

## ARTICULATION AS A SUSTAINABILITY ELEMENTS FOR TECHNICAL AND VOCATIONAL EDUCATION IN SECONDARY DAILY SCHOOLS: AN ANALYSIS OF DELPHI STUDY

Asnul Dahar Minghat<sup>1\*</sup>, Ruhizan M.Yasin<sup>2</sup>, Muhammad Sukri Saud<sup>1</sup>, Yusri Kamin<sup>1</sup> & Kamalularifin Subari<sup>1</sup>

<sup>1</sup> (Dr.), Universiti Teknologi Malaysia, MALAYSIA, asnul@utm.my, p-sukri@utm.my, p-yusri@utm.my & p-arifin@utm.my

<sup>2</sup> (Assoc. Prof. Dr.) Universiti Kebangsaan, Malaysia, MALAYSIA, ruhizanmy@gmail.com

\*Corresponding author [asnul@utm.my]

### Abstract

The development of a high quality education system in Malaysia is among the country's priorities. It is focused on the development of a human capital that is experienced, skilled, progressive and exhibits high moral and ethical values. The Education Development Master Plan (EDMP) 2006-2010 adopted by the Ministry of Education introduced 22 elective Vocational Subjects (VS) to the secondary school curriculum in order to develop vocational skills that would prepare students for skilled and semi-skilled work after school to underpin the economic development of the country. This study is to identify the key elements which support the sustainability of Vocational Subjects in secondary schools in Malaysia based on the strategies outlined by the International Centre for Technical and Vocational Education and Training (UNEVOC) based in Bonn, Germany. Twelve panels of experts in the field of Technical and Vocational Education in Malaysia have been involved in a study involving four rounds Delphi study. In the first round of interviews were carried out on a panel of experts based on the interview protocol. The results of interviews conducted found that articulation is one of the elements for the sustainability of VS in secondary schools. Subsequently, a questionnaire was developed with an expert panel through the second round Delphi study to the fourth round.

**Keywords:** Sustainability, Vocational Subjects, Delphi Study, Articulation.

### 1 INTRODUCTION

Sustainability is defined as an unchanging state or preserved as the original (Kamus Dewan, 2002). The concept of sustainability is an integral part of the discourse of international discussions since the 80s. According to Pavlova (2009), the term sustainability or Sustainable Development has various meanings and definitions depending on an organization. However, the concept of Sustainability or Sustainable Development has begun to be defined for the first time in the Brundtland Commission Report, the World Commission on Environment and Development. According to the Brundtland (1987), Sustainable Development has been conceptualized in a variety of purposes and one of them is

*"...development that meets the needs of the present without compromising the ability of future generation to meet their own needs...."*

According to Ruhizan & Norzaini (2005), sustainability is a future thinking paradigm where aspects of balancing environmental, social and economic are taken into account in development of life. Vocational Subjects (VS), which consist of 22 elective subjects are some of the subjects that were emphasized in the Education Development Master Plan (EDMP) 2006-2010 by the Ministry of Education (MOE). Table 1 shows the vocational subjects grouped according to the mainfield.

**Table1** : Vocational Subjects

Field	Vocational Subject
Engineering/Services	1. Domestic Electrical Appliances Servicing 2. Domestic Wiring 3. Refrigeration and Air Conditioning Equipments Servicing 4. Gas and Arc Welding 5. Motorcyle Servicing 6. Basic Gerontology and Services
Construction	1. Domestic Construction 2. Furniture Making 3. Domestic Plumbing 4. Architectural Landmarks 5. Basic Interior Design
Home Science	1. Design and Sewing 2. Catering and Food 3. Food Processing 4. Facial and Hairstyling 5. Care and Erly Childhood Education
Agriculture	1. Landcape dan Nursery 2. Food Crops 3. Aquaculture and Animal Recreation
Computer Application	1. Computer Graphic 2. Multimedia Production

Source: Vocational Subject concept paper, CDC (2001).

Ministry of Education (MOE) has established National Key Performance Indicator (KPI) for expanding access to quality and affordable education. In 5<sup>th</sup> NKPI, Technical and Vocational Education (TVE) plays a more important role in the Malaysia agenda. Minister Key Performance Indicators (MKPIs), Ministry of Education Malaysia is targeting 100% participation of students in the vocational stream by the end of 2015. According to Ahmad Tajudin (2009), vocational subjects (VS) are some of the subjects in the group of technical and vocational implemented at the secondary level in secondary schools which will be addressed in order to achieve NKPI-5. From 2010 to 2015, there was a significant increase in students who will take VS.

