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Employment Survey of Wheelchair Users and Influential Factors Identified in a Social Enterprise in Hong Kong

Ching Han Young, Siu Hin Lau, and Ka Yuk Carrie Lin

ABSTRACT

Wheelchair users often face both physical and psychological barriers to employment due to restrictions on body movement and inadequate infrastructure in the environment. Over the years, the Hong Kong government and authorities have gradually improved barrier-free access in establishments and major transport service. Employment support has been offered in terms of job pairing, subsidies for employers, and training programs while regulation is not adopted. Individual voices of wheelchair users were usually conveyed through local community groups working to serve their needs. The collection of quantitative data on the employment situation of wheelchair users could provide evidence for representatives to address their concerns during discussions with government committees. While environmental obstructions are removable, personal barriers and motivating factors are less visible and endogenous. This collaboration project with a social enterprise has collected employment data of their members who are wheelchair users and explored factors associated with their employment prospects.

Keywords: Employment Survey, Hypothesis Tests, Influential Factors, Logistic Regression.

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I. INTRODUCTION

The motivation of this study stems from an interest in understanding the employment difficulties faced by local disability groups with the aim to collect quantitative data of related factors and improve their employment prospect. The challenges faced by different disability groups (e.g., visually impaired, hearing impaired, mentally handicapped, physically handicapped) could be complex, even for those within the same group, and thus affected their work motivation and employment opportunities in different ways. Factors and barriers influencing employment of wheelchair users have rarely been studied with systematic analysis. Our aim was to survey the multiple factors possibly affecting their employment rate, including personal background, psychological, environmental, external and government supporting policies.

In a government report (Census and Statistics Department, the HKSAR, 2021), the number of persons with disability (PWDs) in 2020 was 534200, equivalent to 7.15% of the local population of 7474200. The median monthly employment earnings of PWDs were HK\$14000 (US\$1784) as compared with HK\$17700 (US\$2255) for the total employed population. Nearly half (244000 or 46%) of the 534200 PWDs had restriction in body movement, but their median monthly employment earnings of HK\$11000 (US\$1401) was 20% less than that of all employed PWDs (HK\$14000 or US\$1784). It is likely that the gap would further widen due to

the recent impact of COVID-19 on the economy. Among those with restriction in body movement, wheelchair users (WCUs) have severe restriction which had limited their employment opportunities and their potential often understated. Unfortunately, the current infrastructure in this city of high population density with steep slopes still created obstacles for wheelchair users to move around for leisure or for work, despite having gradual improvement in accessibility (Myat, 2020). The local government has been the largest employer of PWDs. However, it has employed less than 2% disabled civil servants since 2015/16 and the recent trend seems decreasing and down to 1.53% in 2020/21 (Zheng, 2022). In terms of annual new recruits of civil servants from 2010-2019 (Civil Service Bureau, the Government of the HKSAR, 2013; The Government of the HKSAR, 2015 & 2019), the percentages of new PWDs recruited annually all fell below 1% as compared with other countries and the trend (least-squares slope) is 0% (i.e., basically no change) over the 10 years.

This study is collaborated with a social enterprise primarily serving the severely physically disabled people. The goals of the association include promoting mutual help among members and supporting their integration into the community, reflecting their needs and cultivating mutual understanding between the mainstream and minorities. The association provide rehabilitation service to WCUs to boost their confidence as members of the community, offer employment support and training courses of new technology

to encourage members to become more financially independent. Our common goal is to collect employment-related data of their members, participation in the government supporting programs and their feedback through a survey study. The following objectives have been adopted in designing the questionnaire:

- 1) Evaluate the current employment status of WCUs in Hong Kong through members of a social enterprise established since 1995
- 2) Analyze the factors affecting low employment rate of WCUs
- 3) Compare the characteristics of WCUs of different employment status and their perception about sources of work pressure
- 4) Collect data on participation of government enhancement or support programs and solicit feedback
- 5) Provide recommendations on improving work motivation and employment prospects

