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

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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 over 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
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 |
|---------|-----------------------|
| 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 quartile, less than median, less than the third quartile and more than the third quartile. Table 1 shows that the first quartile, median, and the third quartile 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.](image-url)
| 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               |
|                             |                                          | Breathing in smoke, fumes, powder or dust, etc                                    | O            | O            | O            | O            | O            |                                               |                                                   |
|                             |                                          | Handling or being in skin contact with chemical products or substances Tobacco   | O            | O            | O            | O            | O            |                                               |                                                   |
|                             |                                          | smoke from other people Handling or being in direct contact with materials       | O            | O            | O            | O            | O            |                                               |                                                   |
|                             | Biological, chemical risks               | Breathing in vapors such as solvents and thinners                                 | O            | O            | O            | O            | O            |                                               |                                                   |
|                             |                                          | Handling or being in skin contact with chemical products or substances Tobacco   | O            | O            | O            | O            | O            |                                               |                                                   |
|                             |                                          | 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                                                       | O            | O            | O            | O            | O            |                                               |                                                   |
|                             |                                          | Lifting or moving people                                                          | O            | O            | O            | O            | O            |                                               |                                                   |
|                             |                                          | Carrying or moving heavy loads, standing                                          | O            | O            | O            | O            | O            |                                               |                                                   |
|                             |                                          | Repetitive hand or arm movements                                                  | O            | O            | O            | O            | O            |                                               |                                                   |
| Work intensity              | Quantitative demands                     | Working at very high speed                                                        | O            | O            | O            | O            | O            | More than “around three-fourths of the working time” is “high” | 1) low 2) high                                     |
|                             |                                          | Working to tight deadlines                                                        | O            | O            | O            | O            | O            | More than “fairly often is “high”               |                                                   |
|                             |                                          | How often do you have to interrupt a task you are doing in order to take on an   | O            | O            | O            | O            | O            | Work intensity “high” if more than half of the three components are involved |                                                   |
|                             |                                          | unforeseen task?                                                                  | O            | O            | O            | O            | O            |                                               |                                                   |
|                             |                                          | The work done by colleagues                                                       | O            | O            | O            | O            | O            | “Yes” is “high”                               |                                                   |
| Pace determinants and       | Numerical production targets or          | Direct demands from customers, passengers, etc                                    | O            | O            | O            | O            | O            |                                               |                                                   |
| interdependence             | performance targets, the direct control  |                                                                                   | O            | O            | O            | O            | O            |                                               |                                                   |
|                             | of your boss                          |                                                                                   | O            | O            | O            | O            | O            |                                               |                                                   |
|                             | Automatic speed of a machine or movement |                                                                                   | O            | O            | O            | O            | O            |                                               |                                                   |
|                             | of a product                         |                                                                                   | O            | O            | O            | O            | O            |                                               |                                                   |
| Emotional demands          | Your job requires that you hide your    |                                                                                   | O            | O            | O            | O            | O            | “Most of the time” or “always” is “high”       | 1) Less than 25 hours 2) Less than 40 hours 3) Less than 52 hours 4) More than 52 hours |
|                             | feelings                              |                                                                                   | O            | O            | O            | O            | O            | More than “around one-fourths of the working time” is “high” |                                                   |
|                             | Handling angry clients                 |                                                                                   | O            | O            | O            | O            | O            | More than “around three-fourths of the working time” is “high” |                                                   |
|                             | A state of emotional unrest            |                                                                                   | O            | X            | X            | X            | X            | More than “around half of the working time” is “yes” |                                                   |
| 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 |

