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USABILITY AND ADAPTABILITY OF PERSONAL MOBILE DEVICES (PMD) FOR STREET VENDORS WITH PHYSICAL IMPAIRMENTS

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ABSTRACT

Persons with physical impairments have limited regenerative abilities and mostly limited to some scope that they are able and unable to do and their participation in the activities are restricted. In Selangor, statistics show the increase number of registered people with disabilities and unemployed due to their limitations and restricted accessibility. They should enjoy independent life and have jobs, for example, by venturing into small medium entrepreneur sector. The role of entrepreneurship has become growing attention in the nation, especially in boosting income generation which is aligned with the current government agenda in development plan and the people with disabilities should not be left out from this agenda. Many forms of personal mobile devices have been introduced to overcome their difficulties. However, the usability of the devices and the ability of the users to adopt the devices are uncertain. This research aims to understand the potential of using mobile device as independent assistant for the users, especially for the street vendors with physical impairments. The objective of the research is to determine the potential criteria of usability of mobile devices for working environment of the vendors in small medium entrepreneur sector. The discussions are based on reviews of related researches and literatures from different sources that were published over the past decade. The data also were collected by interviewing a group of people with physical disability and on-site observation. A group of personal mobile devices was identified including independent wheelchair assistant, robotic wheelchair and wheelchair motorcycle. The results suggest that the device helps users independently access their local communities in some way, but there were several potential usability requirements and adaptability need to be explored. On the basis of the findings, further research to formulate design guidelines for the assistant mobile device for street vendor with physical impairment is exigency.

Keywords: Personal mobile devices, street vendors, physical impairments, PWDs

INTRODUCTION

The unemployment statistics of persons with disabilities in Malaysia is still persistently high. The recent available statistics taken from the Labour Department of Peninsular Malaysia revealed that currently only about 6,750 persons with disabilities are employed in the private sector and less than 1% of the total disabled population are employed in the public sector. Opportunities for them seem limited in terms of career, family, social and community activities. Today, the disabled persons have yet to be fully accepted in the open job market. Most of the employees are afraid to take disabled people to work because of their limitation of accessibility. In other perspective, people perceive the persons with disabilities cannot do better job than ordinary people do. In today's life, they should enjoy independent life and be given opportunity to have career, for example, by venturing into a small medium entrepreneur sector. The role of entrepreneurship has become a growing attention in the nation, especially in boosting income generation which is aligned with the current government agenda in development plan. The persons with disabilities should not be left out from this agenda. The statistics from Research and Development Division, Department of Social Welfare, Putrajaya, Malaysia show the increase number of persons with physical impairments. The total number of registered persons with physical impairments in 2016 is 142,600 peoples and it has been increased in the year 2017 with a total number of 153,426 peoples. These persons usually require personal mobile devices and many forms of the devices have been introduced to overcome their difficulties. Wheelchairs today are now considered not only a means of transportation but also as one way to allow users to express their individuality (Nirmal, 2014). However, the usability of the devices and the ability of the users to adopt the devices are uncertain although there is potential of using mobile device as independent assistant for the users, especially for the persons with physical impairments. Therefore, the objective of the research is to determine the potential criteria of usability of mobile devices for working environment of the vendors in the small medium entrepreneur sector.

PERSONS WITH DISABILITIES

Persons with disabilities are vulnerable to psychological problems, such as poor self-concept and self-esteem that further prevent them from seeking employment (Fumitaka Furuoka et al., 2011; Hussain, 1995). Studies have indicated that people with disabilities have been aware of the potential discrimination in education, training, and employment from a young age (Raske, 2015). Such insure feelings foster a sense of self-limiting conservatism, which in the long run, may negatively influence their career aspirations and employment (Fumitaka Furuoka et al., 2011). Lack of accessible transportation appears to be the greatest problem faced by the people with disabilities (Pfeiffer, 2001; Memorandum on Disability Issues, 2015). Without a customized transportation system, many people who might otherwise be able to join the workforce will be confined to their homes, particularly those with physical disabilities (Barnes, 2012). Physical barriers such as inaccessible buildings and non-disabled-friendly facilities at the workplace can also hinder the employment of persons with disabilities.

Transport design including personal mobile device is to create something new and to give at least one function towards users to solve problems of any issue including those related to disabilities. Indeed, most of the existing products were produced with less research on functionality and usability. Compact and innovative designs become trends in industrial design nowadays as it can help users doing more tasks and using their time efficiently (Simpson, 20014). Suitable vehicles are necessarily important in improving the daily life routine of persons with physical impairment.