II. LITERATURE REVIEW

A. Employment Survey on Wheelchair Users

Past employment surveys for the disabled often considered PWDs as a whole group. According to local classifications, there are nine different types of PWDs: restriction in body movement, seeing difficulty, hearing difficulty, communication difficulty, mental illness/mood disorder, autism spectrum disorder, specific learning difficulties, attention deficit/hyperactivity disorder and intellectual disability (Census and Statistics, the HKSAR, 2021). Nearly half of the PWDs had restrictions in body movement. Around 1% of the total population or 74200 always used a wheelchair to move or walk around. However, relatively few studies have studied their employment-related factors from the perspectives of WCUs. Due to barriers and inadequate considerations in the physical environment including transportation infrastructure, design of toilets (Matthews *et al.*, 2022), WCUs often face more difficulties among those classified as restriction in body movement, and even worse in emergency situations (Qi and Hu, 2020).

B. Questionnaire on Work Ability

Apart from body restrictions, the psychological health would affect a person's work ability. In understanding how different psychometric properties of workers affect their work ability, the Work Ability Index (WAI) questionnaire has been known as an instrument for measuring work ability. Adel *et al.* (2019) customized the WAI questionnaire for employees working in two Iranian petrochemical and car manufacturing companies. Results from 750 respondents showed good correlation of work ability with workers' life at work and leisure time, self-perceived work ability, health status and health-related limitation.

C. Government and Employer Influence

When government initiatives are combined with the right environmental factors and personalized employment support, such as understanding of disability from managers and social acceptance in workplace, the result could be a positive experience. Lewis *et al.* (2013) reported the interview with 98 participants of the WORKSTEP programme in UK. Negative comments about work were less common than positive

comments and they also appreciated the benefits work had on their lives and well-being.

On the demand-side employment, Chan *et al.* (2021) examined the company characteristics that are more likely to have disability inclusion practice and higher employment rates of PWDs. The questionnaire completed by 466 employers in United States revealed that large- and medium-sized companies, Fortune 500 companies and Federal contractors were significantly more likely to implement disability inclusion practices and more receptive to employing PWDs. Suggestions were proposed to state agencies and PWD service providers which include cooperating with employers having intention to hire PWDs, identify suitable types of workers and positions they need to fill and provide appropriate training to these employers.

In United Nations' fact sheet (United Nation, 2007), employers in different countries have pointed out the strengths of their PWD employees. Australian employers found they cherish the job more and would pay effort to maintain it. Information technology-enabled services employer in India appreciated their loyalty and hard-working attitude. IBM employer in New Zealand complimented their excellent problem-solving skills which had been acquired through managing their difficult life. A business process outsourcing company in Singapore found them very dedicated, focused and efficient. A U.S. food company observed that on hiring new PWD employees, their work attitude affected others in a way that resulted in lower employee turnover rate, higher productivity, lower absenteeism and tardiness. Some WCUs started their own business with their area of expertise developed and continued to campaign for disability rights in both career development and sports activities (Lee, 2022).

For employed PWDs interviewed in Denny-Brown *et al.* (2015), the most frequently used supports were assistive technology, including wheelchairs, communication devices that can facilitate their access to information. Staff support and modified work schedule/leave were found to be the second and third frequently used employment supports, respectively, on and off the job. To stay employed, some of the PWDs interviewed need to pay out of their own pockets to acquire the technology or service support. In Hong Kong (Labour and Welfare Bureau, 2019), the government has provided a one-off subsidy to eligible employers to procure assistive devices and/or carry out workplace modifications for each of their employee with disabilities. To help encourage and sustain PWD employment, a pilot scheme, the Community Care Fund has been launched in 2016 to provide a monthly subsidy of HK\$5000 (US\$642) for Higher Disability Allowance recipients in paid employment to hire carers. Providing regular timely caregiver support is crucial, as pointed out in a study for visually impaired patients (Ruiz-Lozana *et al.*, 2022). Recent local incidents also led to further enhancement in providing caregiver assistance.