(continued on next page)
| 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, Physical violence, sexual harassment, bullying/harassment | O | O | O | O | X | “Yes” is “yes” | 1) No 2) Yes |
| | | | | | | | | Strongly disagree, tend to disagree “negative”, neither agree nor disagree “neutral,” tend to agree, strongly agree “positive” | 1) Negative 2) Neutral 3) Positive |
| Management quality | Respects you as a person | Gives you praise and recognition when you do a good job | O | O | O | X | X | “Yes” is “yes” | “Yes” if more than half of all three components are included | 1) No 2) Yes |
| | Is successful in getting people to work together | | O | X | X | X | “Yes” is “yes” | “Yes” if more than half of all three components are included | “Yes” if more than half of all three components are included | 1) No 2) Yes |
| | Is helpful in getting the job done | Provides useful feedback on your work | | | | | | | |
| | Encourages and supports your development | | | | | | | | |
| 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” “Yes” is “yes” | 1) No 2) Yes |
| | Decision latitude | Your order of tasks, your methods of work, your speed or rate of work | O | O | O | O | O | Sometimes or most of the time or always is “yes” “Yes” is “yes” | 1) No 2) 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” | “Yes” if more than half of all three components are included | 1) No 2) 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 satisfied” four points. | 1) Not at all satisfied 2) Not very satisfied 3) Satisfied 4) Very satisfied |
| 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                             | %                            |
| 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                            | 11,995                        | 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                          | 2,063                        | 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                          | 2,787                        | 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        | 22,069                        | 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                          | 5,657                         | 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                          | 9,903                         | 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).
where \( cp_{(2,304) \text{ cases, respectively.}} \) The levels of these factors can create a total of levels of the given factors. The eight factors used in this study weight of the range of part-worth per level, as follows:

\[
U_i = \beta_0 + \sum_{w=1}^{cp} \beta_{1w}X_{1w} + \cdots + \sum_{w=1}^{mp} \beta_{qw}X_{qw} + \varepsilon_i;
\]

where \( cp = mp - 1, i = 1, 2, \ldots, n, p = 1, 2, \ldots, q. \)

\( q \) represents the number of factors; \( n \), the number of main profiles; \( mp \), the number of levels for the p-th factor; and \( X_{1w}, \ldots, X_{qw} \), 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 × 2 × 4 × 2 × 3 × 2 × 3 × 4) different profiles. We estimated \( \beta_{1w}, \ldots, \beta_{qw} \) using the conjoint model one shown here and obtained the part-worth of the w-th level of the p-th factor, \( \alpha_{pw} \), as follows:

\[
\alpha_{pw} = \begin{cases} 
\bar{\beta}_{qw} \text{ for } w = 1, \ldots, cp \\
- \bar{\beta}_{qw} \text{ for } w = cp + 1, \ldots, mp
\end{cases}
\]

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

\[
\gamma_p = \frac{W_p}{\sum_{p=1}^{3} W_p}, \quad W_p = \max(\alpha_{pw}) - \min(\alpha_{pw}).
\]

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 4 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 4

| 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               | 0.55 | 0.58  |
|            | Total         | 28,383| 2.78  | 0.55               |      |       |
| Fourth (2014) | Male          | 12,788| 2.77  | 0.58               | -3.37| 0.001** |
|            | Female        | 11,905| 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.

| Wave | Variables     | N     | Mean  | Standard deviation | Duncan | F   | p    |
|------|---------------|-------|-------|--------------------|--------|-----|------|
|      |               |       |       |                    | 1      | 2   | 3    |
| Fifth (2017) | White collar | 11,412| 2.90 | 0.49               | 2.64   | 2.90| 600.747 <0.001*** |
|        | Blue collar   | 9,534 | 2.64 | 0.59               | 0.54   | 2.78 |       |
|        | Pink collar   | 7,417 | 2.78 | 0.54               |        |     |       |
|        | Total         | 28,383| 2.78 | 0.55               |        |     |       |
| Fourth (2014) | White collar | 10,493| 2.97 | 0.46               | 2.61   | 2.97| 1111.728 <0.001*** |
|         | Blue collar   | 8,383 | 2.61 | 0.61               | 0.56   | 2.70 |       |
|         | Pink collar   | 5,507 | 2.70 | 0.56               |        |     |       |
|         | Total         | 24,383| 2.78 | 0.56               |        |     |       |
| Third (2011)  | White collar | 11,818| 2.95 | 0.50               | 2.61   | 2.95| 1083.682 <0.001*** |
|          | Blue collar   | 10,407| 2.61 | 0.60               | 0.55   | 2.74 |       |
|          | Pink collar   | 6,573 | 2.74 | 0.58               |        |     |       |
|          | Total         | 28,398| 2.78 | 0.57               |        |     |       |
| Second (2010) | White collar | 2,317 | 2.95 | 0.53               | 2.53   | 2.95| 282.627 <0.001*** |
|          | Blue collar   | 2,088 | 2.53 | 0.65               | 0.58   | 2.70 |       |
|          | Pink collar   | 1,296 | 2.70 | 0.62               |        |     |       |
|          | Total         | 5,701 | 2.74 | 0.62               |        |     |       |
| First (2006)   | White collar | 2,830 | 2.97 | 0.61               | 2.56   | 2.97| 309.582 <0.001*** |
|            | Blue collar   | 3,722 | 2.56 | 0.70               | 0.66   | 2.80 |       |
|            | Pink collar   | 520   | 2.80 | 0.66               |        |     |       |
|            | Total         | 7,072 | 2.74 | 0.69               |        |     |       |

Note: *p < 0.05, **p < 0.01, ***p < 0.001.
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.](image)
Fig. 3. Results of conjoint analysis: KWCS third wave.

