Original Article

Changing Factors of Employee Satisfaction with Working Conditions: An Analysis of the Korean Working Conditions Survey

Changhun Lee, Sunyoung Park*

Policy Research Department, Occupational Safety and Health Research Institute, Korea Occupational Safety and Health Agency, Ulsan, Republic of Korea

A B S T R A C T

Background: We hypothesized that the growing demand of Korean workers for work–life balance would change the factors influencing job satisfaction. We sought to verify our hypothesis by conducting a conjoint analysis based on the Korean Working Conditions Survey (KWCS).
Methods: We analyzed the raw data of the KWCS, conducted by the Occupational Safety and Health Research Institute from 2006 to 2017. To complete the analysis, we counted on a conjoint model of analysis, typically used in the analysis of customer satisfaction. The dependent variable was the satisfaction of workers with their working conditions, and the independent variables were the job quality indicators identified by Eurofound.
Results: The factors that have the greatest impact on working conditions satisfaction are summarized as follows: "physical environment" for the first wave, "adverse social behavior" for the second wave, "occupational status" for the third and fourth waves, and "management quality" for the fifth wave. "Earnings" were not a major factor in determining employee job satisfaction, and the relative importance index is decreasing.
Conclusion: According to the results of the analysis of the tendencies of Korean workers, the factors that affect the satisfaction with the working conditions have changed over time. It is crucial to identify factors that affect working conditions to assure the health and productivity of workers. The results of this study demonstrate that policymakers and employers are required to attentively consider human relations and social environment at work to improve working conditions in the future.

1. Introduction

Working conditions are defined as the physical and psychological environment in the workplace and the interaction of employees with their organizational climate. They are important in many aspects, in particular, in terms of the safety and health of workers and productivity. Therefore, working conditions studies are used by the government to make new policies and decisions related to employees [1]. Among the working conditions faced by workers, physical risks increase the likelihood of occurrence of occupational accidents. Yesufu (1984) argues that physical conditions have a significant influence on workers' work, and when offices and factories are too hot or poorly ventilated, they degrade working capacity [2]. Job security improves the performance of work by increasing the concentration of workers, and providing a healthy

and safe working environment could increase labor productivity and consequently increase business profits [3,4]. Adverse psychological working conditions give rise to lower mental health of employees. To protect employees' mental health, those in charge should prevent workplace harassment and achieve social support and work–life balance [5]. For these reasons, policy makers and employers are required to pay attention to "the working conditions satisfaction of workers." Recently, there has been a tendency that Korean workers prefer a work condition in which work–life balance takes precedence over material factors. According to the results of a social survey conducted on 38,000 Koreans, the number of respondents who prioritized work in precedence of work and family life increased from 11.9% in 2015 to 13.9% in 2017. On the other hand, the number of respondents who prioritized work decreased from 53.7% in 2015 to 43.1% in 2017 [6]. This change in

* Corresponding author. Policy Research Department, Occupational Safety and Health Research Institute, Korea Occupational Safety and Health Agency, 400, Jongga-ro, Jung-gu, Ulsan, 44429, Republic of Korea.
  E-mail addresses: lch87@kosha.or.kr (C. Lee), psy0906@kosha.or.kr (S. Park).

perception is interpreted based on the Easterlin paradox that says that substances do not affect satisfaction when they reach income levels that can meet basic needs. Likewise, in Korea, the factors that affect the working conditions satisfaction are highly influenced by the economic development or social issues [7,8].

Eurofound, an agency of the European Union, has been conducting the European Working Conditions Survey (EWCS) since 1991 in an effort to quantify and operationalize the abstract concept of work and to ascertain perceived risk factors to employee health and job satisfaction in relation to the working conditions [9]. According to the "job quality" defined by Green et al. (2016), there are four aspects: wages, prospects and insecurity, intrinsic quality, and the quality of work time as the characteristics of jobs that contribute significantly to the needs of workers in the workplace [10]. Green and Mostafa (2012) introduced a new approach using the EWCS questionnaire to quantify the concept of abstract working conditions through the multiple dimensions of the job quality index. Physical environment, work intensity, quality of working time, social environment, skills and discretion, prospects, and earnings were identified as indicators of job quality [11]. The United Nations Economic Commission for Europe (2015) broadly defines job quality as a characteristic of employment that affects the well-being of workers [12]. Determining factors or indicators of job quality have been discussed at length in several studies. Burchell et al. (2009) argue that the greater the work intensity, the greater the ergonomic risk to health [13]. In the case of nurses, it was reported that the intensity of work affected the quality of sleep [14]. A high level of work intensity can cause workers to experience anxiety, mental disorders, and/or cardiovascular diseases, and the risk of these conditions grows when workers enjoy little social support or job latitude [15]. If workers recognize that they are unfairly paid for unfair treatment, they develop a cardiovascular disease problem, which is a stress-related disease [16]. The reductions of effective working hours are correlated to an increased number of nonregular workers, changes in the structure of holidays, and augmented work intensity [17]. According to Spurgeon et al. (1997), long working hours adversely affect employee mental and cardiovascular health [18]. The reducing working hours on employees and society affects, particularly in terms of changes in the employment structure, the number of jobs created, labor productivity, human resource management, and the standard of living [19]. The more employees experienced job autonomy, the more they received interpersonal feedback, and the more they received emotional support, the higher their level of self-determination motivation [20]. The self-determination theory provides a multidimensional view of the motivation to work, which is called behavioral regulations [21–23]. In the workplace, behavioral regulations correspond to the reason for the worker's motivation to work and are driven by intrinsic motivation, which means the pleasure and satisfaction that the worker gets from getting the job done [24]. Managers are more affected by individual performance than institutional performance [25]. When comparing working conditions of Europe

with those of Korea, the International Labour Organization concluded that Europeans typically work for shorter hours and at a higher intensity, whereas Koreans work for longer hours and at a lower intensity [26]. Job satisfaction is positively correlated with both workers' income and the average income of all workers in the same workplace [27]. To workers, the absolute levels of earnings matter, but the fairness with which monetary rewards are given is just as important as the other. A lack of balance between expenses and income stresses workers out and adversely affects their health [28]. In this study, we mostly examined the effects of individual factors on perceived job quality. The relatively few studies on how these factors generally affect employee satisfaction target only specific occupations, such as urban railroad workers, workers with disabilities, and customer service representatives [29–31]. This study aims to analyze the impact of job quality indicators identified by Eurofound on employee satisfaction using the Korean Working Conditions Survey (KWCS) data. This study also intends to investigate whether the weight of these indicators goes through changes over time.

2. Materials and methods

2.1. Materials

The data of this study counted on the KWCS data set collected by Occupational Safety and Health Research Institute (OSHRI) in the Republic of Korea, which has benchmarked the EWCS and approved by Statistics Korea. Since launching the first KWCS in 2006, the OSHRI has conducted a total of five surveys (as of 2017), targeting workers aged 15 years and older. The KWCS was used as a study to improve the Korean working conditions, such as categories of demographic characteristics, labor quality, hazards exposure, health problems, and income of Korean workers [32,33]. The sample size corresponds to 10,000 people from the first wave to the second wave, but the size of the sample changed to 50,000 from the third wave to the fifth wave by expanding the survey size. For the sake of current comparison, this study focuses primarily on the findings of all surveys conducted from 2006 to 2017 concerning wage earners. Employee satisfaction with working conditions, which is the dependent variable in this analysis, was measured on a four-point scale categorized as "very satisfied," "satisfied," "dissatisfied," and "very dissatisfied."

We have considered seven indicators of job quality as independent variables, and we followed the same methodology used by Eurofound to select and adjust the variables. Some modifications, however, were necessary because of the differences in working conditions between Europe and Republic of Korea.

These indicators are described as follows: "physical environment," which includes ambient, biochemical, chemical and posture-related (ergonomic) risks; "work intensity," which includes quantitative demands, pace determinants, and interdependence; and "emotional demands." The "working time quality"

Table 1
Quartiles of earnings

Quartiles / Year	Minimum	First quartiles	Median	Third quartiles	Maximum
2017 (fifth KWCS)	₩ 100,000	₩ 1,500,000	₩ 2,000,000	₩ 3,000,000	₩ 100,000,000
2014 (fourth KWCS)	₩ 20,000	₩ 1,300,000	₩ 1,850,000	₩ 2,750,000	₩ 23,000,000
2011 (third KWCS)	₩ 50,000	₩ 1,250,000	₩ 1,800,000	₩ 2,500,000	₩ 19,000,000
2010 (second KWCS)	₩ 100,000	₩ 1,000,000	₩ 1,500,000	₩ 2,500,000	₩ 20,000,000
2006 (first KWCS)	Less than ₩ 50,000	₩ 50,000 ~ ₩1,000,000	₩ 1,000,000 ~ ₩ 1,500,000	₩ 2,000,000 ~ ₩ 2,500,000	More than ₩ 3,000,000

The first KWCS received the earnings only in a multiple choice. So the results are presented in intervals.

is based on the Korean Labor Standards Act. The statutory working hours from 2003 to 2017 are 40 hours per week. The total overtime of 12 hours on weekdays is 52 hours, and the maximum work of 16 hours on weekends is 68 hours. We also used the average weekly working hours (25 hours per week, 2017) published by the Ministry of Employment and Labor (2018) to consider temporary and daily workers [34]. We, therefore, expressed this variable in four levels: 25 hours or less per week, 40 hours or less per week, 52 hours or less per week, and over 52 hours per week. "Social environment" includes factors such as abuse, bullying, harassment, violence, and the qualities and attitude of the worker's immediate superior. "Skills and discretion" consists of cognitive dimension, decision latitude, and organizational participation. "Prospects" refers to the subjective sense of prospects that workers assign to their work. In this study, we used questions regarding employee positions and status at work to analyze prospects and divided workers into full-time workers, temporary workers, and daily workers. "Earnings" divide workers' income into quartiles. There is a time lag for each survey. Moreover, the inflation rate and wage growth rate have been considered. We divided this variable into three levels: less than the first quartiles, less than median, less than the third quartiles and more than the third quartiles. Table 1 shows that the first quartiles, median, and the third quartiles all increase over time. The median increased from 1.5 million won in the second KWCS to 2 million won in the fifth KWCS.