III. METHODOLOGY

A questionnaire exploring multiple employment-related aspects from the perspectives of WCUs have been designed and implemented on Google form. A pilot test was launched in the week before to estimate the time taken to complete the

survey and review any necessary adjustment. The survey consisting of 182 questions can be completed within 20 minutes approximately. The official online survey had been conducted from 8 February to 7 March 2022. The data collected were mainly quantitative and categorial while some questions allow open-ended qualitative responses. The questions cover the following potential areas related to employment:

- i) Physical (e.g., severity of disability, ability of using both hands freely, self-care ability)
- ii) Education (e.g., educational level attained, language skills)
- iii) Work experience (e.g., current employment status, years of employment and number of jobs undertaken during physical impairment)
- iv) External environment (e.g., availability of barrier-free facilities in office, work location and flexibility, transportation systems for the physically handicapped)
- v) Psychological (e.g., work-life attitude, persistence in work, work ability, views of low employment rate of WCUs)
- vi) Personal finance (e.g., monthly work salary, government disability allowance, subsidies from government or other organizations)
- vii) Participation and feedback in employment enhancement or supporting programs

The research questions to be addressed are stated as follows:

- 1) What are the personal factors affecting the employment rate of WCUs?
- 2) What are the external factors affecting the employment rate of WCUs?
- 3) From the perspectives of WCUs, what are the reasons for lower employment rate than other disabilities?
- 4) What have been the sources of work pressure from past experiences?
- 5) What is the participation rate in the government employment enhancement or supporting programs and their feedback?

IV. RESULTS

A total of 94 respondents have completed the online questionnaire. The responses are first summarized by descriptive statistics before identifying the potential factors influencing employment of WCUs by further analysis.

A. Descriptive Statistics

1) Physical

The 94 respondents are of working age between 21 years to 64 years old with average of 42 years. The number of years having disabilities range from less than 1 year to 61 years with average of 26 years. There are more male (67%) than female (31%). A majority of 63% acquired disability after birth and 37% are congenital. They are classified into four types of physical impairment with a majority being quadriplegic (68%), followed by lower limb impairment (19%), tetraplegic (one of the two hands and lower limb impaired) (7%) and limb impairment with other disabilities (5%). Slightly less than half has self-care ability (44% vs 56%).

2) Education

Most respondents had attained secondary school education or above with few on the two ends: 5% completed primary school or below, 67% secondary school, 9% post-secondary non-degree and 13% bachelor's degree and 6% master degree. As compared with the young and middle-aged persons in the population from a government report (Census and Statistics, the HKSAR, 2019), a large difference is observed at the two ends: there is a larger percentage of WCUs receiving secondary school education or below (79% vs 49%) and lower percentage with post-secondary education (degree and above) than the young and middle-aged population (19% vs 40%).

3) Current employment status

Over half (55%) are currently unemployed. For subsequent analysis, we define an aggregate group, Cur_Employed, consisting of those receiving monthly salary from an external employer, working in sheltered workshop, self-employed and in paid internship. The Cur_Employed group accounts for 31% (29/94) of all respondents. Accordingly, the estimated current employment rate is only 31%. In the Cur_Employed group, the educational requirement for their employment is diverse: no requirement (38%), secondary school Form 3 to 5 (14%), Form 6 to 7 (28%) and bachelor degree (21%).

4) Work experience

Another way to understand employment-related factors is to identify the respondents who have worked during disability (even if not currently employed). They constitute a larger group of 54% (51/94), labelled as Worked group, while 46% (43/94) has never worked.

The Worked group aged between 23 to 64 years old with average of 41 years, similar to all respondents. Their years of disability was between 2 years to 61 years with average of 29 years, slightly longer than the 26 years of disability on average of all respondents. Their work experience was quite diverse.

The number of working years during disability range from less than 1 year to 49 years with average of 15 years. The longest employment period varied from less than 1 year to more than 30 years with a median of 3 years. The number of jobs they have been employed during disability range between 1 to 10 with an average of 3. However, only half (55% or 28/51) had weekly working hours of less than 40 hours, i.e., not in full-time employment.

