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The Measurement of Experience and Satisfaction with Public Provision of Assistive Technology Services for Workers with Disabilities in Korea

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Abstract. The Korean government has been providing AT services for workers with disabilities and is increasing its provision every year. However, there are request for improvement from individuals with disabilities regarding service process, eligibility, and quality of services. In response to those requests, this study was created to more accurately identify the process to be improved and to collect opinions from workers with disabilities for improvement of public AT services. The survey consisted of respondents' demographic information, experiences with the public AT service process, and opinions on improving public AT service. The request to participate in the survey was conducted for 3 weeks, and the responses of 158 disabled workers were used for analysis. This study used descriptive statistics and analysis of variance and planned follow-up testing in case a significant difference was found. The results indicated a low satisfaction with early stages of AT service process, such as information acquisition. Respondents also hoped that the application process would be changed to be simpler and more direct to take into account workers with disabilities, and that the provision of assistive devices would be expanded and diversified. The government is leading positive changes in line with the needs of workers with disabilities identified in this study. In the future, it is necessary to gradually expand the application eligibility for public AT services and to improve service system and provide government support for them.

Keywords. workers with disability, assistive technology, satisfaction, Korea

A. Introduction

As of 2020, the number of persons with disabilities employed in Korea is 893,392 which is about 34.9% of registered persons with disability aged 15 and over [1]. According to the 2021 Disability Statistics Annual Report, the Ministry of Employment and Labor in Korea spent about $15 million on over 35,000cases of requests for assistive devices in 2020 [2]. Since it has already been reported through a number of studies that the use of appropriate assistive technology (AT) service is effective in increasing the productivity and reducing the functional limitations of workers with disabilities [3-6], the provision of assistive devices for workers with disabilities are increasing in Korea. Through the Korean Employment Agency for Persons with Disabilities (KEAD), which was established by the Ministry of Employment and Labor to help persons with disabilities find employment and support employers in hiring people with disabilities, the Korean government provided 10,084 cases of AT services in 2020 by spending about $9.7 million [2].

KEAD requires applicants to meet one of the following criteria to be eligible for the AT service:

- Employers who employ or intend to hire persons with disabilities
- Heads of national and local governments who apply for AT services on behalf of workers with disabilities who are not public officials
- Among employers who have no employees or employ 4 or fewer workers at the time of application, employers with disabilities who are hiring or intend to hire persons with disabilities
- Workers with disabilities who need automobile modification or assistive devices for commuting to and from work

Although the application documents must be made by designating an assistive technology device user, KEAD’s assistive technology service stipulates the main applicant as employers. Depending on the needs of workers with disabilities, applicants may select a device from the list of assistive devices that have already been reviewed and registered by KEAD. The list consists of about 300 products under 44 items in 8 categories. Covered costs for assistive devices vary. The government spends about $2,680per person with disability and about $4,470 per person with severe disability. However, if an employer commits to continuing to employ a worker with disability while using an assistive device, the government increase the cost caps to $8,930 and S13,400 respectively. The Korean government does not require costs sharing or set a minimum cost that applicants must contribute.

A previous study on public AT service reported that workers with disabilities were satisfied with the quality of assistive devices and effectiveness of devices. However, those workers with disabilities responded that their satisfaction with the service process was relatively low [8]. The study did not reveal which of the stages in the service process gave respondents lower levels of satisfaction. Clues can be found in system improvement requests for public AT services that have been made so far. At the National Assembly audit in 2017, a member of the National Assembly pointed out that the application process needs to be improved as the current application process restricts workers with disabilities from directly applying for assistive devices to better perform their jobs, and in most cases they can only apply through their employers [9]. Even thought the purpose of AT service is to, through promoting vocational rehabilitation and employment, help people with disabilities’ self-realization, assist their full participation in society, improve their quality of life, and ultimately achieve social integration, relevant laws act as a channel through which the government grant a loan or subsidy to employers who hire or want to hire persons with disabilities for the expenses or instruments required for hiring them. As a result, workers with disabilities can directly apply for assistive devices to the government only in limited circumstances, and they have to go through the cumbersome process of persuading employers who are reluctant to acquire the necessary assistive devices.

There have also been claims to change the eligibility criteria so that employers who are employed by the parent corporation or those who employ five or more employees but are still small can benefit from public AT services [10]. Proposals to provide AT services beyond the simple distribution of commercially available assistive devices are also continuing [11]. The purpose of this study is to more accurately identify the AT service procedures that need improvement through satisfaction analysis and to collect opinions from workers with disabilities to improve Korean public AT services.

