

## Abstract

# Study on Women Job at a Time of Digital Transformation (Ⅱ): Career development and social protection system

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### 1. Research questions

The purpose of this study is to look at the effects of the digital transformation on women's jobs, so as to inform policies regarding the career development of women and the social protection system. Planned as a two-year project, the 1st year study(Oh, E.J. et al.

2020) analyzed the changes in women's jobs due to the digital transformation and provided policy suggestions to prepare for the future. The current study is the 2nd year study, and here we have focused on women's career development and the matter of the social protection system. We have looked at four areas: 1) manufacturing SMEs, 2) healthcare and medical services (nursing in particular), 3) the artificial intelligence industry, and 4) crowdworking platforms. Chapter 3 looks at changes in women's jobs owing to the digital transformation. Chapters 4 to 7 look at changes in women's jobs in the four areas of study – 1) manufacturing SMEs, 2) healthcare and medical services (nursing in particular), 3) the artificial intelligence industry, and 4) crowdworking platforms – with a view to policy needs regarding career development and social protection. Chapter 8 looked at how the advancement of digital technology affects female jobseekers. Each Chapter from 4 to 8 provides policy suggestions, based on the relevant findings of the study, regarding women's career development and social protection. Depending on the characteristics of each area studied, the chapters focus either on career development or both career development and social protection. The research questions posed in each chapter are summarized in the following table.

<Table> Key Research Questions Posed in the Study on Women's Jobs  
at a Time of Digital Transformation (II)

Topic	Research Question
Changes in Women's Jobs amid the Digital Transformation (Ch 3)	<ol style="list-style-type: none"> <li>1) Is the polarization of jobs by skill level also observed in women's jobs?</li> <li>2) Are there differences in the characteristics of women's jobs across workplaces that develop/utilize 4th industrial revolution-related technologies and other workplaces?</li> <li>3) STEM personnel are the core workforce of the digital transformation. Among such personnel, what are the differences, by gender, in the work status and working conditions.</li> </ol>
Changes in Women's Jobs and Policy Needs, by Area of Work (Chapters 4~7)	<ol style="list-style-type: none"> <li>1) What are the changes experienced by the women studied, in terms of the digital transformation, jobs, career development, and working conditions?</li> <li>2) Are the managers of the workplaces studied aware of the changes caused by the digital transformation with regards to women's jobs, HR management, and working conditions?</li> <li>3) On the part of the women workers and the managers of the workplaces studied, what are their policy needs regarding women's career development and social protection?</li> </ol>
How the Advancement of Digital Technology Affects Female Jobseekers (Ch 8)	<p>※ Focusing on Users of Reemployment Support Centers</p> <ol style="list-style-type: none"> <li>1) For jobseeking purposes, do women feel the need for vocational training in the use of computers and information (digital) systems?</li> <li>2) Of the female jobseekers, how many have been in occupations that utilize digital technologies? How adequately do they feel they adjusted to meet the technical skill requirements demanded by the labor market?</li> <li>3) What are the female jobseekers' expectations regarding job opportunities and career development?</li> </ol>
Summary and Policy Suggestions (Ch 9)	<ol style="list-style-type: none"> <li>1) For each area of work studied, what are some support measures for women's career development to make the digital transformation more inclusive?</li> <li>2) For each area of work studied, what are some of the issues regarding the social protection system for women workers, and what are the appropriate policy responses?</li> <li>3) What policies will be needed to help female jobseekers cope with the challenges presented by the digital transformation and keep participating in economic activities?</li> </ol>

## 2. Methodologies

### ○ Literature Review

We looked at the literature relevant to this study, including the significance and background of the digital transformation, the effects of the digital transformation on jobs, and policy literature related to the digital transformation. We also reviewed the existing studies and policy-related materials relevant to each of the chapters from 3 to 8.

### ○ Questionnaire Study

From chapter 4 to 8, small-scale questionnaire studies were administered to collect information regarding the individual topics of each chapter. The purpose of these surveys was to record the extent to which women's jobs were changed due to the digital transformation, and to gauge the needs elicited by women workers or workplace managers regarding women's career development / social protection amid such changes. Because the practical constraints of the study meant the surveys had to be conducted in small scale, the scopes of survey's subjects and topics were selected in a strategic manner. The survey's subjects included 1) 400 managers or HR personnel at manufacturing SMEs, 2) 302 nurses at tertiary general hospitals located in the greater Seoul metropolitan area, 3) 337 female SW developers who have experienced or are at risk of career interruption, 4) 361 crowdworkers, and 5) 525 female jobseekers who made use of Reemployment Support Centers.

### ○ Interviews

While the main research methodology of this study was the survey by questionnaire, we also conducted interviews for the purpose of

questionnaire development (Ch 4 and 5), as well as in-depth analyses of the survey findings (Ch 6 and 7). A total of 38 persons, including HR managers at manufacturing SMEs, nurses, female SW developers (including those whose careers were interrupted), and crowdworkers, participated in the interview.