Delphi study is the use of expert opinion. Use of expert opinion for the study was started at the RAND Corporation by Olaf Helmer and Norman Dalkey in 1953 which examined the specific problems in the military (Helmer, 1968). The main objective is to get feedback Delphi that has high validity of the problem and questionnaires given to a group of expert panels. This is done by giving each individual in the group an expert panel questionnaire containing the same questions in addition to incorporating feedback from the expert panel set the previous round (Helmer, 1968).

Delphi studies always used to combine and refine the opinion of a group of experts based on information supplied heterogeneous collective judgment process (Jones, 1979). Delphi study has been used by Dunlap, Ganter & Hvizdak (1998) in the process of preparing principal research instrument involving principals who served in the area of El Paso, Texas and is also effective principals who work in universities. This technique is more of a process group using the written responses of bringing individuals together to discuss. In general, Delphi study has three special properties, namely transparency, feedback control, and statistical analysis group (Dalkey & Armstrong 1989). According to Linstone and Turoff (1975) the five main principles of the Delphi study were (1) the sample is selected individually for each sample and other samples do not know the answer in the expert panel formed group, (2) sample only know the answers of other samples in the second round when researchers do data analysis and send the findings to each member of the panel, (3) the sample did not receive any pressure from any party or other samples to determine their questionnaire responses, (4) data were analyzed statistically and (5) data provided by the sample is not prejudiced (no bias) and thus play a role panel to find a solution.

To achieve the goals and objectives of VS implementation in secondary schools, a study was conducted to identify the elements of sustainability for the VS. The element of continuity is very important in order to maintain the VS and improve the quality of life of society after following VS in secondary schools.

## 2 RESEARCH DESIGN

Delphi study of four cycles were performed in this study. It aims to achieve a high level of consensus among the panel of experts formed by the analyst to list the elements of sustainability VS implementation in secondary daily school. Further more, the findings at this stage has been used to build the items of the questionnaire for conducting a survey on teachers VS to identify the level of sustainability of VS elements according to their views. In the field of educational research, this method has been widely used to predict and identify needs in education. For example, in clinical education, Delphi study has been used in a variety of ways, including for forecasting, planning, and curriculum development (Thangaratinam & Redman, 2005).

### **Research Sample**

Sample selection of this study is among individuals who have a high level of knowledge in the field of technical and vocational education in Malaysia. However, Helmer (1968) in Steward et. al (1999) says Delphi makes it difficult for researchers to give the title of "expert" to an individual solely on the public's assessment of academic qualifications, level of contributions and achievements in their careers. For the purpose of determining the sample, criteria such as the following act as a guide to setting panel of experts in the Delphi study:

1. Degree of Doctor of Philosophy (Ph.D) in the field of technical and vocational education (TVE) or sustainable development for lecturers Institute of Higher Learning (IoHL); lecturer Institute for Teacher Education (ITE) has served between 10 and 15 years in the field of TVE or teacher who has been teaching for more than 10 years in the field of TVE.
2. Have knowledge about TVE curriculum and implementation whether subjects at the university level, ITE and schools.
3. Those who are directly involved in the implementation of the VS especially from the Ministry of Education.
4. The person must be willing to participate in rounds of Delphi study that has been set.

The panel of experts were selected on the basis of their willingness and ability to express an opinion on the topics to be discussed and have profound experience on these matters (French et. al, 2002). Conciding with the criteria that have been set, a total of 12 people were selected for the expert panel (Dalkey et. \al, 1972).

### **First round Delphi study**

In the first round of the Delphi study session, the researcher met and interviewed each participant of the expert panel for the elements of sustainability VS based on the interview protocol that was prepared by the researcher. Researchers have also discussed the concept of sustainability or sustainable development by the Malaysian context. The method is carried out in the first round of the power to explore and understand the phenomenon of a study in greater depth and to explore systematically what will be interpreted by members of the expert panel through conversation, expression of feelings, and their view (Marohaini 200; Patton 2002). Further more, this study for the first round of Delphi was used as the basis for forming an item questionnaire that was used in the second round of the Delphi study session.

### **The second round Delphi study**

In the second round, researchers once again came face-to-face with each participant panel of experts to describe and explain the format and method of the questionnaire that was developed based on the findings in the first round. During the meet with the participants, they were given the opportunity to examine each item to get an explanation of the terms that were poorly understood. Furthermore, they have interacted with the questionnaire for two weeks for state approval, comments and to make any improvements to the questionnaire items.

