

# Stakeholders' Role in Ensuring Success of Entrepreneurship Education in Engineering Curriculum in Malaysia

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## Abstract

Malaysia Education Blueprint 2015-2025 (Higher Education) requires higher learning institutions to have entrepreneurship education embedded into all academic curriculum in order to produce entrepreneurial graduates who are able to create jobs rather than seeking for jobs. Therefore, this paper aims at appraising the expectation of the major stakeholders in delivering a successful entrepreneurship education in engineering curriculum. This study builds on existing literatures, selected journals, books, reports, and websites and employing content analysis method to derive the outcome. This paper finds that entrepreneurship education is an important element to be applied across all academic disciplines, and relevant stakeholders play a very crucial role in the implementation of entrepreneurship education in engineering curriculum. This paper concludes with some proposals as well as recommendation for future research.

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## 1 Introduction

The Malaysia's Ministry of Education (MOE) is committed to competing in the global economy by establishing a higher education system that is recognised as the world's leading education system. Major changes to the higher education system and operation of the Ministry have been proposed in the Malaysia Education Blueprint 2015/2025 (Higher Education) (MEB(HE)). The MEB (HE) outlines 10 transformations that will drive continued excellence in the higher education system

and address systemic issues in terms of quality and efficiency and global trends that disrupt the landscape of higher education. Instilling entrepreneurial mindset throughout the higher education system is one of the main shift in the MEB(HE), developing them to be a young, holistic, entrepreneurial and balanced graduates as well as moving them as job seekers to job creators.

Similarly, European Commission (EC) unleashed its Entrepreneurship 2020 Action Plan aiming to bring back growth and higher levels of employment. Recognising the

importance of entrepreneurship, one of its main actions is to invest in entrepreneurial education and training to support growth and business creation [1].Kuratko[2] reported that since 1980, Fortune 500 companies have lost more than 5 million jobs, but more than 34 million new jobs have been created. Furthermore, in 1996, 1.6 million new jobs were created by small businesses, thus it is inevitable that entrepreneurs creates jobs. BothZamberi[3] and Johansen [4] agreed with entrepreneurial activities to create jobs, create wealth and stimulate the developing economy. On the other hand, Zahra [5] deemed entrepreneurship is important in the transformation of nations, political and socio-economic.

MOE realises that it is indeed an important competency for graduates to acquire these abilities and skills, hence has imposed a compulsory entrepreneurship subject in all public universities (UA) [6]. After two years into the implementation of the blueprint, the MOE's graduates tracer study survey shows a small improvement on unemployment rate among the UA graduates as, it reduced from 24% (2015) to 21.6% (2017) [7, 8] due to the fact that entrepreneurship is not new in Malaysia higher education context. It was first introduced to students at the UA between years 2000 - 2010 for its economic benefits. The move was in response to the Asian financial crisis 1996/1997, the world economic recession 2010/2011, slowing growth of the industrial sector, fluctuation in international trade cycles, competitive globalised economy and change of business environment. The policy makers believe that supporting the economic value of entrepreneurial development is a real and sustainable investment in the nation's future prosperity[9].

## 2 Entrepreneurship and Entrepreneurship Education

There are many different definitions of entrepreneurship by many scholars and there is no definition considered as a universally accepted meaning [10]. The "entrepreneurship" is defined by [11] as the pursuit of opportunity beyond the resources you currently control. According to [12], entrepreneurship is seen as a process change that leads to the creation of new values and entrepreneurs as the founders of the company. To [13], entrepreneurship is the creation of new business whilst [14] cited [15] definition of entrepreneur as "creative destruction" or an individual who introduces new industries (products or services) while destroying the old industries to benefit from the new industries. In addition, [16] described entrepreneurship as an innovative and creative process where there is potential to add value to products, create job opportunities, raise productivity, revitalise and diversify markets, improve social welfare, and more broadly to develop the economy.

