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The Effectiveness of Digital Entrepreneurship Ecosystem Toward Enriching Income Generation: The Moderating Role of Entrepreneurial Intention

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Abstract

This study attempts to examine the functionality of the digital entrepreneurship ecosystem for low-income household Bottom 40 (B40) students toward enriching income generation and entrepreneurial intention as the moderating role in the relationship. This research applied the quantitative method using an online questionnaire. A total of 500 data were gathered from 5 Universities in Malaysia, followed by Partial Least Squares-Structural Equation Modelling (PLS-SEM) analysis to examine the hypotheses suggested in the research. The results implied that the effectiveness of the digital entrepreneurship ecosystem has a positive effect on the enrichment of income generation among B40 students in a higher education institution. It was also shown from the moderating effect analysis that entrepreneurial intention has an important function as a moderator to strengthen the relationship. The research may assist B40 students in a higher education institution for income generation through digital entrepreneurship.

Keywords

digital entrepreneurship ecosystem, low-income household Bottom 40, income generation, entrepreneurial intention

Introduction

There is widespread agreement among academic, corporate, and policymaking communities that fostering entrepreneurship is beneficial for promoting economic growth, reducing poverty, and boosting employment (Dobson & Muhammad, 2022). In the increasingly difficult environment of most countries, entrepreneurship, particularly that which refers to technology problems, is recognized to be vital in strengthening the innovative skills of entrepreneurs. Entrepreneurs have found it easier to adapt to a market that is increasingly focused on technology mainly to their pursuit of business and economic prospects using digital technology (Oppong et al., 2020). DE is a condition occurring through technological assets, such as the Internet and information and communications technology (Le Dinh et al., 2018). Generally, any entrepreneurial activities that transmit an asset, service, or major element of the business into digital could be classified under digital entrepreneurship. Sahut et al. (2021) stated that digital entrepreneurs are faced with various dissimilarities than traditional entrepreneurs. Marketing activities, commodities, and workplaces are the primary factors in differentiating between digital and non-digital entrepreneurs. The higher education students have engaged in the digital entrepreneurship (DE) to boost their income and supplement their daily operations.

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While various programs have been implemented to help the B40 students overcome poverty, many factors are influencing B40 involvement in DE. Thus, this study was required to increase the understanding of this issue in five universities. This study was conducted in accordance with the Entrepreneurship Action Plan Higher Education Institutions (EAP-HEIs) 2021-2025, which attempts to develop ambitious and continuous entrepreneurial ecosystem. Based on Entrepreneurship Action Plan Higher Education Institution (EAP-HEIs) 2021-2025, there are two major points that are frequently highlighted to develop Malaysia as a high-income and inclusive developing nation are entrepreneurship and education. First, the implementation and exposure to entrepreneurial values and culture are the learning processes that provide an opportunity for students to increase their creativity, innovativeness, and feasibility. In this case, these factors are predicted to achieve innovation, employment possibilities, and stronger economic development in the future. Second, the development of the entrepreneurship area is based on the innovation of a university's workforce to form it. This action represents the recent entrepreneurship education curriculum that is updated, in line with the world trends in IR 4.0, and progressing toward sustainable entrepreneurship, which fulfills the entrepreneurship objective (EAP-HEIs 2021-2025). Therefore, the digital entrepreneur was allowed as a career of choice among the students through their business as one of the income-generating activities towards fulfilling the Envision 2030 Sustainable Development Goals. These initiatives align with the second and fifth objectives of National Entrepreneurship Policy 2030. In developing the model, this research focused on the first core of SDG, which was poverty.

Problem Statement and Need for Study

Based on statistics, among the 2.7 million Malaysian households under the B40 group, 56% of the households were situated in cities and 44% were situated in the countryside. Malaysia's Eleventh Malaysia Plan describes the B40 group as a household that receives a monthly salary of under RM4,850 on average. In Malaysia, the Covid-19 pandemic is among the most significant challenges among the current graduates in the labor market. According to the Department of Statistics Malaysia records, the nonemployment degree in Malaysia rise by 5.1% in the second quarter of 2020. Therefore, it was indicated that graduate unemployment is a primary factor leading to 29.3% unemployment, which exceeds half of the overall unemployment. This condition becomes a severe challenge for graduates to be employed. In fact, minimum activities during the Covid-19 pandemic remain a primary obstacle to employment and attendance to physical interviews. However, most of the unemployed graduates are from households under B40.

Given the obstacles faced by these graduates in helping their families escape from poverty lifestyle, the Entrepreneurship Action Plan Higher Education Institution (EAP-HEIs) 2021-2025 developed by the Ministry of Higher Education (MOHE) targets expanding digital entrepreneurship to assist students in establishing their online businesses. Provided the effects of a global pandemic, it is natural for DE to develop. However, despite the interest in DE, studies in this field were scarce (Yaghoubi Farani et al., 2017).

Entrepreneurial intention is one of the most important aspects of business growth and development that can foster independence and individual initiative in a business. Entrepreneurial intention is considered when deciding whether to pursue a career as an entrepreneur (Alferaih, 2022). Because there is no entrepreneur without an entrepreneurial intention, it is critical to understand the factors that drive these goals (Elnadi & Gheith, 2021). As a result, understanding how and why people start businesses is critical. Encouraging larger entrepreneurial objectives is usually beneficial to DE.

Previous research suggested that while basic entrepreneurship skills can be developed at university, the skills do not guarantee the development of a successful entrepreneur (Embi at et al., 2019; Fzlinda, 2019). Given these opposing viewpoints, it is common that an ongoing debate occurs on whether universities will generate a sufficient number and quality of potential entrepreneurs as aimed by the government. Furthermore, studies have shown that students who are not exposed to any basic entrepreneurship education have a weak intention in becoming entrepreneurs. This condition suggests that entrepreneurship intentions would improve an individual's personal characteristics, resulting in high self-confidence in choosing entrepreneurship as a potential career (Fabeil, 2019).

