



# Increasing the Representation of People with Disabilities in Industry 4.0: Technopreneurship, Malaysia Perspectives

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**Abstract.** In this paper, we argue that the advancement of technology in Industry 4.0, which covers growth areas such as big data and machine learning, cybersecurity, digital currencies, blockchain and the Internet of Things (IoT), with expected creations of new job opportunities in the areas of Cyber Security, Data Analytics, Network & Infrastructure and Software Development that can easily be done at home, has produced an ideal scenario in the context of job opportunities for People with Disabilities (PWDs). Under the Eleventh Malaysia Plan (2016–2020), more programs are currently being implemented to empower productive PWDs. These also include greater accessibility to basic education and skills training, one of it being entrepreneurship, to build relevant skills among PWDs so that they are able to compete in the open market either as employees, self-employed individuals or entrepreneurs.

**Keywords:** Industry 4.0 · Person with disabilities · Technology entrepreneur · Technopreneur · Entrepreneur · Information technology · Empower

## 1 Introduction

Based on the World Health Organization's (WHO) estimates, in developing countries, the number of people with disabilities range between 5% and 10% [1]. Based on the total population of 32 million in 2018, if the estimate of the WHO is taken into account, the number of people with disabilities in Malaysia should

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Supported by Malaysia Technology Development Corporation(MTDC) and Universiti Teknologi Malaysia (UTM).

be between 1.6 to 3.2 million. A study conducted by the Institute for Public Health, Ministry of Health Malaysia in 2015, to supplement existing data and provide data for monitoring and evaluation of health programs implemented by the Ministry of Health, found that the prevalence of disability among adults in Malaysia was 11.8%, based on a sample survey of 19,959 healthy adults with ages between 18 to 50 years [5]. This survey supported WHO’s estimate of the number of disabilities in Malaysia.

Using the 2017 Ministry Of Education data [2], estimating that at least 50% of the inclusive education students will choose to continue their studies in higher institutions (Fig. 1), we are looking at the labor market with at least 15,000 productive PWDs. There is an urgent need to create a future in which they participate more actively in society, a future which increases their independence and in which they are able to make decisions about their lives and futures, by offering them opportunities for employment and access to essential services. The

