Accessible Design  

and  

Surveys on Daily Inconveniences Experienced by Persons with Disabilities and Older Persons  

(063)  

Yasuyuki Hoshikawa$^1$ and Yukiko Mizuno$^1$  

$^1$ The Accessible Design Foundation of Japan  

2-5-4 Sarugaku-cho, Chiyoda-ku  

Tokyo, Japan  

E-mail: mizuno@kyoyohin.org

Abstract: This paper explains what accessible design (AD) means and why the concept is needed in the world in the 21st century. It also shows the results of the surveys on daily inconveniences experienced by persons with disabilities and older persons. These surveys serve as a basis for development of products with AD considerations. This paper also describes how the inconveniences and needs are incorporated into AD products and shows some examples of AD products that are used in work environment. The paper also introduces information exchange and communication practice in Japan. Specifically, the paper explains about the Accessible Design Council, where people from ministries, agencies, academic associations, and etc. can communicate with each other in a free and friendly manner.

1. Introduction—the background

1.1 The background—Why is Accessible Design needed?

Two points can be underlined as reasons why Accessible Design (hereafter, AD) is relevant in the world in the 21st century.  

The first point is unprecedented population ageing. In case of Japan, the population of those over 65 years old consisted 17.9% of the population in 2001. In the year 2030, however, it is estimated to jump up to 29.6% of the population. It is obvious that people’s advanced age and decreased functions must be taken into consideration when developing products.  

Another factor is increasing social participation of persons with disabilities. The Convention on the Rights of Persons with Disabilities was unanimously adopted at the general assembly of the United Nations in December, 2006. In the article 9 of the convention, accessibility is clearly stated. Based on the convention, domestic laws in the ratifying countries must conform to the convention, and in the near future, the considerations for persons with disabilities will be taken for granted.

1.2 The definition of AD

AD refers to products/services that are easily used by all people including persons with disabilities and older persons.

<table>
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<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
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<tbody>
<tr>
<td>I … Specialized assistive products</td>
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<tr>
<td>II …Mainstream assistive products</td>
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<tr>
<td>III…Accessible design products</td>
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<td>IV…Barrier-reducing products</td>
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<td>V …Products for general public, without AD considerations</td>
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Figure 1. Definition of AD
Products in the category I in Figure 1. are items that are developed for specific physical characteristics and not used for general public. Wheelchairs are a good example for this category.

Category II is a group of products that were originally designed as assistive products, but came into broader use without modification. Lighters and shoehorns fall into this category.

The category III is so-called accessible design; it refers to the products designed for general users including persons with disabilities and older persons.

Category IV refers to the general products modified to meet various people’s needs.

Category V is the products manufactured for users without disabilities.

In the broadest sense, category 2, 3 and 4 can be regarded as AD.

1.3 Dissemination of AD

The Accessible Design Foundation of Japan (hereafter, the ADF Japan) was established in 1999 for the purpose of promotion and dissemination of AD.

In 1991, a voluntary group named the E&C Project was established aiming at promoting AD products and services to realize a barrier-free society where all citizens can live with ease. This group was the forerunner of the present ADF Japan. The group conducted surveys on inconveniences experienced by persons with disabilities and older persons. Based on the result of these surveys, the group started its work for promoting AD products and the standardization work in designing such products and services.

In order to work on a larger scale and to meet the greater needs of the society, the E&C Project changed its form from a voluntary one to a foundation in the year of 1999. It also was renamed the Accessible Design Foundation of Japan (hereafter, the ADF Japan). Taking over the work of the E&C Project, the ADF Japan has been contributing to the society by raising people’s awareness and maintaining networks for promotion of AD products/services.

The ADF Japan’s Activities

(1) Cooperation with the manufacturing sector
With the advent of unprecedented ageing society, the needs for AD products and services have been intensified. At the same time, the word “AD products/services” has come to be regarded as a key term for the industries. The ADF Japan supports the business sectors in various ways such as promotion of standardization and co-creation systems through organizing symposiums and user surveys.

(2) Promotion of AD products and services
The ADF Japan’s another activity is to promote the concept of AD to the general public. The ADF Japan participates in exhibitions, publishes brochures for children, puts articles in magazines, and provides information on the internet. Under cooperation with school teachers, the ADF Japan educates children and students regarding the importance of AD products/services. The staff members visit elementary schools and junior/high schools on a regular basis.

(3) Standardization
Standardization is an important field for universality of AD products. The ADF Japan is working in close cooperation with the Japanese government and other bodies for international and domestic standardization of AD products.

Internationally, the ISO/IEC Guide 71, which provides basic AD related consideration points, was finalized in 2001. The ADF Japan contributed greatly in the process of compiling this Guide. The ISO/IEC Guide 71 has been introduced in Japan as a domestic standard, and 28 individual AD standards have been developed in Japan based on the ISO/IEC Guide 71.