Currently, the possibility of digital marketing for a larger market is frequently gaining trust and becoming cost-productive for entrepreneurs. As the number of industries affected by the pandemic crisis increases, the majority of micro, small, and medium-sized organizations have been compelled to examine and widen digital marketing approaches in the multi-national commercial sector to increase the significance of the organization's reliability and competitiveness (Yusof et al., 2022). Digital marketing is an essential factor to be considered by every organization and community that aims to progress in the business world and not fall behind in the competition from industry. In the recent business era, continuous improvement in digital policy from time to time is important in ensuring consistent economic development (Baig et al., 2022). This perspective is sound and

able to create notable progress in the field. Therefore, the B40 students' involvement rate in DE is a concern to be highlighted.

With further research works being performed on entrepreneurship, the primary factor of SDG, which is poverty, is not adequately emphasized. While the Government of Malaysia is assisted by a wide range of multisector initiatives for the community, the Covid-19 pandemic impacts the B40 community in the nation, particularly the B40 students. For continuous competitiveness in a labor market, which is predicted to pose more challenges after Covid-19 (Ratten & Jones, 2021), equipping the B40 students with expertise in line with the industry is important. Thus, the students should be more exposed to DE to be informed and gain an entrepreneurial mindset after their studies. They would also be able to observe their performance for talent discovery and supporting an entrepreneur's attributes based on the government's purposes through Entrepreneurship Action Plan (EAP-HEIs 2021-2025). In this case, university students could be involved in business activities during their studies. At the same time, graduate students could be involved in entrepreneurship as one of the operations that generate income (Dobson & Muhammad, 2022), which agrees with the second objective of Shared Prosperity Vision 2030 to solve the imbalance, particularly in the B40 group.

Therefore, this study aims to examine the effectiveness of the digital entrepreneurship ecosystem for Bottom 40 (B40) students toward enriching income generation and entrepreneurial intention as the moderating role in the relationship, particularly within the context of Malaysian higher education institutions.

Specifically, this research intends to address two research questions:

1. Is there a significant relationship between the effectiveness of the digital entrepreneurship ecosystem toward promoting income generation among B40 students in a higher education institution?
2. Does entrepreneurial intention moderate the relationship between the effectiveness of the digital entrepreneurship ecosystem toward promoting income generation among B40 students in a higher education institution?

This article is organized into several sections: Section "Introduction" presents the study background and the conceptions of the digital entrepreneurship ecosystem in Higher Education Institution. Section "Literature Review" illustrates a literature review on the digital entrepreneurship ecosystem, income generation, and entrepreneurial intention literature, followed by a hypothesis in Section "Theory Development." This section is followed by Section "Hypothesis Development," which focuses on the approach applied in this research. The results are presented in Section "Methodology," followed by Section "Data Analysis" that presents the result discussion, limitations, and recommendations for future research works.

Literature Review

Digitalization has made contributions to one of the key behavioral changes in human culture, particularly in the operation of established and emerging organizations operating in the marketplace. Based on the research by Sahut et al. (2021), the comprehension of the matters promoting DE is important in academic research. It also manages the business practice and government policies to foster this progress, with favorable effects on job creation and economic development being taken into consideration.

DE is a situation arising through technological assets, including the internet and information and communications technology (Le Dinh et al., 2018). Generally, any entrepreneurial process that includes the transfer of an asset, service, or primary component of the business into digital could be described as digital entrepreneurship. Baig et al. (2022) and Hull et al. (2007) stated that digital entrepreneurs confront various distinctions in comparison to traditional entrepreneurs. The key differentiation factors between digital and non-digital entrepreneurs include commodities, marketing activities, and the workplace.

Technology, including the internet and information and communications technology, leads to the phenomena known as "digital entrepreneurship" (Le Dinh et al., 2018). The DE may be broadly described as any entrepreneurial actions that transform a service, asset, or significant part of the organization into the digital sphere. Baig et al. (2022) highlighted that digital entrepreneurs encounter several challenges that are otherwise not faced by traditional entrepreneurs. The key distinctions between digital and non-digital entrepreneurs are present in their products, marketing approaches, and working surroundings.

Le Dinh et al. (2018) stated that DE is the resolution of conventional entrepreneurship with a new method of developing and managing a business in the digital period. It is a subcategory of entrepreneurship where digitalization takes place on all or nearly all physical factors of a traditional company. Therefore, DE also incorporates emerging technologies to develop and run businesses in the digital age (Rippa & Secundo, 2019). Following this, research work by Zainal and Yong (2020) indicated that digital entrepreneurship in education could impact the

application of digital technologies and reinforce students' entrepreneurial knowledge and expertise. Another research by Gunaseelan et al. (2022) emphasized that DE is an entrepreneurship activity involving innovation expertise and attributes of competitive aggressiveness for competition in the digital market.

Digital Entrepreneurship Ecosystem

Digital entrepreneurship builds upon the presence and growth of a digital ecosystem. The primary pillar of entrepreneurial ecosystems includes the institutions, which are the rules of the game (Sussan & Acs, 2017). Hu et al. (2016) described institutional entrepreneurship as the key factor for the development of digital ecosystems, followed by the users as the second pillar of digital ecosystems. The digital ecosystem users and participants comprise individuals with the chance for accessing linked devices, such as mobiles, tablets, and computers (Kraus et al., 2019; Sussan & Acs, 2017). Therefore, digital ecosystems provide high chances for students who aim to become entrepreneurs.

The exchange between the government, industries, and universities is essential for the Triple Helix model (Marques et al., 2021). This tripartite association would develop a knowledge society and the possibility for innovativeness and economic growth (Galvão et al., 2020). The enhanced universities' mandate in the tripartite association is essential based on many developmental viewpoints. The universities' new role is highlighted in their third mission that administers the universities with the mandate of socio-economic growth as progress in their traditional teaching missions (Salamzadeh et al., 2022). The university's unlimited potential to equip students with original expertise, beliefs, and talent associated with digital entrepreneurship is the primary merit of the knowledge society. Training is provided to students with a focus on digital entrepreneurial knowledge as a motivation for them to be entrepreneurs or start-up founders. This statement is in line with economic development through job creation and essential products (Galvão et al., 2020; Salamzadeh et al., 2022).

