

Graduate Employability and Digital Entrepreneurship in the Era of IR 4.0

Surina Nayan^{1*}, Latisha Asmaak Shafie², Majdah Chulan³, Fazmawati Zakaria⁴, Suhaimi Nayan⁵

^{1,2,3,4}*Academy of Language Studies, Universiti Teknologi MARA, Perlis Branch, Arau Campus, 02600 Arau, Perlis, Malaysia, 02600 Arau, Perlis, Malaysia*

⁵*Malaysian Spanish Institute, Universiti Kuala Lumpur, Malaysia*

Authors' Email Address: ¹nas2898nas@yahoo.com, ²ciklatisha@yahoo.com, ³majdah@uitm.edu.my, ⁴fazmawati@uitm.edu.my, ⁵suhaimin@unikl.edu.my

*Corresponding Author

Received Date: 2 December 2020

Accepted Date: 30 December 2020

Published Date: 31 January 2021

ABSTRACT

This is a conceptual paper on virtual entrepreneurship that can be ventured by graduates in Malaysia in the IR 4.0 era. The study defines what virtual entrepreneurship is, its advantages, reviews of some literature on the topic, IR 4.0 and its effects on Malaysian businesses in general. Besides, the paper also focuses on types of virtual entrepreneurship that Malaysian graduates can explore. They can venture into cyber-security analyst positions, can produce and innovate IoT tools and solutions, be online retail consigners, can be content creators for Instagram, Twitter and Facebook for companies that need their services, can do freelance copywriting and editing for new companies or traditional companies, can become social media influencers, can become YouTube personalities, can assume the role of digital strategy experts and they can also offer digitalized services and solutions. As a result, they will not depend a lot on working with the government or private sector. It is a well-known fact that getting a job in an office is difficult nowadays. They can find their income to continue supporting their lives in today's challenging world when they are aware of the opportunities offered to them using the virtual world. They can venture into areas that do not require them to commute to their offices every day. Instead, they can just work in front of their laptop or pc or tab which is connected to the internet. Furthermore, they can create other job opportunities for others.

Keywords: *Industrial Revolution, Virtual Businesses, Digital Era, IR 4.0, Graduate Career Opportunities*

INTRODUCTION

The shift from handicraft economy to machine manufacturing in the 1800s marked the beginning of the Industrial Revolution (IR). For centuries, goods were manufactured by human labors or with the assistance of work animals. The beginning of 19 century marked the drastic changes in the manufacturing industry with the introduction of the Industrial Revolution (IR) 1.0 and the progress was rapidly developed to the recent industrial era - Industrial Revolution 4.0. Through history, three major industrial revolutions have taken place. Firstly, is the era of IR 1.0. This era has transformed the world through the introduction of mechanical production equipment that was powered by steam.

Next, is the era of IR 2.0. This is the phase where the focus was on the mass production assembly lines that required the participation of a lot of labour and electrical energy. This era has introduced modernization throughout the globe. Finally, in the era of IR 3.0 which has shaped the globe's 21st century. During this stage, the world was being introduced to automation using electronics and information technology (IT).

Now, we are in the era of IR 4.0. IR 4.0 is also known as the "fourth industrial revolution." Smart machinery and manufacturing will change the nature of the industry world wide. Sun (2018) summarizes IR 4.0 as the following:

- 1st IR - Machine - the introduction of mechanical production facilities powered by water and steam.
- 2nd IR - Automation + Machine - the introduction of mass production based on the division of labor and powered by electricity.
- 3rd IR - Information + Automation + Machine - use of electronics and Information Technology (IT) to further automate production.
- 4th IR - Intelligence + Information + Automation + Machine - use of Cyber-Physical Systems (CPSs).

RESEARCH BACKGROUND

IR 4.0

According to the founder of the 4th Industrial Revolution (IR 4.0), Professor Klaus Schwab, IR 4.0 takes the automation of the manufacturing process to a new level by introducing customized and flexible mass production technologies. This simply means that technical advances in the 21st century fundamentally changed the way humans produce things thus altering the working conditions and lifestyles of people. IR 4.0 is the era of Cyber-Physical Systems which comprise of the networking connection of smart machines, storage systems and production facilities capable of autonomously exchange information, trigger actions and control each other independently. CPSs allow the machines to communicate more intelligently with each other with almost no physical or geographical barriers, resulting in productions of customized products on an industrial scale while providing many opportunities for improvements in operational flexibility and efficiency (Petrillo, 2018). Petrillo (2018) further states that industry 4.0 covers three fundamental aspects mainly: digitization and increased integration of vertical and horizontal value chains, digitization of product and service offerings and introduction of innovative digital business models.

