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# The Application of Interpretive Structural Modeling (ISM) to Develop a Entrepreneurship Training Ecosystem Model

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Abstract: This study focuses on developing an entrepreneurship training ecosystem model for trainees undergoing training at Malaysian Skills Certificate (MSC) accredited centre. This study uses Interpretive Structural Modeling (ISM) and involves 10 MSC training systems and entrepreneurship education experts. In forming a structured relationship model, ISM uses pair-wise comparative analysis to describe complex issues based on organising ideas. This method allows users to form views and solutions more systematically, even when facing difficult problems. It is because the user can easily synthesise the problem and use it to develop ideas and solutions. The results of this study found six components and 43 necessary items. With the formation of this model, the entrepreneurial training process will be easier and more effective. The experts also threw thoughtful, creative, and critical ideas during the collaborative discussion.

Keywords: Entrepreneurship, Entrepreneurship Training Model, Malaysian Skills Certificate (MSC), Interpretive Structural Modeling (ISM).

## 1. INTRODUCTION

Developing entrepreneurs and entrepreneurship is a pillar of national development. A country with many entrepreneurs will cause it to develop rapidly. This is because the country has individuals who meet the criteria of entrepreneurs such as creative, innovative, smart to take opportunities, dynamic, willing to take risks and comfortable with uncertainty. They always

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pursue targets towards meeting the objectives and prospering the national economy by creating new products and services. However, this field is challenging because the success of entrepreneurs depends a lot on their ability to manage production resources and a business well, which requires knowledge and skills. Entrepreneurs are agents of change that will transform, whether in terms of demography, economy, nature, technology, politics, culture and social of a country. Everyone can become an entrepreneur regardless of background and educational status. But what is important is that those interested in this field should know how to choose the right way to produce a product or service that many will accept. The birth of an entrepreneur depends a lot on the environment practised in society. They play an important role in generating the economy, providing infrastructure, and adding value to the country's wealth. Without entrepreneurs, a country can not explore its natural resources, and other countries can not utilise them either. Youngsters, such as students, are among the right targets to produce future entrepreneurs and must stimulate this group by creating an entrepreneurial environment where they study. Educational institutions such as vocational training centres must create a training ecosystem geared towards student involvement in entrepreneurship. The vocational skills they have are important capital to start a business. Many parties are not aware of this. They take too long to think about business ideas when becoming an entrepreneur.

#### 1.1 Problem Statement

An ecosystem of entrepreneurial training is essential to produce future entrepreneurs. Many education policies launched by the government have emphasised this matter (MED, 2019; MOHE, 2021; DHE, 2022). Technical and vocational education institutions (TVET) that provide this training ecosystem will shape the nature of prospective semi-skilled and skilled workers equipped with entrepreneurial characteristics. TVET trainees, such as the Malaysian Certificate of Skills (MSC) training program, will be equipped with a very important entrepreneurial mindset and competence whether they choose to work as salaried employees or self-employed after completing the training. Entrepreneurs among MSC graduates will also be able to increase the number of technology entrepreneurs in the country. However, the small number of MSC graduates who enter the field of entrepreneurship shows that the ecosystem of MSC entrepreneurship training in accredited centres is still misplaced. With 72,796 MSC graduates in 2020 (DSD, 2021), only 763 of those graduates became entrepreneurs (DHE, 2021). This number shows that only 10% of MSC graduates become entrepreneurs compared to other TVET training programs in Malaysia (MOHE,2021). This training program also focuses more on producing workers who will look for jobs rather than training them to become employers who create job opportunities (Shamsuri, 2020; European Commission, 2002; European Commission, 2009). Regarding curriculum and co-curriculum, vocational skills training is not embedded in training to form entrepreneurs, and there are weaknesses regarding delivery quality among instructors (Shamsuri, 2020; Khuzainey et al., 2021). The shortage of MSC graduates in entrepreneurship must be overcome to achieve the government's target of producing at least 10,000 entrepreneurs (MOHE, 2021). Efforts to create an entrepreneurial ecosystem model at MSC-accredited centres should be made to help increase MSC graduates' involvement in the future field of entrepreneurship.