According to Davidson and Vaast (2010), in contrast to traditional entrepreneurship, DE is not the entrepreneur's role. Currently, social interactions within digital environments and the material context of digital technology are focused on. Mutual adaptations are made in the digital ecosystem in terms of locations, services, and products, forming digital entrepreneurial activities. Notably, the teaching of DE is a recently popular subject that is also applicable in numerous educational environments and approaches student's real life in a direct manner (Kraus et al., 2019). In 2016, the DE module was employed in a recent entrepreneurship course at higher learning institutions in Malaysia. This junction was attributed to the developments that modified the job market and business environment, including online sites and social media (Zainal & Yong, 2020). The DE was regarded as among the emerging factors in Malaysian education, which was consistent with Industrial Revolution 4.0.

The government and universities have made combined endeavors to instill entrepreneurial mindsets and capacities through the incorporation of entrepreneurship education as an element of the academic curriculum (Dobson & Muhammad, 2022). Notably, the first initiative under the Malaysia Education Blueprint 2015-2025 is to develop a thorough, thriving, and entrepreneurial graduate (Fabeil, 2019). The aim of this initiative is to develop graduate entrepreneurs and provide training for students with entrepreneurial characteristics in the future in their development into resourceful and independent entrepreneurs.

The Covid-19 pandemic allows the company and entrepreneur to have critical thinking about business procedures and social network site use to support operations according to modern practices, the use of new technologies, approaches from the recent crisis, and social links (Dwivedi et al., 2020). Covid-19 has been determined by the company where the digital economy assists in accelerating digital economy development. The digital economy is among the primary fields of economic development to fulfill the national commitment to develop a country of sustainable development while assuring equal distribution across ethnicities, income groups, and areas (Ratten & Jones, 2021). Students could be described as fast learners in terms of their response to recent technological development while being capable of benefitting from social networking, gaining degrees of trust, and creating possibilities for integrating workplace efficacy (Picatoste et al., 2018). The research by Rodriguez and Lieber (2020) highlighted that students with entrepreneurial and critical thinking place further focus on DE and select entrepreneurship as their career.

The development of technology and social network sites, particularly Facebook, has built high possibilities for students to access the entrepreneurship world through low-cost technology (Khalil et al., 2021). Social network sites frequently offer new resources for entrepreneurs and other companies for further management of their operations (Rippa & Secundo, 2019). Digitalization and technology are the external supports for developing new entrepreneurial progress and business revolution by developing and testing emerging digital technologies to boost online business growth (Le Dinh et al., 2018; Oppong et al., 2020).

Notably, social network sites are effective instruments in having students involved due to their regular use of

the sites in their daily lives (Lewis & Molyneux, 2019). As a platform that exhibits and develops young people's talents and forms start-ups in their field of interest (Weng et al, 2022). However, students solely develop social network sites as a platform for sharing videos and images. This condition indicates the students' need for exposure to the understanding and expertise in data analysis and the ability to assess social media data for their online business (Rani & Padmalosani, 2019).

Income Generation

Entrepreneurship is a factor of income generation that boosts economic development. In an entrepreneurial society, job creation is a regular attribute, given that new actors in the economy possess new attributes through open-source culture. Entrepreneurial activity constantly focuses on value creation. This creation improves factor productivity, which encourages factor utilization and strength in common production procedures. Subsequently, job creations occur within and beyond a specific enterprise from any entrepreneurial actions. Long-term value development places emphasis on entrepreneurship, in which the entrepreneur is required to build a strategy toward maximum profits and expansion for the long term (Langston, 2020). In this case, entrepreneurship provides a dependable income source for the entrepreneur, labor, and other factor inputs.

Considering the emphasis and the potential for entrepreneurial activities, the entrepreneur, and labor to develop, all income earners from entrepreneurial activities have increased their economic independence and confidence to face life obstacles. It could be elaborated that entrepreneurship empowers income in an economy. In the modern world, entrepreneurship offers a new method for combatting poverty and boosting economic development in developing nations (Sahut et al., 2021; Soomro & Shah, 2022). To a notable degree, entrepreneurship reduces the income gap and exhibits a constant mechanism for gaining income. This is followed by the reduction of unbalanced income and poverty.

According to Liu at al. (2022) positivity toward entrepreneurship has a high possibility to lead to the ability to perceive business opportunities. By observing the possibilities and launching their own business, individuals may increase their competitiveness. The B40 group must devise strategies to guarantee their continued ability to support the family financially. Even when some affected members of the B40 group are still working, their income may not be adequate to cover the high cost of living (Sahut & Peris-Ortiz, 2014; Sahut et al. 2021).

During the epidemic, unemployed individuals should be proactive in job-seeking to support their families. These individuals must take the initiative to investigate the unfulfilled neighborhood's needs and transform the resources at hand into opportunities. However, it is challenging for these graduates to assist their families in escaping poverty without a suitable job or salary. Besides finding a job that would allow them to support their families, many individuals struggle to fully return the school debts that they owe throughout their years of diploma or degree studies (Khan et al., 2021).

In contrast to job takers, effective entrepreneurship leads to job creation. In the current global market, the creation of new jobs is suitable as the market evolves at a fast rate. However, in the recent education systems, it is encouraged that students aim for career paths when excessive demand is present. To address the unpredictable crisis and the presence of technology that leads to redundancy among individuals, today's youth should be empowered to become future job creators and achieve sustainability for future generations.

Entrepreneurial Intention

The intention is a characteristic of the individual that forms the desire for specific behaviors, where consistency and strong intention could predict a person's behavior (Baluku et al., 2019). Entrepreneurial intentions would be affected by learning new behaviors influencing attitudes (Arshad et al., 2019; Ferreira et al., 2017). Considering that a business may be started with calculated and purposeful actions, the entrepreneurial intention is critical to comprehending the entire phenomenon involved in a business start-up (Park, 2017).

Soomro and Shah (2022) highlighted that the first stage in starting a new business is to have entrepreneurial intention. In this case, after the completion of undergraduate programs, students will be prepared with the ability to put their aspirations into setting up a company. Entrepreneurship intention is defined as individuals' willingness to embark on new business ventures (Hien & Cho, 2018). Mei et al. (2020) added that entrepreneurial intention refers to a person's subjective attitude toward the desire to establish their firm, which involves mental state and behavioral inclinations.