Industry 4.0 has been defined as the latest trend of automation and data exchange in manufacturing technologies. It connects cyber-physical systems (CPSs), the Internet of Things (IoT), cloud and cognitive computing, bio and nanotechnology, artificial intelligence and robotics, and 3D printing and autonomous vehicles which incorporates cutting-edge technologies; with manufacturing technologies and administration to allow systems to share, analyze and use the information to guide intelligent actions and anticipate any irregularities in the processes or systems so that preventive measures and remedial action can be taken well in advance (Diwan, 2017). The process of data exchange and analysis by these smart machines not only helps industries to improve manufacturing processes, material usage, supply chain and life cycle management of the product but also, in the end, satisfies customers who value speed, cost and value-added innovative products and services. In short, in industry 4.0, machines, humans, processes and infrastructure operate like a single networked loop making the overall management of any industry highly efficient. In order to survive and thrive in the industry 4.0 era, businesses and organizations must evolve with time. They must anticipate the challenges that it offers and ready to adopt a new mindset, alter the company structure, adapt the business model and monitor the changes closely throughout the process. Only by embracing challenges can the main purpose of industry 4.0 that is to achieve improvements in terms of automation and operational efficiency and effectiveness be made possible (Nagy, Oláh, Erde, Máté & Popp, 2018).

The traditional industry players need to adapt and adopt, to survive in the IR 4.0 era. Besides, they also need to be aware that integration and innovation are important elements to succeed in this new phase of industrialization. IR 4.0 connects the virtual world and the real world. All operations are digitalized as they are linked with the cyberspace that combines the use of electricity, electronics and information technology with the assistant of mobile technology, big data and cloud computing. The networks include computer network (internet), wireless sensor networks, nanotechnology, mobile networks (cellular network) and brain research (Rabeh, Husam & Saeed, 2017). Furthermore, IR 4.0 will provide better avenues for business sectors through virtual entrepreneurship/businesses. Therefore, graduates need to grab this golden opportunity to participate and play key roles in strengthening the quality of this type of business. The success of IR 4.0 starts in the classroom. Tertiary students need to be equipped with the ever-changing technological challenges as they will face them when they graduate so that they will have the tech skills to adapt and succeed. This is because new industries and sectors are being created. These new industries and sectors will hire graduates who are well versed in sensor connectivity, machine data and manufacturing processes, data and application.

Workforce recruitment, information and communication technology, business, education and many more will also be affected by IR 4.0. In Malaysia, small-medium enterprises (SMEs) might face difficulties in their operations when their staff are not equipped with the skills needed to cope with the technology that surrounds IR 4.0. It is suggested that these SMEs invest in their staff training so that they will be able to cope with the current technology. Knowing IT is utmost important for graduates. Besides, knowing how to operate modern interfaces, graduates also need to equip themselves with the knowledge on how an organization works and how to fit in that organization (Meylinda Maria, Faaizah & Naim 2018). Employees who are responsible, have high self-confident, good self-control, excellent social skills, honest, have high integrity, adaptable, flexible, having good teamwork, good time management, efficient, self-directed, well-groomed, self-motivated and self-management, able to use techniques skills and modern engineering and ICT tools are preferred by the industries (Mohd Shamsuri & Izaidin, 2014; Noor Suhailie, 2013; Latisha & Surina, 2010). To sum up, education sectors need to prepare students to be qualified candidates for future jobs in the era of IR 4.0.

