT service industry is not bigger than that of ICT manufacturing, the employment situation is worse over the five-year period.

4.3.4. Tenure

Although more than 13% of non-IT related workers have worked for more than 10 years, it has been increased since 2016, but most of ICT workers worked for less than 10 years in one job. Respectively, the results suggest that IT workers have limited opportunities to grow into managers or professionals in a workplace. This indicates that ICT workers are more likely to leave the labor market than the non-information workers. As of 2017, 3.4% of those who have worked in information and telecommunication jobs for more than 10 years are lower than the figure of 6.8% in non-IT related workers. In addition, there are few employees for more than 15 years in this sector [9].

It is not statistically understood whether they leave the company after the first job or leaving the company for the purpose of moving to other company. However, it seems that the opportunities for the industry to grow as a post-employment specialist are limited. This tendency is driven by economic factors such as wages or involuntary unemployment. If it is to leave the labor market completely within the industry rather than to move in the same industry and occupation, it will be a very big loss not only for the industry but also for the nation.

5. Conclusion

We compared and analyzed employment quality indicators (Wage, Working Hours, Involuntary Retirement Rate, Tenure) for four major industry groups (ICT Manufacturing, ICT Service, Non-ICT Manufacturing, and Non-ICT Service) through employment insurance from 2013 to 2017. As a result of the analysis, we can see that the quality of employment in the ICT service industry is worse than that of other industries. Although the working hours of the ICT service industry were lower than those of other industries, and wages were higher, indicating that productivity was higher than other industries, the involuntary unemployment rate is higher than other industries. Most of the workers working in ICT service industry leave the job after 10 years. It means that the quantitative and qualitative indicators have two sides of the coin. Although the quantitative indicators (Wage and Working Hours) look better than other industries, there is a concern that the competitiveness of the industry will be deteriorated if quality indicators (Involuntary Retirement Rate, Tenure) are not considered. The early departure of ICT workers from the labor market eventually leads to mass production of non-skilled workers and weakening the competitiveness of the industry. In order to more closely track the quality indicators of ICT workers, it is necessary to conduct a follow-up survey through various statistics.

We propose four implication and related policies based on the research results.

(Strengthening ICT Service Industry) Compared with ICT manufacturing, traditional employment quality indicators such as wage and working hours of ICT service industry are high. In addition, the working hours of the ICT service industry were lower than those of other industries, and wages were higher, indicating that productivity was higher than other industries. ICT service industry's turnover rate showed the highest turnover rate of ICT service industry in 2013, but the lowest turnover rate in 2017 compared with other industries. It seems unreasonable to assess the quality of employment of the ICT service industry through admission and turnover. In other respects, however, the quality of employment in ICT services has declined across firms of all sizes. Workers engaged in the ICT service industry are not protected sufficiently by the system for employment security, such as employment insurance, and the involuntary unemployment rate is higher than other industries. Most of the workers leave the job after 10 years. The decline in the quality of employment is likely to lead to early departure of the labor market (sequential effects are mass production of

non-skilled workers, decrease of skilled workers and departure of experts, weakening of industrial competitiveness). The shortcut to increase the competitiveness of the industry is to create an environment in which talented people can enter [11]. The national index of digital literacy in Korea is very low in comparison with OECD countries [12]. Therefore, the more digital literacy education should be done.

(Establishing a lifelong career base that can grow as an expert) The government should make every effort to make an environment in which create jobs that ICT industry workers can be recognized as experts. Enterprise should strive to build a foundation for career development in which workers can grow as professionals. The problem of the ICT industry is that it is time for workers to retire after entering the labor market. As shown in the employment insurance statistics, the working years of workers in the ICT industry are within ten years. This is because the involuntary unemployment rate of the ICT service industry is higher than that of other industries. Even though the ICT industry-related labor market is supposed to be a market with active labor flexibility, the environment must be able to grow and work as an expert within the labor market. The labor market of the ICT service industry seems to be a major reason in moving because of other factors such as contract instability (employment stability) before being recognized as a specialist.

(Follow-Up Investigation of ICT Worker Career Movement) If you have to do other things while still trying to work, this is a considerable loss in country. There is an urgent need for follow-up studies on the labor movement in the labor market until retirement, as to whether the ICT job is a labor market environment that can be employed in a lifetime. It is necessary to identify the cause of the situation whether a worker voluntarily leaves the labor market or not: in the process of being admitted → continuous work or retirement → retirement → moving to other industries.

(Vocational vision and social respect for ICT) ICT related occupations generate and transmit information for all industries. It is an important job. In order for high-quality workforce to continue to flow, professional pride as occupation in key industries, as well as the quality of traditional employment, such as wages and working hours, may be another qualitative factor. Self-esteem about work is linked to socially earned respect (reputation) as well as personal and fundamental questions about why we are doing it. It is time for countries, enterprise and citizens to gather wisdom together to build a society and culture where engineers can be respected. As a result, ICT workers are able to feel proud with their competitiveness.

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