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# 1.2 Research Objective

This study was conducted to develop an entrepreneurial training ecosystem model suitable for MSC training programs in accredited centres. It begins by identifying the main components and compiling items in the model to be built.

#### 1.3 Research Question

This study aims to answer questions related to developing an entrepreneurship training ecosystem model in the Malaysian Skills Certificate (MSC) training program. One of the research questions is:

i. What is the priority of the items under each component in an entrepreneurial training ecosystem model for the Malaysian Skills Certificate (MSC) training program?

#### 2. Literature Review

The field of entrepreneurship has been accepted as a program that can help students face the difficulty of getting a job after graduation. This situation is evident when youth unemployment remains high at 11.8 per cent in the last month of 2022 compared to the pre-pandemic level of 9.9 per cent. This factor has pushed them to become entrepreneurs as a compelling situation due to limited job opportunities. In addition, one of the core competencies required by employers in Malaysia found entrepreneurial skills to be a necessity (DSD, 2017; Badariah et al., 2020; Mohamad Zuber et al., 2020). Concerning this, most public and private education centres in Malaysia have made the subject of entrepreneurship one of the subjects taught. MSC-accredited centres should be important in promoting entrepreneurship training to improve national and community development (Som et al.,2022). Next, this accredited centre is accepted as the most appropriate institution for forming an entrepreneurial culture and raising aspirations among trainees. This allows them to make thorough preparations to engage in business.

Therefore, educators need to instil confidence in trainees to seize many entrepreneurial opportunities in the job world. This entrepreneurial opportunity may be born from environmental changes, such as technological, social, political and demographic progress. They must be convinced that entrepreneurs are the most dynamic individuals and are more willing to deal with uncertainty to achieve their goals. They are accepted as a special group for successfully bringing prosperity to the community and the country. In this context, educators play a role in providing, encouraging and developing trainees' interest in entrepreneurship. They also play a role in developing an appropriate entrepreneurship training curriculum. Cultivating entrepreneurial values is a process of developing the attitude of an entrepreneur toward trainees. This effort will direct trainees to venture by choosing a career such as becoming a wholesaler, franchise, direct sales, retailer and taking over family businesses. Entrepreneurial knowledge and skills are also a way of life that trainees will use when they work in the public or private sector.

### 2.1 Entrepreneurship Education and Training (EET) Ecosystem

Entrepreneurship education and training (EET) is developing individual potential related to all aspects of entrepreneurship through management, curriculum implementation, pedagogy and

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assessment in a structured and planned environment (Nor Aishah et al., 2018). Informal entrepreneurship education can also happen to individuals. This process occurs through exposure and daily interaction of individuals with the environment related to entrepreneurial activities. Formal entrepreneurship education aims to form a person who has never thought of knowing and becoming an entrepreneur. The entrepreneurial education ecosystem is the backbone of this formation's success. According to Ismail (2010), an entrepreneurship education system must follow and fit the basic education system practised by an institution. Based on past surveys, the components that must be present in the ecosystem include entrepreneurial competence, curriculum, co-curriculum, pedagogy, competent teaching staff and industry support.

Entrepreneurial competence needs to be identified before forming a curriculum. Competence consisting of three elements, knowledge, skills and attitude (KSA), is the basis for training in the Malaysian Skills Certificate (MSC) program system at accredited centres. It is a pillar to generate interest and motivation to get to know entrepreneurs and entrepreneurial careers. The content of the curriculum provides a process of forming an entrepreneurial mindset towards identifying ideas and entrepreneurial opportunities creatively and innovatively. Under business management skills, the curriculum content provides potential entrepreneurs with basic and advanced skills in preparation for entering the business world. The involvement of trainees in the real world or outside the classroom is one of the elements of effective teaching in any education system. An activity known as a co-curricular activity is any activity planned as an extension of the learning and teaching process in the classroom that allows students to add, strengthen and practice the knowledge, skills and values learned in the classroom (Zainun, 2019). Under the pillar of pedagogy, it aims to help potential entrepreneurs consolidate or transform their talents, which are the vocational skills learned so that they can commercialise their products or services. In addition, the competence of the instructor who trains has a profound effect on the training process of potential entrepreneurs. Finally, after successfully starting a business, the support of the industry is very important to ensure that entrepreneurs can survive and continue to grow their businesses.