Based on an interview conducted by Zaheer et al. (2019) with the founders of 12 digital start-ups, the entrepreneur's education, involvement, vision, objective, values, focus, and timing have a direct relation to entrepreneurial success. Family background, personal commitment, motivation, knowledge, and personal expertise associated with the industry and industrial sectors are essential for entrepreneurial success.

Theory Development

Social Cognitive Theory (SCT)

One of social psychology's most well-known and prominent theories is Bandura's SCT (Bandura, 2005). Its influence has expanded to numerous fields (Nabi & Clark, 2008), including learning about entrepreneurship (Harinie et al., 2017). Self-efficacy as a predictor of any behavior serves as the theoretical foundation. A person's confidence in their capacity to complete a task is known as self-efficacy (Bandura, 1997). According to the theory, a high level of self-efficacy influences behavior, determines actions to take, and boosts tenacity when faced with challenges (Bandura, 2005). This relationship, according to academics, is superior to the majority of predictors employed in entrepreneurship research. For example, self-efficacy has been suggested by Krueger et al. (2000) to be a crucial precondition for entrepreneurial purpose. According to research conducted by Harinie et al. (2017) and Liguori et al. (2018), people who possess high levels of entrepreneurial self-efficacy (ESE) are more naturally inclined to engage in entrepreneurial activities. In light of this, ESE is a reliable indicator of a person's confidence in their capacity to start a profitable business (Karlsson & Moberg, 2013).

Social Capital Theory (SCT)

For more than 20 years, Social Capital Theory has dominated popular social science theories and models (Adler & Kwon, 2002; Coleman, 1988; Fukuyama, 2002). The SCT's adaptability in offering a precise definition of well-being among people or groups contributed to its rise in popularity. The SCT views capital to be a resource intrinsic to social interactions. As a result, social capital is the result of social interactions, specifically the traits that young people acquire from participating in different groups at home, school, and other organizations, like self-assurance, trust, security, and loyalty. Additionally, some researchers found a relationship between an individual's development of various forms of capital and their level of education (Rogosic & Baranovic, 2016). Based on the theoretical framework of Coleman's (1988) research, a number of studies have established the connection between education and the formation of social capital. Although Coleman has historically approached the idea in terms of the social capital that exists inside families, they have also taken into account social capital that exists within communities (Rogosic & Baranovic, 2016). Bourdieu (2011) made an effort to clarify and confirm that social capital tends to accelerate social reproduction when it is associated with an individual's level of education. Furthermore, educational institutions (such schools or universities) and social capital are related, claim Rogosic and Baranovic (2016).

Hypothesis Development

The hypotheses suggested in this research were based on theoretical and empirical reviews of the study factors. The association between the factors was investigated through theoretical and empirical reviews, leading to the establishment of the primary hypotheses. A hypothesis was also made on the moderating impact of the associations.

Digital Entrepreneurship Ecosystem and Income Generation

The digital entrepreneurship ecosystem is a crucial factor (König et al., 2019) influencing numerous degrees and elements of the innovation system through changes in the objectives, forms, and networking procedures of the entire business system (Satalkina & Steiner, 2020). By reinforcing economic forms, encouraging, and executing innovation, and developing more jobs, entrepreneurship leads to economic development. As conception, entrepreneurship comes with several conflicts (Mu et al., 2020; Scholz et al., 2020).

Digital skills worldwide are adjusting the form, characteristics, and dynamics of employment, communication, establishment, and learning at a fast rate (Chan et al., 2019). Moreover, people, families, businesses, government establishments, and companies have been incorporated into the fast-paced growth of ICT. This condition has transformed the physically linked biological procedure into a digital procedure for an open, interactive, and collaborative network (Jain et al., 2015).

Several research works demonstrated the importance of entrepreneurship education in the development of the mindset essential for entrepreneurship among student graduates (Guerrero et al., 2015; Liu et al., 2022; C. Marques et al., 2018). Education leads to the expansion of knowledge, which is crucial for human capital and creates social norms representing the social capital core. It could be seen that universities provide several benefits in terms of having students involves with industries by acting as a hub for networking operations allowing individuals to meet and exchange insights (Eesley & Lee, 2021).

A notably low number of research works (Gordon et al., 2010; Hayter, 2013) addressed the part played by educational establishments to strengthen income generation for B40 students. On the other hand, Ilonen (2021) and Baig et al. (2022) emphasized the high recognition of the university's function in human capital establishment

although there is less research or understanding of digital entrepreneurship's capability to build an income.

The institutions of higher learning play their role to motivate and assist students in obtaining applicable and updated expertise, which includes the entrepreneurial and digital expertise needed for innovation in the workplace (Eesley & Lee, 2021; Goyanes, 2015). An emphasis for EU nations aims to strengthen technological and entrepreneurial expertise in education in underdeveloped regions. The universal purpose of offering efficacious and integrated education and teachable moments in the long term indicates the significance of education for a sustainable environment (Nambisan et al., 2019; Zhao, 2021). Therefore, the hypothesis was developed as follows:

H1: There is a positive relationship between the effectiveness of the digital entrepreneurship ecosystem toward promoting income generation.

Moderating Effect of Entrepreneurial Intention

Entrepreneurship as an education conception comes with irregularities; one of which has an association with the course content (Zhao, 2021). The learning organization presents notable suggestions for education's role as an essential factor in encouraging economic development and stronger capability. These roles are for success in the international marketplace and response toward recent and emerging challenges (Harjanti & Noerchoidah, 2017).