We operationalized each variable and processed their components by matching them with the variables presented in the KWCS. The finally processed components were also operationalized into factor levels. Table 2 shows a detailed description of each of these variables and their factors and levels.

2.2. Methods

The method of conjoint analysis was first introduced by Luce et al. (1964) [35]. According to Hair et al. (1995), it is a multivariate technique used to understand how given subjects indicate their preferences for given goods or services. In other words, it is a method to calculate part-worth by the level of individual attributes inherent in a product or service through which it allows for the prediction of a choice with a higher probability from the consumer's perspective [36]. Conjoint analysis is favored in business marketing and is often used to support decision-making across various fields for new product development, the determination of the competition structure, market segmentation, pricing, advertising, distribution, and more [37,38]. In this study, we used the conjoint analysis method to determine how factors of job quality affected workers' overall satisfaction.

For our analysis, we estimated part-worth and relative importance per respondent and added the resulting estimates to the overall estimates. Several models can be used to analyze preference, including the vector model, the ideal point model, the part-worth function model, and the mixed model. In this study, we used the main effect model without interactions to analyze part-worth. Our part-worth function model offers flexibility because it allows the preference function for each given factors and its various levels to take on diverse forms. Our model of analysis can be expressed as follows:

Fig. 1. Results of conjoint analysis: KWCS fifth wave.

Table 2
Factors and levels of the variables

Factor	Factor components	Factor questions	Fifth (2017)	Fourth (2014)	Third (2011)	Second (2010)	First (2006)	Factor variables processing		Factor levels
Physical environment	Ambient risks	Vibrations from hand tools, machinery, etc Noise, high/low temperatures	O	O	O	O	O	More than "around half of the working time" is "yes"		1) Less than half 2) More than half
	Biological, chemical risks	Breathing in smoke, fumes, powder or dust, etc Breathing in vapors such as solvents and thinners Handling or being in skin contact with chemical products or substances Tobacco smoke from other people Handling or being in direct contact with materials	O	O	O	O	O			
	Posture-related (ergonomic) risks	Tiring or painful positions Lifting or moving people Carrying or moving heavy loads, standing Repetitive hand or arm movements	O	O	O	O	O			
		Sitting	O	X	X	X	X			
Work intensity	Quantitative demands	Working at very high speed Working to tight deadlines	O	O	O	O	O	More than "around three-fourths of the working time" is "high"	Work intensity "high" if more than half of the three components are involved	1) low 2) high
		How often do you have to interrupt a task you are doing in order to take on an unforeseen task?	O	O	O	O	O	More than "fairly often" is "high"		
	Pace determinants and interdependence	The work done by colleagues Direct demands from customers, passengers, etc Numerical production targets or performance targets, the direct control of your boss Automatic speed of a machine or movement of a product	O	O	O	O	X	"Yes" is "high"		
	Emotional demands	Your job requires that you hide your feelings	O	O	O	O	O	"Most of the time" or "always" is "high"		
		Handling angry clients	O	O	O	O	X	More than "around three-fourths of the working time" is "high"		
		A state of emotional unrest	O	X	X	X	X	More than "around one-fourth of the working time" is "high"		
Working time quality	Working time per week	How many hours do you usually work per week in your main paid job?	O	O	O	O	O	The reference is "less than 25 hours."		1) Less than 25 hours 2) Less than 40 hours 3) Less than 52 hours 4) More than 52 hours

Table 2 (*continued*)

Factor	Factor components	Factor questions	Fifth (2017)	Fourth (2014)	Third (2011)	Second (2010)	First (2006)	Factor variables processing		Factor levels
Social environment	Adverse social behavior	Verbal abuse, unwanted sexual attention, threats, humiliating behaviors	O	O	O	O	X	"Yes" is "yes"		1) No 2) Yes
		Physical violence, sexual harassment, bullying/harassment	O	O	O	O	O			
	Management quality	Respects you as a person	O	O	O	O	X	Strongly disagree, tend to disagree "negative", neither agree nor disagree "neutral," tend to agree, strongly agree "positive"		1) Negative 2) Neutral 3) Positive
		Gives you praise and recognition when you do a good job	O	X	X	X	X			
		Is successful in getting people to work together	O	O	O	O	X			
		Is helpful in getting the job done	O	O	O	O	X			
		Provides useful feedback on your work	O	O	O	O	X			
		Encourages and supports your development	O	O	O	O	X			
Skills and discretion	Cognitive dimension	Solving unforeseen problems on your own, complex tasks, learning new things	O	O	O	O	X	"Yes" is "yes"	"Yes" if more than half of all three components are included	1) No 2) Yes
		You are able to apply your own ideas in your work	O	O	O	O	O	Sometimes or most of the time or always is "yes"		
	Decision latitude	Your order of tasks, your methods of work, your speed or rate of work	O	O	O	O	O	"Yes" is "yes"		
	Organizational participation	You are consulted before targets for your work are set	O	O	O	O	X	Most of the time or always is "yes"		
		You are involved in improving the work organization or work processes of your department or organization								
		You can influence decisions that are important for your work								
Prospects	Occupational status	What is your occupational status in the workplace?	O	O	O	O	O	The reference is "day"		1) Day 2) Temporary 3) Full-time
Earnings	Monthly earnings	How much are your monthly earnings from your main paid job?	O	O	O	O	O	The reference is "less than first quartiles"		1) Less than first quartiles 2) Less than median 3) Less than third quartiles 4) More than third quartiles
Working conditions satisfaction		On the whole, are you very satisfied, satisfied, not very satisfied or not at all satisfied with working conditions in your main paid job?	O	O	O	O	O	Give "Not at all satisfied" one point, "Not very satisfied" two points, "Satisfied" three points and "Very satiated" four points.		1) Not at all satisfied 2) Not very satisfied 3) Satisfied 4) Very satisfied

Table 3
Demographic profile of subjects

Item	Fifth KWCS(2017) (n = 28,383)		Fourth KWCS(2014) (n = 24,383)		Third KWCS(2011) (n = 28,798)		Second KWCS(2010) (n = 5,701)		First KWCS(2006) (n = 7,072)	
	N	%	N	%	N	%	N	%	N	%
Gender										
Male	13,736	48.4	12,788	52.4	16,921	58.8	3,160	55.4	4,595	65.0
Female	14,647	51.6	11,595	47.6	11,877	41.2	2,541	44.6	2,477	35.0
Age (years)										
15—29	3,961	14.0	3,510	14.4	4,780	16.6	868	15.2	1,244	17.6
30—39	6,570	23.1	6,259	25.7	8,719	30.3	1,630	28.6	2,520	35.6
40—49	7,366	26.0	7,087	29.1	8,283	28.8	1,759	30.9	2,065	29.2
50—59	6,404	22.6	4,803	19.7	4,835	16.8	943	16.5	981	13.9
>60	4,082	14.4	2,724	11.2	2,181	7.6	501	8.8	262	3.7
Education										
Less than middle school	3,476	12.2	2,793	11.4	3,110	10.8	812	14.2	1,024	14.5
High school	9,894	34.9	9,208	37.8	11,212	38.9	2,435	42.7	2,915	41.2
College and university	14,557	51.3	11,656	47.8	13,694	47.6	2,285	40.1	2,767	39.1
Graduate school	440	1.6	574	2.4	776	2.7	169	3.0	366	5.2
DK/no opinion/refusal	16	0.1	152	0.6	6	.0				
Occupational status										
Full-time employee	22,060	77.7	18,456	75.7	22,758	79.0	4,448	78.0	5,913	83.6
Temporary employee	1,772	6.2	1,677	6.9	1,759	6.1	440	7.7	457	6.5
Day employee	4,551	16.0	4,250	17.4	4,281	14.9	813	14.3	702	9.9
Occupation classification										
White collar	11,432	40.3	10,493	43.0	11,818	41.0	2,317	40.6	2,830	40.0
Blue collar	9,534	33.6	8,383	34.4	10,407	36.1	2,088	36.6	3,722	52.6
Pink collar	7,417	26.1	5,507	22.6	6,573	22.8	1,296	22.7	520	7.4
Working time										
Less than 25 hours	2,403	8.5	1,974	8.1	1,406	4.9	454	8.0	339	4.8
Less than 40 hours	14,360	50.6	11,277	46.2	9,993	34.7	2,159	37.9	2,454	34.7
Less than 52 hours	7,719	27.2	6,819	28.0	9,498	33.0	1,710	30.0	2,255	31.9
More than 52 hours	3,901	13.7	4,313	17.7	7,901	27.4	1,378	24.2	2,024	28.6

Source: OSHRI, KWCS (2006, 2010, 2011, 2014, 2017).

