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RESEARCH ARTICLE

Senior Citizen Activity Centre E-commerce and Cybersecurity: The Way Ahead to IR 4.0 [version 1; peer review: 1 approved, 1 approved with reservations]

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V1 First published: 22 Dec 2021, 10:1302
<https://doi.org/10.12688/f1000research.73555.1>
 Latest published: 22 Dec 2021, 10:1302
<https://doi.org/10.12688/f1000research.73555.1>

Abstract

Background - The Malaysian ageing community's IT aptitude is limited and is a key factor preventing Malaysia's ageing population from successfully entering Industry 4.0. This study aims to digitalize Malaysian older people with e-commerce. This will require cybersecurity awareness training due to potential cybersecurity threats when conducting business online. Furthermore, this study advances the Industry 4.0 initiatives set by Malaysia's National Industry 4.0 Policy Framework by means of a voluntary community-based training program. It also creates a policy that elevates Malaysia's senior citizens' current level of ICT innovation baseline commensurate with Industry 4.0 transformation standards.

Methods - Participatory action research was conducted with members in a Senior Citizen Activity Centre (PAWE) through focus group discussions. Each focus group consisted of 6-8 people. Through identifying the community's problem in the focus groups, an e-commerce platform was developed for the elderly to commercialise their existing products. The dissemination of e-commerce training and cybersecurity awareness were also conducted as part of mitigating fraud relating to online transactions.

Results - The findings show that PAWE members' IT aptitude was limited, that they needed assistance with understanding the e-commerce platform, and that they had limited cybersecurity awareness.

Conclusions - The country's ageing population programs and services are preparing for an ageing nation. In order for Malaysia's ageing population to become self-sustainable, researchers suggest that Malaysian older persons become entrepreneurs. Third generation entrepreneurs must also be supported by social innovation, technological innovation, and cybersecurity awareness, which leads to achieving IR 4.0 and meets the economic, social and sustainable environmental goals.

Open Peer Review

Approval Status

	1	2
version 1		
22 Dec 2021	view	view

1. **Salawati Mat Basir**, Universiti Kebangsaan Malaysia (UKM), Bangi, Malaysia

2. **Nai Peng Tey**, University of Malaya, Kuala Lumpur, Malaysia

Any reports and responses or comments on the article can be found at the end of the article.

Keywords

Ageing population, Cybersecurity, Entrepreneurship, Industry 4.0

This article is included in the **Research Synergy** Foundation gateway.

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Author roles: **Tan SL:** Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Writing – Original Draft Preparation, Writing – Review & Editing; **Vergara RG:** Formal Analysis, Methodology, Writing – Original Draft Preparation, Writing – Review & Editing; **Khan N:** Formal Analysis, Writing – Review & Editing; **Khan S:** Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: This research is funded by the Malaysian Ministry of Education (MOE) through the Fundamental Research Grant Scheme (FRGS) FRGS/1/2019/SSI10/MMU/02/1. The authors alone are responsible for the views expressed in this article, which does not necessarily represent the views, decisions, or policies of MOE or the institutions with which the authors are affiliated. The funder had no role in study design, data collection and analysis, or preparation of the manuscript.

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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How to cite this article: Tan SL, Vergara RG, Khan N and Khan S. **Senior Citizen Activity Centre E-commerce and Cybersecurity: The Way Ahead to IR 4.0 [version 1; peer review: 1 approved, 1 approved with reservations]** F1000Research 2021, 10:1302 <https://doi.org/10.12688/f1000research.73555.1>

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Introduction

Malaysia will reach an ageing nation status by 2030. This means that more than 14% of the population will be 60 years of age or older (Department of Statistics Malaysia, 2021). The Malaysian government reported that in 2020, “there are 3.7 million senior citizens in the country, and it is expected to increase by 15.3%, to 5.3 million senior citizens in 2030” (New Straits Times, 2021). Malaysia has less than nine years as of writing this article to ensure the infrastructure, programs, and services for the ageing population are ready. Under the Ministry of Women, Family and Community Development’s (KPWKM) Department of Social Welfare (JKM), with other government agencies and non-governmental organizations (NGOs), Malaysia currently has 148 Senior Citizen Activity Centres/ Pusat Aktiviti Warga Emas (PAWE). These centres were developed for senior citizens to carry out daily activities in the community. Joining PAWE is free of charge to Malaysians and activities include but are not limited to: religious, recreational, therapy and rehabilitation, health seminars, and training courses. To alleviate the burden on the government, this study explored a self-sustainable solution for PAWE, which includes social innovation, technological innovation, and cybersecurity awareness to achieve Industry 4.0.