Entrepreneurship education and training (EET) is challenging for technical and vocational training institutions (TVET). This is because this institution is focused on training trainees in the skills field and should encourage efforts to create new products. This release is for trading in physical, service and new technology. Previous studies have explained that EET should focus on three dimensions: applying awareness, entrepreneurial skills and self-assessment skills. EET emphasises the human development process that is oriented towards entrepreneurship. EET emphasises learning about the behavioural dimension rather than the content of a subject.

## 2.2 Malaysian Skills Certificate System

The main weakness of the skills certification system before 1993 was the lack of a clear path for skilled workers in terms of qualifications and career development. To overcome this problem, the National Vocational Training Council (NVTC) has introduced a five-level training structure which is the Malaysian Skills Certificate (MSC) Level 1 to 3, the Malaysian Skills Diploma (MSD) Level 4 and the Malaysian Skills Advanced Diploma (MSAD) Level 5. NVTC has also announced the concept of Competency Based Training (CBT) as the basis of a

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more effective and flexible training system. Competence here means a task unit that integrates knowledge, skills and attitudes in using certain tools, materials and techniques to complete duties related to a job. It is something that can be observed and measured or assessed. To ensure that training programs are developed based on industry needs, NVTC has developed employment standards as a guide. It is a specification that must be possessed by an employee working in Malaysia. This standard outlines the criteria requirements for employment and career advancement.

Developing job standards begins with the invitation of experts to contribute to the job analysis. It is then broken down according to duties and tasks. The next step is to analyse the teaching before they form and develop the curriculum. By using this job standard, presenters and providers of training programs can ensure graduates from the institution meet the skills in the workplace or national industry.

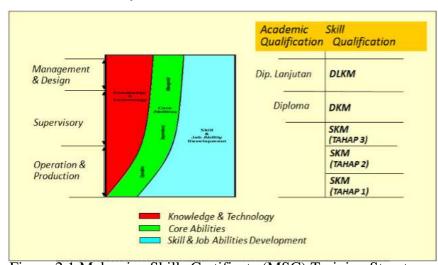


Figure 2.1 Malaysian Skills Certificate (MSC) Training Structure

### 2.3 The Iceberg Competency Model

Underlying characteristics mean competence is an individual's deep and strong character, and it will predict the individual's behaviour in all situations and tasks. For example, an individual with self-worth as an entrepreneur will more easily exhibit entrepreneurial characteristics when given a task requiring entrepreneurial traits. While an individual who has the self-worth of a manager is quite challenged to hold a position that requires him to display entrepreneurial characteristics. The strong and deep character is explained in the Iceberg Competency Model in Figure 2.1

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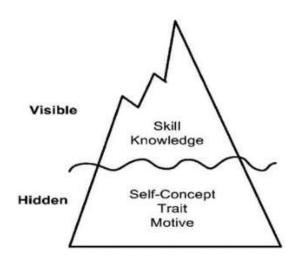


Figure 2.2 The Iceberg Competency Model (McClelland DC, 1998)

Based on Figure 2.1, the Iceberg Competency Model contains seven competency categories which are divided into two groups, namely:

- i. The knowledge/Skill Competency Group is shown by the diagram of Icebergs that are above the water level. This competency group consists of the following competency categories:
  - (a) Skills
  - (b) Knowledge
  - (ii) Behavioral Competency Group is shown in by section
- ii. Icebergs that are below the surface. This competency group consists of competency categories as follows:
  - (a) Value
  - (b) Social Role
  - (c) Self-Image
  - (d) Nature
  - (e) Motive

All categories of competence are essential to an individual in performing a task. Skills and knowledge are critical in implementation tasks. However, both cannot distinguish outstanding (outstanding performers) from those who have average performance (average performers).

The Malaysian Skills Certification System (MSC) has applied this model in the training system at Department of Skills Development (DSD) accredited centres. It starts with developing the National Occupational Skills Standard (NOSS), which has elements of knowledge, skills and attitude (KSA) before forming the training curriculum. This is because this training system has adopted the Competency Based Training (CBT) approach as a training guide to ensure that this program always meets the needs of the industry. This approach changes the instructor-centred training system to trainee-centred training (Yahya,2014). Implementing

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this training concept involves identifying the skills needed in the work environment that focus on real achievement.