Table 4
Results of *t*-test analysis by gender

Wave	Variables	N	Mean	Standard deviation	t	p
Fifth (2017)	Male	13,736	2.76	0.57	−6.82	<0.001***
	Female	14,647	2.80	0.53		
	Total	28,383	2.78	0.55		
Fourth (2014)	Male	12,788	2.77	0.58	−3.37	0.001**
	Female	11,595	2.80	0.55		
	Total	24,383	2.78	0.56		
Third (2011)	Male	16,921	2.77	0.58	−4.10	<0.001***
	Female	11,877	2.80	0.55		
	Total	28,798	2.78	0.57		
Second (2010)	Male	3,160	2.73	0.64	−1.41	0.159
	Female	2,541	2.75	0.59		
	Total	5,701	2.74	0.62		
First (2006)	Male	4,595	2.71	0.71	−3.96	<0.001***
	Female	2,477	2.78	0.65		
	Total	7,072	2.74	0.69		

Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

$$U_i = \beta_0 + \sum_{w=1}^{c_1} \beta_{1w} X_{1w} + \cdots + \sum_{w=1}^{c_q} \beta_{qw} X_{qw} + \varepsilon_i;$$

where $c_p = m_p - 1$, $i = 1, 2, ..., n$, $p = 1, 2, ..., q$.

q represents the number of factors; n, the number of main profiles; m_p, the number of levels for the p-th factor; and $X_{1w}, ..., X_{qw}$, the levels of the given factors. The eight factors used in this study consist of two, two, four, two, three, two, three, and four numbers of cases, respectively. The levels of these factors can create a total of 2,304 ($2 \times 2 \times 4 \times 2 \times 3 \times 2 \times 3 \times 4$) different profiles. We estimated $\widehat{\beta_{1w}}, ..., \widehat{\beta_{qw}}$ using the conjoint model one shown here and obtained the part-worth of the w-th level of the p-th factor, α_{pw}, as follows:

$$\alpha_{pw} = \begin{cases} \widehat{\beta_{qw}} \ for \ w = 1, ..., c_p \\ -\sum_{\alpha=1}^{c_p} \widehat{\beta_{qw}} \ w = m_p \end{cases}$$

The importance of each factor, γ_p, is defined as the relative weight of the range of part-worth per level, as follows:

$$\gamma_p = \frac{w_p}{\sum_{p=1}^{q} w_p}, \ w_p = max(\alpha_{pw}) - min(\alpha_{pw}).$$

We applied the design and method of conjoint analysis suggested by Carroll et al. (1995), Gustafsson et al. (2007), and Marshall et al. (2002) to determine the principles of our design, run the conjoint analysis, and analyze worker satisfaction with working conditions using a linear model [39−41]. We referred to Aizaki (2012, 2013) for the development of the conjoint and select product profiles seen in Statistical Package R (Version 3.6.1 for Windows) [42,43].

3. Results

3.1. Demographic statistics of the data

Table 3 and Fig. 1 show the demographic characteristics of wage workers. The analysis only included wage workers. In the case of missing values for the satisfaction with working conditions (dependent variable) and job quality index (independent variable) questions, the missing values were eliminated. The final number of data used was 28,383 for the fifth wave, 24,383 for the fourth wave, 28,789 for the third wave, 5,701 for the second wave, and 7,072 for the first wave.

The gender distribution was 65% for male workers and 35% for female workers in 2006 and 48.4% for male workers and 51.6% for female workers in 2017. The proportion of elderly workers aged 50 years or older rose from 17.6% in 2006 to 37.0% in 2017. As the Republic of Korea became an aging society, the proportion of older workers increased. According to a 2017 OECD report, the employment rate of the elderly aged 65 years and older accounted for 45%, ranking second [44]. The proportion of elderly workers is expected to rise further in the future. The ratio of "college and university graduates" at the education level increased from 39.1% in 2006 to 51.3% in 2017. Korea's college and university enrollment rate reached 70% in 2016, ranking first among OECD countries [45]. Full-time workers saw a slight decrease (83.6−77.7%), whereas day workers saw a slight increase (9.9−16.0%). The "occupation type" showed a similar distribution ratio in the second to the fifth survey. Occupation classification changed from 40% for white-collar jobs, 52.6% for blue-collar jobs, and 7.4% for pink-collar jobs in 2006 to 40.3% for white-collar jobs, 33.6% for blue-collar jobs, and 26.1% for pink-collar jobs in 2017. It shows a tendency to decrease long

Table 5
Results of ANOVA model analysis by occupation type

Wave	Variables	N	Mean	Standard deviation	Duncan 1	Duncan 2	Duncan 3	F	p
Fifth (2017)	White collar	11,432	2.90	0.49			2.90	600.747	<0.001***
	Blue collar	9,534	2.64	0.59	2.64				
	Pink collar	7,417	2.78	0.54		2.78			
	Total	28,383	2.78	0.55					
Fourth (2014)	White collar	10,493	2.97	0.46			2.97	1111.728	<0.001***
	Blue collar	8,383	2.61	0.61	2.61				
	Pink collar	5,507	2.70	0.56		2.70			
	Total	24,383	2.78	0.56					
Third (2011)	White collar	11,818	2.95	0.50			2.95	1083.682	<0.001***
	Blue collar	10,407	2.61	0.60	2.61				
	Pink collar	6,573	2.74	0.55		2.74			
	Total	28,798	2.78	0.57					
Second (2010)	White collar	2,317	2.95	0.53			2.95	282.627	<0.001***
	Blue collar	2,088	2.53	0.65	2.53				
	Pink collar	1,296	2.70	0.58		2.70			
	Total	5,701	2.74	0.62					
First (2006)	White collar	2,830	2.97	0.61			2.97	309.582	<0.001***
	Blue collar	3,722	2.56	0.70	2.56				
	Pink collar	520	2.80	0.66		2.80			
	Total	7,072	2.74	0.69					

Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table 6
Results of KWCS multiple linear regression analysis

Independent variable			5th (2017)	4th (2014)	3rd (2011)	2nd (2010)	1st (2006)
Intercept			2.36***(0.02)	2.36***(0.02)	2.22***(0.02)	2.26***(0.04)	2.36***(0.04)
Physical environment		More than half	-0.28***(0.01)	-0.27***(0.01)	-0.21***(0.01)	-0.25***(0.03)	-0.43***(0.03)
Work intensity		High	-0.10***(0.01)	-0.09***(0.02)	0.00(0.01)	-0.07(0.05)	-0.30***(0.03)
Working time quality		Less than 40 hours	-0.07***(0.01)	-0.07***(0.01)	-0.05***(0.02)	-0.07(0.03)	0.07(0.04)
		Less than 52 hours	-0.10***(0.01)	-0.17***(0.02)	-0.12***(0.02)	-0.15***(0.03)	-0.05(0.04)
		More than 52 hours	-0.18***(0.01)	-0.28***(0.02)	-0.21***(0.02)	-0.29***(0.03)	-0.26***(0.04)
Social environment	Adverse social behavior	Yes	-0.21***(0.01)	-0.25***(0.01)	-0.23***(0.01)	-0.34***(0.04)	-0.22**(0.07)
	Management quality	Neutral	0.22***(0.01)	0.07***(0.01)	0.19***(0.01)	0.10***(0.03)	
		Positive	0.38***(0.01)	0.20***(0.01)	0.30***(0.01)	0.23***(0.02)	
Skills and discretion		Yes	0.04***(0.01)	0.12***(0.01)	0.13***(0.01)	0.15***(0.03)	0.16***(0.02)
Occupational status		Temporary	0.19***(0.01)	0.21***(0.02)	0.25***(0.02)	0.25***(0.03)	0.12**(0.04)
		Full-time	0.24***(0.01)	0.33***(0.01)	0.34***(0.01)	0.29***(0.03)	0.27***(0.03)
Earnings		Less than Median	0.01(0.01)	0.02(0.01)	0.02**(0.01)	0.05*(0.02)	0.07**(0.02)
		Less than 3rd quartiles	0.04***(0.01)	0.05***(0.01)	0.04***(0.01)	0.09***(0.02)	0.16***(0.02)
		More than 3rd quartiles	0.06***(0.01)	0.12***(0.01)	0.14***(0.01)	0.21***(0.03)	0.32***(0.02)
F			262.3***	309.5***	339.1***	70.5***	130.7***
R^2			0.115	0.151	0.142	0.148	0.182
Adj. R^2			0.114	0.151	0.141	0.146	0.181
Num. obs			28,383	24,383	28,798	5,701	7,072

Note: *p<0.05, **p<0.01, ***p<0.001 , The suggested values are Unstandardized B and Coefficients Std. Error.

working time. Less than 40 hours increased from 34.7% to 50.6%, and more than 52 hours decreased from 28.6% to 13.7%.