### **The third round Delphi study**

For the third round, the participant expert panel established by the researcher has been asked once again to give its approval to the items that have been analyzed in the previous round without adding any new items. Reasons will be given if their level of agreement was found to be beyond the scale of the approval of the majority of the session the previous round. In short, the third round session aims to bridge the gap in views among the participants of the expert panel of the Delphi study.

### **The fourth round Delphi Study**

The purpose of the fourth round was to bridge the gap inviews among participants in the expert panel

established by the researcher to the questionnaires which were analyzed in the third round. Finally, in this round, all the items of the questionnaire reached a high level of agreement among experts.

Action researchers to stop when the number of rounds reached a high level of agreement is in line with the opinion (Martino 1972; Delbecq et. al (1975); Ludwig 1997; Bauder 1999). In their opinion, the number of rounds in a Delphi study approach is between two and ten rounds to limit the findings that meet the goals and objectives of the study. However, the round will be stopped if a high level of agreement among the experts was reached and the necessary information has been obtained or preliminary agreement on the number of rounds has been completed successfully by the researcher.

### 3 RESULTS

#### *Delphi Study Participant Profile*

Eight of the academic staff of the Institute of Public And Private Higher Learning, a lecturer ITE, two officers from the Ministry of Education and a teacher of experts was appointed to the panel of experts in the Delphi study. Tables 3 and 4 below show the Delphi Study participant profile and field of expertise.

**Table 3 :** The Delphi Study Participant Profile

Designation	Male	Female	Total
	(person)	(person)	(person)
Academic Staff at Public Institute of Higher Learning	6	1	7
Academic Staff at Private Institute of Higher Learning	-	1	1
Lecturer Institute for Teacher Education (ITE)	1	-	1
Education Officer	2	-	2
School Teacher	-	1	1
<b>TOTAL (People)</b>	<b>8</b>	<b>4</b>	<b>12</b>

**Table 4:** Experience in the field of expertise Delphi study participants

Experience	10 – 15	16 – 20	21 – 25	26 - 30	> 30	Total
	years	years	years	years	years	
Designation	(person)	(person)	(person)	(person)	(person)	(person)
Academic Staff at Public Institute of Higher Learning	-	2	-	2	3	7
Academic Staff at Private Institute of Higher Learning	-	-	-	1	-	1
Lecturer Institute for Teacher Education (ITE)	-	1	-	-	-	1
Education Officer	-	1	-	-	1	2
School Teacher	-	-	-	-	1	1
<b>TOTAL (people)</b>	<b>-</b>	<b>4</b>	<b>-</b>	<b>3</b>	<b>5</b>	<b>12</b>

#### *Findings Delphi First Round-Interviews*

Interviews conducted were based on the interview protocol that was prepared by the researcher. Sustainable Development for Technical and Vocational Education and Training (UNESCO, 2004b) was used as the basis

for developing the interview protocol. Articulation has been identified as one of the elements of sustainability VS in secondary schools. Here is an expert from the informants in the first round.

*In fact I have two articles that we call the SD (Sustainable Development) or ESD, the importance of Sustainable Development, we focus on TVE. There are two things, first, when we say the TVE system exists means that the output of the system work either for the world or for further study [IN1T1-17 / 02 (SK2: S8)]*

**The second round to fourth round in the Delphi Study**

Table 5 shows the breakdown of Delphi study analyzes data from the second to the fourth round of indicators articulation. In the second round, there are four items were dropped and all six items had reached a high level of agreement among the panel of experts Delphi study. Five items were obtained IQR score from 0 (IQR = 0) and M = 5 and one item scored IQR = 1 and M = 5.

In the third round, the results of the analysis carried out shows all items in this indicator has got a deal at a high level among the expert panel Delphi study. IQR scores obtained are worth 0 and 1 while the median (M = 5). The fourth round Delphi study conducted for indicators of articulation find all six items were found high levels of agreement and approval are high IQR score = 0 and the median (M = 5).