### 2.4 The Entrepreneurship Ecosystem Model for TVET

Teaching and learning entrepreneurship in TVET requires changes in terms of methods and culture. Many factors are to be considered in improving trainees' entrepreneurial ability. The factors are interrelated, which ultimately form its entrepreneurial education ecosystem. UNESCO-UNEVOC has coordinated steps to hold a series of international meetings with experts worldwide to form an entrepreneurial learning model for TVET institutions (UNESCO-UNEVOC, 2019). This series of expert meetings have successfully developed a model that will drive the quality of entrepreneurship learning. This model consists of two levels, namely the micro level and the macro level. At the micro domain level, designs effective entrepreneurial learning experiences, curriculum, learning modes beyond formal curriculum and support for career paths and start-ups. At the micro level, the main components are policy and strategy, resources, stakeholders, culture, teacher training, channels, assessment and recognition.



Figure 2.3 Entrepreneurship ecosystem model for TVET (UNESCO-UNEVOC, 2019)

## 3. METHODOLOGY

Interpretive Structural Modeling (ISM) begins by identifying variables. They are followed by a problem-solving session with experts who know about the issue at hand. Then, contextually relevant phrases are identified to link the variables based on the context of the issue. A self-interaction matrix structure (SSIM) is developed based on pairs for variables and transitive logic. The SSIM matrix is then transformed into a reachability matrix with the help of discrete mathematics. Finally, based on the distribution of variables, a structural model known as the Interpretive Structural Model (ISM) is produced. Experts will interpret and evaluate this model to get a solution or at least a solid understanding of this issue. This example also shows that

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ISM is usually used in combination with each other in research studies such as Group Nominal Technique (Delbecq, 1975), the Delphi technique (Dalkey, 1972), the Focus group interview (Krueper, 2001), and others. In this example, the Nominal Group of Techniques (NGT) is used to generate the variables that the experts in the ISM session will discuss. Plus, while with the NGT, the ISM forms part of the Research Development Approach.

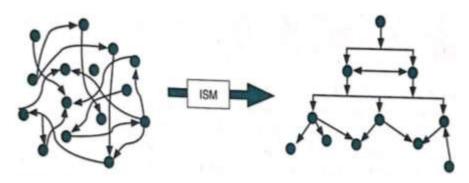


Figure 3.1 ISM application in linking ideas into a model

## 3.1 Sampling

Participants are expert panels. The right choice is essential for the success of this study because the output of the study is based on experts' opinions (Skulmoski, Hartman, and Krahn, 2007). Dalkey (1972 defines an expert as an individual who is knowledgeable in specific fields, while Adler and Ziglio (1996) asserted that the selection of experts should be based on four 'expertise' requirements: 1) knowledge and experience with the issues investigated; 2) ability and willingness to participate: 3) sufficient time to participate in this study: and 4) effective communication skills. The following are experts panel have selected for this study:

Table 3.1 A list of selected subject matter experts

		Term of	
Code	Certification	Experiences	Expertise
		(Year)	
SME1	Adv.Diploma	16	MSC System
SME2	Master	7	Entre.Education
SME3	Master	18	Entrepreneur
SME4	Degree	12	Entrepreneur
SME5	PhD	11	Entre.Education
SME6	Degree	28	Entrepreneur
SME7	Master	14	Entre.Education
SME8	Adv.Diploma	6	MSC System
SME9	PhD	10	Entre.Education
SME10	PhD	18	MSC System

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#### 3.2 Instrument

Three instruments are used in this phase. First, the draft items of the entrepreneurial ecosystem model produced from the literature review were used in the first step of phase 2 during the Fuzzy Delphi method (FDM). This list serves as a guide for practitioners to identify appropriate training ecosystem items to include in the model. Items in the list will be agreed on whether to be included, grouped or discarded entirely. Experts are allowed to add other activities they find suitable for included in the model's final list of learning activities. The final list has been presented to the experts. They must provide a number ranking indicating their preference level for each model item. The second instrument is interpretive structural modelling software which Sorach Incorporation developed called Concept Stars. This software is used to facilitate discussion and make decisions among experts in closed sessions to determine the relationship between the included software items.