3.2. Testing of differences in working conditions satisfaction by group

In this section, we conducted a test to see if there was a difference in the satisfaction of the working conditions according to gender and occupational classification to verify the significant differences compared with their subgroup of the survey. We hypothesized that the factors influencing worker satisfaction would differ by type of occupation classification; to verify this hypothesis, we divided workers into white-, blue- and pink-collar groups. Referring to a study by Rhee et al. (2017), white-collar workers include managers, professionals, technicians, and clerks; blue-collar workers are agricultural workers, craft workers, plant and
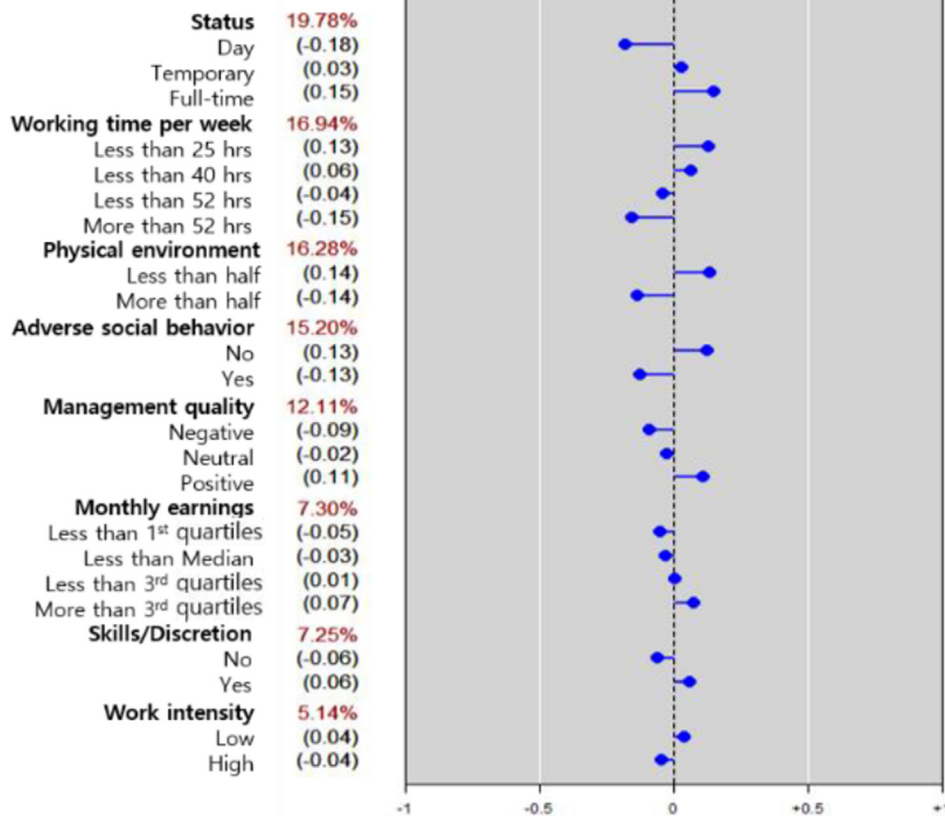

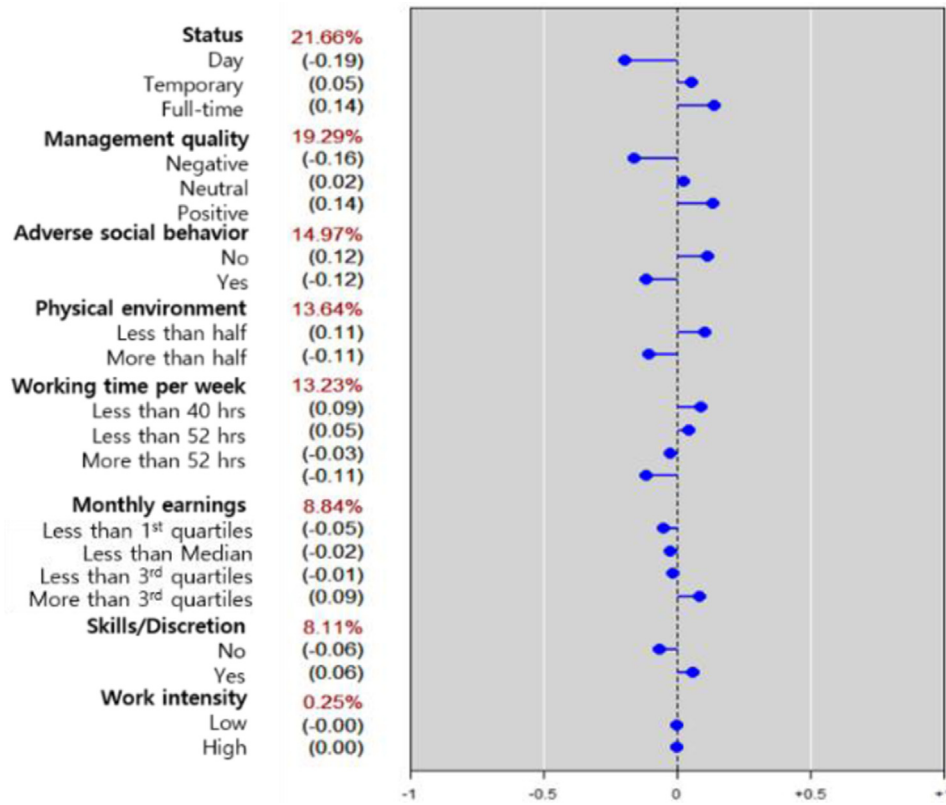**Fig. 2.** Results of conjoint analysis: KWCS fourth wave.

Fig. 3. Results of conjoint analysis: KWCS third wave.

Table 7
Overall conjoint analysis results

| Factor		Level	5th (2017) (n=28,383)		4th (2014) (n=24,383)		3rd (2011)(n=28,798)		2nd (2010) (n=5,701)		1st (2006) (n=7,072)	
			Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)
Physical environment		1) Less than half	0.14	18.67%(2)	0.14	16.28%(3)	0.11	13.64%(4)	0.13	13.67%(4)	0.22	21.34%(1)
		2) More than half	-0.14		-0.14		-0.11		-0.13		-0.22	
Work intensity		1) Low	0.05	6.65%(6)	0.04	5.14%(8)	-0.00	0.25%(8)	0.04	3.97%(8)	0.15	14.60%(4)
		2) High	-0.05		-0.04		0.00		-0.04		-0.15	
Working time quality		1) Less than 25 hours	0.09	12.25%(5)	0.13	16.94%(2)	0.09	13.23%(5)	0.13	15.81%(3)	0.06	16.20%(2)
		2) Less than 40 hours	0.02		0.06		0.05		0.05		0.13	
		3) Less than 52 hours	-0.01		-0.04		-0.03		-0.02		0.01	
		4) More than 52 hours	-0.10		-0.15		-0.11		-0.16		-0.20	
Social environment	Adverse social behavior	1) No	0.10	13.79%(4)	0.13	15.20%(4)	0.11	14.97%(3)	0.17	18.38%(1)	0.11	10.87%(6)
		2) Yes	-0.10		-0.13		-0.11		-0.17		-0.11	
	Management quality	1) Negative	-0.20	25.53%(1)	-0.09	12.11%(5)	-0.16	19.29%(2)	-0.11	12.45%(5)		
		2) Neutral	0.02		-0.02		0.02		-0.01			
		3) Positive	0.18		0.11		0.14		0.12			
Skills and discretion		1) No	-0.02	2.58%(8)	-0.06	7.25%(7)	-0.06	8.11%(7)	-0.07	8.18%(7)	-0.08	7.70%(7)
		2) Yes	0.02		0.06		0.06		0.07		0.08	
Occupational status		1) Day	-0.14	16.41%(3)	-0.18	19.78%(1)	-0.19	21.66%(1)	-0.18	15.87%(2)	-0.13	13.59%(5)
		2) Temporary	0.04		0.03		0.05		0.07		-0.01	
		3) Full-time	0.10		0.15		0.14		0.11		0.14	
Earnings		1) Less than 1st quartiles	-0.03	4.12%(7)	-0.05	7.30%(6)	-0.05	8.84%(6)	-0.09	11.67%(6)	-0.14	15.71%(3)
		2) Less than Median	-0.01		-0.03		-0.02		-0.03		-0.07	
		3) Less than 3rd quartiles	0.01		0.01		-0.01		-0.00		0.02	
		4) More than 3rd quartiles	0.03		0.07		0.09		0.13		0.18	
Test Statistic			Value	Sig	Value	Sig	Value	Sig	Value	Sig	Value	Sig
Pearson's R (p-value)			0.339	<0.001***	0.389	<0.001***	0.376	<0.001***	0.385	<0.001***	0.426	<0.001***
Kendall's tau (p-value)			0.257	<0.001***	0.305	<0.001***	0.291	<0.001***	0.302	<0.001***	0.336	<0.001***