5) Company characteristics

On examining the characteristics of the most recent employer company of the Worked group (54% or 51/94), about half of the Worked group (51% or 26/51) was employed in small companies with fewer than 20 employees, 14% and 16% were in larger companies with 100 to 499 and more than 1000 employees, respectively.

These data showed that small-sized companies have employed more PWDs than the larger companies. However, the number of PWDs (excluding the respondent) employed in these companies is small: 35% (18/51) has employed no other PWD employees while 24% (12/51) has employed only 1 to 5 PWD employees. As compared with the Cur_Employed group, the educational requirement for employment for the Worked group is shifted towards the lower level: no

requirement (41% vs 38%), secondary school Form 3 to 5 (16% vs 14%), Form 6 or 7 (20% vs 28%), post-secondary non-degree (6%) and bachelor degree (18% vs 21%).

6) Personal finance

The monthly income distribution reflects certain degree of income disparity. Out of the 87 valid responses, only about 30 respondents reported having monthly personal income. In this group with monthly income, the median lies in the range of HK\$6601 to \$12000 (US\$841 to \$1529). At the two ends, 27% received less than HK\$3600 (US\$459) and 37% received more than HK\$18000 (US\$2293).

Further analysis has been carried out to address the research questions in Section III, first on the groups based on past work experience: Worked vs Never worked. Then it is repeated on groups based on current employment status: Cur_Employed vs the Not employed. Naturally, the two paired groups share some common respondents as a respondent in the Cur_Employed group also belongs to the Worked group.

B. Personal Factors Affecting Employment Rate

To address research question 1 (Section III), the following personal factors have been identified as having association with employment rate in one or more employment groups:

- i. Self-care ability
- ii. Educational level attained
- iii. Persistence in work

When considering how different types of physical impairment with/without self-care ability affect employment rate, Table I shows the cross-tabulation data of the Worked and Never Worked groups.

Considering all types of physical impairment together, those with self-care ability have significantly larger proportion (66% or 27/41) with work experience than those without (45% or 24/53). *Self-care ability* is associated with the worked experience during disability at 5% significance

level (p -value of chi-squared test of association = 0.047). For specific type of impairment, the test indicates no significant association or not applicable due to small data. Only simple proportions of having work experience can be compared between those with or without self-care ability.

Educational level and employment rate indicate association when comparing those attaining post-secondary education (non-degree, degree or above) and those with lower qualification. This relationship is significant in the Worked and Never worked groups (p -value of chi-squared test < 0.001), as well as the two groups based on current employment status (p -value of chi-squared test = 0.013). The z test is also applied to compare difference in two population proportions at 5% significance level:

- i. The Worked group has significantly larger proportion (43%) with post-secondary education or above than the Never worked (9%).
- ii. The Cur_Employed group also has significantly larger proportion (45%) with post-secondary education or above than the Not employed (20%).

Persistence in work is found to have association with employment rate. The Worked group agreed or strongly agreed they did not give up working despite their disabilities (p -value of chi-squared test < 0.001) and similar findings for the Cur_Employed group (p -value of chi-squared test = 0.012). A larger proportion (69%) of Cur_Employed expressed persistence in work despite their disabilities than the Not employed (40%). Unsurprisingly, Fig. 1 shows those expressing persistence in work have much stronger appreciation of the benefits of working in related questions than the others. Table II reveals the monthly income statistics for the groups of different persistent attitude in work. Even though 64% (60/94) of all respondents are not employed, the general pattern indicates the more persistent the work attitude, the higher the monthly income as reflected in the median to maximum income.

TABLE I: TYPE OF PHYSICAL IMPAIRMENT WITH/WITHOUT SELF-CARE ABILITY CROSS-TABULATED WITH PAST WORK EXPERIENCE

Group	Quadriplegic impairment		Lower limb impairment		Tetraplegic impairment		Limb impairment with other disabilities		Total
	√	X	√	X	√	X	√	X	
Worked	15	18	10	3	2	1	0	2	51
Never worked	8	23	4	1	1	3	1	2	43
Total	64		18		7		5		94

√: with self-care ability, X: without self-care ability.