#### 3.3 Procedure

It has become a common practice ISM is combined with other methods in a study. As described above, FDM is combined with ISM to set model items based on experts' views. Analytical Flierachical Processing and the like to generate the items. They have not necessarily used FDM only. Interviews (unstructured, semi-structured, or structured) can also be applied. The condition of the method is based on the input and decisions of experts. That's why Public Polling or general surveys are not appropriately used to generate model items. Conclusion If the questionnaire is carried out, it only serves as an input research basis to be consulted by experts. But this step is optional and depends on the context of the study. Bottom line, it's crucial to justify the combination of some technic or technique with ISM to generate items such as elements as the example described here. It has become a common practice ISM is combined with other methods in a study. As described above, FDM is combined with ISM to set model items based on experts' views. Analytical Flierachical Processing and the like to generate the items. They have not necessarily used FDM only. In fact, interviews (unstructured, semistructured, or structured) can also be applied. The condition of the method is based on the input and decisions of experts. That's why Public Polling or general surveys are not appropriately used to generate model items. Decision If the questionnaire is carried out, it only serves as an input research basis to be consulted by experts. But this step is optional and depends on the context of the study. Bottom line, it's important to justify the combination of some technic or technique with ISM to generate items s as the example described here.

#### 3.4 Data Analysis

The steps in ISM aim to develop a model through expert decisions about the relationships between items using the training ecosystem with the help of ISM software, as discussed. This model aims to function as a catalyst for entrepreneurship training at MSC-certified centres. However, as discussed in the previous section, its implementation is based on mobile learning to supplement the formal and informal classroom learning experience model for complete learning (where students learn solely through mobile devices and networks).

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# 4.0 Finding

Regarding the items of the entrepreneurship training ecosystem agreed, experts have identified that to enable more MSC trainees to enter the field of entrepreneurship, entrepreneurship training items (1) MUST be carried out BEFORE item (2) to guide through the SSIM process. Expressions for enabling more trainees to enter the field of entrepreneurship is a contextual phrase for the study. In contrast, the phrase MUST be handled BEFORE' is a phrase MUST be handled BEFORE' is a relational phrase to relate items from the model.

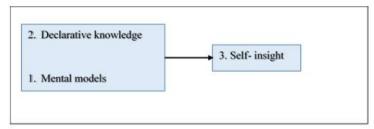


Figure 4.1: Entrepreneurship Competency Standard (Knowledge) Model

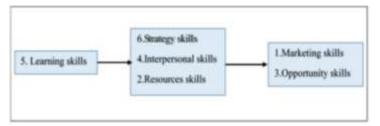


Figure 4.2: Entrepreneurship Competency Standard (Skills) Model

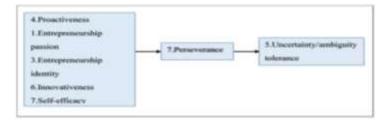


Figure 4.3: Entrepreneurship Competency Standard (Attitudes) Model

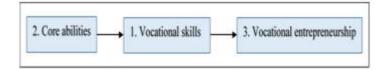


Figure 4.4: Entrepreneurship Curriculum Model

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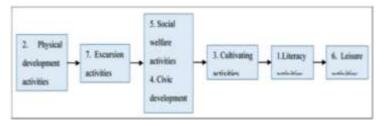


