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Promoting the development of gerontechnology in Hong Kong

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ABSTRACT

Elderly can improve their well-being and achieve healthy ageing by utilising effective gerontechnology. There are some barriers and challenges that hinder the development and utilisation of gerontechnology in Hong Kong, including the inadequate awareness of the importance of technology in elderly healthcare, limited resources invested in the market, and lack of human resources. Hong Kong government has launched more funding schemes to encourage collaborations with different sectors including universities, research institutions, non-governmental organisations and businesses to participate in gerontechnology market. The development of gerontechnology is relatively small in Hong Kong and more efforts are needed to discover the potential in this market. This paper evaluates the current support for gerontechnology in Hong Kong and concludes with some recommendations on its future improvements.

KEYWORDS: Gerontechnology, elderly healthcare, healthy ageing

1 TECHNOLOGY AND AGEING POPULATION

Ageing problem is one of the major challenges to Hong Kong's healthcare system. Hong Kong's ageing population is becoming more serious and rapid that causes heavier pressure on medical services (Ng et al., 2019). Hong Kong's public medical system is bearing a lot of pressure as public hospitals are already overburdened with lengthy waiting times and for a variety of general and specialist services. The estimated number of people aged 65 or above will be accumulated to around 16% of the total population by 2021, occupying one-sixth of the people in Hong Kong (Hong Kong Elderly Commission, 2020). While the baby boomers grow to 75 years old, the number of elderly aged over 75 will be multiplied in the future (Hong Kong Elderly Commission, 2020).

It is essential to achieve healthy ageing so that older adults can maintain wellbeing (World Health Organization, 2019). World Health Organization (WHO) has recognised healthy ageing a concept of viewing ageing as a positive process full of opportunities (WHO, 2021). With the rapid growth of information and communication technologies (ICT), there is good utilisation on technologies that improves efficiency of daily activities and healthcare services, which in turn help older adults to achieve quality of life and healthy ageing (Bong et al., 2019; Chan & Cheung, 2020). Application of the technologies also allows better communication between older adults and their family members or caregivers by providing valid resources and information that help caregivers to know the real-time situation of the older adults (Ruggiano et al., 2019).

To meet the needs of ageing, technology for elderly has received more recognition and support. Gerontechnology, a science domain that combines technology advancement with ageing products and services, becomes a new research area that aims to improve quality of life of elderly and facilitate them the access to goods, services and infrastructures (Sundgren et al., 2020; Halicka, 2019). In general, gerontechnology is an umbrella term for any technological tools or services that assist the elderly to perform different tasks, provide telemonitoring services, and enable residences with technology (Sundgren et al., 2020). Apart from supporting the elderly to stay healthy and active while remaining independent, gerontechnology development also supports the community to look forward for future possibilities with the advent of nascent technologies that alleviate manpower pressure on healthcare, ultimately easing public health finance burden (Helbostad et al., 2017; Normie, 2011).

The usage of technology products among older adults is still not extensive in Hong Kong, notwithstanding the stepped-up efforts by the government to promote healthcare technology in recent years (Legislative Council Secretariat, 2018). This review aims to study the development of gerontechnology in Hong Kong, and evaluate the benefits and barriers of utilising technologies in address of ageing population.

2 IMPORTANCE OF UTILISING GERONTECHNOLOGY FOR ACHIEVING HEALTHY AGEING

Healthcare technologies are interdisciplinary products created by scholars, engineers and healthcare professionals, having the same goal towards a better old-age life for the elderly. The decline in functional capacity of the elderly is unavoidable, but it is important to improve their wellness, an important aspect of healthy ageing suggested by the WHO. Embedding with innovations customised to the individual needs for improving cognitive functional ability and physical decline caused by ageing, gerontechnology offers opportunities to develop new healthcare models for the elderly to live independently and healthily (Petermans, 2017). Technologies such as socially assistive robotics and communication technology can even

reduce depression and social loneliness, facilitating ageing in place and healthy ageing (Chen & Lou, 2020).