The term *entrepreneurship education* suggests that a formal education is essential in entrepreneurship. It is a process of learning and identifying opportunities to start a new business or enterprise [17]. In the World Economic Forum Report, [18] defined entrepreneurship education as developing individual's ability, attitudes, behaviours and capacities. Characteristically, it is about leadership and the application of those skills and attitudes which can take many forms during an individual's career, creating a range of long-term benefits in terms of economic, social and cultural context [18].

Historically, entrepreneurship education started in the United States (US)

and has been taught primarily to the business school students, but over the past 20 years, it has been introduced across all academic fields and spread to Europe [19]. There is increase emphasis on teaching entrepreneurship even in the primary, and secondary schools [20]. This shift was due to the economic conditions and students achievement gained from learning how to create commercial or social value from the knowledge and skills [21]. This is further demonstrated with expanding of researches and literatures in relation to entrepreneur, and entrepreneurship education [22, 23].

Back in Malaysia, MOE is taking many initiatives such as encouraging universities students to participate entrepreneurship activities through training, seminars, short courses, conferences and events with hope to expose and develop their entrepreneurial attitudes and mindset [24]. Such efforts can lead to [25] and boost economic growth [26], which in turn directly affects the realisation of a developed nation[27].

With the importance of entrepreneurship education, higher learning institutions (HLI) have been incorporating entrepreneurship education across all academic disciplines either as a major or a minor stream [28]. Introducing entrepreneurship education into engineering curriculum allows students to better understand of engineering enterprise (start-up of engineering business), namely developing concepts of leadership, innovation and creativity [29]. Li[30] believed entrepreneurship education improves employability for medical students. This is proven as two new medical device companies were set-up by medical graduates upon completing entrepreneurship education in their medical curriculum [31]. Fernandes

[32] highlighted that entrepreneurship forms part of the degree curriculum for Psychology, Social Education, Tourism, Economics, Law, Management, Informatics, Management and Information Systems as well as Hospitality Management in their university. In 2010, US's College Music Society listed one of its goals to promote understanding of how entrepreneurship can act as a catalyst the career aspirations of students involved in music programmes [33]. In this context, introducing entrepreneurship education to undergraduate agricultural students seems to help reducing unemployment and socio-economic problem [34].

Clearly, this indicated that entrepreneurship education has been widely included in all academic curriculum. For the purpose of this paper, entrepreneurship education in mechanical engineering curriculum will be explored. How far have the UA as one of the main stakeholders in championing this effort in implementing the entrepreneurship education in their curriculum and what are the improvements to sustain the entrepreneurship education in the said curriculum? Using literature survey by examining selected journals, reports and websites on entrepreneurship education and engineering curriculum, as well as content analysis as a method, this paper appraises the expectation of the relevant stakeholders' role in realising the implementation of entrepreneurship education in engineering curriculum across the UA in Malaysia. Also, this paper concludes with recommendation for future research.

### 3 Stakeholders

This development is a complex network of closely related stakeholders trying to fulfil the need of a client and users

[35]. It involves many different parties to work closely to execute the blueprint.

### 3.1 What is stakeholder?

The term *stakeholder* is used as a general term to describe individuals, groups, or organisation that may have an interest in particular activities [36]. Stakeholders are those considered as organisation, networks and individuals who are able to influence the objectives and activities of the organisation [37, 38], whereas [39] defined it as “individuals and organisations who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or successful project completion.” In short, stakeholder will influence the course of a project and in this paper it will influence the Ministry of Education (MOE) blueprint [40]. To safeguard the successful implementation of the entrepreneurship education into UA, defining the stakeholders involved are as importance as ever.

### 3.2 Who are the stakeholders involved?

The MOE’s blueprint has been developed through collaborative processes and consultations with input from more than 100 stakeholder groups. Stakeholders involved include global educators, university administrators, university boards, academics, trade unions and associations, department personnel, industry and employer bodies, related institutions, parents, students and the general public [40]. From MEB(HE), MOE highlighted HLIs, industries, students, academic communities, and MOE as the main stakeholders groups for corresponding responsibilities to ensure the successful implementation of the blueprint. After two years implementing the blueprint, there is a slight improvement on the unemployed

graduates from the UA [7, 8]. To ensure the improvement rate keep rising and success of the [40], MOE must ensure that the involved stakeholders must continuous play their respective roles [41].