TABLE II: IMPACT OF PERSISTENCE IN WORK ON MONTHLY PERSONAL INCOME

Monthly income (HK\$)	Persistence in work despite disabilities?				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Minimum	*	*	*	*	*
Quartile 1	*	*	*	*	*
Median	6,601 – 12,000	*	*	*	*
Quartile 3	18,001 – 24,000	12,000	below 3,600	*	*
Maximum	above 24,000	above 24,000	6,601 – 12,000	18,001 – 24,000	Below 3,600
Count	16	30	11	32	5

*Not employed

TABLE III: FACTORS AFFECTING UNEMPLOYMENT AND THE PERCENTAGE OF SUPPORT FROM ALL RESPONDENTS

Factor affecting unemployment	Percentage support or strongly support
Inadequate barrier-free facilities in work location	77%
Lack of appropriate employment opportunities	74%
Inadequate transportation systems to work location for physically handicapped	68%
Need caregiver assistance	64%
Difficult for employer to have empathy or understanding about needs of PWDs	57%
Do not have employment direction	57%
Do not pass job interview	55%

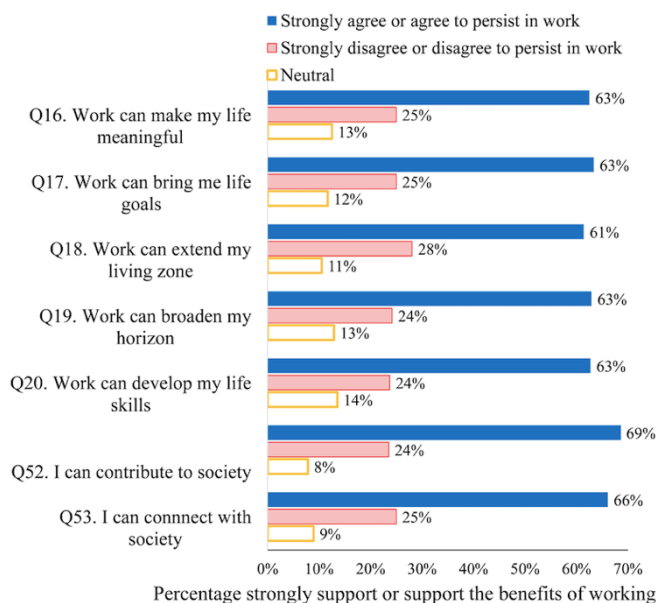


Fig. 1. Relationship between persistent work attitude and views on benefits of working.

Logit Regression Results

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=====
Dep. Variable:      Worked      No. Observations:      94
Model:             Logit      Df Residuals:         89
Method:            MLE        Df Model:              4
Date:              Thu, 03 Nov 2022      Pseudo R-squ.:       0.2886
Time:              14:50:23      Log-Likelihood:      -46.107
converged:         True        LL-Null:              -64.815
Covariance Type:  nonrobust      LLR p-value:         1.479e-07
=====

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	coef	std err	z	P> z	[0.025	0.975]
const	-2.5778	0.689	-3.744	0.000	-3.927	-1.228
Years_of_disability	0.0383	0.019	2.067	0.039	0.002	0.075
Self-care ability	1.2576	0.536	2.347	0.019	0.207	2.308
Persistence	1.6480	0.521	3.166	0.002	0.628	2.668
Edlevel	2.0993	0.686	3.059	0.002	0.754	3.444

Fig. 2. Classification Model of Worked Group by Logistic Regression.

C. External Factors Affecting Employment Rate

To address research question 2 (Section III), barriers of employment are identified. In questions asking about reasons for unemployment during disability period, the most common reason is inadequate barrier-free facilities in work location, receiving positive responses from 77% (or 72/94) of all respondents.