The elderly suffers age-related chronic co-morbidities that are often accompanied by physical impairments and cognition decline. They face risk of falls due to muscle weakness in their limbs and bodily balance (Hsu et al., 2014). The elderly commonly takes three or more kinds of medicines per day (Normine, 2011) and it is difficult for them to adhere to the right timing or medicine. Assistive and age-enabling healthcare technologies allow the elderly to have more support to maintain autonomy and live independently for the 150,000 older persons aged 65 or above who are living alone (Census and Statistics Department, 2016). Video-monitoring, remote health monitoring, fall detectors and pressure mats are electronic equipment and sensors that contribute to elderly care according to individual's needs and lifestyle (Bong et al., 2019). The elderly can then handle daily activities more independently and pursue meaningful living in the community, with delays in institutionalisation, resulting in less pressure on the healthcare system (Wong et al., 2017; Francis et al., 2019).

A more well-known elderly healthcare services provided with gerontechnology in Hong Kong is the Care-on-Call Service provided by the Senior Citizen Home Safety Association. It provides comprehensive 24/7 support services including emergency aid, integrated care, and day-to-day care. It has also developed an electronic watch with in-build GPS and sensors to detect user's location. Similar gerontechnology like the Fall alarm GPS Locator and its Communicator A3 are embedded with the fall detection alarm to enhance safety of the elderly. The location tracker will send emergency calls and signal to the family members automatically when the elderly has an accident (Gerontech and Innovation Expo Sum Summit [GIES], 2020). Other useful gerontechnologies include Smart ECG Patch, which is a device used to check and follow the health data of the elderly (GIES, 2020). It is a surveillance system application which analyses blood level, glucose level, weight, and body temperature. The advantage of such mobile monitoring devices is that the elderly can have early screening and monitoring, and thus preventing sudden and unexpected sickness (GIES, 2020). Furthermore, the health data will be built into a personal health database to estimate the health challenges and potential risks of sickness of the elderly (Hocking et al., 2014; Torri et al., 2015).

3 CURRENT SUPPORT FOR THE DEVELOPMENT OF GERONTECHNOLOGY IN HONG KONG

3.1 Government Funding

The government established the Innovation and Technology Bureau (ITB) in 2015 and implemented more funding schemes, aiming to improve quality of life of Hong Kong citizens. To step up the research and development of technology for elderly healthcare, the importance of increasing resources for technology innovations with more investment funding was emphasised in the 2017 Policy Address.

The Innovation and Technology Fund (ITF) was established in 1999 and more funding had been made in the past years, including HKD$1 billion earmarked specifically for the scheme "Innovation and Technology Fund for Application in Elderly and Rehabilitation Care" in 2018. It provided subsidy for NGOs to procure, rent and trial use technology products for elderly (Social Welfare Department, 2020). The government expected the scheme to promote gerontechnology to improve the quality of life for elderly and minimise the burden and pressure of the healthcare system (Marques et al., 2020).

The Social Innovation and Entrepreneurship Development Fund (SIE Fund), established in 2013, has received another HKD$500 million fund from the government in 2021-22 for continued fostering the development of gerontechnology. It provides diverse resources for businesses, non-governmental organisations (NGOs), academics and philanthropies in support of research, innovative ideas, products and services that benefit society unmet needs. The SIE Fund has inclusively built a gerontechnology platform in 2021 to facilitate the sharing of knowledge and experience regarding gerontechnology initiatives, with a view to address ageing issues (Social Innovation and Entrepreneurship Development Fund, 2021).

Since 2017, the government and Hong Kong Council of Social Service (HKCSS) have hosted the "Gerontech and Innovation Expo cum Submit" (GIES), the only annual Gerontech fair in Hong Kong, to extend the healthcare technologies project in The Hong Kong Science and Technology Park (Chui, 2020; GIES, 2020). GIES promotes the latest ideas of innovative technology products and technical knowledge that are related to the healthcare needs of the elderly and help them to be engaged in more suitable medical care with convenience (Chan, 2017). The GIES welcomes local and overseas providers to showcase their foremost healthcare technologies and ideas in gerontechnology. Visitors and caregivers are given the opportunities to experience different innovative technologies that may be beneficial to personal's needs.