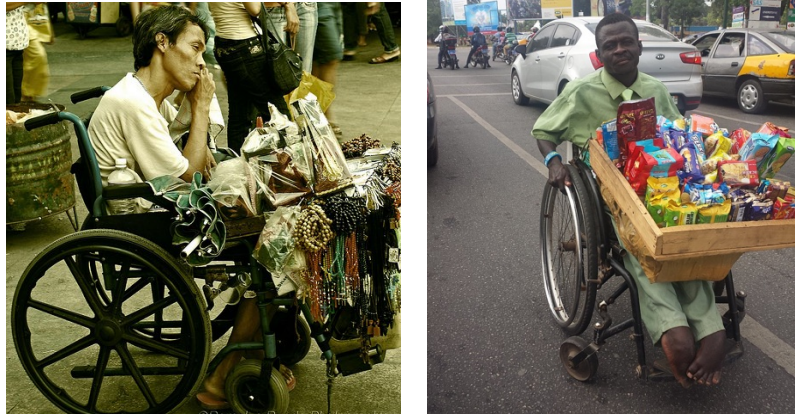


Figure 1: Users of wheelchair with different physical impairments

Statistic of Registered PW Ds in Malaysia

Prevalence of persons with disability in Malaysia is growing, a total of 437, 954 individuals in 2017 based on a survey on living conditions among persons with disability. The statistics from Research and Development Division, Department of Social Welfare, Putrajaya shows the increase number of PWDs in 2017 with a total 437, 954 people as compared to 409,269 peoples in 2016 and 365,577 peoples in 2015. In Selangor, the statistics show the increase number of registered persons with disabilities in 2017 as compared to their numbers in 2015 and 2016 as shown in Table 1. This table illustrates the increase numbers of registered persons with disabilities in the three years periods.

Table 1: The number of registered PWDs in accordance to states, 2015-2017

State	Year		
	2015	2016	2017
Johor	45,953	50,312	52,753
Kedah	32,983	36, 435	38,764
Kelantan	25,947	29,264	31,553
Melaka	18,391	20,059	21,111
Negeri Sembilan	17,273	19,171	20,242
Pahang	21,946	24,350	25,931
Perak	33,020	36,099	38,210
Perlis	4,404	5,002	5,506
Pulau Pinang	22,094	24,775	26,349
Sabah	22,806	25,593	27,725
Sarawak	25,037	28,159	30,164
Selangor	55,594	63,514	68,648
Terengganu	18,281	20,467	22,070
W.P. Kuala Lumpur	20,911	24,913	27,666
W.P. Labuan	1037	1,156	1,262
TOTAL	365,677	409,269	437,954

There are different categories of disabilities as highlighted by the statistics and each category shows the increase numbers of persons in the three years period. Table 2 shows that physical impairment is the most common type of disability in the year 2017, followed closely by learning disabilities. Although the statistic shows the least numbers of persons with speech impairment, this type of disability also gradually increases.

The World Health Organisation (WHO) estimates that 7-10% of human beings have some degree of impairment or disability. About 80% of these live in developing countries and of these it is estimated that less than 5% have access to rehabilitation services. Pfeiffer (2001) defines physical impairment as a disabling condition or other health impairment that requires adaptation and these conditions may be either temporary or more permanent. Different types of physical impairment cause limitation in independent which are often associated with leg fractures, strokes, morbid obesity, trauma, and Multiple Sclerosis (Barnes, 2012). Persons with physical disabilities have restricted mobility that affect their activities of daily living, thus they are usually unemployed due to their limitations and restricted accessibility.

Table 2: The numbers of registered PWDs in accordance to the category of disabilities

Categories of Disabilities	Year		
	2015	2016	2017
Visual impairment and blindness	32,807	36,692	39,114
Hearing impairment	29,636	31,937	33,414
Physical impairment	125,491	142,600	153,426
Learning disabilities	129,550	143,334	153,083
Speech or language impairment	1,827	2,104	2,274
Mental	29,403	33,518	36,183
Others	16,936	19,084	20,460
TOTAL	365,677	409,269	437,954

METHODS OF RESEARCH

This research involved qualitative methods of data collection. The secondary data for this research are based on reviews of related researches and literatures from different sources that were published over the past few years. The primary data were collected by interviewing a group of people with physical disability and in complementary with direct observation. Direct observation was employed because this method does not require the researcher to become a participant in the context. Also, the researcher can capture via technology the phenomena being observed. This method of data collection tends to be more focused and less time consuming. The observation was conducted to observe the street vendors with disabilities in their trade dealings at the well-known street markets and business areas in Kuala Lumpur. These places are suitable environment for the data collection that represent local culture, diversity of age groups and races, and different types of selling goods. The street vendor is also known as street trade, which includes street food vendor, peddler, and hawker. Street vendors classification can be possible on various factors including their mobility and working duration. (Bhowmik, 2005) identified three categories of street vendors as shown in Figure 2. In the context of this study and according to the need of the study, all three types of street vendors were observed based on their favorite trading sites.