Besides, IR 4.0 is imbued with robotics, artificial intelligence and cyber-physical systems that increase efficiency yet reduce employment in production, distribution and consumption. IR 4.0 requires high-skill tasks workers as automation replaces low skill workers (Mohamad, Mohamad, Salleh, Rahman, Abdul Rahman & Sulaiman, 2018). IR 4.0 enables consumers and companies to use data to analyse and make informed decisions by using the intelligent networking of product and processes (Nagy, Oláh, Erde, Máté & Popp, 2018). Therefore, job opportunities are available for graduates with creativity, human values and critical thinking skills to perform high skills tasks. Graduates need to be analytical and creative where they can identify opportunities, detect and adapt to provide solutions in fast-changing contexts. Therefore, the higher education sector has an essential role in preparing graduates for future employment with high analytical skills and human values (Omar & Hasbolah, 2018). Educators help graduate to thrive in IR 4.0 by being innovative and adopt technological skills (Flynn, Dance & Schaefer, 2017).

Virtual Entrepreneurship

Virtual entrepreneurship is the act of creating an online business or businesses while building and scaling them to generate profit while at the same time being able to initiate social change, creating innovative products and services and presenting new life-changing solutions (Zhao & Collier, 2016). In a market of uncertainty, an internet entrepreneur who is a risk-taker as well as the main decision-maker; operates, organizes and manages any new online or internet enterprises or businesses with minimal investments compared to a traditional business owner who requires a large amount of capital, premises, ready-made products and staff management. In other words, a creative person who

leverages the internet; the existing electronic telecommunication infrastructure to transact businesses as a mean to generate income and profit.

Advantages of Virtual Business

Venturing in virtual businesses has many potential advantages, including cost-effective, flexibility, quick feedback and analysis, low-risk, increase networking and global access, provide limitless freedom and positive working environment. Nurturing entrepreneurship can bring a positive impact on the economy and society in several ways. Firstly, virtual entrepreneurs create new businesses. They invent goods and services, resulting in employment which resulting in more development. Secondly, virtual entrepreneurs contribute to the gross national income. This is because new product or technologies create new markets and likewise, and increased employment and higher earnings contribute to a nation's tax base which enables the government to spend more on public projects. Lastly, virtual entrepreneurs create social change. They are creators and innovators, embracing new ideas, possibilities and technologies with unique inventions that reduce dependence on existing methods and system (Nagy, Oláh, Erde, Máté & Popp, 2018). Thus, the use of the internet has revolutionized work and play across the globe.

Effects of IR 4.0 to Businesses in Malaysia

In today's world, technological innovation has given great influence on the way people live and work. People do not likely know how it will unfold but one thing for sure it presents something new which deals with complexity. It must be integrated involving all global stakeholders, politicians, private sectors as well as educationists to civil society. It is believed that the objective of IR 4.0 is to modernize Malaysian industrial capability. It intends to transform the economy from a low – cost manufacturing country into a high - value competing manufacturer (Mottain, 2019). By having these changes in Malaysia, it does affect the transformation of the entire systems of production, management and governance. This industrial revolution has affected businesses in Malaysia.

Initially, the customer expectations, product enhancement, collaborative innovation and organizational forms are the four major effects of IR 4.0 on businesses (Schwab, 2016). The major shifts on the demand side of the customers are occurring and those business people need to adapt to the growing transparency and new patterns of consumer behaviours. This IR 4.0 will change the way businesses interact with customers by creating an expectation for more customization. For example, it is making for companies to offer customers digitize previews of products for them to place customized orders. Thus, it forces companies in Malaysia to rethink and adapt the new way they design market and deliver their products and services.

Furthermore, there is also a dramatic shift in the labour force as for predominant jobs such as data entry and telemarketing have been taken over by machines. According to Bowles (2014) and Brynjolfsson & McAfee (2014), technological advancements would not only reduce the number of routine jobs but also high-skilled jobs which are defined by pattern recognition and cognitive non-routine tasks. Meanwhile, the revolution will eliminate the need for employers to hire certain types of work positions according to the nature of the work, but to shift to the tasks that require Malaysian graduates to have creativity, emotional intelligence and people skills. In other words, employers need to adjust their hiring practices to satisfy the different types of positions in their companies. This will give rise to the segregation of jobs into low skill/low pay and high skill/high pay segments. Consequently, it will lead to an increase in social tensions (Schwab, 2016). This industrial revolution will also lead to the increasing demand for highly skilled graduates while the demand for graduates with less education lower skills will decrease. Due to this reason, Malaysian graduates need to equip themselves with basic technological literacy to interact with industry 4.0 tools.