**Table 5:** Items for Articulation Element

No.	Element/ Item	Second Round				Third Round				Fourth Round			
		M	Med	IQR	Consensus Level	M	Med	IQR	Consensus Level	M	Med	IQR	Consensus Level
<b>Articulation</b>													
1	VS will be more successful if the articulation of these subjects have a clear path after students take VS	4.54	5	0	High	4.75	5	0	High	4.75	5	0	High
2	VS articulation must be established to convince parents about the direction VS students after school	4.64	5	1	High	4.75	5	0	High	4.75	5	0	High
3	VS students will have a clear direction either to study or work in areas where articulation trained VS created	4.82	5	0	High	4.83	5	0	High	4.83	5	0	High
4	VS articulation necessary to guide students VS to determine the direction upon completion of schooling	4.64	5	0	High	4.83	5	0	High	4.83	5	0	High
5	VS articulation essential to enable them to	4.82	5	0	High	4.75	5	1	High	4.83	5	0	High

be trained to work in the field													
6	VS articulation is an essential element for Sustainable Development so it is more sustainable to meet the needs of the country's human capital development	4.64	5	0	High	4.67	5	0	High	4.75	5	0	High

**Indicator:**

M - Mean

Med - Median (level of agreement)

IQR - Inter Quartile Range (0 – 1 = High Consensus, Diana et.al 2004)

#### 4 DISCUSSION AND CONCLUSION

Through the study, it was found that articulation has been identified as one of the elements of continuity of vocational subjects (VS) in secondary schools. At the end of the fourth round, the Delphi study showed high agreement among the panel of experts with the IQR score of 0 and for each questionnaire for the elements of articulation among them; (i) VS will be more successful if the articulation of these subjects have a clear path after students take VS, (ii) VS articulation must be established to convince parents about the direction VS students after school, (iii) VS students will have a clear direction either to study or work in areas where articulation trained VS created, (iv) VS articulation necessary to guide students VS to determine the direction upon completion of schooling, (v) VS articulation essential to enable them to be trained to work in the field, (vi) VS articulation is an essential element for Sustainable Development so it is more sustainable to meet the needs of the country's human capital development.

Articulation is an indicator that has the highest contributing factor in the preservation of the VS day secondary schools. Results showed that students felt the VS will have a clear direction during their studies or work in areas where articulation trained VS created. Next articulation VS need to guide students VS to determine the direction upon completion of schooling. Finally, the respondent argues that the articulation is an important indicator for the sustainability of the VS so that it is more sustainable to meet the needs of the country's human capital development.

Articulation of a particular program in technical and vocational education should be given primary attention. Another point of articulation is the route that will be taken by students after completion taking a course. With the articulation of a particular course then a student know what direction to take its course after completion of a course or program that has been followed for a period. According to Gilani (2010) in an interview conducted, for the preservation of a program or course must have a clear articulation. This includes career path or pursuing other training institutions. Consistent with this view, part of technical and vocational education (TVE, 2008) MOE has outlined articulation as one of three key elements to strengthen technical education and vocational secondary school level. In view of this researcher is a very good effort to determine the direction of students taking the PTV in secondary schools. Although at this time there have Malaysian Qualification Framework (MQF) but does not affect or detailing the route or direction in TVE especially students who take VS. It is easier to route the student after taking Malaysia Certificate Examination in the secondary school system.

In addition, SEAMEO VOCTECH (2007, 2008) has identified a number of issues related to technical and vocational education in Southeast Asia. Articulation as one of the findings of this survey was a problem or issue that has also been given the same attention by SEAMEO VOCTECH. Therefore the researcher aspects or indicators should be included in the articulation of the establishment or implementation of a subject is technical and vocational education at the secondary school level. Clear articulation convince students and parents to follow VS in secondary schools. Effects of the students who took the VS will surely continue their studies or work in the same field immediately after completing his studies in grade five. Mohd Nasir (2003) states that the articulation is very prominent in countries that have been developed and have

the services sector has matured and is based on high-tech industrialization. However articulation in technical education and vocational training is a relatively new thing compared to other fields as opportunities to pursue studies in technical and vocational training is limited before.

Articulation in technical and vocational education in Malaysia has a lot of potential if all parties continue to work towards the articulation of a coherent and distinctive. Implementation of this VS can also give students an opportunity to articulate technical and vocational programs ranked higher or deeper if there is articulation in the implementation of the VS in secondary daily schools. This in turn will be able to preserve the VS in secondary schools. Efforts are being implemented by the articulation of technical and vocational education division. Thus the awareness of parents and students on the routes in articulation should be enhanced. If the articulation can not be documented clearly is proposed that parents and students, especially first study will be the next route upon completion of grade five to inquire the matter to the school, district education offices, the state education department or MOE. This effort is to meet the guidelines and issues and trends in technical and vocational education while as noted by SEAMEO VOTTECH (2007, 2008).

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