(4) Research
In order to develop AD products and services, it is necessary to study what kinds of inconveniences are experienced in daily lives. The ADF Japan conducts surveys on the inconveniences and the needs of various people including persons with disabilities and older persons. The gathered information is compiled as database and is provided to various sectors of the society to help devise AD products and services. At the same time, the ADF Japan works with the central and municipal governments to organize R&D projects to make a difference in the policy-making process.
2. Surveys on inconveniences experienced by persons with disabilities and older persons

2.1 Overview

In order to find out what kinds of devices with AD concept are needed, it is indispensable to know what inconveniences are experienced by persons with disabilities and older persons. In other words, devising accessible products and services starts with grasping the needs of persons with disabilities and older persons. For this purpose, a series of surveys were conducted by the E&C Project and the ADF Japan. The surveys were conducted with cooperation from 12 disability organizations. Table 1 shows kinds of surveys conducted from the year 1993 to 2003.

<table>
<thead>
<tr>
<th>Year</th>
<th>Target</th>
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<tbody>
<tr>
<td>1993</td>
<td>Persons with visual impairments</td>
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<tr>
<td>1995</td>
<td>Persons with hearing impairments</td>
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<tr>
<td>1995</td>
<td>Pregnant women</td>
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<td>1997</td>
<td>Older persons</td>
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<tr>
<td>1998</td>
<td>Wheelchair users</td>
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<tr>
<td>2002</td>
<td>Persons with low vision</td>
</tr>
<tr>
<td>2003</td>
<td>Persons with intellectual disabilities</td>
</tr>
<tr>
<td>2003</td>
<td>Children</td>
</tr>
</tbody>
</table>

In this paper, the surveys targeting persons with visual impairments, persons with hearing impairments, and wheelchair users will be discussed in details.

Along with the surveys listed above, “Surveys on work environment for workers with decreased physical functions” was conducted in 2006, which this paper also looks into in details. The details of these four surveys above are shown in Table 2.

<table>
<thead>
<tr>
<th>Title of Survey</th>
<th>Persons surveyed</th>
<th>Respondence rate</th>
<th>Survey method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons with visual impairment</td>
<td>Application of 406 subscribers of national braille newsletters</td>
<td>69% 279 responded</td>
<td>Mailing, telephone in-person interview</td>
</tr>
<tr>
<td>Persons with hearing impairment</td>
<td>654 wheelchair users who belong to the Spinal Injuries Japan</td>
<td>48.5% 317 responded</td>
<td>Mailing, telephone in-person interview</td>
</tr>
<tr>
<td>Wheelchair users</td>
<td>450 Members of organizations of hearing impairment</td>
<td>68% 308 responded</td>
<td>Mailing, telephone in-person interview</td>
</tr>
<tr>
<td>Work environment for workers with decreased physical functions</td>
<td>Random selection of 800 listed companies</td>
<td>20.7% 166 companies responded</td>
<td>Mailing</td>
</tr>
</tbody>
</table>

2.2 Results of the surveys

2.2.1 Inconveniences experienced by persons with visual impairment

Figure 2 shows general inconvenience at home experienced by persons with visual impairment. Figure 3 and 4 indicate what kind of electrical appliances are inconvenient to use by persons with visual impairment and why they are inconvenient.
2.2.2 Inconveniences experienced by persons with hearing impairment

In a preliminary phase of the survey on persons with hearing impairment, most of the respondents stated that they didn’t experience inconveniences in their daily lives. With the follow-up examination, it was found that persons with hearing impairment are not aware of sound information around them, thus not
feeling any inconveniences. Therefore, it was decided that examples of sounds usually heard in a daily life were presented to the respondents beforehand. As the next step, the respondents were asked about their opinions as to which sound information was necessary for their daily life. Figure 5. shows what sounds are needed in the work environment.

2.2.3 Surveys on wheelchair users

In this survey, 50 actions were listed in the questionnaire. Wheelchair users made checks in the actions with which they encounter difficulties. Figure 6. indicates top 25 inconveniences experienced by wheelchair users.

![Figure 6. Inconveniences experienced by wheelchair users](image)

2.2.4 Surveys on older persons

The survey on work environment for workers with decreased physical functions was conducted in 2006. This survey was made possible as a joint research with the Japan Society for the Promotion of Machine AD introduced

![Figure 7. Aged workers and work environment that need AD taken into account](image)
Industry.

The respondents of the survey were not older persons themselves but listed companies. 63.3% of the companies responded to the survey are currently hiring workers over 60 years. At the same time, 24.1% of the respondents have an intention to increase employment of persons over 60 years old. Figure 7 shows the list of items in offices with AD considerations and items that need AD taken into consideration in the work environment.

2.2.5 Survey summary

In the surveys targeting persons with disabilities, various inconveniences were pointed out depending on types of disabilities and situations.