There has been no argument regarding the association between the digital entrepreneurship ecosystem and entrepreneurial intention, especially in developing nations (Habib et al., 2020; Langston, 2020). This association is elaborated in this article through the discussion on the function of entrepreneurial intention to moderate between income generation and the digital entrepreneurship ecosystem. Based on research work by Dobson and Muhammad (2022) entrepreneurship education allows for important expertise and knowledge. This condition impacts students' attempts of becoming an entrepreneur, which results in economic development and a decrease in poverty through job creation. Ilonen (2021) and Turker and Selcuk (2009) demonstrated that entrepreneurship education at a university degree in significantly impacted entrepreneurial intention. This was followed by the argument that education on entrepreneurship is highly effective in the development of knowledge on entrepreneurship, which was in line with the cross-culture research of Baluku et al. (2019) and Moriano et al. (2012). An associated research work performed in Malaysia recorded that a suitable entrepreneurship education exposure would impact the students' intent of becoming entrepreneurs Dobson and Muhammad (2022). In line with this, the following hypothesis was formulated:

H2: Entrepreneurial intention moderates the relationship between the effectiveness of the digital entrepreneurship ecosystem toward promoting income generation.

Methodology

Design and Sample

This study population included the B40 students from five higher education institutions, namely Universiti Malaya (UM), Universiti Teknologi Malaysia (UTM), Universiti Kebangsaan Malaysia (UKM), Universiti Tun Hussein Onn Malaysia (UTHM), and Universiti Putra Malaysia (UPM). These universities were selected because it has a strong recognition as major entrepreneurial universities and achieved several entrepreneurship awards.

The unit of analysis in this study is the students under the B40 category. The criteria were used to determine the individuals who were eligible to participate in the study are (1) the students should be from the B40 group; (2) the household income of the students' family should be lower than RM4,850; and (3) their nationality should be Malaysian. The purposeful sampling technique and data collection processes were carried out in a cross-sectional manner using an online survey method (Google Form). Each of the students from the five higher education institutions was given a Google Form link which consisted of a set of questionnaires that included a cover letter specifying the goal of the study and statements on confidentiality and the voluntariness of participation. Five hundred questionnaires were collected from Google Form between January to May 2022, 500 were returned, and this amount was adequate to perform the PLS-SEM analysis (Adam et al., 2022).

The analysis of the respondents' background information demonstrated that among the 500 respondents, 39.7% were represented by males, while 60.3% were represented by females. Most of the respondents (94.0%) were Malays, Indians (4.0%), Chinese (1.1%), and 0.9% of other races (Bumiputera). As for the education level, 89.0% was represented by undergraduates, while 11.0% was represented by postgraduates. Within the 500 respondents, UTM (20.0%), UM (20.0%), UPM (20.0%), UKM (20.0%), and UTHM (20.0%).

Measures

The adaptation of the questionnaire employed for information gathering was made from past research works,

which adhered to these variables (digital entrepreneurship ecosystem, entrepreneurial intention, and income generation). The overall quantity of items employed in the scale was 29, which excluded the demographic profile. Furthermore, three factors were employed, namely digital entrepreneurship ecosystem, entrepreneurial intention, and income generation. The independent factor, the digital entrepreneurship ecosystem, was evaluated with a 17-items (DEE1- My university has established programs to encourage entrepreneurial activity; DEE2- The structure of my university encourages students to acquire entrepreneurial attitudes and abilities; DEE3- The scope and depth of entrepreneurship education at my university have expanded; DEE4- My university has intensified efforts toward developing job creators than job-seekers; DEE5- A variety of entrepreneurial strategies, including teaching and encouraging student diversity and creativity, are being used more frequently at my university; DEE6- Extracurricular activities are offered at my university to help students develop their entrepreneurial attitude and encourage it.; DEE7- My university has made a commitment to engage in knowledge sharing with a range of stakeholders, including the public sector, business community, and society; DEE8- My university has formed connections with a range of entities, such as schools, alumni, and local and regional businesses and entrepreneurs; DEE9- To foster dynamic knowledge exchange in both directions, my university collaborates with scientific parks, incubators, and other outside organizations; DEE10- Through official or informal business/external entrepreneurial activities, my university assists students in exchanging information and working with the outside world; DEE11- My university has established mechanisms to facilitate students' mobility between the classroom and the outside world, including teaching and research exchanges, internships; DEE12- My university collaborates and forms commercial and industrial partnerships with businesses, entrepreneurs, and the general public to share its research findings; DEE13- More relationships and collaborations have been formed between my university and other stakeholders, including local businesses, communities, chambers of commerce, and alumni; DEE14- To promote internal knowledge sharing, my university incorporates research findings into entrepreneurship education and training; DEE15- The autonomy to choose its business endeavors is granted to my university; DEE16- Innovative and multidisciplinary entrepreneurial operations are supported by the institutional free will that my university offers; DEE17- My university leads entrepreneurial ventures to success by providing institutional effort and responsibility) adapted from Sooreh et al. (2011) and Salamzadeh et al. (2022). At the same time, the moderating variable, entrepreneurial intention measured using seven-items (EI1- I'm committed to starting a business in the future; EI2- As an entrepreneur, I am willing to take a chance; EI3- I would rather work for the government; EI4- I would rather work for private companies; EI5- After completing my university education, I want to launch a business; EI6- I'll probably put in a lot of effort to launch my own business; EI7- I'm prepared to launch my own company) adapted from Tofan and Semizhon (2017) and Salamzadeh et al. (2022). Finally, the dependent variable which is income generation measured by five items (IG1- Training students to acquire skills and knowledge for employment in business related occupations; IG2- Helping students to set up small scale businesses which can liberate them from poverty; IG3- Preparing students for life-long learning by developing in them the necessary mental tools, technical skill, and other qualities needed for active participation in team working; IG4- By developing the understanding of careers, job opportunities and employment requirements; IG5- Providing good citizenship through preparing students to become intelligent and productive wage-earners) adapted from Helen et al. (2023).

Overall, the measurement of items was conducted with a five-point Likert scale, which ranged from one (strongly disagree) and five (strongly agree). The consolidated questionnaire was examined for dependability and efficacy through Cronbach's alpha and composite reliability, respectively. This action was performed for data credibility improvement and scaling through five universities.