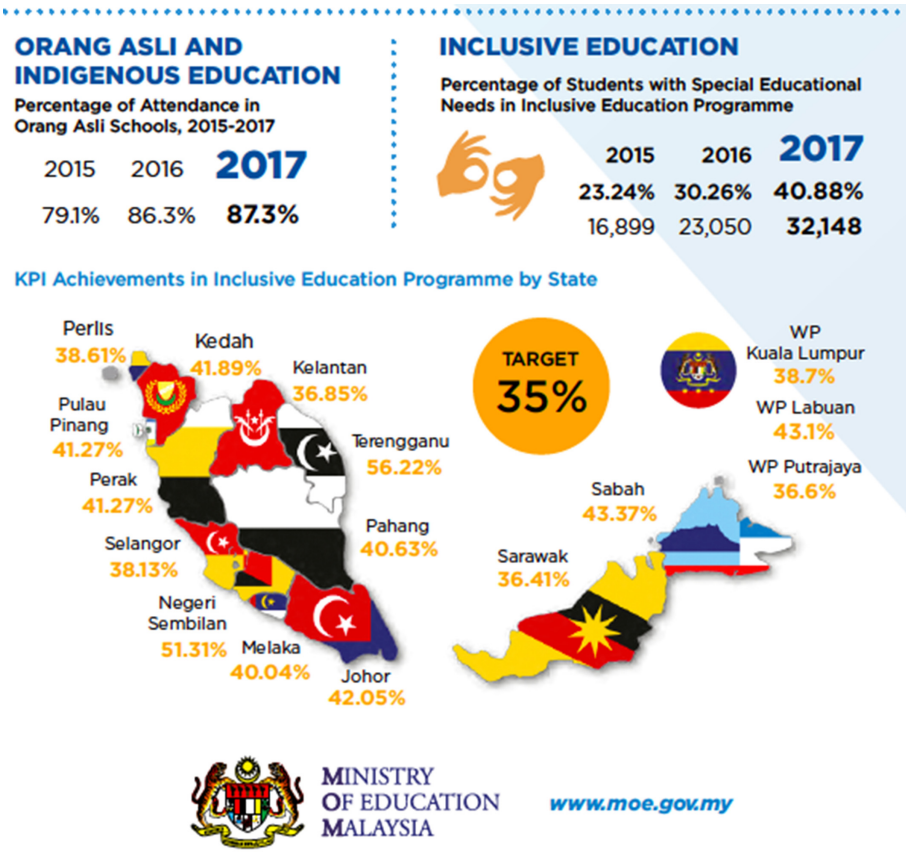


Fig. 1. Inclusive education: percentage of students with special educational needs in inclusive education programme. Source from: Ministry of Education [9]

World Bank estimated that the total national income losses ranged from US\$ 1,370 billion to US\$ 1,940 billion worldwide, due to the exclusion of people with disabilities from mainstream society [15].

## 2 Employment, Self-employment and Entrepreneurship for People with Disabilities

There are a number of literature studies discussing the challenges for PWDs regarding their job opportunities in the labor force [16,28,29]. Among the challenges are [12]:

- Inaccessible transportation
- Inaccessible buildings
- Negative attitudes by employers
- Low self-esteem
- Overprotective families

Lack of appropriate transportation facilities is a major barrier to PWD employment. Secondly is the stigma and prejudice of employers and society to PWDs. The Labor Force’s 2017 report showed that there are a total of 303,000 PWDs outside the labor force, which translate into total national income losses ranging from US\$ 1.18 billion to US\$ 1.68 billion according to the World Bank estimate [15] (Fig. 2).

Reasons for not seeking work	('000)		(%)	
	2016	2017	2016	2017
<b>Total</b>	<b>6,987.6</b>	<b>7,042.9</b>	<b>100.0</b>	<b>100.0</b>
Schooling	3,002.8	3,008.8	43.0	42.7
Homework/family responsibilities	2,906.5	2,905.0	41.64	41.2
Going for further studies	155.3	153.3	2.2	2.2
Disabled	274.1	303.2	3.9	4.3
Not interested	88.2	75.8	1.3	1.1
Retired	560.7	597.7	8.0	8.5

**Fig. 2.** Source from: Statistic Department of Malaysia [24]

From 1999 to 2001, a total of 4,017 disabled workers were registered with the Labor Department. Out of these 4,017, a total of 2,529 people with disabilities were placed in various job sectors. Khor (2010) noted that despite the 1% quota, the public sector employed only 581 people and the private sector employed less

than 5,000 people with disabilities [15]. To mitigate the problems, the Ministry of Woman Family and Community Development (MWFCD) led the “Project to Support Disability Participation” [13] with a joint collaboration with the Japan International Cooperation Agency (JICA), which resulted in the creation of a specific job title called “Job Coach”. A Job Coach is a job mediator between employers and PWDs. A Job Coach is responsible for promoting employment for PWDs and maintaining their retention rates. Based on the outcome of the project, having in-house job coaches in workplaces helped to increase job placements and opportunities for PWDs. In 2012, the Labor Department registered 13,339 PWDs, out of which 9,074 were successfully employed.

Under the Eleventh Malaysia Plan (2016–2020)[3], more programs are currently being implemented to empower productive PWDs; including greater accessibility to basic education and skills training, one of which is entrepreneurship, to build relevant skills among PWDs so that they can be employed by the relevant private and public sectors. There are a total of 3,782 PWDs working in the public sector as of September 2018. The Ministry of Education has the highest number of such staff at 1,477. Currently the goal is to reach a number of 12,811 [18]. While it is an increase from 2,623 in 2014, it is still less than 1% of the quota allocated by the government. Other solutions to the problems of unemployment among PWDs include increasing the number of PWD entrepreneurs and self-employed individuals. Since the terms self-employed and entrepreneur are closely linked [27], we refer to the following definitions and will continue to use both terms synonymously:

*Self-employment: Those who work for profit or fees in their own business, profession, trade or operate a farm [6].*