Figure 2: Categories of street vendors

This research also involved line-up analysis of the selected personal mobile devices, namely manual wheelchair, motorized wheelchair and mobility scooter. These types of assistive device are the major types which are the kinds of common used by people with physical impairments. As such, the analysis aimed to identify and determine the physical attributes, functions, usability and mechanism of the mobile devices.

ANALYSIS, FINDINGS AND DISCUSSION

The objective of the research is to determine the potential criteria of usability of mobile devices for working environment of the vendors in a small medium entrepreneur sector. In consistent with the objective of the study, the line-up analysis as shown in Table 3 was done to identify the usability and technology of a group of personal mobile devices including independent wheelchair assistant, motorized wheelchair and mobility scooter. Although this list of assistive technologies is not exhaustive and there are a great many more types of technologies for disabilities than are listed here, but the authors have listed some of the major types which are the kinds of common used by people with physical impairments and they are more affordable leading to them being procured as a cheaper alternative.

Table 3: Line-up analysis of selected personal mobile devices

Types of PMD	Type 1: Independent Wheelchair Assistant	Type 2: Motorized Wheelchair	Type 4: Mobility scooter
			
Description:	Design to help users independently access their local communities	Making sure the user is fully independent, capable of traversing any terrain and situation.	The design function to accommodate a user for greater mobility and independence, especially outdoors.
Type of power:	NA	Electric	Engine
Target User:	Physical Impairment Person	Physical Impairment Person	Physical Impairment Person
Target place:	Suitable used for indoor and outdoor area	Suitable used for indoor and outdoor area	Suitable used for indoor and outdoor area
Situation:	Home usage, public area	Home usage, public area For short and long distance	Home usage, public area For short and long distance
How to use:	Basic usage of transport from one place to another. Easy to navigate certain obstacles	Can be transformed to help user's activity Basic usage of transport from one place to another Easy to navigate certain obstacles	Can be transformed to help user's activity Basic usage of transport from one place to another Difficult to navigate certain obstacles
Size	Intermediate	Big	Big
Comfort:	Intermediate	Comfortable	Comfortable
Efficiency	Ease of transfer Need small space to keep the wheelchair which can be folded. The user needs to transfer into seat vehicles	Ease of transfer Fitted in most situation Need space to keep the wheelchair.	Difficulty of transfer The user need to transfer their scooter into vehicles
Mechanism	Requires upright posture, shoulder and hand strength, upper-body mobility and strength.	arm-rest mounted controller. Applied mechanism that makes product can be transformable	Applied mechanism that makes product can be transformable

The line-up analysis of the selected personal mobile devices reveals that all devices are suitable for persons with physical impairment and they can be used for indoor and outdoor area. However, there are some distinctive operational mechanism between wheelchair and mobility scooter. The purpose of the analysis was to determine the most suitable assistive device to meet their needs, especially if they venture in the small medium entrepreneur sector. Motorized wheelchair also known as electric powered wheelchair is accommodative in making sure the user is fully independent, capable of traversing any terrain and situation. The wheelchair offers comfort and ease of transfer from one place to another and the device is fitted in most situation. Meanwhile, the mobility scooter has some limitations including the extra size of the device and difficulty in navigating through obstacles in the user's environments. Other drawbacks of mobility scooter include its longer length, which limits their turning radius and ability to use some lifts or other wheelchair-designed access technologies such as kneeling bus lifts. In addition, individual needs may affect the suitability of the individual device for various situation and places. According to Kohei and Ronny (2011), a power chair user might also have special seating or arm and leg rest requirements that are better served by a power chair than a mobility scooter.

The findings suggest that all selected devices help the users with disabilities independently access their local communities in some way. Indeed, there were several potential usability requirements and adaptability need to be explored. As a wheelchair user, the person is unable to walk due to his or her injury or illness and the person relies on the assistive devices to move around. Their disabilities are either temporary or permanent. Based on the direct observation conducted along Jalan Masjid India, Kuala Lumpur, Malaysia, many street vendors with disabilities, namely having neuromuscular disorders and injuries used the wheelchair as assistive device to increase and ease mobility, for example as shown in Figure 3. Their adaptability with the devices as observed by the author is on their easy navigating in restricted spaces, whether in the public spaces or buildings.



Figure 3: A street vendor uses assistive device for ease of movement in the restricted space

One of the vendors explains, “the wheelchair device is affordable and specifically tailored to the user to ensure that they are properly fitted and easy to manage”. On the aspect of efficiency of the device, other vendor mentions, “manual wheelchair offers ease of transfer and easy to keep in vehicles due to its lighter and compact design. The user needs to transfer into seat vehicles thus it is fittingly prescribed for users with any disability to walk within a limited movement”. However, one of the draw backs of presently available wheelchairs is that this assistive device is not designed for all types of disability. Wheelchairs are used for specific disabilities and physical barriers place additional requirements on the strength and durability of wheelchairs (Nirmal, 2014).