## 4 Roles of Stakeholders towards Entrepreneurship Education In Malaysia Education Blueprint 2015/2025 (Higher Education) (MEB(HE))

From five categories of stakeholders listed by MOE, each category is viewed to play an important role in the realisation of MEB(HE). Amongst these crucial roles are that the stakeholders have to share responsibility, co-operative decisions and execution, while at the same time seek for long term solutions, using innovative methods, and managing risks together [35]. For the purpose of this paper, stakeholder involvement to the entrepreneurship (one of the main shifts in MEB(HE)) in UA will be deliberated.

### 4.1 Higher Learning Institutions (HLI)

With the empowerment of autonomous status to all the 20 UA in Malaysia [42], it enables the UA to move more effectively and flexibility in making decisions. This moves would enable UA to embrace their role as transformational change leaders: charting visionary journeys for their institutions, rallying all stakeholders in the effort to turn their institution vision into reality as well as modelling the students mindsets, values and behaviours [40]. UA will be able to eliminate unnecessary red tape and harmonise the standard and requirements across their institutions thus it is aligned with the education blueprint. A crystal-clear responsibility and expectation can be conveyed throughout the institution as the

leaders are able to strategically drive the entrepreneurship spirit and mindset by establishing incubation centres, strengthening university-industry collaboration, embedding entrepreneurial courses across the curriculum and developing synergies (inter- and intra-university) [43].

HLI needs to create a favourable environment for the development of ideas and entrepreneurial behaviour [44]. [45] presented the concept of entrepreneurial universities in two simple dimensions in the simplest form: 1) Receiving innovative responses as an entrepreneur to better adapt to his surroundings; through the structure of governance and policy and institutional management practices that instil entrepreneurial thinking; 2) An institutions that create the environment to instil, promote, support, motivate and reward the development of entrepreneurial thinking and behaviour.

#### **4.2 Industries**

Engaging HLI-industry relationship provides effective mechanism to materialise entrepreneurship education. Concurrently, it involved technology transfer and industry-based research activities [46]. Richardson and Hynes [47] emphasised that HLI-industry approaches is the way to develop entrepreneurship-focused students. By doing so, it encourages students to think in a non-traditional way and become a person who takes the necessary risks in the entrepreneurial economy [48]. Mueller [49] concluded that HLI-industry has increased the permeability of knowledge filters, thereby enhancing regional economic performance. Associating HLI with the industry enables students to acquire knowledge of commercialisation with

entrepreneurial communities [50]. Commercialisation may include patenting and licensing, which may form in spin-offs or incubators [51, 52].

#### **4.3 Students**

Students are the beneficiary of the education imparted to them, in which will prepare them for greater employability [40]. [53] recognises student engagement in creating a meaningful relationship between student and staff in HLI by identifying three correlated scopes of student engagement, namely 1) students' participation in learning, teaching and assessment activities; 2) students' contribution to decision making; and 3) issues related to student identity. This is further supported by [54], who claimed that enhancement is best achieved when students are actively participating in their education. Thus, HLI will undeniably have a better understanding that meet the needs of the students, which includes feedback to faculties about their teaching that will help in the development and improvement of teaching and learning methodology, as well as curriculum improvement and designs [55]. Study also showed that student self-efficacy improved much better after taking the entrepreneurship education, while their confident level in business venturing increases after attending the entrepreneurship courses [21].

#### **4.4 Academic communities**

Cheng [56] concluded that academics need to review the existing curriculum and design a more appropriate curriculum in order to develop an effective entrepreneurship programme. Academician needed to transform the course learning outcomes and syllabus content to ensure the students benefit from the entrepreneurship

subjects [57]. This is to the fact that lacking of practical case studies and interaction with successful entrepreneurs were among the feedbacks from students [56]. This is proven true as a comparative study on entrepreneurship education by [58] revealed that trainers lacked of necessary skills and knowledge about entrepreneurship to provide to students, which require for an in-career training and support to ensure the they are better equipped. Junior Enterprise concept which is entirely student-run consulting companies is seen as one of the best practices to foster entrepreneurial mindset [20] as industrial training in entrepreneurship would stimulate the essential entrepreneurship skills in non-business disciplines students [58]. Entrepreneurship education can be incorporated into engineering curriculum by demonstrating business examples to engineers to be on how they can contribute to the society [59].