B. Materials and methods

1. Participants and Procedure

An announcement was made through KEAD requesting that workers with disabilities who had previously received public AT services participate in the survey. Two additional follow-up notifications were posted during the three-week data collection period. A total of 211 respondents who had received public AT services within five years of the survey date voluntarily participated in the survey and submitted their responses via e-mail. In this study, excluding the responses of 44 job-seekers with disabilities and nine careless respondents, only the responses of 158 workers with disabilities were used for the analysis. The research participants agreed and signed an informed consent form that the survey data would not be used for anything other than research purposes.

Table. 1. Sociodemographic characteristics of the participants

Characteristics	Frequency	%
Gender		
Female	54	34.2
Male	104	65.8
Age		
16-29 years old	12	7.6
30-39 years old	48	30.4
40-49 years old	53	33.5
50-64 years old	45	28.5
Occupation		
Managers or professionals	49	31.0
Clerical support workers	87	55.1
Service and sales workers	12	7.6
Craft or machine operating or assembling workers	6	3.8
Elementary workers	4	2.5
Functional limitation		
Upper extremity functional limitations	8	5.4
Lower extremity functional limitations	48	32.4
Both upper and lower extremity functional limitations	20	13.5
Insufficient neck and body supports	14	9.5
Visual impairments	40	27
Hearing impairments	18	12.2
Company size		
1-4 employees	25	15.8
5-50 employees	70	44.3
51-299 employees	38	24.1
300-999 employees	13	8.2
1000 or more employees	12	7.6
Length of employment		
Less than 1 year	15	9.5
1-3 years	38	24.1
3-10 years	76	48.1
More than 10 years	29	18.4

Note. N=158

2. Instrument

Survey questions were developed based on previous research on public AT services [e.g. 8, 12] and were reviewed with KEAD's AT service staff. The self-administered questionnaire e-mailed to the participants consisted of three components; respondents' demographic information, their experiences with the public AT service process, and their opinions about improving public AT services. The demographic questionnaire requested information of participants' gender, age, occupation, functional limitation, company size, and length of employment. The participants' experience with the public AT service process was designed to measure their satisfaction with each stage of public AT services, from information acquisition to receipt of devices. The respondents were asked to indicate the level of satisfaction with the services on a 5-point Likert scale. The anchors were 1= *very dissatisfied* and 5=*very satisfied*. The participants' opinions about improving AT services was constructed to collect improvement requests and to measure their expectations for improving the application process to include workers with disabilities as applicants.

3. *Statistical analysis*

The present study employed descriptive statistics and analysis of variance (ANOVA). Satisfaction on each stage were compared using a one way repeated measures ANOVA to determine if significant differences exist between mean scores of the six stages. A follow up test was planned for the case that significant differences are found. Significant differences provide more accurate information about respondents' satisfactory level of the public AT service procedure.

C. **Results**

Of the 158 participants, 34.2% were females (n=54) and 65.8% were males (n=104). 7.6% of participants fell into the age category of 16-29 years old range (n=12), 30.4% were in 30-39 years old range (n=48), 33.5% were in 40-49 years old range (n=53), and 28.5% were in 50-64 years old range (n=45). Majority of participants worked as clerical support workers (n=87, 55.1%) or managers or professionals (n=49, 31.0%). Of the 147 participants responding to their functional limitations, 32.4% had lower extremity limitations, such as moving or carrying (n=48), followed by both upper and lower extremity limitations, such as sitting or standing (n=20, 13.5%) and hearing impairments (n=18, 12.2%). The majority of respondents reported that they are employed by companies with between 5 and 50 employees (n=70, 44.3%). With regard to length of employment at the current job, a majority reported 3 to 10 years (n=76, 48.1%). In terms of assistive devices, of the 196 cases, the most provided devices were chairs (21.1%, n=44), followed by postural support (n=27, 12.9%), electronic reading software and hardware (n=22, 10.5%), and tables (n=21, 10%).

One hundred fifty-eight participants responded their satisfaction with each process from information acquisition to receipt of assistive devices. The mean score and standard deviation of the information acquisition stage were 3.5 and 1.24 respectively, 3.65 and 1.24 for the Application, 3.66 and 1.15 for Review, 3.75 and 1.13 for Decision notification, 3.79 and 1.17 for Process after approval to receipt, and 3.87 and 1.13 for Receipt of devices.