A pilot test was carried out to determine construct reliability, face validity, and content validity prior to the main study (Adam et al., 2022). Five academic entrepreneurship specialists participated in content validity testing to see whether the scale items accurately reflected the characteristics evaluated. Emails were used to get in touch with and approach the expert panels. A number of items were changed in response to the comments in order to ensure that the content was understandable and obvious in light of the study's context. Ultimately, this suggests that the integrity of the content was guaranteed. Next, face validity was undertaken by incorporating five selected respondents from the B40 students to gather their feedbacks on the face validity of the items. The findings demonstrated that the participants could comprehend the questions on the survey. Ultimately, 30 questionnaires were distributed to B40 students from the 5 higher education institutions in order to conduct a pilot test to assess the study's validity. According to the results, every construct assessed using Cronbach's alpha has crossed the cutoff point, which is greater than .70

Table 1. The Descriptive Analysis Score for DEE, EI, and IG.

Construct	Mean	Standard deviation (*SD*)	Score
Digital Entrepreneurship Ecosystem (DEE)	3.69	0.37	High
Entrepreneurial Intention (EI)	3.58	0.49	Moderate
Income Generation (IG)	3.73	0.49	High

(Fuzi et al., 2019; Hair et al., 2014). In particular, Cronbach's alpha is DEE is .84, for EI is .91 and for IG is .86. The items can now be subjected to additional analysis after being validated.

Data Analysis

Descriptive Analysis of the Study Variables

Descriptive statistical analysis was used to determine the mean and standard deviation of each survey item for the main constructs. The overall mean score for the Digital Entrepreneurship Ecosystem (DEE) is 3.69 ($SD = 0.37$; Sekaran, 2000). In this situation, as a whole, it demonstrated that the five higher education institutions' ability to create the entrepreneurial attitude and capabilities, as well as increased efforts toward producing job creators rather than job seekers among graduates, remained strong. As a result, it must continue to sustain and enhance in the future by collaborating with all stakeholders and promoting comprehensive efforts to encourage the growth of digital entrepreneurship among B40 students.

The overall mean score for entrepreneurial intention (EI) is 3.58 ($SD = 0.49$; Sekaran, 2000). In this situation, the intentions of B40 students to become digital entrepreneurs and to establish and start their own businesses are still moderate and should improve in the future. The B40 students must be nurtured to be more confident and risk takers in order to be successful digital entrepreneurs who can compete worldwide and support their families by opening a business after completing their university studies.

The high level overall mean score for Income Generation (IG) is 3.73 ($SD = 0.49$; Sekaran, 2000). The universities' capacity to offer the B40 students training, lifelong learning experiences toward understanding of careers, work prospects, and employment requirements, as well as preparing students to become intelligent and productive wage-earners, was demonstrated by the IG score. Therefore, it still has to be improved and maintained in the future by assisting students in starting small enterprises that can help them escape poverty and are in line with government policy. The overall score for DEE, EI, and IG is shown in Table 1.

Measurement Model

Partial least squares structural equation modelling (PLS-SEM) conducted data analysis in two phases, where the adoption of measurement and structural models took place. In the first phase, data analysis was conducted for the measurement model with the use of the PLS algorithm. Using this model, the indicators and variables were applied through composite reliability and Cronbach's alpha. The cut-off value for these two statistics was 0.7 (Adam et al., 2022; Hair et al., 2017; Haq & Awan, 2020). All research factors fulfilled this attribute, with the alpha reliability statistic ranging from .874 to .93 and the composite reliability statistic ranging from .86 to .93. Thus, these factors fulfilled the reliable data standard. Measurement of the convergent validity of the scale was conducted with factor loading for the entire items. The outcome of factor loadings ranged from 0.603 to 0.915, which was deemed acceptable (Hair et al., 2017; Haq & Awan, 2020; Haq et al., 2020; Peterson & Kim, 2013). Overall, the items exhibited convergent validity through their statistics that ranged from 0.6 to 0.911, which validated the data for convergent validity. The average variance extracted should exceed 0.5 for convergent validity (Hair et al., 2017; Haq et al., 2020; Huo et al., 2021; Nawaz et al., 2020, 2021).

It was found in this research that the AVE scores for the entire constructs exceeded 0.50 following the removal of three items (DEE 10, DEE 15, and EI 4). The average variance extracted (AVE) for the factors employed in this research exceeded the threshold prescribed, which confirmed the convergent validity of the data (Table 2).

Further analysis of the data was conducted for discriminant validity through the heterotrait-monotrait ratio of correlation (HTMT). In this case, it was agreed that the value must not be higher than 0.9; the entire values must be lower (Adam et al., 2022; Hair et al., 2017). The values under the HTMT ratio were found to be lower than 0.9, which validated the data with discrimination as shown in Table 3.

Structural model

Direct Relationship. In the third stage of data analysis, data analysis was conducted for structural model or path analysis through bootstrapping with Smart PLS 3.0.

Table 2. The Summary Results' Convergent Validity for DEE, EI, and IG.

Construct	Item	Loading	*CR*	AVE
Digital Entrepreneurship Ecosystem (DEE)	DEE 1	0.696	.911	0.772
	DEE 2	0.722		
	DEE 3	0.714		
	DEE 4	0.734		
	DEE 5	0.766		
	DEE 6	0.722		
	DEE 7	0.738		
	DEE 8	0.759		
	DEE 9	0.776		
	DEE 11	0.854		
	DEE 12	0.794		
	DEE 13	0.770		
	DEE 14	0.765		
	DEE 16	0.728		
	DEE 17	0.722		
Entrepreneurial Intention (EI)	EI1	0.797	.879	0.646
	EI2	0.835		
	EI3	0.603		
	EI5	0.827		
	EI6	0.801		
	EI7	0.846		
Income Generation (IG)	IG1	0.833	.874	0.637
	IG2	0.846		
	IG3	0.915		
	IG4	0.805		
	IG5	0.765		

Note. CR = Composite reliability; AVE = Average variance extracted.

This stage follows the measurement model. The importance of the associations is commonly presented as a path analysis, which demonstrates the direct or indirect impacts. Specifically, the direct impacts are the general linear regression. The path analysis diagram is acquired following the constant bootstrapping procedure (5,000 interactions) to validate the statistical significance.

It was shown from the results that the R2 amounted to 0.546, indicating that 54.6% of the variation in IG (dependent variable) could be represented by DEE (independent variable). The examination of the study model demonstrated that DEE was significantly and positively related to IG ($\beta = .346$, $t = 4.928$, LL = 0.221, UL = 0.453), which supported H1. This result exhibited a significant degree of DEE, followed by the rise in IG as presented in Table 4 and Figure 1.