Industry 4.0 (IR 4.0) refers to the fourth phase of the Industrial Revolution. In IR 4.0, cyber-physical systems are emphasised, and focusing on interconnectivity, automation, and machine learning. However, while social media and the internet are vital to daily life, this is the extent of Malaysian senior citizens’ IT aptitude in PAWE. This limitation in PAWE member’s technology use and technical know-how are key factors preventing older Malaysians from successfully entering Industry 4.0, which is contrary to the Malaysian government’s initiatives as stated in the National Industry 4.0 Policy Framework. Furthermore, while the country currently has Cybersecurity laws, awareness of cybersecurity and cyber resilience among the Malaysian ageing population is also limited. Cybersecurity is another key element in the IR 4.0 transformation, which is to ensure information systems and manufacturing lines are protected from ubiquitous cybercrime threats.

Objectives

This study aims to identify the challenges preventing the Malaysian ageing population, specifically members of Senior Citizen Activity Centres (PAWE), from reaching Industry 4.0. Once the problem is identified, PAWE members together with the researchers can solve the problem and develop a sustainable solution for PAWE to advance to the IR 4.0 set by Malaysia’s National Industry 4.0 Policy Framework. Lastly, this study aims to create a policy that proposes a self-sustainable solution for Malaysia’s ageing population with minimal financial assistance from the government.

Problem statement

Industry 4.0 is associated with rapid technological advancements that lead to transformations in the socio-economy. Luppigini (2012) talks about whether the fast growth in

technological development and digitization is leaving a positive influence on individuals and society. Rifkin (2014) strongly calls for further research to address the various unexpected consequences of the rapid pace of technological developments. One of the most important challenges faced by governments, policy makers, and society is also how to tackle the set of technology disruptions associated with this new industrial era (McKinsey, 2016; Zervoudi, 2020). Industry 4.0 is fast approaching Malaysia and the Malaysian government is preparing the nation according to the National Industry 4.0 Policy Framework. While social media and internet use has become a part of the everyday lives of older Malaysians, that is the extent of the older population’s IT aptitude. The ageing population in Malaysia is rich with experience, property, and human networks; however, their current level of technology knowledge has not reached the Industry 4.0 level. As such, this study of the Malaysian ageing population, specifically from PAWE, explores the gaps that prevent them from achieving Industry 4.0.

Research questions

1. What are the challenges preventing Malaysia’s senior citizens in PAWE from achieving Industry 4.0?
2. How can Malaysia’s entrepreneurs in PAWE become self-sustainable in Industry 4.0?
3. How does social innovation help achieve industry 4.0 for Malaysia’s ageing population?

Methods

Study design

This study was conducted using a Participatory Action Research (PAR) approach to address the Malaysian third age entrepreneur limitation in digitalization and determine how best to disseminate the solution for them to prepare for Industry 4.0. Action research is an iterative process and does not end until the problem is solved. PAR studies with older people is limited in that there is a power difference between the older person and researchers (Corrado *et al.*, 2020). However, in this study, the PAWE members were active partners in the problem solving and solution implementation.

Participant selection

Data was collected in March to April 2021. Participants were selected by purposive sampling from direction by Malaysia’s Department of Social Welfare (JKM). Participants were all above the age of 60 men and women in Senior Citizen Activity Centre (PAWE) Sepang, Malaysia.

Data collection

Data was collected through face-to-face focus group discussions led by the corresponding author, a PhD holder in gender and socio-legal studies. Data was also collected through observations and field note taking. The focus group consisted of 6 people and lasted for one hour. Questions asked during the focus group were:

1. How are you currently running your business?
2. Who are your customers?
3. How do you receive your orders or reservations?