### Table 7
Overall conjoint analysis results

| Factor                        | Level                          | 5th (2017, n=28,383) | 4th (2016, n=24,383) | 3rd (2015, n=28,708) | 2nd (2014, n=5,701) | 1st (2006, n=7,072) |
|-------------------------------|--------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                               |                                | Percent (%)          | Relative importance (Rank) | Percent (%)          | Relative importance (Rank) | Percent (%)          | Relative importance (Rank) | Percent (%)          | Relative importance (Rank) | Percent (%)          | Relative importance (Rank) |
| Physical environment          | Low                            | -0.14                | 16.67% (2)           | -0.14                | 16.28% (3)           | -0.11                | 13.64% (4)           | -0.13                | 13.67% (4)           | 0.22                  | 21.38% (1)               |
|                               | High                           | -0.05                | 5.14% (8)            | -0.05                | 5.00% (8)            | -0.04                | 3.97% (8)            | -0.04                | 3.93% (8)            | -0.13                 | 14.60% (4)              |
| Work intensity                | Low                            | 0.05                 | 6.65% (6)            | 0.04                 | 5.14% (8)            | 0.00                 | 2.25% (8)            | 0.04                 | 3.97% (8)            | 0.15                  | 14.60% (4)              |
|                               | High                           | -0.05                | 5.14% (8)            | -0.05                | 5.00% (8)            | -0.04                | 3.97% (8)            | -0.04                | 3.93% (8)            | -0.13                 | 14.60% (4)              |
| Working time quality          | Less than 24 hours            | 0.04                 | 12.22% (5)           | 0.13                 | 16.94% (2)           | 0.09                 | 13.22% (5)           | 0.11                 | 15.81% (3)           | 0.13                  | 16.20% (2)              |
|                               | Less than 40 hours            | 0.02                 | 3.85% (7)            | 0.06                 | 16.94% (2)           | 0.05                 | 13.22% (5)           | 0.11                 | 15.81% (3)           | 0.13                  | 16.20% (2)              |
|                               | Less than 52 hours            | -0.04                | 13.79% (4)           | -0.01                | 13.79% (4)           | 0.11                 | 15.20% (4)           | -0.11                | 15.87% (4)           | 0.11                  | 15.87% (4)              |
|                               | More than 52 hours            | -0.10                | -0.14                | -0.10                | -0.14                | -0.10                | -0.14                | -0.10                | -0.14                | -0.10                | -0.14                |
| Social environment            | No                             | 0.10                 | 13.79% (4)           | 0.13                 | 15.20% (4)           | 0.11                 | 14.97% (3)           | 0.17                 | 18.38% (1)           | 0.11                  | 18.87% (6)              |
|                               | Yes                            | -0.10                | -0.13                | -0.11                | -0.13                | -0.11                | -0.13                | -0.11                | -0.13                | -0.13                |
| Management quality            | Negative                       | -0.20                | -0.09                | -0.16                | -0.11                | -0.11                | -0.11                | -0.11                | -0.11                | -0.11                |
|                               | Neutral                        | 0.02                 | 35.53% (1)           | 0.02                 | 12.11% (5)           | 0.02                 | 20.29% (2)           | 0.01                 | 12.45% (3)           | 0.01                  | 12.45% (3)              |
|                               | Positive                       | 0.18                 | 0.11                 | 0.14                 | 0.12                 | 0.12                 | 0.12                 | 0.12                 | 0.12                 | 0.12                 |
| Skills and discretion         | No                             | -0.02                | 2.89% (8)            | -0.06                | 7.25% (7)            | -0.06                | 8.11% (7)            | -0.07                | 8.18% (7)            | -0.08                  | 7.80% (7)              |
|                               | Yes                            | 0.02                 | 0.09                 | 0.06                 | 0.06                 | 0.06                 | 0.06                 | 0.06                 | 0.06                 | 0.06                 |
| Occupational status           | Day                            | -0.14                | -0.18                | -0.19                | -0.18                | -0.19                | -0.19                | -0.19                | -0.19                | -0.19                |
|                               | Temporary                      | 0.04                 | 16.15% (3)           | 0.03                 | 16.94% (2)           | 0.03                 | 21.46% (3)           | 0.07                 | 15.87% (2)           | -0.01                 | 15.39% (5)              |
|                               | Fulltime                       | 0.10                 | 13.79% (4)           | 0.13                 | 15.20% (4)           | 0.11                 | 14.97% (3)           | 0.17                 | 18.38% (1)           | 0.11                  | 18.87% (6)              |
| Earnings                      | Less than 1st quartiles        | -0.05                | -0.03                | -0.05                | -0.03                | -0.05                | -0.03                | -0.05                | -0.05                | -0.05                |
|                               | Less than Median               | -0.01                | 3.85% (7)            | -0.03                | 7.50% (6)            | -0.02                | 8.46% (6)            | -0.03                | 11.67% (3)           | -0.07                 | 15.71% (3)              |
|                               | Less than 2nd quartiles        | 0.01                 | 0.01                 | 0.01                 | 0.01                 | 0.01                 | 0.01                 | 0.01                 | 0.01                 | 0.01                 |
|                               | More than 3rd quartiles        | 0.03                 | 0.07                 | 0.09                 | 0.13                 | 0.13                 | 0.13                 | 0.13                 | 0.13                 | 0.13                 |
| 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.
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 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,
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 10
Results of conjoint analysis by gender, female