Lack of standards and technology might be another issue that may delay the industrial revolution. For instance, the banking & finance sector. They are both being transformed or disrupted by digital banks and FinTech companies. In the new era of IR4.0, one should not be surprised if fintech poses a threat to traditional banking (Mottain, 2019). Indeed, the cashless transaction in Malaysia is still in infancy. However, at present, Malaysia is moving towards a cashless society in 2020, where it intends to implement the use of the mobile wallet. It is reported that Singapore, registered a 61% cashless transaction in 2016, while Malaysia reported a mere 1% usage (Ishak, 2016). Due to this reason, the banking and payment industry has made efforts to introduce the electronic payments to the Malaysians which affect changes to the most common payment instruments like credit, charge and debit cards for the biggest impact. Apart from that, the Virtual Reality (VR) application has been in used for quite some time particularly in the gaming industry but, lately, it has gained momentum due to the advancement of the technology. However, there are quite a several construction projects in the architecture industry, Malaysia, which are still using 2D drawings and mock-ups to demonstrate their ideas. As the VR technology emerges, they need to shift to this new approach as it will bring new experience to view everything in 3D. In fact, Aerospace Malaysia Innovation Centre (AMIC) has already implemented a VR system (Shah Rajab, 2016)

In a nutshell, the shifts from simple digitization to innovation based on the combinations of technologies is forcing those who involve in business to re-examine the way they do their business. Malaysia's future productivity growth is greatly dependent on Malaysian graduates who applied advanced knowledge and technologies associated with the revolution to ensure sustainable economic growth. The most important thing is they have to understand their changing environment does affect Malaysian entrepreneurship businesses.

Industry 4.0 and Graduate Career Opportunities

Graduates need to be exposed to early work experience and they need to be trained and encouraged to participate in the workplace as early as possible. This is vital as it will widen their horizon on what is taking place and what is changing in today's businesses. Graduates are known as the building blocks of our country. When they are guided correctly and are concerned about their future, then they will equip themselves with the knowledge needed to compete and survive in this era of IR 4.0 world where technology changes very fast. It is therefore important to implement the 4C elements/skills in our education system. These 4Cs are critical thinking and problem solving, collaboration, creativity and communication (Hwa, 2016). With the uprising technology, graduates need to sharpen their problem thinking skills. They are urged to have their role by taking control of the analytics and should know how to enhance factory floor production. To conclude, tough demand can be solved when graduates can think critically.

Industry 4.0 allows graduates to explore new career opportunities. Advances and the Internet of things that impact IR 4.0 enable graduates to explore new career and entrepreneurial opportunities. First, technologies used in super intelligent societies create a demand for cybersecurity analysts. Cybersecurity analysts navigate threats for information assets that deal with phishing, network attacks or cyber-attacks, which include removal of the risks and recovery. Once companies decide to embark on digitalisation, security becomes imperative as they need to invest in secure encryption of information, sensors, networks and others. Cybersecurity analysts protect the online data of their companies or organisations from being compromised by installing firewalls, identifying threats, implementing security plans, monitoring and overcoming security breach. Second, graduates can be creators and innovators for IoT tools and solutions. As IR 4.0 demands innovation, there will be high demand for innovators. Graduates can ask funds for their projects to provide financial resources to produce new products in a shorter time. Crowdfunding has become a popular alternative financial resource for financial funding (Mollick, 2014; Moritz, & Block, 2014). Graduates can request funds from angel investors or seed funding from crowdfunding platforms like GoFundMe, IndieGoGo and Kickstarter where families, friends and strangers fund creative projects.

Third, online retail and offline businesses with an online presence offer graduates to be online retail consigners. Graduates can assist customers in making choices on products and services by personalising products or services based on customers' preferences. The ability to curate and act as drop shippers while marketing other people's products allow them to save money by learning to market other products before launching their products. Fourth, the demands for content creators create opportunities for graduates to produce quality content for Instagram, Twitter and Facebook for companies or individuals to disseminate information about their products, services and achievements. Positions like social media managers enable companies or individuals to promote a positive image of their clients' on social media sites by using effective contents and communication handled by social media managers. As a result, companies and individuals with social media managers will have effective relationships and brand images by being able to promote their products and services efficiently. Apart from that, graduates can be copywriters and editors by doing freelance copywriting and editing for new companies or traditional companies which want to enhance their online presence with social media sites. Graduates can get referrals from their existing customers in building clientele. The graduates can employ a referral reward program that could motivate their clients in encouraging them to use these graduates' services. They can start using their blogs and social media accounts as their portfolios.