4. Are you comfortable using technology to run your business?
5. What do you know about cybersecurity?
6. Do you know how to protect your data?

The first phase of PAR required ‘diagnosing’ the problem of concern for the PAWE community, as seen in [Figure 1](#). In this phase, the PAWE members conveyed their concerns for not knowing how to sell their handcrafted goods and services in an online platform. Once identified, the next phase ‘action planning’ required the participants and researchers to devise a solution to the problem. In this phase, the researchers and PAWE members agreed that a website was necessary for them to sell their products.

However, hands on training and cybersecurity training were a necessary part of ensuring the PAWE members understood the how to use the website and safely use the e-commerce platform. The next phase ‘taking action’ required implementing the proposed solution. According to the Organisation for Economic Cooperation and Development (OECD), social innovation is “the design and implementation of new solutions that imply conceptual, process, product, or organisational change, which ultimately aim to improve the well being of individuals and communities.” For the purpose of this study, social innovation facilitated as part of the solution to PAWE’s difficulty in connecting small business products to an online platform. In this case, a website tied to an e-commerce platform and social media to help the PAWE community sell their products online was developed by a private Malaysian IT services company. The dissemination of e-commerce training and cybersecurity awareness was also conducted as part of the mitigation to prevent online fraud relating to online transactions. Following this phase, ‘evaluating’ the solution implemented was observed. The last phase ‘specify learning’ was to identify general findings.

Data analysis

Results of the discussions from field notes were transferred to an excel sheet for participants to verify and from there, themes were determined manually. Themes such as “traditional”

were determined from the focus group discussions. “Not comfortable” or “Not knowledgeable” and “Need assistance” regarding technology and cybersecurity was a common theme among the PAWE members.

Results

The results of the focus group discussions show that PAWE members did not have the experience to conduct e-commerce on their own. The participants in the study owned and operated smart phones. However, they requested that their children or younger person in PAWE assist them for anything technical. Their use of technology was limited to using social media in their smart phones and its basic features i.e. messaging, watching and downloading videos and files. The participants pursued entrepreneurship in a traditional way. They sold their handmade products or services face-to-face. When asked to use an e-commerce platform such as Amazon, Shopee or Lazada, they were not certain how to do it and were overwhelmed by the idea of creating a website for their community. Once the researchers clarified that the PAWE members were not expected to create their own website and that a private company was engaged to develop a website as a social innovation product, the PAWE members were relieved and were more accepting of the idea of using an online platform connected to their social media apps. The participants during the first phase of diagnosing the problem mentioned they will ask their children to help them with technical issues regarding the e-commerce platform. The researchers engaged a private Malaysian IT services company as part of the ‘taking action’ phase to develop a website as a social innovation product for the PAWE community to sell their products/services online. The website linked purchases to the PAWE community’s social media to help track and fulfil orders, since the community is well versed on using social media apps such as WhatsApp and Facebook. As part of implementing the solution, training on cybersecurity awareness, cybersecurity threats while using social media and e-commerce were also conducted.

As observed in the first phase of the PAR study, the PAWE members were ready to give the responsibility of handling the website and administrative duties to the younger member assigned to the centre. The IT company and researchers trained this representative and all six of the main PAWE members in the focus group on how the website works and key features for the IT administrator.

Due to the COVID-19 pandemic, a web-based solution to assist PAWE members sell their products/services is ideal. Malaysia is still limiting the opening of the economy and online businesses are often sought after in the new normal.

Discussion

The participants for this study have previously used traditional methods in selling their products/services such as face-to-face retail services i.e., food and beverage, hospitality, health and wellness, and handicrafts. Moving their business to an online e-commerce platform was novel for them and a challenge to the participants due to their limited technical knowledge

Figure 1. Action Research Model (Susman, 1983).

and know how. Although, they had traditional views on selling their products initially, they were open to learning more about the e-commerce platform the researchers proposed for them to use. The participants were also open to learning more about cybersecurity, since they were planning to move their business to the e-commerce platform. This is a step forward for the PAWE participants in achieving IR 4.0 and becoming more self-sustainable entrepreneurs in the digital age. The results of this study are contrary to previous results such as [Corrado *et al.* \(2020\)](#), which showed that older persons “are rarely positioned as equitable partners, co-learners, or agents for change” in PAR. In the case of our study however, the PAWE senior citizens were motivated to adopt a technology, provided that they have a younger person close to them to assist with the technical aspects of the project. The PAWE members’ interest in expanding their business by moving it to an online platform was positive. Although, while some of the PAWE members showed interest in using the online platform themselves, it was for the benefit of their own business and separate from the proposed one-stop-shop platform for the entire PAWE community.