*Entrepreneurship: A combination of the activities discovery, evaluation and exploitation of opportunities to introduce e. g. goods and services, processes and organization structures that were not existent before [23].*

### 3 Definition of Technopreneurship

An *Entrepreneur* is a person who finds a gap in the market and develops new products or services to address the gap. A *Technopreneur*, on the other hand, is one of the major extensions of entrepreneurship, based on the U.S. legal definition [30]. A Technopreneur is a new age entrepreneur who uses technology to make innovations and comes out with something new. Technopreneurs operate differently from those in the current economic order, by optimizing the use of technology to innovate new products and services that create a marketplace disruption. For example, Uber’s founders thought (Idea) of a different way of calling a cab (market gap), used the power of technology (built an integrated GPS app) and changed the taxi/cab industry’s economy completely.

### 3.1 Role of Technology and Mastering Technology Competency for PWDs

To compete in today's global landscape, it is essential to use state-of-the-art technologies such as computer systems, including software and hardware, or manufacturing processes. However, the efficient and successful use of ordinary technology subject to the context, requires specific capabilities. Typical requirements include, the ability to perceive technology, the ability to work with technology, and the ability to understand technology.

People with higher education level would generally imply a greater ability to use technology [19]. However, people with disabilities such as physical or cognitive impairments, are often limited with respect to these capabilities, even if they are highly educated. In most cases, this is due to inadequate technologies that do not meet PWDs requirements. Therefore, PWDs are often unable to make efficient use of technology. This means that PWDs have disadvantages in obtaining independent individuality (perspective of individuals) as well as information necessary for entrepreneurship (perspective of information society), in addition to overcoming barriers in order to organize their businesses in a competitive manner (perspective of business organization).

### 3.2 Technopreneurship and PWDs

Being an entrepreneur affords individuals with a certain degree of independence [26], which is crucial for PWDs as they are very unique individuals that require a certain type of environment to thrive in. At the same time, entrepreneurship demands from its entrepreneurs a tenacity and strong self-motivation to succeed [22].

According to the Flow Theory of Csikszentmihalyi, motivation can be achieved or maintained if the capabilities of a person are sufficient to meet the requirements of a particular situation. If the capacity of a person is insufficient for the task, it is more likely to be abandoned by the individual [7]. PWDs are often at a disadvantage when it comes to handling a complex situation such as entrepreneurship. The task for PWDs is much more difficult and at times even impossible, compared to people without disabilities. They lack specific capabilities due to their disability, e.g., visual or mobile capabilities, which worsen their chance to compete in the market.

Data from the Malaysian Ministry of Education (2017)[8] showed that there were about 2,139 disabled students enrolled into Malaysian public universities, which comprised of a total student enrolment of 119,558 in 2017. This showed that PWDs are still lagging behind in education systems in Malaysia, thereby placing them at a disadvantage in terms of job opportunities in the open market. Educational inferiority can easily reduce self-motivation, which could also result in damaged self-esteem [25].

Technology is an important factor in achieving and maintaining self-motivation and self-esteem for PWDs, and it also helps them in participating in the social environment [11]. Assistive technologies (AT), accessible websites and

accessible applications make it possible for PWDs to become part of the society [4, 20]. For instance, artificial limbs, retina implants or screen readers that enhance inclusion and self-esteem set important conditions for starting businesses for PWDs. Additionally, technology is also a critical factor in today's business startups.

The OECD report provides a better understanding of the complexity of this multifaceted topic, with specific recommendations for policy actions in order to promote the self-employment of people with disabilities [31]. The first suggestion that can be derived from this article concerns the need for IT accessibility laws to be regulated and tightened, particularly for public institutions. Secondly, the policy requires an accessible educational framework to ensure that more students with disabilities are able to complete their college degrees and thus build a proper basis for self-employment. Thirdly, it is strongly recommended that the AT market be consolidated and standardized to ensure the high-quality supply and dissemination of suitable AT and innovative services for people with disabilities to help them start their own businesses. Ultimately, by advertising and funding such R&D projects, policies can attract attention and efforts, which can help in developing and evaluating accessible technologies for disabled entrepreneurs [31].

In Fig. 3, we illustrate our points in these sections about disabled entrepreneurship for clearer understanding.