| Factor                  | Level         | 5th (2017: n=14,647) | 4th (2016: n=10,495) | 3rd (2011: n=11,877) | 2nd (2010: n=2,541) | 1st (2006: n=2,477) |
|-------------------------|---------------|-----------------------|----------------------|----------------------|----------------------|----------------------|
| Physical environment   |               |                       |                      |                      |                      |                      |
| 1) Less than half      | 0.13          | 1.01                  | 1.00                 | 1.01                 | 1.01                 | 1.01                 |
| 2) More than half      | -0.13         | -0.10                 | -0.11                | -0.14                | -0.14                | -0.14                |
| Work intensity         |               |                       |                      |                      |                      |                      |
| 1) Low                 | 0.07          | 0.05                  | 0.06                 | 0.04                 | 0.04                 | 0.04                 |
| 2) High                | -0.07         | -0.05                 | -0.06                | -0.01                | -0.01                | -0.01                |
| Working time quality   |               |                       |                      |                      |                      |                      |
| 1) Less than 25 hours  | 0.08          | 0.12                  | 0.07                 | 0.13                 | 0.13                 | 0.13                 |
| 2) Less than 40 hours  | 0.01          | 0.06                  | 0.04                 | 0.06                 | 0.06                 | 0.06                 |
| Adverse social behavior|               |                       |                      |                      |                      |                      |
| 1) No                  | 0.09          | 0.12                  | 0.11                 | 0.13                 | 0.13                 | 0.13                 |
| 2) Yes                 | -0.09         | -0.12                 | -0.11                | -0.13                | -0.13                | -0.13                |
| Social environment     |               |                       |                      |                      |                      |                      |
| 1) No                  | 0.18          | 0.11                  | 0.13                 | 0.19                 | 0.19                 | 0.19                 |
| 2) Yes                 | 0.01          | 0.06                  | 0.03                 | 0.10                 | 0.10                 | 0.10                 |
| Occupational status    |               |                       |                      |                      |                      |                      |
| 1) Day                 | -0.11         | -0.13                 | -0.10                | -0.17                | -0.17                | -0.17                |
| 2) Temporary           | 0.02          | 0.01                  | 0.01                 | 0.09                 | 0.09                 | 0.09                 |
| 3) Full-time           | 0.09          | 0.12                  | 0.08                 | 0.07                 | 0.07                 | 0.07                 |
| Earnings               |               |                       |                      |                      |                      |                      |
| 1) Less than 1st quart | -0.04         | -0.08                 | -0.10                | -0.15                | -0.15                | -0.15                |
| 2) Less than Median    | -0.02         | -0.05                 | -0.05                | -0.05                | -0.05                | -0.05                |
| 3) Less than quartile  | 0.01          | 0.05                  | 0.02                 | 0.04                 | 0.04                 | 0.04                 |
| Skills and discretion  |               |                       |                      |                      |                      |                      |
| 1) No                  | 0.05          | 0.11                  | 0.09                 | 0.17                 | 0.20                 | 0.17                 |
| 2) Yes                 | 0.01          | 0.06                  | 0.03                 | 0.10                 | 0.10                 | 0.10                 |