3.2 Support by NGOs

Apart from the government being an important stakeholder in the gerontechnology ecosystem, NGOs also play a role in integrating health management technology in elderly community care (Wong et al., 2017). The Jockey Club Community eHealth Care Project (JC eHealth Project) commenced in 2016 and funded by the Hong Kong Jockey Club Charities Trust (The Trust), aims to empower the elderly ability to manage their health through the use of technology. JC eHealth Project collaborates with interdisciplinary partners, including CUHK Jockey Club Institute of Ageing Senior Citizen Home Safety Association, and various NGOs such as Haven of Hope Christian Service, Caritas Hong Kong Services for the Elderly and The Hong Kong Society for the Aged. They set up eHealth station in their participating centres and conduct regular health measurements via real time telecommunication technology for the elderly. The Trust also supports GIES for three consecutive years with a new pilot service model introduced in 2020 called the Jockey Club 'age at home' Gerontech Education and Rental Services. It promotes gerontech products and the latest rental and maintenance services (The Hong Kong Jockey Club, 2020).

4 BARRIERS AND CHALLENGES IN PROMOTION OF GERONTECHNOLOGY

Gerontechnology development has generated some effective solutions and essential contributions to resolving the current problems and difficulties of elderly healthcare services (Lai, 2018). However, there are limitations in applying healthcare technologies for Hong Kong elderly (Schoeb, 2016).

4.1 Low level of technology acceptance among elderly

The understanding of the benefits of technology in elderly healthcare is still insufficient in Hong Kong. Several proposed models such as the Technology Acceptance Model, Senior Technology Acceptance model (STAM), and Model for the Adoption of Technology by Older Adults (MATOA) explain direct factors that affect attitudinal perception, behavioural intention to use technology (Davis, et al., 1989; Chen & Chan, 2014; Wang et al., 2017). Taking ageing into account, STAM and MATOA suggest factors such as self-efficacy, anxiety and health conditions are stronger predictors on the use of technology among older adults.

The elderly in general have strong customer loyalty and may feel uncomfortable to change from traditional healthcare channels such as face-to-face consultation with doctors, to new healthcare products. In addition, many elderlies have deterioration of the functions of visual, speech, and auditory sensation (Whitson et al., 2018). Two out of five Hong Kong elderly have difficulties in utilising technologies in their daily life because of deterioration of body functions (Smith, 2014). They may perceive using technological services as a challenge and burden. The lack of functional literacy in technology and belief that technology is helpful in daily life lead to the lower acceptance rate of gerontechnology in the older group (Bong et al., 2019). Older generations do not have enough practice or education in related area, and thus they have lower awareness about the benefits of using and applying new healthcare technologies (Baker et al., 2017; Talukder et al., 2020). This has led to a huge barrier to the clear understanding about the healthcare technologies. The complexity of adopting healthcare technology is another hurdle for the elderly unless special training is provided.

4.2 Limited resources for technology use among elderly

Limited resources are also a barrier to the adoption of gerontechnology among the elderly (Chen & Chan, 2014). Internet connection is a basic and essential requirement for using different technologies. It is a major barrier for those elderly who do not have internet access. The number of older adults using personal computer and smartphone is increasing, but some of them do not have updated technological devices or their homes are not installed with technology systems and devices (Census and Statistics Department, 2017). Installation cost of such systems can hardly be affordable by the general elderly population. For example, installing a fall detector needs several sensors inside the home to ensure adequate signal coverage (Deen, 2015). In addition, healthcare monitoring applications that enable hourly updates, emergency calls and rehabilitation create operation expenses and maintenance costs (Baker et al., 2017). The affordability of users is a concern when costs can vary widely depending on different health conditions. Therefore, some elderlies are lack of the opportunity to adopt healthcare technologies in their daily life.

4.3 Lack of awareness of gerontechnology industry development

Development of gerontechnology in Hong Kong is still at an initial stage, despite having gained more attention in recent years. More funding by the government and NGOs has been injected into gerontechnology, yet there is no official department or strategy for promotion or training (Wong et al., 2017). Technology has been incorporated well in hospitals and acute care in Hong Kong but the spending towards gerontechnology products is relatively insufficient. Gerontechnology is only regarded as supplementary rather than a focus for improving elderly healthcare. Wong et al. (2017) have pointed out that the Elderly Health Care Voucher Scheme is a good intention in improving primary care but also reflected that the government has disregarded technology products for elderly healthcare, as such products are excluded in the scheme.