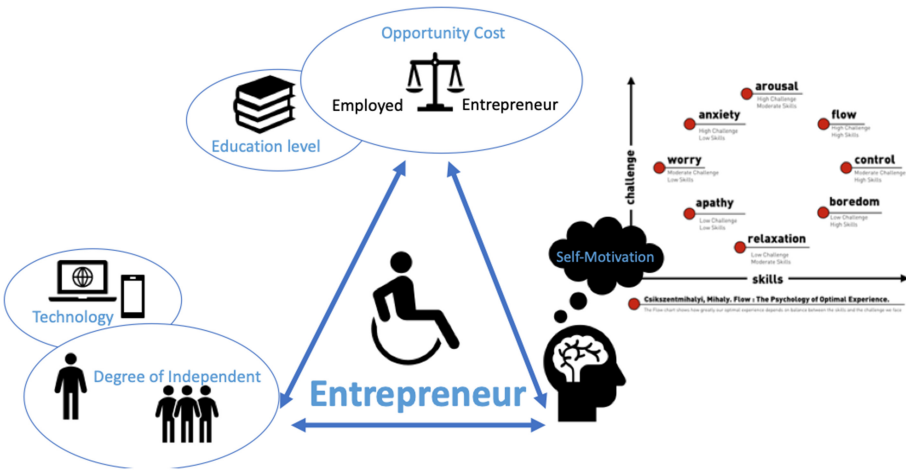


Fig. 3. Technology, self-motivation and entrepreneurship

## 4 Government vs Private Sector Initiatives

### 4.1 Government Initiatives

There has been a paradigm shift in Malaysia over the years when it comes to dealing with PWD issues. Before the PWDs Act was enacted in 2008, the approach taken by Malaysia in dealing with PWD issues was more about a Charity Model Disability [14], that had no specific plan and policy aimed at improving their quality of life and well-being. In 2010, Malaysia signed the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) and in November 2012, Malaysia and other members of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) adopted the “Making the Right Real” strategy for PWDs in Asia and the Pacific, which included 10 goals and 62 indicators. This was to serve as part of Malaysia’s strategy for moving forward towards building a stronger policy framework for mainstream disabled people and ensuring their effective participation in the society. UNCRPD defined disability in accordance with the Social Model Disability [21], that recognized disability as an evolving concept and also noted that disability was the result of interactions between people with disabilities, and attitudinal and environmental barriers that impede their full and effective participation in society on an equal footing with people without disabilities. The responsibilities of implementing a national plan and policy regarding PWD fall under the jurisdiction of the National Council for Persons with Disabilities (NCPWD), chaired by the Ministry of Women, Family and Community Development (MWFCD). NCPWD recognized that a collective effort through multi-sectoral and multi-agency collaboration with other relevant agencies was needed to achieve comprehensive and holistic results.

There are a number of government agencies that cater to the matter of entrepreneurship. For example, Majlis Amanah Rakyat (MARA) or The Trust Council for Bumiputera, a statutory agency, has been given the government’s mandate to develop successful and innovative Bumiputera entrepreneurs who are empowered with global human capital and integrity, and who contribute to increased equity ownership in return. MARA has a dual role to play in the development of education and entrepreneurship. MARA has successfully implemented its educational transformation in Technical and Vocational Education and Training (TVET) in line with its slogan, “Entrepreneurship and Global Education”, combining with the ethos of entrepreneurship to develop “glocal” technopreneurs. Although MARA has successfully developed and implemented technopreneur syllabus for their entrepreneurs, this is only for the those non-disabled. We can hardly get data from them about the number of disabled entrepreneurs due to the low numbers they have and to their inconsistency in keeping records of PWD entrepreneurs.