Note: *p<0.05, **p<0.01, ***p<0.001
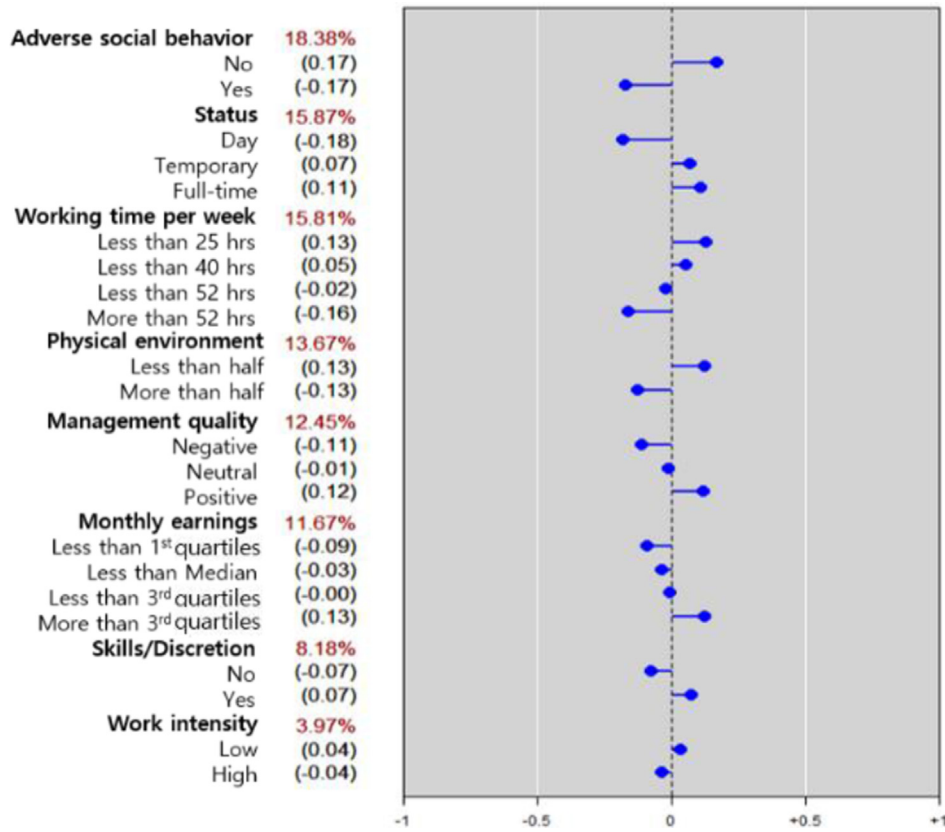
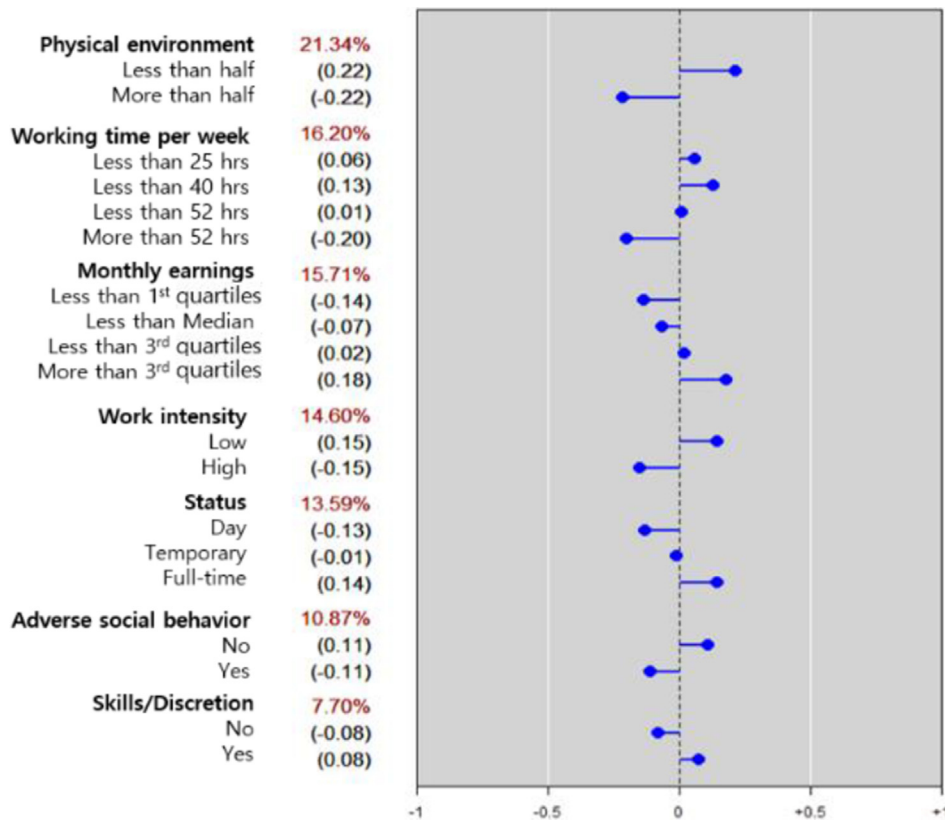**Fig. 4.** Results of conjoint analysis: KWCS second wave.

Fig. 5. Results of conjoint analysis: KWCS first wave.

Table 8
Pace determinants and interdependency between Republic of Korea and Europe (unit: %)

Pace determinants and interdependency		EWCS			KWCS			
		2005	2010	2015	2010	2011	2014	2017
Work pace dependent on	The work done by colleagues	42	39	39	16	20	23	25
	Direct demands from people such as customers, passengers, pupils, patients, etc.	68	67	68	42	46	35	55
	Numerical production targets or performance targets	42	40	42	15	19	16	21
	Automatic speed of a machine or movement of a product	19	18	18	6	9	8	11
	The direct control of your boss	36	37	35	34	41	31	45

Source: Eurofound, EWCS (2005, 2010, 2015), OSHRI, KWCS (2006, 2010, 2011, 2014, 2017).

machine operators, elementary occupations, and armed forces occupation; and pink-collar workers are services and sales workers [31].

We performed the *t*-test on five waves to check whether there were any differences in job satisfaction by gender. According to the result, it turns out that a statistically significant difference in job satisfaction is present in the remaining waves except wave 2.

The results of the analysis of variance results showed that there is a difference in satisfaction according to the occupation type in all waves. The results of the Duncan's post-hoc test showed that white-collar workers' satisfaction was the highest, followed by pink-collar workers and blue-collar workers. As a result, there are differences in satisfaction with the working conditions by gender and occupation (Tables 4 and 5).

3.3. Results of multiple linear regression analysis

In addition, a test was conducted to see if the relationship between the satisfaction with working conditions and the seven factors was meaningful. The results of the multiple linear regression analysis show that the seven factors affected the satisfaction with the working conditions with statistical significance. Through this analysis, we were convinced that it was possible to analyze

interrelation between the working conditions satisfaction and seven factors (Table 6).

3.4. Conjoint analysis results

For measuring the goodness-of-fit of the conjoint analysis model, we used Pearson's R and Kendall's tau statistical test results, and the results indicate that this study is statistically significant and that the properties of the profiles extracted by the orthogonal design are appropriate.

The main factors affecting the satisfaction with the working conditions have changed over time. The factors that have the greatest impact on working conditions satisfaction are as follows: "physical environment" for the first wave, "adverse social behavior" for the second wave, "occupational status" for the third and fourth waves, and "management quality" for the fifth wave. Table 8 shows that Korean workers' pace of work is decided by their boss's direction unlike Europe, except for the external factors such as customer demand. This is gradually on the rise. The rate of direct control of the boss increased from 34% in 2006 to 45% in 2017 (Table 7).

Our analysis of the fifth wave showed that the most decisive factor of job satisfaction in the Republic of Korea was "management quality" (25.53%), part of the social environment. This was followed,

Table 9
Results of conjoint analysis by gender, male

Factor		Level	5th (2017) (n=13,736)		4th (2014) (n=12,788)		3rd (2011)(n=16,921)		2nd (2010) (n=3,160)		1st (2006) (n=4,595)	
			Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)
Physical environment		1) Less than half	0.14	18.07%(2)	0.14	15.79%(3)	0.09	10.80%(5)	0.11	12.94%(5)	0.20	19.49%(1)
		2) More than half	-0.14		-0.14		-0.09		-0.11		-0.20	
Work intensity		1) Low	0.03	4.13%(7)	0.04	4.29%(8)	-0.00	0.33%(8)	0.05	5.48%(8)	0.16	16.05%(4)
		2) High	-0.03		-0.04		0.00		-0.05		-0.16	
Working time quality		1) Less than 25 hours	0.07	11.48%(5)	0.14	16.43%(2)	0.10	12.99%(4)	0.11	14.71%(4)	-0.02	17.34%(3)
		2) Less than 40 hours	0.03		0.06		0.05		0.05		0.17	
		3) Less than 52 hours	-0.00		-0.05		-0.04		-0.02		0.02	
		4) More than 52 hours	-0.10		-0.15		-0.11		-0.14		-0.18	
Social environment	Adverse social behavior	1) No	0.11	15.03%(4)	0.13	15.27%(4)	0.12	14.32%(3)	0.13	15.10%(3)	0.08	8.36%(6)
		2) Yes	-0.11		-0.13		-0.12		-0.13		-0.08	
	Management quality	1) Negative	-0.19	25.0h4%(1)	-0.09	12.34%(5)	-0.15	17.73%(2)	-0.13	15.89%(2)		
		2) Neutral	0.01		-0.03		0.01		0.00			
		3) Positive	0.18		0.12		0.14		0.13			
Skills and discretion		1) No	-0.03	3.64%(8)	-0.07	7.64%(6)	-0.07	8.89%(7)	-0.05	5.73%(7)	-0.06	5.82%(7)
		2) Yes	0.03		0.07		0.07		0.05		0.06	
Occupational status		1) Day	-0.17	17.61%(3)	-0.20	21.23%(1)	-0.25	25.73%(1)	-0.17	17.97%(1)	-0.13	14.68%(5)
		2) Temporary	0.07		0.03		0.07		0.04		-0.04	
		3) Full-time	0.10		0.17		0.17		0.13		0.17	
Earnings		1) Less than 1st quartiles	-0.03	5.01%(6)	-0.04	7.01%(7)	-0.03	9.21%(6)	-0.04	12.18%(6)	-0.16	18.25%(2)
		2) Less than Median	-0.02		-0.03		-0.05		-0.07		-0.10	
		3) Less than 3rd quartiles	0.01		-0.01		-0.02		-0.02		0.06	
		4) More than 3rd quartiles	0.04		0.08		0.10		0.13		0.21	
Test Statistic			Value	Sig	Value	Sig	Value	Sig	Value	Sig	Value	Sig
Pearson's R (p-value)			0.370	<0.001***	0.422	<0.001***	0.415	<0.001***	0.386	<0.001***	0.461	<0.001***
Kendall's tau (p-value)			0.282	<0.001***	0.333	<0.001***	0.324	<0.001***	0.312	<0.001***	0.367	<0.001***