There is also a lack of human capital in innovation and technology, especially those who specialise in both health and technology. Being an international financial hub, Hong Kong industries focus predominantly on the financial and service sectors. Compared to countries like South Korea and Japan, funding for technology research and development in Hong Kong is short-term, and without a long-term planning on scale and excellence (Wong et al., 2017). The lack of recognition and understanding of the importance of gerontechnology lead to difficulty in encouraging the business sector to invest in innovation concepts and prototypes of gerontechnology. The lack of professionals and sustainable funding hinder the advancement in geronetechnology industry and achievement of healthy ageing in Hong Kong.

5 RECOMMENDATIONS ON DEVELOPMENT OF GERONTECHNOLOGY

In the wake of outbreak of the pandemic, technology innovation and development have been further sped up to fill in gaps healthcare of servcices. Social distancing and limited access to healthcare services due to the COVID-19 pandemic have resulted in more utilisation of telehealth. It does not only minimise the spread of the virus from reduced personal contacts but also provides an effective service delivery to the elderly. While new opportunities are created in research and development in technology, gerontechnology is no exception. Gerontechnology in Hong Kong is still in a very immature development stage and more efforts are needed to enhance its utilisation.

5.1 Enhance elderly's involvement in gerontechnology

There is a need to enhance the understanding of the importance of technology in the society. Elderly community centres can organise regular events and workshops to bring up the significance of technology and usefulness of gerontechnology. Inter-generational programmes can also be organised to provide opportunities for the old and young generations to interact with each other and learn to use technology together in elderly care. The Jockey Club Smart Ageing Hub provides supportive system for the elderly to experience high-tech healthcare, such as nighttime monitoring system for demented elderly (Cheung et al., 2021). More exposure to technology can help increase the awareness, education and empowerment on elderly care and to encourage independent living and autonomy. Thus, they may have significant improvement in technology use and make good application to healthcare (Peng et al., 2018). The government should provide some incentives and financial support for the elderly to use gerontechnology. There should be some user-friendly online platforms for healthcare services or treatment for the elderly such as promising smart homes, robotics, living laboratory, etc. Doctors and patients can directly communicate with each other through systematic process automatically. The advantage is that the elderly with mobility impairment can receive treatment and services at home, thus saving time in traveling to the healthcare facilities (Lagu et al., 2013).

5.2 Increase capacity in gerontechnology research

The lack of human resources in the health and technology sector is an obstable to enhance the capacity of gerontechnology research. Efforts should also be made to cultivate talents in this area in order to increase and retain the supply of professionals in gerontechnology. To attract the younger generations to the gerontechnology start-up field, engineering and technology programmes in universities can integrate elderly healthcare curriculum and innovations on gerontechnology. Offering a prospect of research postgraduate studies and job opportunities in research and development can also help encourage students to pursue a career in gerontechnology.

5.3 Enhance collaborations with private sector

The lack of collaboration between different stakeholders prohibits the recognition of geronetechnology. It is important to work with the private sector in order to transfer research ideas and results into service-related applications and to launch products in the gerontechnology market. There are five research and development centres in Hong Kong but the production of gerontechnology related products is very low, hindering the build-up of larger research scale and later stage of product development. This may be due to the short-term and fragmented funding available for research and for companies to continue their product enhancement and commercialise business ideas (Wong et al., 2017). Apart from providing more funding to support local entrepreneurs to start businesses, a better support system with more guidance and information can be established to enhance interaction between research

institutions and private entities to increase productivity and competition, thus sustaining long-term development of gerontechnology products.

6   CONCLUSION

Ageing population is a big social challenge that gives pressure on healthcare services and expenditure in Hong Kong. Advancement of technology improves people's quality of life. The development of gerontechnology can support elderly healthcare and promote healthy ageing. The market for gerontechnology is at an early stage in Hong Kong and the variety of concerned products is limited, mainly due to the lack of awareness of the importance of gerontechnology. In addition, lack of human resources, limited collaboration with the private sector and expensive costs hinder the utilisation of technology in elderly care. The government has invested more funding resources to support research activities and attract more venture capital funds to co-invest in innovation and technology start-ups in recent years. There are difficulties in establishing a more comprehensive ecosystem for gerontechnology in Hong Kong. But with more incentives for research investment and efforts in collaborating with different stakeholders, the market for gerontechnology in elderly care has huge potential. In a not far future, utilisation of gerontechnology can effectively help achieve healthy ageing in Hong Kong.

7   ACKNOWLEDGEMENT

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