#### ○ Statistical Analysis

We analyzed data from official statistical studies to look at whether there were gender disparities in the changes to jobs due to the digital transformation, and whether there were differences in the use of female workers between workplaces that utilized digital transformation-related technologies and those that did not. The studies compiled by Statistics Korea used in the analysis include the Economically Active Population Survey (2000, 2014– 2020), the Business Activity Survey (2019, 2020), and the Regional Employment Survey (2020).

#### ○ Policy Forum on Women's Jobs amid the Digital Transformation(in four sessions)

A policy forum was held over four sessions, where we sought the input of insiders at an IT firm, which provides the core technology behind the digital transformation, female insiders at a firm that operates a smart factory, an expert in hospital information systems, and manager in charge of vocational training for women in big data and AI technologies.

#### ○ Expert Consultation Group

During the early stages of the study, a group of experts were consulted to provide strategic guidance regarding the direction and scope of the study. Furthermore, the expert group also assisted with

the review of the 5 types of questionnaires, workshops for brainstorming policy measures, and in-depth review of the draft of the study. A total of 23 experts were consulted.

### 3. Key Findings and Policy Suggestions

#### 1) Changes in Women's Jobs

Women tended to be employed in occupations that made little use of SW, and workplaces that utilized digital transformation-related technologies lacked gender diversity. Looking at gender gaps in STEM occupations, women were found to be concentrated in lower-ranking, lower-paying positions, affording them little opportunity to develop their careers at positions demanding higher skill and offering better pay. If such conditions prevail, women workers will become easier to substitute with the advancement of technology, and will face greater risk of being barred from joining key, high-skill jobs.

An underlying factor behind this reality is the gender separation in occupations and university majors. In other words, occupations that utilize digital technology or those in STEM fields have traditionally been centered on males, with a smaller pool of female talent that is trained via schools, universities, and vocational training institutions. The digital transformation is currently in its early stages, and is likely to intensify in the future. Therefore, there is a need to equip women with the skills to utilize digital technology and to support their entry into jobs that utilize digital technology. In particular, relevant policies should be expanded to help younger women join STEM majors and jobs, while opportunities must also be provided for middle-age or older women to receive digital technology training they may need for job retention.

## **2) Changes in Women's Jobs and Policy Suggestions – Manufacturing SMEs**

The manufacturing SME workplaces that participated in this study mainly employed women workers in operating information systems or in production occupations. In the future, there will be the need for more female engineers skilled in digital technology, more female professionals capable of operating information systems, and more support for improving the digital skills of female production workers.

In terms of the digital transformation, workplaces with higher female employment tended to lag behind those with lower female employment. This may become a factor that impedes the job retention and career development of women workers in workplaces with higher female employment. Thus, measures may be considered for identifying and supporting industries characterized by both high female employment and high demand for digital transformation.

Regarding the needs for SMEs in preparation of the digital transformation, demand was highest among both managers and women workers for workplace-specific vocational training.

The policy suggestions for manufacturing SMEs were mainly focused on the career development of female workers. These included digital competency / new ICT technologies training for women via the Ministry of Employment and Labor's vocational training program for incumbent workers, expanding the hiring of female professionals in the information systems of manufacturing SMEs, and expanding the university training of female talent in engineering / SW convergence tech fields.

## **3) Changes in Nursing Jobs and Policy Suggestions – Implications of Nursing Information Systems**

Although the advancement of nursing information systems (NIS)

has brought substantial changes in the way nursing jobs are performed, most incumbent nurses are relying on on-the-job experience to pick up new occupational skills because they did not receive NIS training while at school. However, for nurses to make more proactive use of the data that is compiled in NIS and develop new career paths, they will need training on NIS and statistics.

Nurses are seldom involved in hospital NIS or teams in charge of it. Because nurses serve as coordinators who link all the medical staff within a hospital, there is a need to expand their participation in NIS affairs. In particular, the expertise of nursing professionals must be utilized for the standardization of NIS terminology.

While half of the nurses who participated in this study voiced interest in broadening their careers through participation in NIS duties, they felt that they had little actual opportunities to do so. It is expected that the aging population is going to be intensified in the future, and that the healthcare industry will develop in the local community. Consequently, professionals with nursing experience may be able to join jobs in related fields. For this to happen, nurses must become better equipped to work with digital technologies.

In this area, policy suggestions were mainly focused on career development. These included engaging nurses in NIS, development of careers in information systems-related jobs, and NIS training in nursing schools. Policy suggestions pointing to regulatory reform regarding the utilization of NIS / medical records for determining the optimal number of nursing staff may be considered a form of social protection for nurses.