Conclusions

The Malaysian government is preparing well before it reaches ageing nation status in 2030. The current government’s programs and services are in line with this goal of preparing the nation. However, in order for the senior citizens in PAWE to become self-reliant and self-sustainable, the researchers suggest that PAWE continue to stay active in learning about new technologies to support their small businesses, which is supported by social innovations, technological innovation and cybersecurity awareness. This leads to healthy ageing and achieving IR 4.0 whereby the Malaysian senior citizens meet the economic, social, and sustainable environment goals.

The study shows that PAWE has active entrepreneurs. However, the technology innovation aspect was previously not there. Their IT aptitude was limited to using basic smart phone functions and social media. Combining Technological Innovation, Social Innovation and Cybersecurity Awareness helps improve the senior citizen entrepreneurs in PAWE to reach IR 4.0 as seen in this study.

The PAWE members were introduced to an e-commerce platform to advance their business digitally. Although some

of the members were reluctant at first, they embraced the technology with the assistance of their children. An inter-generational factor is significant and should be explored in future studies, since the younger generations can assist senior citizens having IT technical issues.

Ethical approval

Ethical Approval was granted by the Research Ethics Committee of Multimedia University (approval number EA0312021).

Participant consent

Consent was obtained from all participants written (signed) and verbally.

Data availability

Underlying data

Figshare: Focus Group Discussion Results PAWE. <https://doi.org/10.6084/m9.figshare.16531071.v1>. [Tan Swee Leng *et al.* \(2021a\)](#)

Figshare: COREQ for PAWE Ecommerce Cybersecurity

<https://doi.org/10.6084/m9.figshare.17135117.v2>. [Tan Swee Leng *et al.* \(2021b\)](#)

Data are available under the terms of the [Creative Commons Attribution 4.0 International license](#) (CC-BY 4.0).

Author contributions

Tan O: Conceptualization, Data Curation, Funding Acquisition, Formal Analysis, Investigation, Methodology, Project Administration, Writing – Original Draft Preparation, Writing – Review & Editing; **Vergara R:** Formal Analysis, Methodology, Writing – Original Draft Preparation, Writing – Review & Editing; **Khan S:** Writing – Review & Editing; **Khan N:** Formal Analysis, Writing – Review & Editing

Acknowledgments

The authors wish to thank the members of Senior Citizen Activity Centre/ Pusat Aktiviti Warga Emas (PAWE) for participating in this research. They were actively involved throughout the study, providing invaluable data and recommendations to improve the recommended solution.

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[Publisher Full Text](#)

Open Peer Review

Current Peer Review Status:

Version 1

Reviewer Report 06 February 2023

<https://doi.org/10.5256/f1000research.77214.r158427>

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Nai Peng Tey

Population Studies Unit, Faculty of Business and Economics, University of Malaya, Kuala Lumpur, Malaysia

The article "Senior Citizen Activity Centre E-commerce and Cybersecurity: The Way Ahead to IR 4.0" deals with the use of technology among older adults in conducting their businesses. It is a good exploratory study on this topic, to stimulate more large scale research for policy formulation.

1. General comments:

- Inappropriate use of words or terms
- "IT aptitude" -it should be IT skill or knowledge
- "Malaysian older people", "Malaysian ageing population" - rewrite as 'older Malaysians'
- "To commercialize their existing products" - change 'to sell and buy things'
- "Senior citizen" - 'older adults' is a more appropriate term

2. Abstracts:

- The Background in the abstract must be reorganized, starting with problem statement, followed by the objectives of the study.
- The objectives must be reworded. A single study such as this cannot aim to digitize Malaysian older people, nor can it advances the Industry 4.0 initiatives set by Malaysia's National Industry 4.0 Policy Framework by means of a voluntary community- based training program. it can only aim to provide a better understanding on the involvement of older Malaysians in e-commerce

3. Introduction

- In the introduction - the study cannot create a policy - it aims to provide some inputs to inform policy.