Table. 2. Satisfaction with the assistive technology service process

Stages	Frequency	%	Mean	Standard Deviation
Information acquisition (n=158)			3.5	1.24
Very dissatisfied	13	8.23		
Dissatisfied	17	10.76		
Neutral	50	31.65		
Satisfied	34	21.52		
Very satisfied	44	27.85		
Application (n=158)			3.65	1.24
Very dissatisfied	11	6.96		
Dissatisfied	19	12.03		
Neutral	35	22.15		
Satisfied	43	27.22		
Very satisfied	50	31.62		
Review (n=158)			3.66	1.15
Very dissatisfied	10	6.33		
Dissatisfied	12	7.59		
Neutral	44	27.85		
Satisfied	47	29.75		
Very satisfied	45	28.48		
Decision notification (n=158)			3.75	1.13
Very dissatisfied	9	5.70		
Dissatisfied	10	6.33		
Neutral	41	25.95		
Satisfied	49	31.01		
Very satisfied	49	31.01		
Process after approval to receipt (n=158)			3.79	1.17
Very dissatisfied	10	6.33		
Dissatisfied	11	6.96		
Neutral	34	21.52		
Satisfied	50	31.65		
Very satisfied	53	33.54		
Receipt of devices (n=158)			3.87	1.13
Very dissatisfied	9	5.70		
Dissatisfied	9	5.70		
Neutral	30	18.99		
Satisfied	55	34.81		
Very satisfied	55	34.81		
Time taken from application submission to receipt of devices (n=158)			3.52	1.18
Very dissatisfied	12	7.59		
Dissatisfied	17	10.76		
Neutral	43	27.22		
Satisfied	49	31.01		
Very satisfied	37	23.42		

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Overall satisfaction (n=158)			3.78	1.12
Very dissatisfied	8	5.06		
Dissatisfied	11	6.96		
Neutral	38	24.05		
Satisfied	51	32.28		
Very satisfied	50	31.65		

A one way repeated measures ANOVA test was conducted to determine a difference between the mean scores of the six stages. The result showed that there is a statistically significant difference [F(5, 785) = 7.62, p = 0].

Table. 3. One way repeated measure ANOVA

Source of Variation	Sum of Squares	df	Mean Square	F	P-value	Fcritical
Rows	1026.3	157	6.53694	18.49034	2.1E-182	1.216347
Columns	13.47679	5	2.695359	7.624071	5.23E-07	2.225511
Error	277.5232	785	0.353533			
Total	1317.3	947				

When followed up with a post-hoc test, a significant difference was found between following pairs: (a) Information acquisition and Decision notification (p = .006), (b) Information acquisition and Process after approval to receipt (p = .003), (c) Information acquisition and Receipt of devices (p = .001), and (d) Review and Receipt of devices (p = .037)

Table. 4. Post-hoc test

Stage	Information acquisition	Appli-cation	Review	Decision notification	Process after approval to receipt	Receipt of devices
Information acquisition						
Application	.613					
Review	.347	1.0				
Decision notification	.006*	1.0	1.0			
Process after approval to receipt	.003*	.662	.550	1.0		
Receipt of devices	.001*	.055	.037*	.801	1.0	

Note. Adjustment for multiple comparisons: Bonferroni.
*. The mean difference is significant at the .05 level.

Sixty nine participants responded to the requests for improvement. Twenty six percent requested expansion and diversification of registered assistive devices (n=18), 13% reported improvement of device quality &maintenance (n=9), and 11.6% responded publicity of AT services (n=8). Seven point two percent of the respondents answered a try-on of an assistive devices (n=5), and 5.8% responded a simplification of the process (n=4). An expansion of the budget, increase in information accessibility, and expansion of application eligibility each showed a response rate of 4.3% (n=3).

Table. 5. Requests for improvement

Requests for Improvement	Frequency	%
Expansion and diversification of registered assistive devices	18	26.1
Improvement of device quality &maintenance	9	13.0
Publicity of assistive technology services	8	11.6
Try-on of assistive devices	5	7.2
Process simplification	4	5.8
Budget expansion	3	4.3
Increase in information accessibility	3	4.3
Expansion of application eligibility	3	4.3
Miscellaneous opinions	16	23.4
Total	69	100

Participants were asked to respond to their expectations about changing the application process from indirect to direct. Seventy seven point eight percent of participants expected positive effects because they do not have to ask an employer's permission (n=39, 31.7%); the application process would be simplified (n=32, 31.7%); and the choice and control of workers with disabilities would increase (n=30, 24.4%).