#### **4) The Working Conditions of Female SW Developers at Risk of Career Interruption, and Policy Suggestions**

Most female SW developers worked long hours and were burdened



with excessive workloads, making it difficult for them to maintain a work–life balance. Due to the prevalence of career interruptions, there is a lack of female mentors or role models in their field. Furthermore, female SW developers perceived that they were subject to some gender discrimination in terms of HR practices. They emphasized the need for efforts to eliminate gender discrimination in HR practices, as well as efforts to curtail long working hours and excessive workloads. In particular, in the case of non–permanent workers such as temporary / daily workers or freelancers, there was a need to alleviate anxieties regarding the discontinuation of employment contracts. We also found that such workers may have faced substantial discrimination in terms of access to company policies for work–life balance. The majority of this study's respondents felt that in the field of SW programming, continually picking up new skills built competitiveness, and expected that AI–based programming will emerge as a key field in the future. However, we found that they had limited access to AI–related training.

Female SW developers at risk of career interruption require not only policies for career development, but also social protection against the risk of job loss. In particular, they had high need for social protection with regards to long working hours, gender discrimination in HR practices, the job retention of temp / daily / freelance workers, and work–life balance. In terms of career development, they voiced high demand for the acquisition of AI–related technology. Furthermore, in addition to simple vocational training, we found that there was need for a platform that could match such training institutions with the firms seeking to hire. Based on these findings, we suggested the following policies: 1) integrated case management for the career development of female SW

developers, 2) strengthening of AI-related training content, 3) broadening of female-led AI fields, and 4) measures for expanding company policies regarding work-life balance.

#### **5) Working Conditions and Policy Suggestions – Crowdworkers**

Depending on the nature of the work, crowdworkers may be characterized either as freelancer-type workers or providers of piecemeal labor 'micro-tasks'. While the former is allowed direct contact with clients and are able to form entrepreneur-like industrial relations (in terms of entrepreneurial risk-taking and opportunity for profit via market participation), the latter are obliged to accept predetermined rates (set by clients or their platforms), and are dependent on the platform provider's performance reviews for the continued provision of services. Despite this, such workers were not quite willing to perceive of themselves as workers employed by platforms.

While among the freelancer group, participation in platforms itself was often seen to add to career development or building experience, they had little expectation that either the platform or public services would contribute anything toward their skill development. On the other hand, those in the micro-tasking group tended to take up crowdworking because they considered it an easy way to make money with a low barrier to entry regardless of skill level. Although some of these workers took up crowdworking with almost no skills at all, they did voice a demand for some kind of support structure that would help them strengthen their skills and guide them toward a career ladder they could climb.

The views among the groups differed even further with regards to the need for social insurance. Workers in the freelancer group, who currently have no access to employment insurance (EI), expressed

interest in the MOEL's program for supporting the EI enrollment of self-employed persons, as well as a fair and efficient reform of EI that they might benefit from. Because most of the workers in the micro-tasking group were currently enrolled in EI via their main jobs, they felt little need or interest in enrolling in EI via their crowdworking arrangements.

Meanwhile, both groups responded having experienced unfair HR practices or the violation of rights at their platform, and also raised concerns about unfair closure of accounts, inaccurate or opaque evaluation systems, excessively low pay, and excessively high commission requirements.

Policy suggestions in the area of crowdworking platforms were mainly focused on strengthening social protection for workers. These included 1) support for the private autonomy of crowdworkers vis-a-vis platforms, 2) expanding EI eligibility, 3) legislation in support of maternity protection and against discrimination, sexual harassment, and other abuse. In terms of policies for career development, we suggested measures involving the National Employment Support System and the HRD Learning Card program.

#### **6) How Female Jobseekers have Coped with the Digital Transformation, and Policy Suggestions**

14.3% of the female jobseekers who responded to the study reported that, during the past 5 years, they experienced an instance where they were unable to enter a job due to insufficient computer skills. 74.3% of the respondents who had prior employment experience said that they worked in a job where they had to work with a computer or data processing terminal, and 20.5% said that they experienced mismatches between their own tech skills and those required by their job. Most cases of mismatch were observed

holders of associate or higher degrees, and were found more often in jobs that required high skill levels.

Looking at the information system–related training needs voiced by female jobseekers, demand was found to be highest for training in creative media / app development (55.4%), followed by training on new technologies such as big data analysis / IoT, etc. (48.0%), and computer training for office workers (37.0%). 98.1% of the respondents expressed willingness to build on their skill levels in order to find or retain jobs, and 87.9% expressed interest in fields where new jobs were being created due to the advancement of digital technology.

In terms of government support for their career development over the mid to long term, respondents voiced the greatest demand for vocational training for strengthening technical skills (41.5%), followed by provision of job / placement information suited for women's characteristics (24.8%), job / placement counseling for jobless women (14.7%), continuous individual counseling or coaching on career development (13.0%), and support for women's startups (6.1%).

Based on the above findings, we proposed the following policy suggestions: 1) developing and providing new training programs, 2) identifying promising future jobs for women, 3) support for computer programming training (by skill level required for work), 4) providing information and counseling on career development (by age / educational level), and 5) adjusting the role and direction of Reemployment Support Centers for women.

Research areas: labor•employment

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