Moderating Effects. The next objective of this research is to examine the moderating impacts of entrepreneurial intention digital entrepreneurship ecosystem and income generation. To examine the interaction impacts of moderators through PLS-SEM, the orthogonalization method was employed as per Henseler and Chin's (2010) suggestion in identifying the moderating effect of entrepreneurial intention on the association. The notable impact of entrepreneurial intention was evaluated through a bootstrapping re-sampling with 5,000 re-samples. Based on the bootstrapping result, the interpretation of the interaction term was performed by multiplying the moderator and exogenous variables (Adam & Mahadi, 2018).

As seen in Table 5, entrepreneurial intention was responsible for moderating the association between Digital Entrepreneurship Ecosystem and Income Generation. Thus, with the increase in Entrepreneurial

Table 3. Results of HTMT Criterion.

Construct	Digital Entrepreneurship Ecosystem	Entrepreneurial Intention	Income Generation
Digital Entrepreneurship Ecosystem (DEE)			
Entrepreneurial Intention (EI)	0.116		
	CI.90		
	(0.131,0.195)		
Income Generation (IG)	0.103	0.577	
	CI.90	CI.90	
	(0.133,0.214)	(0.511,0.671)	

Note. Criteria Discriminant Validity is established at HTMT0.85.

Table 4. Resulting Direct Relationships.

Structural paths	Path. Coeff.	*SE*	*t*-Value	*p*-Values	Boot LL	Boot UL
DEE → IG	0.346	0.070	4.928	.001	0.221	0.453

Note. DEE = Digital Entrepreneurship Ecosystem; IG = Income Generation.

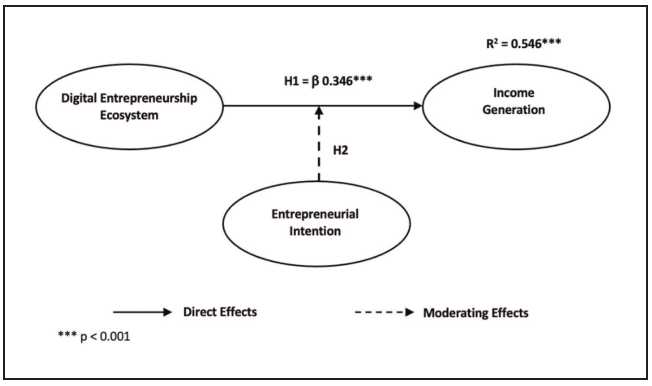

Figure 1. Conceptual framework of digital entrepreneurship ecosystem, income generation, and entrepreneurial intention as moderator.
***$p < .001$.

Table 5. Result for Moderating Effects.

Paths	Coefficient	*t*-value	*p*-value
Digital Entrepreneurship Ecosystem → Income Generation	0.427	6.440	.000
Entrepreneurial Intention → Income Generation	0.294	5.181	.000
Digital Entrepreneurship Ecosystem × Entrepreneurial Intention → Digital Entrepreneurship Ecosystem	0.133	2.825	.005

Intention, the influence of the Digital Entrepreneurship Ecosystem on Income Generation also increased. Therefore, hypothesis H2 was supported.

Discussion

The purpose of this study is to examine the digital entrepreneurship ecosystem for B40 students toward enriching income generation and the moderating impact of entrepreneurial intention. Two factors, namely digital entrepreneurship ecosystem (DEE) and the impact of entrepreneurial intention (EI), were examined to determine their effects on income generation (IG). Specifically, this study aims to examine the impact of entrepreneurial intention as a moderator in the relationship between DEE and IG. A PLS-SEM analysis was used to examine data from a sample of 500 B40 students from 5 universities in Malaysia. The data fully support the study's claim that digital entrepreneurship ecosystem is significantly and positively related to income generation and entrepreneurial intention strengthen the relationship between DEE and IG. An explanation of this discussion is described as follows:

First, this study shows a positive and significant relationship between DEE and IG. This is consistent with previous studies that found that students that implement DEE improve their lifestyle by generating income through their own business (Eesley & Lee, 2021; Liu et al., 2022; C. Marques et al., 2018). According to Salamzadeh et al. (2022) many studies have found that DEE are the most successful strategies for students to be a digital entrepreneur and able to spur their online business growth and survival by generating income for their business. The digital entrepreneurship ecosystem, including the universities, is deemed the platform for digital entrepreneurship leading to income generation among B40 students. In fulfilling this action, they make an investment to develop entrepreneurship. This research has demonstrated that the digital entrepreneurship ecosystem is significantly and positively related to income generation. Thus, it is indicated that the adjustments in university teaching, which include the system from a conventional system to a digital entrepreneurial system, have an impact on the students toward strengthened income generation. These findings were in line with the previous study by Nambisan et al. (2019), Zainal and Yong (2020), and Zhao (2021) that aimed to provide efficacious and unified education and teachable moments for all individuals in the long term. This study recorded the significance of education in environmental sustainability. Additionally, the understanding or networks obtained through the inputs and procedures in entrepreneurial universities could strengthen every member's possibility for entrepreneurship.

The results were in line with the extant literature confirming the strong and favorable impact of the entrepreneurial university on income generation (Eesley & Lee, 2021; Guerrero et al., 2015; Marques et al., 2018). These results could be related to the evolution into entrepreneurial universities, which changes the inputs, outputs, and procedures toward entrepreneurship or enhanced industry-driven studies (Baig et al., 2022). As a result, all these factors improve individuals' exposure to the acquirement of related knowledge that enforces the digital entrepreneurship ecosystem value among the students. The entrepreneurial university is producing platforms for digital entrepreneurship through a series of exchanges between professionals. Therefore, graduates are equipped with strong prospects for making new initiatives as entrepreneurs. It was concluded that the digital entrepreneurship ecosystem supports the progress in income generation. In this case, the promotion of transforming the universities in Malaysia into entrepreneurial universities could sustain the national objective

to reduce the mismatched expertise and unemployed youth.