In general, persons with visual impairment encounter inconveniences regarding obtaining information and distinguishing similarly shaped objects.

As for persons with hearing impairment, it was found that they are not aware of the sound information around them. It is desirable that sound information be presented in other forms.

In the survey concerning the aged workers and work environment, more than 50% of the companies responded answered as that some kind of AD has been introduced or should be introduced to their facilities in order to address workers’ decreased physical functions. Taking into account ageing of the population and increasing social participation of persons with disabilities, it is obvious that AD consideration is highly beneficial to the society as a whole.

3. User needs and AD products

Based on the results of the surveys, manufacturers have been making efforts to materialize AD products. Some industries have developed a series of guidelines for AD products and the products that satisfy the guidelines are certified by the industry as AD products.

3.1 The market scale of AD in Japan

Figure 8 shows the market size of AD products and services. The market size was 4.1 billion US dollars in fiscal year 1995, and it has steadily expanded to 22 billion US dollars in fiscal year 2004, which is five
times as big as in the year 1995. The increase indicates strong demand for products with AD considerations by the general public. Particularly, electrical appliance industry has devised more AD products than other industries, and its increase of the market scale is one of the biggest of the AD market as a whole.

3.2 Product examples

In this section, some examples of AD products in offices will be introduced. In an office, various considerations have to be taken into account. An office consists of many portions; for example, it’s a part of a building. This means that an office has an entrance, elevators, ventilations, lightings, and etc. As it’s for an office use, it naturally needs office equipment and furniture such as photocopiers, telephones, desks, cabinets, and etc. Considerations for disabilities and decreased physical functions should be taken into account in each component part of offices.

The elevator in Figure 10. was developed by the process of accessibility verification of the older persons, persons with visual impairment and wheelchair users. In the car of the elevator, mirrors and handrails are equipped to meet various needs of the users. The button layouts are designed for easy recognition with high contrast and raised characters. The information on the buttons is also indicated in braille. The location of the braille is standardized in the Japanese Industrial Standard (JIS T 0921:2006).

The toilet in Figure 11. is equipped with flip- up armrests for easy sitting down and standing up. The product is operable with a remote controller. The positional relation of the flush button, the paper holder, and the emergency button is standardized by the Japanese industrial standard (JIS S 0026:2007).

The height of the table top in Figure 12. can be electrically adjusted. The height range is from 685 mm to 1055 mm to ensure wheelchair accessibility.
Figure 13. shows a bone-conduction telephone. By pressing the receiver onto bone around the ear or the cephalic part, the sound vibration is conveyed directly to the skull, allowing clear sound. It also has a function of “speed reduction,” which reduces the speed of rapid utterance. Two functions of clear sound and speed reduction enable persons with hearing disabilities and older persons enjoy talking on the phone. As for the telephone set, there is a raised dot on the button five so that users can tell the basic position of the button layout. Placing a dot on the button in the basic position is standardized in the Japanese Industrial Standard (JIS S 0011).

As for the cash register in Figure 14, the height of the letters shown in the display is 14mm and the letters utilize yellowish green LED. The size of the keys that are frequently used are larger so that users minimize misoperations.

The stapler in figure 15. can be used with strength of 50% less than that required to use ordinary staplers. The round shape is comfortable for a long-time grip. Refilling staples is also easy.

The scissors in figure 16. have a safety lock so that they don’t open accidentally. The scissors are supported by spring and can be used for long periods of time without feeling fatigue.

The binders in Figure 17. is the one that needs only one finger to open and close. The product is made of soft plastic that is comfortable for operation.

4. Conclusion

With efforts made by manufacturers and enhanced social awareness, more and more AD products have come to the market in Japan. For further dissemination of AD, collaboration among various sectors in the society is indispensable. In particular, collaboration with disability and elderly organizations and with the academic circle should be noted.

Knowing needs of persons with disabilities and older persons is the first step to devise AD products. International scheme to gather the information would be most desirable. In this regard, an advisory group for accessible design is going to be established in ISO/ TC 159 (Ergonomics) in November, 2007. Vigorous activities of this advisory group are much anticipated.

At the same time, ergonomic expertise is indispensable to grasp human characteristics including those
of persons with disabilities and older persons. Collected data has been utilized to alleviate inconveniences and help manufacturers devise AD products. In the meantime, experts in the field are actively involved in the process of international standardization related to AD.

For coordination of various sectors in the society, the ADF Japan set up the Accessible Design Council which has been providing a place where people from ministries, agencies, academic associations, and etc. can communicate with each other in a free and friendly manner. The Accessible Design Council holds meetings on a regular basis, seminars, symposiums, and so on.

AD products are developed with a cycle of finding of inconveniences, ergonomic research, and manufacturer’s efforts. Continuation and coordination of efforts in each field is essential to realize a truly accessible society to every citizen.