Note: *p<0.05, **p<0.01, ***p<0.001

Table 10
Results of conjoint analysis by gender, female

Factor		Level	5th (2017) (n=14,647)		4th (2014) (n=11,595)		3rd (2011)(n=11,877)		2nd (2010) (n=2,541)		1st (2006) (n=2,477)	
			Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)
Physical environment		1) Less than half	0.13	18.04%(2)	0.10	12.22%(5)	0.11	15.19%(3)	0.14	14.15%(4)	0.16	15.43%(3)
		2) More than half	-0.13		-0.10		-0.11		-0.14		-0.16	
Work intensity		1) Low	0.07	10.07%(6)	0.05	6.60%(8)	-0.00	0.28%(8)	0.01	1.36%(8)	0.14	13.74%(4)
		2) High	-0.07		-0.05		0.00		-0.01		-0.14	
Working time quality		1) Less than 25 hours	0.08	10.75%(5)	0.12	17.27%(1)	0.07	12.58%(6)	0.13	14.68%(3)	0.10	12.93%(5)
		2) Less than 40 hours	0.01		0.06		0.04		0.06		0.06	
		3) Less than 52 hours	-0.02		-0.03		-0.01		-0.01		0.02	
		4) More than 52 hours	-0.07		-0.15		-0.10		-0.17		-0.17	
Social environment	Adverse social behavior	1) No	0.09	12.68%(4)	0.12	16.03%(3)	0.11	16.40%(2)	0.23	22.49%(1)	0.16	15.51%(2)
		2) Yes	-0.09		-0.12		-0.11		-0.23		-0.16	
	Management quality	1) Negative	-0.20	26.06%(1)	-0.09	12.32%(4)	-0.17	21.71%(1)	-0.08	9.15%(7)	╳	╳
		2) Neutral	0.03		-0.02		0.03		-0.02			
		3) Positive	0.18		0.11		0.13		0.10			
Skills and discretion		1) No	-0.01	2.00%(8)	-0.06	7.12%(7)	-0.05	6.96%(7)	-0.10	9.55%(6)	-0.10	9.80%(6)
		2) Yes	0.01		0.06		0.05		0.10		0.10	
Occupational status		1) Day	-0.11	13.80%(3)	-0.13	16.27%(2)	-0.10	13.00%(5)	-0.17	12.90%(5)	-0.11	8.57%(7)
		2) Temporary	0.02		0.01		0.01		0.09		0.04	
		3) Full-time	0.09		0.12		0.08		0.08		0.07	
Earnings		1) Less than 1st quartiles	-0.04	6.60%(7)	-0.08	12.17%(6)	-0.10	13.88%(4)	-0.15	15.72%(2)	-0.21	24.02%(1)
		2) Less than Median	-0.02		-0.05		-0.02		-0.05		-0.08	
		3) Less than 3rd quartiles	0.01		0.03		0.02		0.04		0.00	
		4) More than 3rd quartiles	0.05		0.11		0.09		0.17		0.29	
Test Statistic			Value	Sig	Value	Sig	Value	Sig	Value	Sig	Value	Sig
Pearson's R (p-value)			0.305	<0.001***	0.355	<0.001***	0.332	<0.001***	0.405	<0.001***	0.396	<0.001***
Kendall's tau (p-value)			0.235	<0.001***	0.282	<0.001***	0.255	<0.001***	0.310	<0.001***	0.307	<0.001***

Note: *p<0.05, **p<0.01, ***p<0.001

in descending order, by "physical environment," "occupational status," "adverse social behavior" (part of social environment), "working time," "work intensity," "earnings," and "skills and discretion." In other words, the two factors associated with the workers' social environment ("management quality" and "adverse social behavior") accounted for much of each worker's satisfaction or dissatisfaction (39.32%). It is also important to note that physical environment (direct risks present at work) and occupational status (indicative of job security) ranked higher than earnings according to the results of all wave surveys. Earnings are not a main factor determining worker job satisfaction, and index is on the decline (Figs. 2–5).

In the last survey, the fifth wave, "management quality" and "physical environment" for both male and female were found to

Table 11
Results of conjoint analysis by occupation type, white-collar job

Factor		Level	5th (2017) (n=11,432)		4th (2014) (n=10,493)		3rd (2011)(n=11,818)		2nd (2010) (n=2,317)		1st (2006) (n=2,830)	
			Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)
Physical environment		1) Less than half	0.14	23.67%(2)	0.14	23.97%(2)	0.10	14.32%(5)	0.21	21.01%(2)	0.21	23.37%(1)
		2) More than half	-0.14		-0.14		-0.10		-0.21		-0.21	
Work intensity		1) Low	0.06	10.67%(5)	0.03	4.54%(7)	-0.01	2.20%(7)	0.08	8.47%(7)	0.18	20.02%(3)
		2) High	-0.06		-0.03		0.01		-0.08		-0.18	
Working time quality		1) Less than 25 hours	0.07	12.54%(4)	0.05	14.46%(3)	0.09	16.19%(4)	0.12	13.05%(3)	0.16	22.18%(2)
		2) Less than 40 hours	0.01		0.06		0.03		0.04		0.10	
		3) Less than 52 hours	-0.01		-0.01		0.00		-0.03		-0.02	
		4) More than 52 hours	-0.08		-0.10		-0.12		-0.14		-0.24	
Social environment	Adverse social behavior	1) No	0.11	17.51%(3)	0.14	24.14%(1)	0.12	18.65%(2)	0.23	23.18%(1)	0.11	11.58%(4)
		2) Yes	-0.11		-0.14		-0.12		-0.23		-0.11	
	Management quality	1) Negative	-0.18	27.53%(1)	-0.06	12.96%(4)	-0.13	19.85%(1)	-0.11	11.97%(4)	╳	╳
		2) Neutral	0.03		-0.03		0.00		-0.02			
		3) Positive	0.15		0.09		0.13		0.13			
Skills and discretion		1) No	0.01	1.61%(8)	-0.04	7.55%(6)	-0.03	4.86%(8)	-0.04	3.98%(8)	-0.06	6.29%(6)
		2) Yes	-0.01		0.04		0.03		0.04		0.06	
Occupational status		1) Day	0.00	2.13%(7)	0.01	3.87%(8)	-0.14	17.61%(3)	0.11	9.18%(5)	0.03	5.63%(7)
		2) Temporary	0.01		-0.03		0.05		-0.04		-0.06	
		3) Full-time	-0.02		0.02		0.09		-0.07		0.04	
Earnings		1) Less than 1st quartiles	-0.03	4.33%(6)	-0.03	8.50%(5)	-0.02	6.31%(6)	-0.10	9.17%(6)	-0.07	10.95%(5)
		2) Less than Median	-0.01		-0.05		-0.02		0.01		-0.04	
		3) Less than 3rd quartiles	0.01		0.03		-0.02		0.01		-0.02	
		4) More than 3rd quartiles	0.02		0.05		0.06		0.08		0.13	
Test Statistic			Value	Sig	Value	Sig	Value	Sig	Value	Sig	Value	Sig
Pearson's R (p-value)			0.257	<0.001***	0.263	<0.001***	0.260	<0.001***	0.307	<0.001***	0.335	<0.001***
Kendall's tau (p-value)			0.179	<0.001***	0.188	<0.001***	0.196	<0.001***	0.208	<0.001***	0.255	<0.001***