In this sense, [21] suggested three models that HLI can adapt to deliver the entrepreneurship education, namely 1) inclusion of entrepreneurship-related experiential activities into the engineering curriculum; 2) provision of at least two entrepreneurship-related courses to be taught to engineering students to increase the confident level about performing entrepreneurial tasks; and 3) provision of multidisciplinary programmes to students with a broader exposure to business concept that are relevant to engineers. To achieve this, development of the curriculum is advisable to focus on learning “for” rather than “about” entrepreneurship [18], where special attention should be taken in designing entrepreneurship in engineering curriculum. In addition, courses on decision-making, effective communication, entrepreneurial negotiation, leadership,

effective and efficient use of resources, new product development, creativity and critical thinking, as well as service-based and technological innovation should be included in the curriculum [60].

#### **4.5 Ministry of Education (MOE)**

The Government, and specifically MOE play significant roles in fostering entrepreneurship ecosystem of the country [61]. As the policymaker and regulator in HLI, its role is to address the mindsets, knowledge-based skills, and cultural constraints to entrepreneurship [62] as well as to streamline and focus the activities to eliminates bureaucratic red tape and micro-management of HLI [40]. Constant engagement with other stakeholders is also crucial in ensuring the success implementation of the blueprint and the sustainability of the entrepreneurship education [63]. The MOE may encourage HLI through the creation of exemplars and role models by running annual “Entrepreneurial University of the Year” awards similar to the National Centre for Entrepreneurship in Education (NCEE) in United Kingdom which has been successfully held annually with the Times Higher Education (a leading publication reporting specifically on news and issues related to higher education which is based in London) [45]. Every year, a university stands out from the six finalists who have grown into the best entrepreneurial achievement last year. The framework behind the award highlights the importance of entrepreneurial environments, entrepreneurship and innovative teachers, the affected student communities, and the impact on their institutions, stakeholders and their environment.

## 5 Implementation of Entrepreneurship Education in Engineering Curriculum

Table 1 illustrates the list of UA offering entrepreneurship courses in mechanical engineering curriculum compiled from the respective UA's academic handbooks. A total of 14 out of 20 UA are offering undergraduate mechanical engineering degree with only 12 UA offered entrepreneurship course. All the entrepreneurship courses offered are categorised as University General Course, which means students are required to undertake the course during their study duration and it is a pre-requisite for graduation.

Each UA offered the entrepreneurship subject varies from one to another. For example, six UA are using Introduction,

Core or Basic Entrepreneurship as the course title, whereas another six UA uses Technology, Techno- or Engineering Entrepreneurship as the course title to depict towards technology or engineering-based type of entrepreneurship courses. It is apparent that different UA scheduled the entrepreneurship courses at different semester. Furthermore, each course offered carries different weightage of credit hour ranging from two to three credit hour. Universiti Malaya (listed No. 3 in Table 1) went extra mile by offering additional entrepreneurship course as an elective. However, Duval-Couetil[21] claimed that having at least two entrepreneurship-related courses to be taught will increase the confident level about performing entrepreneurial tasks.

**Table 1.** List of UA offering entrepreneurship education in mechanical engineering curriculum

No	Name of Public University (UA) (in alphabetical order)	Offering Undergraduate Mechanical Engineering Degree	Offer Entrepreneurship as University General Course	Entrepreneurship Course Title	Offered in Semester #	Credit Hour
1	Universiti Islam Antarabangsa Malaysia	✓	✓	Technology Entrepreneurship	7	2
2	Universiti Kebangsaan Malaysia	✓	✓	Basic Entrepreneurship & Innovation	2	3
3	Universiti Malaya	✓	✓	Basic Entrepreneurship Culture	2	2
4	Universiti Malaysia Pahang	✓	✓	Technopreneurship	7	2
5	Universiti Malaysia Perlis	✓	✓	Engineering Entrepreneurship	5	2
6	Universiti Malaysia Sabah	✓	✓	Basic Entrepreneurship Culture	3	2
7	Universiti Malaysia Sarawak	✓	X			
8	Universiti Pertahanan Nasional Malaysia	✓	✓	Basic Entrepreneurship	8	2
9	Universiti Putra Malaysia	✓	X			
10	Universiti Sains Malaysia	✓	✓	Core Entrepreneurship	2	2