Other factors receiving 50% or more positive responses are identified for analyzing the difference within each of the two paired groups: Worked vs Never worked and Cur_Employed vs Not employed. Table III shows the relative support for each factor from all respondents. For each factor, the proportion of support from the two groups in each pair is statistically the same (p-value of z test > 0.05).

D. Logistic Regression

To further analyze the factors influencing employment rate of WCUs (research questions 1 and 2 (Section III)), binary logistic regression is applied to predict the classification of two groups in each pair below:

- i) Worked vs Never worked groups
- ii) Cur_Employed vs Not employed groups

The candidate independent variables include disability type, self-care ability, years of disability, age, persistence in work, educational level (attaining post-secondary education: non-degree, degree or above), motivation level to connect to

society, indicator of no employment direction and different levels of government subsidies received.

Equation (1) shows the significant logistic regression model for classifying Worked and Never worked groups using the Python module Statsmodels (Fig. 2).

$$\hat{p}_W = [1 + \exp(-(-2.5778 + 1.648 \cdot (Persistence) + 2.0994 \cdot (Education\ level) + 1.2576 \cdot (Self-care\ ability) + 0.0383 \cdot (Years\ of\ disability)))]^{-1} \quad (1)$$

where \hat{p}_W denotes the estimated probability of a respondent being classified as Worked group. All four independent variables in (1) are significant (with p-value < 0.05) and have positive coefficients. This implies each variable has positive impact on the probability of having worked before as the variable increases, holding other variables unchanged. The first three variables have also been identified by the descriptive statistics and hypothesis testing earlier in this section. A 5-fold cross-validation approach using Python library Sklearn yields an accuracy score of 72.4% on average with a range between 68.4% and 78.9%.

Equation (2) shows the significant logistic regression model for classifying Cur_Employed and Not employed groups using the Python module Statsmodels (Fig. 3):

$$\hat{p}_C = [1 + \exp(-(-2.1047 + 1.9152 \cdot (Gov_subsidies_0) + 1.2078 \cdot (Persistence)))]^{-1} \quad (2)$$

where \hat{p}_C denotes the estimated probability of a respondent being classified as Cur_Employed group. Variable Gov_subsidies_0 indicates if the respondent is NOT receiving government subsidies (1: True, 0: False). Both independent variables in (2) are significant (with p-value < 0.05) and have positive coefficients.

Logit Regression Results

```

=====
Dep. Variable:      Cur_employed      No. Observations:      94
Model:             Logit      Df Residuals:         91
Method:            MLE        Df Model:              2
Date:              Thu, 03 Nov 2022      Pseudo R-squ.:       0.1800
Time:              15:17:38      Log-Likelihood:      -47.628
converged:         True        LL-Null:              -58.083
Covariance Type:  nonrobust      LLR p-value:         2.880e-05
=====

```

	coef	std err	z	P> z	[0.025	0.975]
const	-2.1047	0.459	-4.581	0.000	-3.005	-1.204
Persistence	1.2078	0.520	2.325	0.020	0.190	2.226
Gov_subsidies_0	1.9152	0.531	3.610	0.000	0.875	2.955

Fig. 3. Classification Model of the Currently Employed (Cur_Employed) Group by Logistic Regression.

This implies the more persistent in work, the larger probability of being currently employed, while holding the other variable unchanged. When a respondent is not receiving government subsidies (Gov_subsidies_0 = 1), it could be due to having current employment, as the eligibility of obtaining monthly government allowance per family is assessed based on income and asset. A 5-fold cross-validation approach yields an average accuracy score of 75.6% with a range between 68.4% and 78.9%, similar to that of the classification model for the Worked group.

(1) and (2) share the common variable of **persistence** (in work). One reason could be the two paired groups share some common respondents. Another reason is the persistent work attitude is endogenous and generally applies to those with past or current employment.