Note: *p<0.05, **p<0.01, ***p<0.001

Table 12
Results of conjoint analysis by occupation type, blue-collar job

Factor		Level	5th (2017) (n=9,534)		4th (2014) (n=8,383)		3rd (2011)(n=10,407)		2nd (2010) (n=2,088)		1st (2006) (n=3,722)	
			Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)
Physical environment		1) Less than half	0.11	15.96%(3)	0.09	11.99%(5)	0.07	9.29%(5)	0.06	8.44%(6)	0.18	19.36%(1)
		2) More than half	-0.11		-0.09		-0.07		-0.06		-0.18	
Work intensity		1) Low	0.02	2.89%(7)	0.03	4.47%(8)	-0.01	1.11%(8)	-0.01	1.39%(8)	0.14	15.09%(4)
		2) High	-0.02		-0.03		0.01		0.01		-0.14	
Working time quality		1) Less than 25 hours	0.08	12.75%(5)	0.16	18.20%(2)	0.11	13.66%(4)	0.13	16.96%(3)	-0.01	14.89%(5)
		2) Less than 40 hours	0.02		0.03		0.04		0.00		0.13	
		3) Less than 52 hours	-0.01		-0.07		-0.06		-0.02		0.02	
		4) More than 52 hours	-0.09		-0.12		-0.09		-0.12		-0.14	
Social environment	Adverse social behavior	1) No	0.13	18.31%(2)	0.14	18.14%(3)	0.11	15.08%(3)	0.16	22.07%(1)	0.14	15.62%(3)
		2) Yes	-0.13		-0.14		-0.11		-0.16		-0.14	
	Management quality	1) Negative	-0.21	29.17%(1)	-0.10	14.88%(4)	-0.16	19.92%(2)	-0.11	14.53%(4)	╳	╳
		2) Neutral	0.01		-0.02		0.03		0.01			
		3) Positive	0.20		0.13		0.13		0.10			
Skills and discretion		1) No	-0.01	0.96%(8)	-0.05	6.30%(6)	-0.07	8.85%(6)	-0.04	5.77%(7)	-0.07	7.33%(7)
		2) Yes	0.01		0.05		0.07		0.04		0.07	
Occupational status		1) Day	-0.13	15.60%(4)	-0.18	20.96%(1)	-0.20	23.54%(1)	-0.17	19.64%(2)	-0.07	11.65%(6)
		2) Temporary	0.04		0.03		0.07		0.06		-0.07	
		3) Full-time	0.09		0.15		0.13		0.12		0.14	
Earnings		1) Less than 1st quartiles	-0.00	4.36%(6)	0.00	5.07%(7)	-0.01	8.29%(7)	-0.04	11.21%(5)	-0.12	16.07%(2)
		2) Less than Median	-0.03		-0.01		-0.05		-0.05		-0.10	
		3) Less than 3rd quartiles	0.00		-0.04		-0.01		-0.02		0.04	
		4) More than 3rd quartiles	0.03		0.04		0.07		0.12		0.17	
Test Statistic			Value	Sig	Value	Sig	Value	Sig	Value	Sig	Value	Sig
Pearson's R (p-value)			0.346	<0.001***	0.349	<0.001***	0.354	<0.001***	0.308	<0.001***	0.395	<0.001***
Kendall's tau (p-value)			0.270	<0.001***	0.274	<0.001***	0.276	<0.001***	0.230	<0.001***	0.306	<0.001***

Note: *p<0.05, **p<0.01, ***p<0.001

have the greatest influence on satisfaction with the working conditions. The influence of "work intensity" decreased from 16.05% to 4.13% in males, whereas it decreased from 13.74% to 10.07% in females. Female workers seem to be more sensitive to "work intensity" than male workers are. The impact of "working time" also decreased a lot from 17.34% to 11.48% for men and slightly decreased from 12.93% to 10.75% for women. The difference could

be found from the fact that women had negative part-worth even under 52 working hours, whereas men had negative part-worth over 52 hours in 2017. In the case of "adverse social behavior," females had higher relative importance from 2006 to 2014, whereas males had a higher percentage in 2017. This is because the value of males did not change, but that of females decreased. Both skill and discretion had a low impact on satisfaction in both males and

Table 13
Results of conjoint analysis by occupation type, pink-collar job

Factor		Level	5th (2017) (n=7,417)		4th (2014) (n=5,507)		3rd (2011)(n=6,573)		2nd (2010) (n=1,296)		1st (2006) (n=520)	
			Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)	Part-worth	Relative importance (Rank)
Physical environment		1) Less than half	0.13	19.91%(2)	0.12	17.30%(1)	0.11	17.97%(3)	0.17	23.95%(1)	0.36	40.77%(1)
		2) More than half	-0.13		-0.12		-0.11		-0.17		-0.36	
Work intensity		1) Low	0.06	9.59%(5)	0.05	7.08%(8)	-0.00	0.15%(8)	0.05	6.85%(7)	0.01	1.31%(6)
		2) High	-0.06		-0.05		0.00		-0.05		-0.01	
Working time quality		1) Less than 25 hours	0.08	9.54%(6)	0.08	14.69%(3)	0.03	8.15%(5)	0.05	11.72%(4)	0.00	16.07%(3)
		2) Less than 40 hours	-0.01		0.06		0.03		0.05		0.10	
		3) Less than 52 hours	-0.01		-0.02		-0.01		0.02		0.09	
		4) More than 52 hours	-0.05		-0.12		-0.06		-0.12		-0.19	
Social environment	Adverse social behavior	1) No	0.08	11.70%(4)	0.10	15.00%(2)	0.12	21.41%(2)	0.12	16.19%(3)	-0.15	17.20%(2)
		2) Yes	-0.08		-0.10		-0.12		-0.12		0.15	
	Management quality	1) Negative	-0.19	27.61%(1)	-0.08	12.69%(5)	-0.17	25.47%(1)	-0.05	8.17%(6)	╳	╳
		2) Neutral	0.01		-0.01		0.05		-0.02			
		3) Positive	0.17		0.09		0.12		0.07			
Skills and discretion		1) No	-0.04	5.85%(7)	-0.06	8.80%(7)	-0.04	7.70%(6)	-0.12	16.41%(2)	-0.01	0.98%(7)
		2) Yes	0.04		0.06		0.04		0.12		0.01	
Occupational status		1) Day	-0.10	13.26%(3)	-0.10	14.00%(4)	-0.02	6.31%(7)	-0.05	5.57%(8)	-0.08	7.81%(5)
		2) Temporary	0.02		0.00		-0.03		0.03		0.05	
		3) Full-time	0.08		0.09		0.04		0.02		0.03	
Earnings		1) Less than 1st quartiles	-0.00	2.54%(8)	-0.05	10.43%(6)	-0.07	12.84%(4)	-0.06	11.13%(5)	-0.13	15.87%(4)
		2) Less than Median	-0.01		-0.03		-0.01		-0.05		-0.03	
		3) Less than 3rd quartiles	-0.01		-0.02		0.00		0.01		0.02	
		4) More than 3rd quartiles	0.02		0.10		0.08		0.10		0.14	
Test Statistic			Value	Sig	Value	Sig	Value	Sig	Value	Sig	Value	Sig
Pearson's R (p-value)			0.274	<0.001***	0.297	<0.001***	0.288	<0.001***	0.296	<0.001***	0.279	<0.001***
Kendall's tau (p-value)			0.207	<0.001***	0.236	<0.001***	0.220	<0.001***	0.224	<0.001***	0.207	<0.001***

Note: *p<0.05, **p<0.01, ***p<0.001

females. Their influence declines over time. The "status" showed that males were more affected than females. However, women tended to increase the effect of status on satisfaction over time. In both males and females, the factor "earnings" has been decreasing over time. However, for men, from 2010 to 2014, it turned out that they had a positive part-worth only when their earnings were above the third quartile. Men were found to have higher levels of satisfaction when entering higher earnings quintiles (Tables 9 and 10).

In the occupation type, the results once again demonstrated the "management quality" as the most important factor affecting the job satisfaction of workers in all occupation type in the fifth KWCS. "Physical environment" also emerged as the second most important factor. Even when workers were divided and analyzed based on occupational types, "earnings" did not appear as an important factor compared with the other factors.

"Work intensity" tended to increase in white- and pink-collar workers, whereas blue-collar workers decreased. In addition, blue-collar workers showed less than 5% of the influence of work intensity on satisfaction. In the "working time," the white-collar workers reduced significantly from 22.18% to 12.54%, the pink-collar workers decreased significantly from 16.07% to 9.54%, and the blue-collar workers decreased slightly from 14.89% to 12.75%. "Skills and discretion" tended to decline in all occupational groups. In the case of pink-collar workers, the factor had a higher proportion of job satisfaction than other occupation groups. Moreover, for white-collar workers, the value of part-worth was negative in 2017. White-collar workers are seen as the ones with a negative impact under pressure and stress because they are required to create new things and solve complex problems. This result may be attributable to the presence of reverse causality [46]. The result was positive when the occupation type was controlled, but it was negative when the group was controlled in white-collar workers. "Occupational status" was an important part of blue-collar and pink-collar workers. Blue-collar workers accounted for 15.60%, pink-collar workers accounted for 13.26%, and white-collar workers accounted for 2.13%. White-collar workers had less influence on status than other occupations (Tables 11–13).

4. Discussion

In this study, we sought to rank the seven factors of job quality, identified by Eurofound, in descending order of their impact on worker job satisfaction. Our analysis showed that, to Korean workers, major factors affecting the satisfaction with the working conditions have changed over time. The factors that have the greatest impact on working conditions satisfaction are as follows: "physical environment" for the first wave, "adverse social behavior" for the second wave, "occupational status" for the third and fourth waves, and "management quality" for the fifth wave. The same way Korean workers started to value work–life balance recently, "earnings" were not a major factor in worker job satisfaction. During the analysis period, "earnings" were not a major factor in determining worker job satisfaction, and the relative importance index is on the decline. These results indicate that there is a limit to where material rewards increase the satisfaction with the working conditions.