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

| Factor                  | Level         | 5th (2017: n=11,432) | 4th (2016: n=10,495) | 3rd (2011: n=11,877) | 2nd (2010: n=2,541) | 1st (2006: n=2,477) |
|-------------------------|---------------|-----------------------|----------------------|----------------------|----------------------|----------------------|
| Physical environment   |               |                       |                      |                      |                      |                      |
| 1) Less than half      | 0.14          | 0.14                  | 0.10                 | 0.11                 | 0.11                 | 0.11                 |
| 2) More than half      | -0.14         | -0.14                 | -0.10                | -0.14                | -0.14                | -0.14                |
| Work intensity         |               |                       |                      |                      |                      |                      |
| 1) Low                 | 0.06          | 0.03                  | 0.03                 | 0.01                 | 0.01                 | 0.01                 |
| 2) High                | -0.06         | -0.03                 | -0.01                | -0.03                | -0.03                | -0.03                |
| Working time quality   |               |                       |                      |                      |                      |                      |
| 1) Less than 25 hours  | 0.07          | 0.05                  | 0.09                 | 0.12                 | 0.12                 | 0.12                 |
| 2) Less than 40 hours  | 0.01          | 0.06                  | 0.03                 | 0.04                 | 0.04                 | 0.04                 |
| Adverse social behavior|               |                       |                      |                      |                      |                      |
| 1) No                  | 0.11          | 0.14                  | 0.12                 | 0.23                 | 0.23                 | 0.23                 |
| 2) Yes                 | -0.11         | -0.14                 | -0.13                | -0.11                | -0.11                | -0.11                |
| Social environment     |               |                       |                      |                      |                      |                      |
| 1) No                  | 0.18          | 0.06                  | 0.03                 | 0.04                 | 0.04                 | 0.04                 |
| 2) Yes                 | -0.01         | -0.04                 | -0.03                | -0.04                | -0.04                | -0.04                |
| Occupational status    |               |                       |                      |                      |                      |                      |
| 1) Day                 | 0.01          | 0.01                  | 0.01                 | 0.03                 | 0.03                 | 0.03                 |
| 2) Temporary           | 0.01          | 0.03                  | 0.05                 | 0.07                 | 0.07                 | 0.07                 |
| Skills and discretion  |               |                       |                      |                      |                      |                      |
| 1) No                  | 0.04          | 0.09                  | 0.06                 | 0.08                 | 0.08                 | 0.08                 |
| 2) Yes                 | 0.01          | 0.04                  | 0.03                 | 0.04                 | 0.04                 | 0.04                 |
| Earnings               |               |                       |                      |                      |                      |                      |
| 1) Less than 1st quart | -0.03         | -0.05                 | -0.02                | -0.05                | -0.05                | -0.05                |
| 2) Less than Median    | -0.01         | -0.05                 | -0.02                | -0.05                | -0.05                | -0.05                |
| 3) Less than quartile  | 0.01          | 0.05                  | 0.01                 | 0.05                 | 0.05                 | 0.05                 |
| Test Statistic         | Value         | Sig                   | Value (p-value)      | Sig                   | Value (p-value)      | Sig                   |
| Kendall’s tau (p-value)| 0.257         | <0.001***              | 0.263                | <0.001***             | 0.260                | <0.001***             |

Notes: N(5)=315, N(4)=315, N(3)=308, N(2)=302, N(1)=294
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 females.