Fifth, graduates can become social media influencers who have persuasion power over their followers. Social media influencers become an essential marketing tool to connect brands with customers (Lokithasan, Simon, Jasmin & Othman, 2019). Graduates can include authenticity on their lifestyle branding and become trusted sources of the brands that they promote. Social media influencers with personal social media accounts like Twitter, Facebook, YouTube and Instagram assist their followers in making their informed purchasing decisions (Glucksman, 2017). Brand companies invest in social media influencers to connect directly with their consumers. For instance, being a YouTube personality is a lucrative career opportunity for graduates. The ubiquity of social media, especially video-sharing contents make YouTube celebrities more powerful than traditional celebrities. Living skills have become popular as viewers want to learn about cooking, property management, parking properly, tutoring and photography. YouTube personalities make a profit from the number of viewers for their contents (Torres-Hortelano, 2019). YouTube phenomenon derives from the narcissistic exhibition, participatory venture, self-interest venture for popularity, feelings of connectivity (Torres-Hortelano, 2019).

Apart from that, organizations require digital strategy experts with big data skills to assist them to comprehend strategies to incorporate winning business strategy with digital technologies while data mining software and algorithms successfully. Many companies lack knowledge on how to navigate their companies in IR 4.0 and super-intelligent society. Their current workers need to be retraining, and continuous learning is required by companies to survive in IR 4.0. By offering high-value services and new services, graduates can fill in the gap that requires highly skilled workers who are badly needed by companies in IR 4.0. Last, graduates can utilize the popularity of sharing economies such as jewellery rental, workspace, swap clothes, carpooling, sports equipment rental, technology lending services, parking space, education sharing platform, bike-sharing and running errands. Wirtz, So, Mody, Liu and Chun (2019) indicate that sharing business models are preferred by customers and investors that challenge traditional business models.

CONCLUSION

Moving into the era of IR 4.0 is challenging. Things need to be done quickly and some businesses are done virtually through the use of IT. Virtual entrepreneurship is one of the areas that can be explored by Malaysian graduates as it provides a platform for them to venture into virtual businesses that can connect them with people from all walks of life globally. Nowadays, graduates themselves can create their businesses through virtual entrepreneurship and they do not need to depend a lot on jobs offered

by the government or private institutions anymore. They may offer jobs to others as well through virtual businesses. This will directly reduce the rate of unemployment among graduates.