A comparison of our analyses on the fifth waves showed that Korean workers, over time, placed much greater importance on social environment, as seen by indicators such as "management quality" and "adverse social behavior," and less importance on material compensation. "Physical environment" has declined in importance but is still a vital factor in determining the satisfaction with the working conditions. These findings suggest that the establishment of laws, policies, and systems to ensure occupational safety and health can significantly contribute to improving

satisfaction with the working conditions. This trend persisted in the analysis conducted by gender and the occupation type. Mentioning the differences by occupation, as we might expect, blue- and pink-collar workers attached greater importance to "occupational status" than white-collar workers. "Work intensity" tended to increase in white- and pink-collar workers, whereas that in blue-collar decreased. It turned out that female workers seem to be more sensitive to "work intensity" than male workers. Regarding "adverse social behavior," females had higher relative importance from 2006 to 2014, but males had a higher percentage in 2017. This is because the value of males did not change, but that of females decreased.

The satisfaction with the working conditions is an important factor that affects the health and productivity of workers. We hope that this study will serve as a reference for companies and governments to provide better working conditions for workers and to achieve better productivity. This article encounters some limitations to generalize all workers character. The findings of the study are the results of survey only conducted on Korean workers. Therefore, the research results can focus on the reflection of Korean social issues only, although it is possible that other potential factor affecting job satisfaction exist. Despite these limitations, this article can contribute to providing policymakers and managers with an implication to improve their organization development. To take sophisticated policy improvement measures and support working conditions reform, it will be required to continue with basic surveys and related studies on the working environment of workers.

Conflicts of interest

All authors have no conflicts of interest to declare.

References

[1] Gerber PD, Nel PS, Van Dyk PS. Human resource management. 4th ed. Johannesburg (South Africa): Oxford University Press; 1998645p.

[2] Yesufu TM. The dynamics of industrial relations: the Nigeria experience. Ibadan (Nigeria): Oxford University Press; 1984234p.

[3] Ahmed S, Al Haderi SMS, Ahmad FB, Jaaffar AR, Walter J, Al Douis GAA. Employee job security and performance relationship in developing economy through employee engagement: critical analysis with PLS-SEM. Int J Econ Res 2017;14(19):133–47.

[4] Lamm F, Massey C, Perry M. Is there a link between workplace health and safety and firm performance and productivity? N Zeal J Empl Relat 2007;32(1):72–86.

[5] Laine H, Saastamoinen P, Lahti J, Rahkonen O, Lahelma E. The associations between psychosocial working conditions and changes in common mental disorders: a follow-up study. BMC Publ Health 2014;14(1):588.

[6] Min HJ, Sim MG. Find the agenda for Gwangju and South Jeolla Province in response to the demographic cliff (2) go beyond the compatibility of a work and family to work and life balance. Naju (Korea): Gwangju Jeonnam Research Institute; 2018. Report No.:2018-07. 19p. [in Korean].

[7] Easterlin RA. Does economic growth improve the human lot? Some empirical evidence. In: David PA, Reder MW, editors. Nations and households in economic growth: essays in honor of Moses Abramowitz. USA (NY): Academic Press; 1974 p. 89–125p.

[8] Easterlin RA. Income and happiness: towards a unified theory. Econ J 2001 july;111:465–84.

[9] Eurofound. Fifth European working conditions survey: overview report. Dublin (Ireland): Eurofound; 2012. 151 p.

[10] Green F, Felstead A, Gallie D. Job quality and inequality: the unequal world of work in the UK, 1986-2012. Juncture 2016;22(4):329–33.

[11] Green F, Mostafa T. Trends in job quality in Europe. Dublin (Ireland): Publications Office of the European Union, Luxembourg; 2012. 94 p.

[12] United Nations Economic Commission for Europe. Handbook on measuring quality of employment: a statistical framework. UNECE Report; 2015. 320 p.

[13] Burchell BM, Gollac M, Illessy E, Lorenz C, Mako C, O'Brien, Valeyre A. Working conditions in the European Union: working time and work intensity. Dublin (IE): Eurofound; 2009. Report No.:2009-VIII. 69p.

[14] Seol MJ, Lee MS, Lee SK. Effects of labor intensity and fatigue on sleep quality of clinical nurses. J Korean Acad Nurs Adm 2018 Sep;24(4):276–87 [In Korean].

[15] Karasek R, Theorell T. Healthy work: stress, productivity, and the reconstruction of working life. New York(US): Basic Books; 1990. 402 p.

                      Saf Health Work 2021;12:324−338

[16] Pfeifer C. Unfair wage perceptions and sleep: evidence from German survey data. J Appl Soc Sci 2015;135:413−28.

[17] Sung JM. The effect of reducing legal working hours. Mon Labor Rev 2005;5:66−75 [in Korean].

[18] Spurgeon A, Harrington JM, Cooper CL. Health and safety problems associated with long working hours: a review of current position. Occup Environ Med 1997;54(6):367−75.

[19] Kim ST, Park WS, Ahn JY, Jeon BY, Jeon JH. The effects of reducing working hours on the national economy and society. Sejong (Korea): Korean Labor Institute; 2001. 77 p [in Korean].

[20] Shin IY, Lee GY. Antecedents and consequences of work self-determined motivation: work contexts and commitment to change. Korean J Bus Adm 2015;28(11):2909−29. In Korean.

[21] Deci EL, Ryan RM. Intrinsic motivation and self-determination in human behavior. NY (US): Plenum press; 1985. 372 p.

[22] Deci EL, Ryan RM. The "what" and "why" of goal pursuits: human needs and the self-determination of behavior. Psychol Inq 2000;11(4):227−68.

[23] Ryan RM, Deci EL. Self-determination theory: basic psychological needs in motivation, development, and wellness. NY(US): Guilford; 2017. 756 p.

[24] Fernet C, Litalien D, Morin AJS, Austin S, Gagné M, Lavoie-Tremblay M, Forest J. On the temporal stability of self-determined work motivation profiles: a latent transition analysis. Eur J Work Organ Psychol 2020;29(1):49−63.

[25] Kim H. A study on the management performance of public institutions and financial compensation of the head of the institution. Korean Public Adm Rev 2015;49(1):24−272 [In Korean].

[26] Eurofound., International Labour Organization(ILO). Working conditions in a global perspective. Dublin (Ireland): Eurofound and Geneva(Switzerland):ILO; 2019. 178 p.

[27] Clark AE, Kristensen N, Westergård-Nielsen N. Job satisfaction and co-worker wages: status or signal? Econ J 2009;119:430−47.

[28] Siegrist J. Adverse health effects of high-effort/low-reward conditions. J Occup Health Psychol 1996;1(1):27−41.

[29] Chang YH, Kook KH. A study on the influence of employee job environment on the job satisfaction. J Korean Soc Railway 2008:1943−54 [in Korean].

[30] Shin JO. Multiple mediator of job environment and work sustainability on the relation of job satisfaction and life satisfaction. J Crit Soc Welfare 2015;49:202−26 [in Korean].

[31] Rhee GY, Park WY. Emotional worker's satisfaction about work environment and work autonomy. Korean J Soc Iss 2017;32(2):9−32 [in Korean].

[32] Kim YS, Park JS, Rhee GY, Kim HM. A comparison between the second Korean working conditions survey (KWCS) and the first KWCS. Saf Health Work 2015;6(2):85−9.

[33] Rhee GY, Kim YS, Cho YH. The type of payment and working conditions. Saf Health Work 2015;6(4):289−94.

[34] Ministry of Employment and Labor (Korea). Report on labor force survey at establishments. Ministry of Employment and Labor; 2018. Report No.: 11-1492000-000034-06.[In Korean].

[35] Luce D, Tukey J. Simultaneous conjoint measurement: a new type of fundamental measurement. J Math Psychol 1964;1:1−27.

[36] Hair JF, Anderson RE, Tatham RL, Black WC. Multivariate data analysis with readings. 4th ed. Englewood Cliffs, N.J.: Prentice Hall; 1995. 745 p.

[37] Wittink DR, Philippe C. Commercial use of conjoint analysis: an update. J Mark 1989;53(3):91−6.

[38] Green PE, Srinivasan V. Conjoint analysis in consumer research: issue and outlook. J Consum Res 1978;5(2):103−23.

[39] Carroll JD, Green PE. Psychometric methods in marketing research: Part 1, conjoint analysis. J Mark Res 1995;32(4):385−91.

[40] Gustafsson A, Herrmann A, Huber H. Conjoint measurement: methods and applications. 4th ed. Springer; 2000. 380 p.

[41] Marshall P, Bradlow ET. A unified approach to conjoint analysis methods. J Am Stat Assoc 2002;97(459):674−82.

[42] Aizaki H. Basic functions for supporting an implementation of choice experiments in R. J Stat Softw 2012;50(2):1−24.

[43] Aizaki H. Support.CEs: basic functions for supporting an implementation of choice experiments. Comprehensive R Archive Network. 2013. Available from: http://cran.r-project.org/web/packages/support.CEs.%20support.CEs.pdf.

[44] OECD. Pensions at a glance 2017: OECD and G20 indicators. Paris (FR): OECD Publishing; 05-Dec. 164 p.

[45] OECD. Education at a glance 2016: OECD indicators. Paris (FR): OECD Publishing; 15-Sep. 508 p.

[46] Martin L. Do innovative work practices and use of information and communication technologies motivate employees? Ind Relat 2017;56(2):263−92.