E. Perceived Reasons for Lower Employment Rate of Wheelchair Users Than Other Disabilities

To address research question 3 (Section III), the following have been considered as reasons for lower employment rate of WCUs than other PWDs:

- i. Physical restrictions have reduced the employment opportunities.
- ii. Inadequate barrier-free facilities in workplace.
- iii. Accessibility to transportation in the work location needs to be considered.
- iv. Additional resources and support need to be provided by employer's organization.
- v. Flexible work hours arrangement needs to be provided by employer's organization.
- vi. Working may cause the loss of government allowance.
- vii. Salary of WCUs is lower than other types of disability.

Table IV shows the proportions who agree or strongly agree on the above reasons in the two paired groups (Worked vs Never worked and Cur_Employed vs Not employed). The first six reasons (i)–(vi) have been supported by a majority in each group. Only the last reason (vii) Salary of WCUs is lower than other disabilities is supported by about half in each group. For each reason, the proportion of support received from the two groups is statistically the same (p -value of z test > 0.05), except for (iii) Accessibility to transportation in the work location which affects the currently employed (Cur_Employed group) more directly than the Not employed. Results in Table IV can help inform the government, building contractors and employers on lowering the barriers of employment for WCUs.

F. Sources of Work Pressure

In addressing research question 4 (Section III), physical restrictions were found to receive the largest number of positive responses (28% or 26/94) from all respondents. Significantly larger proportion (48% or 14/29) of the Cur_Employed group considered this as the source of work pressure than the Not employed (19% or 12/65) (p -value of z test = 0.002). This echoes the result that physical restrictions have reduced the employment opportunities. (Physical restrictions is the most supported reason for lower employment rate of WCUs in Table IV.) Other sources of work pressure have found small number of positive responses from all respondents: Inadequate self-confidence (14%),

unable to fulfil basic job requirement (13%), inadequate barrier-free facilities in workplace or work location (11%), little promotion prospect (11%) and long work hours (10%). There is no significant difference in the low response rate between the Cur_Employed and Not employed groups.

G. Participation in Different Employment Enhancement or Supporting Programs

The last research question 5 (Section III) covers five types of employment enhancement or supporting programs:

- i. Work Orientation and Placement Scheme
- ii. Recruitment or job pairing services
- iii. Vocational training
- iv. Job-related counselling services
- v. Life Planning

Table V shows the overall participation rate in each program is less than 18%. Three programs, recruitment or job pairing services, vocational training and job-related counselling services had more participation from Worked group than Never worked. The low participation rate in some programs could be due to the short history of introduction, like Life Planning for the disabled has not been adopted by many associations. Work attitude of individuals may also affect participation. Among 25 respondents who did not think Life Planning would help them identify their career direction, 11 (44%) were from the group who expressed being less persistent in work. Individual responses could still reflect certain outcomes. In the Work Orientation and Placement Scheme, 2 out of the 4 participants had their contract extended by their employers after the end of the scheme. In Recruitment or job pairing services, 6 out of the 29 currently Employed(paid) had participated in this program and 4 of them agreed the program could increase their job opportunities and enhance their confidence. Among 8 participants who joined both vocational training and job-related counselling services, 3 expressed that these programs helped them find employment. Overall, due to the small participation data, there is insufficient information to evaluate the effectiveness of these programs.

V. LIMITATIONS OF STUDY

The survey was conducted online with self-reported data collected. A follow-up qualitative focus group interview could have enhanced the understanding of individual difficulties faced by WCUs, thus generating more insights. This was hindered by the escalating COVID-19 situation locally from February to March 2022 (survey period).

TABLE IV: REASONS FOR LOWER EMPLOYMENT RATE OF WCUS THAN OTHER DISABILITIES AND PERCENTAGE OF SUPPORT RECEIVED

Reason (Section)	Work experience during disability		Current employment status	
	Worked (51)	Never worked (43)	Cur_Employed (29)	Not employed (65)
(i)	98% (50)	91% (39)	100% (29)	92% (60)
(ii)	82% (42)	81% (35)	83% (24)	78% (51)
(iii)	84% (43)	79% (34)	90% (26)	60% (39)
(iv)	82% (42)	77% (33)	86% (25)	77% (50)
(v)	77% (39)	74% (32)	86% (25)	72% (47)
(vi)	61% (31)	63% (27)	66% (19)	60% (39)
(vii)	49% (25)	51% (22)	62% (18)	48% (31)