REFERENCES

- Bowles, J. (2014). The computerisation of European jobs. Who will win and who will lose from the impact of new technology onto old areas of employment? Retrieved from <http://www.bruegel.org/nc/blog/detail/article/1394-the-computerisation-of-european-jobs/>
- Brynjolfsson, E. & McAfee, A. (2014). *The second machine age. Work, progress, and prosperity in a time of brilliant technologies.* New York: W.W. Norton & Company.
- Flynn, J., Dance, S., & Schaefer, D. (2017). Industry 4.0 and its Potential Impact on Employment Demographics in the UK. 10.3233/978-1-61499-792-4-239.
- Diwan, P. (2017). Is Education 4.0 an imperative for success of 4th Industrial Revolution? Retrieved from <https://medium.com/@pdiwan/is-education-4-0-an-imperative-for-success-of-4th-industrial-revolution-50c31451e8a4>
- Glucksman, M. (2017) 'The Rise of Social Media Influencer Marketing on Lifestyle Branding', Elon University, no date. Retrieved from <https://www.elon.edu/u/academics/communications/journal/wpcontent/uploads/sites/153/2017/12/Fall2017Journal.pdf#page=77>
- Hwa, Y. Y. (2016). From drills to skills? Cultivating critical thinking, creativity, communication, and collaboration through Malaysian schools. Penang Institute working paper. Retrieved from https://penanginstitute.org/wp-content/uploads/jml/files/research_papers/HwaYY_Four-Cs_working_paper_28October2016.pdf
- Ishak, M. (2016). Digitisation of Financial Transactions: Cashless society and bitcoin for Malaysia. Malaysian's National Foresight Magazine. (4). Retrieved from https://www.myforesight.my/wp-content/uploads/2016/12/MyForesight_Mag_04-2016_.pdf
- Latisha Asmaak Shafie & Surina Nayan (2010). Employability awareness among Malaysian undergraduates. *International Journal of Business and Management*, 5(8), 2010, pp. 119-123.
- Lokithasan, K., Simon, S., Jasmin, N. Z., & Othman, N. A. (2019). Male and Female Social Media Influencers: The Impact of Gender on Emerging Adults. *International Journal of Modern Trends in Social Sciences*, 2 (9), 21-30. DOI: 10.35631/IJMTSS.29003
- Meylinda Maria, Faaizah Sahbodin & Naim Che Pee (2018). Malaysian higher education system towards IR 4.0; Current trends overview. Conference Paper in AIP Conference Proceedings. Retrieved from <https://aip.scitation.org/doi/pdf/10.1063/1.5055483>
- Mohamad, E., Sukarma, L., Mohamad, N.A., Salleh, M.R., Rahman, M.A.A., Abdul Rahman, A.A., and Sulaiman, M.A. (2018). Review on Implementation of Industry 4.0 Globally and Preparing Malaysia for Fourth Industrial Revolution, The Japan Society of Mechanical Engineers 28th Design Engineering and Systems Division, Yomitan village, Okinawa Prefecture.
- Mohd Shamsuri Md Saad & Izaidin Ab. Majid (2014). Employers' perceptions of important employability skills required from Malaysian engineering and information and communication technology (ICT) graduates. *Global Journal of Engineering Education*, 16 (3), 110-115
- Mollick E. (2014). The dynamics of crowdfunding: An exploratory study. *Journal of Business Venturing*, 29 (1), pp. 1-16.
- Moritz, A., & Block, J. (2014). Crowdfunding: A Literature Review and Research Directions. *SSRN Electronic Journal*, 33. Doi:10.2139/ssrn.2554444.
- Mottain, M. (2019, May 22). IR4.0: On the brink of technological revolution. The STAR. Retrieved from <https://www.thestar.com.my/business/business-news/2019/05/25/ir40-on-the-brink-of-technological-revolution>
- Nagy J., Oláh J., Erdei E., Máté D., & Popp J. (2018). The role and impact of industry 4.0 and the internet of things on the business strategy of the value chain-the case of Hungary. *Sustainability*. 10 (10), 3491.

- Noor Suhailie Mohd Noor. (2013). Higher education and graduate's employability skills; What the employer think and graduates have? Unpublished Master Thesis. KDI School of Public Policy and Management.
- Omar, S.A., & Hasbolah, F. (2018). Awareness and Perception of Accounting Students towards Industrial Revolution 4.0. Proceedings of the 5th International Conference on Accounting Studies (ICAS 2018), 16-17 October 2018, Penang, Malaysia
- Petrillo, A. (2018). Fourth Industrial Revolution: Current Practices, Challenges, and Opportunities. Retrieved from <https://www.intechopen.com/books/digital-transformation-in-smart-manufacturing/fourth-industrial-revolution-current-practices-challenges-and-opportunity>
- Rabeh Morrar, Husam Arman & Saeed Mousa (2017). The Fourth Industrial Revolution (Industry 4.0): A Social Innovation Perspective. Retrieved from <https://timreview.ca/article/1117>
- Shwab, K. (2016). The Fourth Industrial Revolution: what it means, how to respond. Retrieved from <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond>
- Shah Rajab, R. (2016). Virtual reality application and industry 4.0. Malaysian's National Foresight Magazine. (4). Retrieved from https://www.myforesight.my/wp-content/uploads/2016/12/MyForesight_Mag_04-2016_.pdf
- Torres-Hortelano, L. (2019). Audio-visual genres and poly mediation in successful Spanish YouTubers. *Future Internet*, 11, 40.
- Wirtz, J., So, K., Mody, M., Liu, S., & Chun, H. (2019). Platforms in the Peer-to-Peer Sharing Economy. *Journal of Service Management*, 30(4), 452-483.