There are very few government agencies that provide specific initiatives for PWD entrepreneurs. One of that is the Malaysia Welfare Department which has introduced a grant scheme to enable eligible PWDs to expand their businesses; known as “Skim Galakan Perniagaan Orang Kurang Upaya (SB-OKU)”. A total

of RM 16 million has been budgeted for this scheme, which has benefited a total of 1,563 PWDs as of 2014. Analysis of the current government infrastructure for PWDs showed that it is an extension of existing infrastructure available to ordinary people or people with no disabilities. The existing approach to PWD issues is close the gap between normal people and PWDs through a lens of a non-disabled people's perspectives. But if we agree that disability is a direct result of a hostile environment (Social Disability Model) rather than physical and mental disability (Medical Disability Model), then we must change our approach by trying to close the gap between PWDs and normal people, through PWDs perspective. For example, looking at the situation from a blind person's perspective might help us ask questions like - What if we live in a world without light? How will we do business? How can we create a non-visually dependent business environment? What kind of skills are needed to survive in that alternate world? Eight years after the government introduced inclusive development as the national agenda, the results were found, and the data was not encouraging.

## 4.2 Private Sector Initiatives

Although there is an increasing awareness of the demand to have more PWD entrepreneurs in the market, the private sector has been very slow on the uptake. Currently, only the Maybank Foundation has developed a holistic entrepreneur ecosystem that specifically targets minorities in Malaysia [10].

Reach Independent and Sustainable Entrepreneur (R.I.S.E) program is designed to train, coach and mentor participants to develop their entrepreneurial skills, resulting in higher income levels, and thus improving their overall standard of living. The key features of the program include; Practical entrepreneurship training, Effective mentoring and focus on income improvement, and Large-scale involvement of Maybank employees. Currently R.I.S.E is in phase 2 and has successfully trained 1,080 PWDs with the top 40% result for the initial 280 participants involved in the pilot project in Malaysia. This pilot project was started in September 2014, and has an average income increase as highlighted below:

- Per participants in RISE is 411.7
- Income Increase from RM 462.50 to RM 2,366.47;
- Average Income Increase RM 1,903.97

The R.I.S.E. programme starts with a three-day training on entrepreneurship and financial management. This is followed by three to six months of mentoring with a special focus on motivating participants. After the programme, participants continue to be guided and introduced to business opportunities. Their income-generation ability is also monitored. Maybank does not provide special loans to the R.I.S.E. participants but supports them to become eligible for standard loans. The training has enabled participants to build innovative sales strategies into their business ideas, enhance business management skills and augment client acquisition and retention, resulting in greater financial independence and increased resilience in businesses.

The fourth industrial revolution is changing the global economic landscape, covering growth areas such as big data and machine learning, cybersecurity, digital currencies, blockchain and the Internet of Things (IoT), with an expected creation of 30,000 jobs by 2020. New areas like Cyber Security, Data Analytics, Network & Infrastructure and Software Development will replace legacy areas or make the traditional workforce obsolete [9]. Emerging job positions such as digital content creators, programmers, social media managers, which can easily be done at home, are ideal positions in the context of job opportunities for PWDs.

## 5 Conclusion

Disabled people experience higher unemployment rates, economic inactivity and lack of social protection compared to their non-disabled peers. Research shows that there are economic and business benefits for PWDs inclusion. These include the benefits for economies as a whole, for companies that adopt various practices, and for people with disabilities themselves. In the era of the fourth industrial, the constraints of physical impairment should no longer applies due to the divergent of technology available. Technologies enable a more flexible working environment, better involvement in PWD's workforce and a range of new jobs [17].

Referring to a report from OECD, it is seen that for PWDs in parts of Europe, self-employment or entrepreneurship appears to be a viable opportunity [31].

Our research shown that the Technopronuership ecosystem for PWDs in Malaysia is almost non-existent. It should be developed further for them, and should be guided by the underlying principle that in all actions involving persons with disabilities, their interests and needs should be taken into account; whether undertaken by individuals, public or private social welfare institutions, courts of law, administrative authorities or legislative bodies or entities; recognizing that inclusion and mainstreaming should be promoted and specialized.

**Acknowledgement.** Deepest gratitude to Malaysia Technology Development Corporation (MTDC) and Universiti Teknologi Malaysia (UTM) for supporting our ongoing research that will allow us to identify suitable technopreneur skills that PWDs need and the level of their knowledge that will give them the opportunity to participate actively in Industry 4.0 movement and taking advantages of an advancement in technology to change how they are interacting with the society.

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