11	Universiti Teknikal Malaysia Melaka	✓	✓	Entrepreneurship Technology	8	2
12	Universiti Teknologi Malaysia	✓	✓	Introduction to Entrepreneurship	5	2
13	Universiti Teknologi MARA	✓	✓	Technology Entrepreneurship	7	2
14	Universiti Tun Hussein Onn Malaysia	✓	✓	Technopreneurship	2	3

In summary, the importance and focus on entrepreneurship varies according to UA in Malaysia. For instance, Universiti Malaysia Sarawak (UNIMAS) and Universiti Putra Malaysia (UPM) have not introduced entrepreneurship into their mechanical engineering curriculum. This may deter the MOE's vision in achieving its objective of instilling entrepreneurial mindset through the HLI system. Having said that, there may be other factors that are affecting these outcome. Karim[64]pointed out that due to the increase in credit hours, the university's provision of more core entrepreneurship courses will become a barrier, which will translate into higher tuition fees for students. He further emphasised that the limitation to offer more entrepreneurship courses is that credit hours for new courses must be obtained from existing courses (i.e. credit hours for certain courses must be reduced) and require the approval of the Engineering Accreditation Council Malaysia (EAC) [65]and Malaysian Qualifications Board (MQA).

Hence, this paper suggests that since UA is one of the main stakeholders in ensuring the entrepreneurial mindset being cultivated into students, more has to be done to achieve the objective of MOE.

## 6 Conclusion

It is suffice to conclude, from this brief yet significant insight into the role of the stakeholders in warranting the success of the entrepreneurship education in UA in Malaysia. From Table 1, may also confirms

that the priority of the UA towards offering entrepreneurship courses are somehow rather low. The entrepreneurship education at UA need to be updated regularly to ensure students are nurtured and interest are created for entrepreneurial effectiveness. By creating job creators, Malaysia's unemployment rate can be reduced, thus reducing the number of job seekers. In this regard, the curriculum needs to emphasise certain mindsets and skills, including social and emotional skills such as self-confidence, leadership values, motivation, endurance and self-efficacy, as well as general business skills needed for managing a business [62]. However, measures that can be taken include the introduction of specially designed modules and courses to foster students' entrepreneurial awareness and characteristics[17].

For engineering students, especially those who are in the field of mechanical engineering, content and methods of entrepreneurial education teaching should be specially designed and different from other general business management courses. The content designed for entrepreneurship education should link the structure of personality relationships with attitudes toward entrepreneurship, ultimately affecting entrepreneurial intent and entrepreneurial aspirations [66]. On the industry collaboration, some efforts have been made, for example 2u2i academic programme, an acronym for two years in university (2u) and two years in industry (2i), is a learning concept which combines on- and off-



campus learning throughout the study period. This programme provides student a greater exposure to real industry working environment, and to conform the relevancy of the industry needs with the curriculum [67].

As the HLI are going through the MEB(HE) transformation, setting up steering groups at national level, where all the different stakeholders involved in entrepreneurship education can be represented, will further safeguard the success of the blueprint.

While this paper contributes to the stakeholders and entrepreneurship literature, this paper also includes noteworthy limitations of the study, such as prioritisation and understanding of the key stakeholders as well as definition of the critical success factors. Some future potential research areas worth exploring are analysis of the outcome of implemented entrepreneurship education in UA, conducting stakeholder analysis to prioritise and understand the key stakeholders, and defining the critical success factors as well as developing a holistic entrepreneurship education in engineering curriculum, teaching and learning methods, which will definitely assist in achieving the MOE mission.

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