Table. 6. Reasons of respondents' expectation

Reasons of Respondents' Expectation	Frequency	%
Reasons for positive effect		
No employer permission required	39	24.7
Simple procedures	32	20.3
Increase in choice and control of workers with disabilities	30	19.0
Miscellaneous	22	13.9
Sub total	123	77.8
Reasons for no effect		
No Changes	9	5.7
Increase in paper-work and individual responsibility	5	3.2
Unaware of changes due to lack of publicity	2	1.3
Miscellaneous	2	1.3
Sub total	18	11.4
Reasons for negative effects		
Increase in paper-work and cumbersome personal effort	14	8.9
Miscellaneous	3	1.9
Sub total	17	10.8

Note. N=158

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D. Discussion

This research was conducted to investigate the degree of satisfaction with each stage of the KEAD’s assistive technology services process and to find ways to improve the public AT services. According to research result, workers with disabilities who need AT services appear to have difficulty obtaining information. Respondents reported needing information about which assistive devices are available, what policies or services exist, and how to apply. Specifically, workers with disabilities reported that, in their experience, employers were less likely to cooperate as AT service applicants if they did not have enough information about public AT services. What is noteworthy is that even though the survey was conducted only for those who received the AT service, they reported the lowest level of satisfaction with obtaining information. These findings would be even more stark if the study had included workers with disabilities who needed AT services but had not applied for them. Respondents’ requests for increased publicity of public AT services also reflect the unmet needs of workers with disabilities. Chae, Jo, and Kwon [13], in their study on the awareness and necessity of assistive technology by vocational rehabilitation experts, argued that it is necessary for the government to strengthen the promotion of public AT services and provide more information.

Workers with disabilities most wanted the expansion and diversification of assistive devices. Although an increasing number of assistive devices are being registered every year, the limited pool of assistive devices could not satisfy the needs of workers with disabilities. However, it is unclear whether the expansion and diversification of items will increase the satisfaction level of the public AT service for workers with disabilities beyond bringing additional budget. The Korean government can consider providing an alternative AT service that can replace the current assistive device registration system. Beyond the simple provision of commercially available assistive devices, the government can promote overall service quality improvement through the introduction of individual case management by assistive technology experts. Through the provision of systematic services such as service planning, service selection, solution trial, re-evaluation, and follow-up by assistive technology experts, more effective and satisfactory use of AT services can be expected. The Korean government is trying to further systematize its services. For instance, KEAD is operating an assistive technology exhibition and experience hall. However the purpose of this place is limited to introduce registered assistive devices. Such fragmentary service can be improved by extending its purpose to the AT service consultation and trial use of assistive devices for a sufficient period of time. AT professionals emphasize that trial use is an important procedure as a way to verify the viability of the AT service to be implemented, uncover unknown problems and, find other possible solutions [14]. Several studies have reported that about 25~30% of assistive devices are unused or abandoned [15-17]. A more structured and managed approach to AT services, such as service plans for AT implementation and trial use of assistive devices, can reduce the likelihood of wasting budget by not using assistive devices [18].

Majority of workers with disabilities have positive expectations about changing the application process to applying directly. They predicted that these changes would eliminate the need to obtain an employer's permission to apply for assistive technology services, streamline the application process, and increase choice and control for workers with disabilities involved in decisions. However, additional considerations are needed to maximize the effectiveness of direct application for services. For instance, the government needs to publicize the conversion to direct application on a large scale so that it is well recognized by the public. The government should also seek a systemic approach to help individuals prepare for the increased legal liability

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and paperwork. At the same time, it should be ensured that such change does not relieve employers of their obligation to provide or cooperate in obtaining reasonable accommodations.

The results of the study implies that public AT services in Korea are limited in items and contents and do not provide consumer-centered services. Assistive technology is not synonymous with assistive devices. AT includes not only products, but also services, strategies, and practices [19]. Ultimately, it is necessary to identify what each individual needs and provide individualized services. However, what needs to be improved most urgently is that the government should make more efforts so that disabled workers and employers can more conveniently obtain information about public AT services and apply for them.

It must be pointed out that this study has limitations in interpreting the results. Because the purpose of this study is to investigate the experience and satisfaction with the process of the public AT services, those who could not apply or did not receive the service for any reason were not included in this study. If those with disabilities are included in further research, it is expected to obtain information and opinions that will help bring public AT services to more potential consumers.

E. Conclusions

Assistive technology services are playing an increasingly important role in the vocational rehabilitation and employment of workers with disability. In response to the recognition of the importance of assistive technology and the demand for service improvement, the Korean government has recently initiated a positive change by adding workers with disabilities and public officials with disabilities to the eligible applicants. In addition, consultation on the selection of assistive devices has been strengthened by considering the type, characteristics, and degree of disability, and inconveniences in performing job duties. These changes are in line with the requests of workers with disabilities identified in this study, and make them expect more changes in the future. It is hoped that the application eligibility will be gradually expanded so that anyone with a disability who wants to work can benefit from public AT services. moreover, the government's propective service improvement and support are needed to enable more comprehensive case management such as try-on of assistive devices, training on the use of assistive devices, and follow-up management beyond consultation on the selection of assistive devices.

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