Figure 4.5: Entrepreneurship Co-Curriculum Model

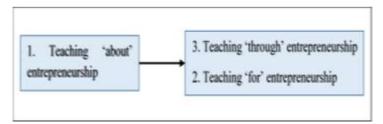


Figure 4.6: Entrepreneurship Pedagogy Model

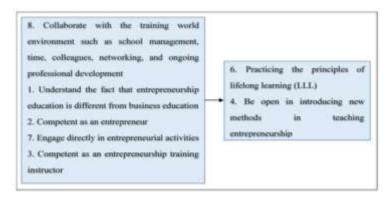


Figure 4.7: Entrepreneurship Competent Instructor Model

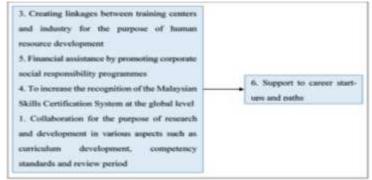


Figure 4.8: Entrepreneurship Industry Partnership Model

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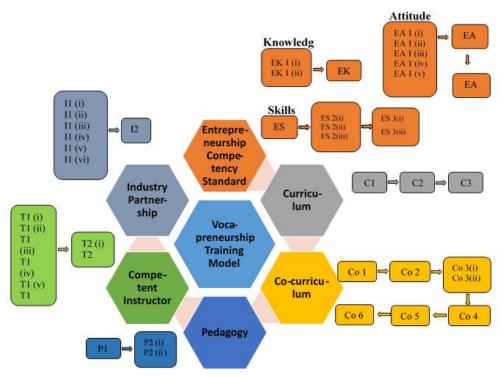


Figure 4.9: Entrepreneurship Training Ecosystem Model

## 4. DISCUSSION

Refers to the role of activities in the group respectively, training instructors need to pay attention to all 43 items because they are individual and related and influence the implementation of the entrepreneurial training model. In terms of achieving training outcomes, the items discussed above are based on the collective decision of experts regarding course objectives, as mentioned in the findings section. This model can also guide how learning activities are individually and related to help in helping the students to achieve results. However, this activity is not implemented exclusively to deliver course results certainly. An activity or a set of activities can help fulfil various training results during the trainees' learning process. For example, items 1 and 5 or 2 to 4 are essential as input knowledge for the results of the first exercise, 'apply principles and practices of professional oral communication skills'. Items 8,9, 10, 11, 12, 14, 15, 16, 17, and 18 can help increase trainees' skills in applying the principles and practices of entrepreneurship. In contrast, items 6, 13, 19, 22, 23 and 24 can measure where trainees can use communication skills; however, this set of items also applies to fulfilling outcomes in other training. Interpretative Structured Modeling (ISM) has played an essential role as a reliable technique in economics and administration, even in making risky decisions high for an organisation. Because of its potential large, ISM has worked in various fields, but unfortunately, this technique is inconsistent in education. However, it appears to be a robust methodology in educational research, such as some studies that have used methods. It has been used in designing policies and educational programs, but most studies focus on managing educational institutions, as discussed earlier in this chapter. This may be due to ISM

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being first introduced and applied in the business sector and management. ISM is not intended to produce a final product. Still, it is more of a medium of learning where users can have a more precise and accurate view of an issue or problem studied through visual representation in the form of structural models. This will then assist users in generating solutions to this issue, as shown in the example above, the application ISM presented in this chapter. ISM is a stronger method when combined with other techniques, such as Techniques Nominal Group, as described and shown in the application. This aims to reveal the potential of the ISM in educational research, especially in better understanding, especially in complex issues.

#### 5. CONCLUSION

Interpretive Structured Modeling (ISM) is a systematic method of building an organised and directed framework for complex problems to produce a realistic picture in understanding a situation and the variables involved. The ISM process consists of the identification of factors, definitions of the relationship between those factors, and the application of rank and instructions for ranking the elements to solve the complex problem from a systems perspective. The ISM process can change an abstract and fuzzy model system to more models with a clear definition. These models will help unpack the main factors related to a problem or issue. After identifying key factors or elements, strategies can be developed to deal with the situation more effectively and directly. The ISM method is precious in managing the perceptions and views of individuals of various disciplinary backgrounds and can be used as the medium to integrate different group perceptions, participate in decision discussions, able to manage a large number of components and relationships in a system that complex, is heuristic in terms of assessing the need for formulation model, and ultimately lead to a deeper understanding about the behaviour of a system. ISM is also easy to use, and the results are easily communicated to interested groups the bigger one. So no wonder ISM is getting increasingly widespread in its use in the industrial and academic sectors since it was introduced by Warfield in 1974. For this study, the use of this ISM application has successfully answered the research question by organising the priorities of the items under each component which ultimately forms a complete entrepreneurial training ecosystem model.

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