TABLE V: PARTICIPATION RATES (NUMBER) IN EMPLOYMENT ENHANCEMENT OR SUPPORTING PROGRAMS

Program (Section IV.G)	Work experience during disability		Current employment status	
	Worked (51)	Never worked (43)	Cur_Employed (29)	Not employed (65)
(i)	10% (9)	16% (8)	2% (1)	3% (1)
(ii)	12% (11)	18% (9)	5% (2)	21% (6)
(iii)	17% (16)	24% (12)	9% (4)	10% (3)
(iv)	15% (14)	27% (14)	0% (0)	10% (3)
(v)	3% (3)	2% (1)	5% (2)	0% (0)

The number of respondents of 94 may not fully represent the unknown local population of WCUs of employment age (18-65 years old) and their employment experience. Simple random sampling of respondents from the population and independent responses have been assumed when applying the hypothesis tests (of association and difference in two population proportions) and logistic regression modelling.

VI. RECOMMENDATIONS

Based on our survey results and information from public sources, recommendations are made in Table VI in the Appendix section. The rationale behind is to lower the barriers and maximize the positive influential factors of employment of WCUs.

VI. CONCLUSION

The employment survey for wheelchair users have enabled better understanding of the difficulties faced by the disability group with serious restriction in body movement. The factors with positive influence on employment include work attitude

(persistence in work), self-care ability and attaining post-secondary education or above. The sample data reveal different levels of persistence in work is reflected in the personal income. The major personal barrier to employment is physical restrictions, which likely affect work attitude, self-confidence and requires caregiver assistance. Working may cause the loss of government allowance is a personal concern affected by external regulations. Personal barrier could be worsened by external barriers of inadequate barrier-free facilities in office, work location and transportation systems, thus reducing employment opportunities. The influential factors in the workplace include employer’s empathy and understanding about the physically handicapped, additional resources and support, flexible work hours and the difficulties experienced in passing job interview. We conclude this study by making recommendations on adopting a fixed quota system (with alternative options) for employers, improving infrastructure, enhancing self-care ability, promoting life and career planning at an early age, fostering an inclusive culture in the society to realize the differently abled potential of wheelchair users. Future directions could include qualitative interview with the WCU members or developing advanced classification models inspired by the survey data.

APPENDIX

TABLE VI: RESULTS AND RECOMMENDATIONS

Survey results or information from public sources		Recommendations
1	Annual percentage of new recruits of civil servants with disabilities is less than 1% from 2010-2019	Employment quota system (with alternative options) for employers;
2	Half of the respondents in Worked group were employed in small companies with fewer than 20 employees	1, 2: encourage companies, especially medium- and large-sized, government contractors to consider hiring policies of WCUs and create/allow work from home jobs
3	Major external barriers are inadequate barrier-free facilities in work location and transportation systems to work location for physically handicapped	3: Improve the infrastructure of facilities and transportation, as early as in the design stage, to reduce the barriers due to physical restrictions and increase user safety: (i) Install navigation system and motion detections to provide direction and real-time location; (ii) Allocate budget for such infrastructure
4	Persistence in work has association with employment rate	4, 5, 7: Enhance self-care ability, promote life planning at an early age and foster mutual help
5	Self-care ability is associated with having/not having worked during disability	Increase university admission quota for disability applicants;
6	Educational level attained and employment rate indicate association	4, 6: provide training in more advanced new technologies (e.g., aerial photography) by non-governmental organizations and social enterprise could sharpen their competitive edge
7	“Do not have employment direction” is a factor affecting the employment rate of WCUs (supported by over half of the respondents)	Promote non-employment related recreational activities in the society to help foster self-confidence and social inclusion
8	“Difficult for employer to have empathy or understanding about needs of PWDs” is a factor affecting the employment rate of WCUs (supported by over half of the respondents)	7, 8:

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CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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