The study noted with aspiration that persons with physical disability would gain more accessibility into vending for living survival and subsequently, vending would promote their self-sustenance and empowerment. However, they may face many challenges, for examples negative street experiences and unfavorable urban elements and spaces. There is a vital need for the local authorities of Kuala Lumpur to provide the condition for the entire individual with all physical and psychological conditions in society to use the existing urban facilities in accordance with each individual need. In 11th Malaysian Plan, the Prime Minister has set another milestone as the nation embarks on an imperative mission towards a progressive high-income nation, as envisioned in Vision 2020. For Malaysia to be a high-income nation, the people should be able to compete on a regional and global stage. In accomplishing this goal, all Malaysian should give their contributions and put forward their best in seizing the opportunities available to be able to take this challenge for the future generation and the future of this country. Malaysia should provide the accessibility to all range of human kind to the major community as well the minority as they will commit towards country development. The distributional policies of the government will therefore be focused towards ensuring equality of opportunities for all no matter of age, which refer to youth generation and elderly people. They should never differentiate their status of poor or rich, normal or disabled physicality. Persons with disabilities have been categorized as a minority in Malaysia and undoubtedly, they can also contribute to the country development. The Malaysian government's awareness of the issues of the disabled stems from policies aimed at involving them in societal development on an equal basis with non-disabled (Osman, 2015). As such, they can attain opportunity to become a competitive, creative and innovative person. In their case of physical disabilities, assistive devices like wheelchairs and other personal mobile devices are a dime a dozen but the advent of advance and affordable technologies should be truly enabling them to commit towards country development. Their involvement in the developments challenge traditional perspectives of disability in social work (Raske, 2005). Also, there is a need for employers to examine potential professions for persons with disability. Pfeiffer (2001) points out that if the social system is truly flexible and fully accommodates the PWDs, disability would disappear. They will no longer be considered as disadvantaged or minority group.

CONCLUSION AND RECOMMENDATION

The study found that the wheelchairs, especially the one with motorized technology has more advantages with little restrictions on the usage as compared to the mobility scooter. The findings suggest that the wheelchair devices help the vendors with physical impairments to access their local communities independently in some ways. However, there are several requirements of usability and adaptability need to be improved, especially on the aspect of design flexibility and operational mechanism of the device in meeting the users' individual needs. These serve as practicable criteria on the usability of mobile devices for working environment of the vendors in small medium entrepreneur sector. Accordingly, manufacturers may consider modifying the mechanism and efficiency of mobility scooters to appeal to the users. While a powered wheelchair eliminates much of the problem of a manual wheelchair, its appearance and efficiency still requires some improvement to be more appealing and affordable for more users. Therefore, further research is necessary to investigate further on the design of new assistive device for street vendors since there is no specialized device or vehicle available and the research should focus on their needs for work performance. In general, there are many aids and devices that can help people with physical impairments live more comfortably and independently. However, they are not specifically designed and manufactured for the users. As most of their disabilities are varies, it is likely that their needs for assistive devices are differs accordingly. The street vendors with disabilities increasingly rely on the assistive devices for both career and personal use. This device technology helps them stay connected to their surroundings and other human beings especially their coworkers, clients and customers, hence the use of specialized mobile device at workplace can raise compliance with the nature of working environment. The 1Malaysia concept has its core, the principle of social justice. This principle necessitates a renewed focus on championing the interests of every community, ensuring no group is left behind or marginalized in the interest of nation's development. However, social justice in Malaysia requires taking into consideration the respective levels of achievement of each community. Therefore, it involves adopting a fair approach in terms of providing additional assistance to the disadvantaged groups, namely the PWDs. Malaysia has endorsed the United Nations Convention on the Rights of Persons with Disabilities and enacted the Persons with Disabilities Act 2008 for promotion of the betterment of Persons with Disabilities. Similarly, the Article 8 (1) and (2) of the Federal Constitution 1957 has provided equality of all before the law and protection for all citizens against discrimination on grounds of race, descent, or place of birth in any law. Therefore, the rights of the persons with disabilities need to be fully protected. The national statistic shows the growing numbers of registered PWDs year by year. Hence the objective is to ensure that all Malaysians are brought to the equal opportunity in pursuing their livelihoods, independent living and community participation. Every human in this world has their own

hope, ambition and dreams which are different from each other. Humans need earnings for their living needs, either they are normal people or people with disabilities.

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