Finally, the study also determined the moderating role of entrepreneurial intention. The moderating effect of entrepreneurial intention on the digital entrepreneurship ecosystem with income generation are in line with the findings of previous studies (Dobson & Muhammad, 2022; Habib et al., 2020). These findings showed that the impact of EI has been practiced in HEI to strengthen the relationship between DEE and IG. This finding is in line with Social Capital Theory (Bandura, 2005) and Social Cognitive Theory (Coleman, 1988) since EI would be affected by learning new behaviors influencing attitudes (Arshad et al., 2019; Ferreira et al., 2017). Entrepreneurial intention is critical to comprehending the entire phenomenon involved in a business start-up (Park, 2017) since intention is the most strategically significant to generate income in business. Notably, students with stronger entrepreneurial motivation and drive to depend on the available procedures of their universities could improve their entrepreneurial actions and income generation.

Conclusion, Implications, and Future Research Direction

Conclusion

This study has achieved its objective by proving the moderating role of EI in the relationship between the DEE and IG of B40 students. Data were collected from 500 B40 students from 5 HEI in Malaysia and analyzed using PLS-SEM. This model incorporated DEE, IG and EI as a standard in Malaysian HEI. Specifically, the results indicate that DEE has a significant effect on IG among B40 students in five Malaysian HEI. The current findings of this study provide evidence that an effective EI leads to better decision-making skills, methods, and practices, thus achieving a better income. Furthermore, the results of this study are expected to serve as a foundation for the B40 students from five HEI in making decisions on the best motivational strategies to apply in their company in order to increase revenue. As a result, this strategy will encourage the B40 students to change the way they think about using EI to develop improved decision-making techniques, methods, and practices, which will lead to greater income and business success. Based on the literature review, digitalization created notable progress in the methods through which businesses are run by entrepreneurs. Following that, scholars conducted analysis on various emerging prospects developed for success elements, entrepreneurs, and the obstacles for digital entrepreneurial activities. Besides the initiatives in this area in the Malaysian context, the study also contributes to the extant literature by suggesting a measurement scale for a higher education institution. The result on the significance of entrepreneurial intention also assists the decision-makers in considering this element in their policies. Regarding the higher education institution, numerous policies place further focus on the hard aspect, while the soft aspects are overlooked in numerous cases. Accordingly, this study provided several insights into the significance of entrepreneurial intention as a soft conception associated with the third generation of universities.

Theoretical and Managerial Contributions

Theoretical Contributions. This study has contributed to the literature by investigating the efficacy of the digital entrepreneurship ecosystem in income generation. At the same time, the investigation was conducted on the moderating impact of entrepreneurial intention. It is known that no research was conducted on the use of the available framework. Empirically, research works have highlighted the role of universities as the source of entrepreneurship education, followed by entrepreneurial skills. Therefore, the focus on job creation through entrepreneurship education is important, especially in the context of Malaysia, for university graduates to become digital entrepreneurs. This aspect is crucial, given that unemployment leads to a higher poverty rate. In addition, unemployment among youth is a possible social and political issue, which includes other bandwagon impacts (Eurostat, 2014; Salamzadeh et al., 2022).

Practical Contributions. The results of this research would provide insights into the appearance of IR 4.0 in boosting the digital economy and digital entrepreneurship to employ the expertise and understanding. Furthermore, social requirements among the B40 students in HEI would be addressed. The development of a hybrid model would facilitate digital entrepreneurs to explore online businesses and establish a social effect on income generation and a community with higher sustainability. Through this result, B40 students would gain the correct expertise and knowledge, allowing them to make effective contributions to the community. This condition could improve the graduates' competitiveness. This research was in line with one of the 12 National Key Economic Areas suggested by the Government. This condition encourages the expansion and innovation of the nation's expertise and knowledge through the expansion of the nation's fields of speciality into new and unaddressed sectors, particularly for community development.

The government may employ the primary results of this research to create a model on the ability of digital entrepreneurship. This action aims to develop graduates with an entrepreneurship mindset and select

entrepreneurship as a career to address the demands and boost the community's socio-economic condition based on the national agenda to assist the marginalized communities in Malaysia, including the B40. This study was also in agreement with the Shared Prosperity Vision 2030, which aims to address economic inequalities throughout income groups, areas, and ethnicities to guard and support the citizen without overlooking any individuals. Hence, the development of a framework, which incorporates the efficacy of entrepreneurship ecosystem, immersive learning, and quadruple helix method toward digital entrepreneurship, is deemed important particularly in supporting the social welfare of B40 graduates in HEI. This study also agreed with the 10-10 MySITE framework, which aims to create a fresh holistic ecosystem method of co-creating a new future for the country. This action is performed to establish digital entrepreneurs within the B40 graduates to enforce economic competitiveness and life quality.

Limitations and Future Research Direction

The limitations of this study are the selection of the study's respondents, from five higher education institutions only whereby the study surveyed the limited scale of five higher education institutions in Malaysia that solely focused on Universiti Putra Malaysia (UPM), Universiti Tun Hussein Onn Malaysia (UTHM), Universiti Teknologi Malaysia (UTM), Universiti Malaya (UM), and Universiti Kebangsaan Malaysia (UKM). Therefore, the generalization of the sample was performed solely on these five universities. Following that, the university lecturers and other staff were not involved in this research.

Despite its limitations, this study can be extended to further understand the development of DEE in the HEI sector. First, future research can replicate this study in a wider scope by adding more variables to better comprehend the development of DEE in Malaysia. It is suggested that future research works address social digital entrepreneurship, given the drive among low-income individuals to be involved in social digital opportunities. This factor may be an appealing subject to be examined in the future. The comparison between the practical approaches on the organizational degree may also be a potential subject as it could enable policymakers to take the initiative in bridging the digital gap. Future studies should also focus on women's entrepreneurship concerns and the disadvantages and advantages that female social digital entrepreneurs receive from emerging digital prospects. The findings from this study can be used to inform an extension of this study with the same variables to examine the relationship between DEE with wider geographical contexts whereby it suggested the same model will be applied to other HEI/TVET in Malaysia. Finally, it is suggested that future research is conducted on the fast-paced progress in digital entrepreneurship.

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Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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