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

| Factor                                  | Level | 5th (2017 n=9,534) | 4th (2014 n=8,833) | 3rd (2013 n=10,407) | 2nd (2010 n=2,088) | 1st (2006 n=3,722) |
|------------------------------------------|-------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Physical environment                     |       |                     |                     |                     |                     |                     |
| 1) Less than half                        | 0.11  | 15.96% (3)          | 0.09                | 11.99% (3)          | 0.07                | 9.29% (3)           |
| 2) More than half                        | 0.13  | 17.30% (3)          | 0.12                | 17.97% (3)          | 0.17                | 20.59% (3)          |
| Work intensity                           |       |                     |                     |                     |                     |                     |
| 1) Low                                   | 0.02  | 2.89% (7)           | 0.33                | 4.87% (8)           | 0.01                | 1.11% (8)           |
| 2) High                                  | 0.02  | 0.03                | 0.01                | 0.01                | 0.01                | 0.01                |
| Working time quality                     |       |                     |                     |                     |                     |                     |
| 1) Less than 25 hours                    | 0.08  | 0.15                | 0.11                | 0.13                | 0.01                | 0.13                |
| 2) Less than 40 hours                    | 0.02  | 0.03                | 0.04                | 0.04                | 0.04                | 0.04                |
| 3) Less than 52 hours                    | 0.01  | 0.06                | 0.06                | 0.06                | 0.06                | 0.06                |
| Social environment (work intensity)      |       |                     |                     |                     |                     |                     |
| 1) No                                    | 0.13  | 18.51% (2)          | 0.14                | 18.14% (2)          | 0.11                | 17.08% (2)          |
| 2) Yes                                   | 0.13  | 18.45% (2)          | 0.14                | 18.45% (2)          | 0.14                | 18.45% (2)          |
| Earnings                                 |       |                     |                     |                     |                     |                     |
| 1) Less than 1st quartiles               | 0.01  | 3.63% (6)           | 0.01                | 3.07% (6)           | 0.01                | 2.97% (6)           |
| 2) More than 3rd quartiles               | 0.02  | 0.04                | 0.04                | 0.04                | 0.04                | 0.04                |
| Test statistic                           | Value | Sig                 | Value               | Sig                 | Value               | Sig                 |
| Pearson’s R (p-value)                    | 0.346 | 0.001***            | 0.336               | 0.001***            | 0.356               | 0.001***            |
| Kendall’s tau (p-value)                  | 0.270 | 0.001***            | 0.270               | 0.001***            | 0.260               | 0.001***            |

### 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 (2013 n=6,573) | 2nd (2010 n=1,256) | 1st (2006 n=520) |
|------------------------------------------|-------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Physical environment                     |       |                     |                     |                     |                     |                     |
| 1) Less than half                        | 0.13  | 19.91% (5)          | 0.12                | 17.30% (3)          | 0.11                | 17.97% (3)          |
| 2) More than half                        | 0.13  | 17.30% (3)          | 0.12                | 17.97% (3)          | 0.17                | 20.59% (3)          |
| Work intensity                           |       |                     |                     |                     |                     |                     |
| 1) Low                                   | 0.06  | 9.59% (5)           | 0.05                | 7.08% (8)           | 0.06                | 5.15% (8)           |
| 2) High                                  | 0.06  | 0.05                | 0.05                | 0.05                | 0.05                | 0.05                |
| Working time quality                     |       |                     |                     |                     |                     |                     |
| 1) Less than 23 hours                    | 0.08  | 0.08                | 0.08                | 0.03                | 0.03                | 0.03                |
| 2) Less than 40 hours                    | 0.01  | 8.14% (6)           | 0.06                | 6.49% (8)           | 0.05                | 5.15% (8)           |
| 3) Less than 52 hours                    | 0.01  | 14.69% (6)          | 0.06                | 12.69% (4)          | 0.05                | 11.72% (4)          |
| Social environment (working time)        |       |                     |                     |                     |                     |                     |
| 1) Less than half                        | 0.08  | 0.08                | 0.08                | 0.08                | 0.08                | 0.08                |
| 2) More than half                        | 0.13  | 10.00% (5)          | 0.12                | 13.00% (2)          | 0.12                | 16.19% (3)          |
| Earnings                                 |       |                     |                     |                     |                     |                     |
| 1) Negative                              | 0.01  | 27.61% (1)          | 0.01                | 21.16% (1)          | 0.02                | 8.19% (1)           |
| 2) Neutral                               | 0.17  | 0.07                | 0.17                | 0.07                | 0.17                | 0.07                |
| Test statistic                           | Value | Sig                 | Value               | Sig                 | Value               | Sig                 |
| Pearson’s R (p-value)                    | 0.274 | 0.001***            | 0.001***            | 0.001***            | 0.001***            | 0.001***            |
| Kendall’s tau (p-value)                  | 0.207 | 0.001***            | 0.001***            | 0.001***            | 0.001***            | 0.001***            |

Note: p<0.05, ***p<0.001.
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- 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 9–13).

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, but 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 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 be a help to providing policymakers and managers with an implication to improve the organization and 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.

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