- *"However... this is the extent of Malaysian senior citizens' IT aptitude in PAWE"* - This sentence is not clear.
- I suggest you combine this with the next sentence: While social media and the internet are vital to daily life, older Malaysians, including PAWE's members limited technology use and technical know-how prevented them from successfully entering Industry 4.0, as envisaged under National Industry 4.0 Policy Framework.

4. Objectives

- *"Lastly, this study aims to create a policy that proposes a self-sustainable solution for Malaysia's ageing population with minimal financial assistance from the government"* - This study cannot possibly create a policy - at best it can provide an input or create some awareness to the policymakers.

5. Participant selection

- *"Data was collected in March to April 2021. Participants were selected by purposive sampling from direction by Malaysia's Department of Social Welfare (JKM)"* - it is more appropriate to state 'in consultation with the Department of Social Welfare', instead of being directed.

6. Data collection

- *"Data was collected through face-to-face focus group discussions"* (in March and April 2021)... The authors did not state how many FGDs (face-to-face group discussions) were conducted. They merely stated six participants per group. Since the field work was conducted over March and April, I would assume that there would be more than one FGD. Moreover, the paper did not state where the participants came from. The goods that they buy and sell are also not clearly stated. E-commerce deals with both buying and selling. If they all come from one locality and selling only handicrafts, the study cannot claim to be representative of the country.

7. Results

- From the results section, it appears that there is only one FDG, and the time taken was for follow-up action.
- Perhaps a more detailed description of the participants is warranted - the age, sex, ethnicity, locality, years in business, types of goods and services traded (buying and selling).
- The statement *"since the community is well versed on using social media apps such as WhatsApp and Facebook"* contradicts the earlier claim that PAWE's members have limited technical knowledge and knowhow.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Not applicable

Are all the source data underlying the results available to ensure full reproducibility?

No source data required

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Demography and population studies

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 30 May 2022

<https://doi.org/10.5256/f1000research.77214.r135920>

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Salawati Mat Basir

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This article is very interesting and touches on a topic that is very rare for people wanted to discuss. The authors show the importance of the ICT to all the senior citizens but at the same time remind the reader about the issue of cyber security.

The data collection and the questions asked to the participants are really connected to the main topic.

Frankly, this article is excellent and important to discuss how the PAWE activities regarding e-commerce and, the threat of cybersecurity that the senior citizens do not understand. The introduction by the authors clearly stated the percentage of senior citizens in Malaysia and the number of PAWE under the Ministry of Women, Family and Community Development, other government agencies and NGOs. The authors address a very important issue in their problem statement regarding the National Industry 4.0 Policy Network that many ageing populations especially at the PAWE not compatible with the current technology and are yet to reach the 4.0 level. This article also uses Participatory Action Research (PAR) approach for their methodology to address the issue where their results are much more accurate to understand the level of technology among the senior citizen at PAWE despite only PAWE in Sepang, Selangor was selected for sampling.

The result of the approach by the authors successfully shows that the participants previously using the traditional method in selling their products and services and the changing platform to online commerce really a challenge for the participants due to their limited knowledge and

practice of online commerce.

The authors also successfully proved that PAWE has active participants in the e-commerce business and come out with the suggestion for government to expand more assistance for the participants even though the younger generations in the family of senior citizens actually help them a lot.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: International development law

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Comments on this article

Version 1

Reader Comment 22 Mar 2022

Habibullah Habibullah, National Research and Innovation Agency, Indonesia (BRIN), Jakarta, Indonesia

The results of this study are very interesting, namely the IT capabilities of PAWE members are limited, that they need help understanding the e-commerce platform, and that they have limited cybersecurity awareness. The same thing happens in Indonesia, the elderly have limited ability to cybersecurity, so e-commerce is needed that makes it comfortable for the elderly to access it.

Competing Interests: I have the same research interests as the author

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