Journal of Education and e-Learning Research
Vol. 9, No. 2, 119-128, 2022
ISSN(E) 2410-9991 / ISSN(P) 2518-0169
DOI: 10.20448/jeelr.v9i2.4044

Development of an Educational Sustainability Assessment Model: Application of the Delphi Technique and Pilot Study

Chaiwichit Chianchana

King Mongkut's University of Technology, North Bangkok, Thailand.
Email: chaiwichit.c@fte.kmutnb.ac.th Tel: (66)2555-2000 Ext.3209

Abstract

The objective of this research was to develop an educational sustainability assessment model using the Delphi technique. The research participants were an expert panel and stakeholders of educational projects. The research instruments consisted of an open-ended questionnaire and assessment forms. The frequencies, medians, quartile deviations, means and standard deviations of the data were analysed. The research results found that the assessment framework for educational sustainability in the first round consisted of the following indicators: pre-conduct, process conduct, post-conduct and the criteria consisted of the possible opportunities in sustainability (for pre-conduct and process conduct) and true sustainability (for post-conduct). The second round of assessment indicators and criteria were high, and in the third round they were very high. A pilot study of the feasibility of sustainability (pre-conduct) found that this project had the opportunity to achieve sustainability at the highest level and all model assessment standards were at the highest level.

Keywords: Assessment model, Educational sustainability, Delphi technique, Pilot study, Assessment indicators, Assessment standards.

Citation | Chaiwichit Chianchana (2022). The Development of an Educational Sustainability Assessment Model: Application of the Delphi Technique and Pilot Study. Journal of Education and e-Learning Research, 9(2): 119-128.
History:
Received: 28 April 2022
Revised: 8 June 2022
Accepted: 21 June 2022
Published: 13 July 2022

Publisher: Asian Online Journal Publishing Group

Funding: This research is supported King Mongkut's University of Technology North Bangkok (Grant number: KMUTNB-64-DRIVE-14).
Acknowledgement: The author acknowledges the support and encouragement from the committee at Science and Technology Research Institute, King Mongkut's University of Technology North Bangkok, Thailand.
Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.
Transparency: The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained.
Ethical: This study followed all ethical practices during writing.

Contents

Contribution of this paper to the literature
The novelty created by this research is that the newly developed educational sustainability assessment model covers practical significances that are suitable for assessors who want to use it to assess educational sustainability that will lead to the creation of information from assessments for the development of sustainability.

1. Introduction

The key principles of the National Economic and Social Development Plan no. 12 (2017–2021) adhere to the 'Philosophy of Sufficiency Economy' in order to reasonably integrate development in all dimensions. This is a necessary condition for sustainable development with a focus on developing people to be complete people. This is a necessary condition for sustainable development with a focus on developing people to be 'complete people'. Thai society is a quality society that adheres to the principle of 'people at the centre of development', that is aimed at creating quality of life and good health for Thai people and developing complete, disciplined, knowledgeable, skilled, creative and socially responsible citizens with positive attitudes. Ethical and moral development is applicable to people of all ages (Office of The National Economic and Social Development Board of Thailand, 2016). The key issue is the development of human capital to sustainably improve the quality of education.

This initiative also conforms to the National Research Policy and Strategy no. 9 (2017–2021), strengthens the development and sustainable cooperation of national research organization networks and research networks at home and abroad and collaborates with networks to create quality research personnel and research skills development systems and plans for young people at the student level (National Research Council of Thailand, 2016). This is also focused on the issue of sustainable development. The results of the study show that there are three dimensions of sustainable development: economic growth, social inclusion and environmental sustainability. Sustainability assessment should consist of cost–benefit analysis, impact assessment, green accounting, social impact analysis and safeguard compliance (Thomas, 2017).

Sustainability indicators have been in the process of development for some time. The Hang Seng Corporate Sustainability Index, STOXX Global ESG Leaders Indices, FTSE4Good Bursa Malaysia Index, KRX ESG Leader 150 Index, SGX Sustainability Index, SGX Sustainability Enhanced Index, SGX Sustainability Leader Index and SGX Sustainability Leaders Enhanced Index are assessed in three areas: environment, society and corporate governance (Pattarasen, 2017). In the evolution of sustainability indicators, only assessments in three areas are found: environment, society and corporate governance.

Problems in the systemic assessment of educational sustainability urgently need to be addressed. An important solution to the problem and the cause of the problem is the development of models or assessment models for continuous sustainable development (Power, Stern, & Ardoin, 2006). This is in line with the research proposals of the secretariat of the education council proposing that future research should focus on strengthening sustainable development (Narot, 2007) and Buosonte (2009) discussing issues/guidelines worthy of further education and knowledge of educational assessment/social sciences. One interesting point is the permanence or sustainability of educational or social projects.

The main problem is the lack of an educational sustainability assessment model that needs to be developed to support educational sustainability assessments, such as plans, projects, programmes or educational curriculums. The above-mentioned characteristics are called 'models' (Chianchana, 2017). These models lead to educational sustainability assessments, so it is necessary to develop an educational sustainability assessment model for use in educational sustainability assessments that will lead to the creation of information from assessments for the development of sustainability.

In efforts to obtain answers to the research problem, the following research questions are asked: What should the educational sustainability assessment model look like and what are the levels of quality to test the assessment model? The research objectives aim to develop an educational sustainability assessment model and to test the educational sustainability assessment model.

2. Review of the Literature

2.1. Concept of Sustainability

Sustainable development as a concept has been gaining attention since the Brundtland Commission Report in 1987 (World Commission on Environment and Development, 1987). The concept of sustainability was presented under the following topics: sustainability characteristics and sustainability assessment. The importance of sustainability was primarily based on the view that a journey would facilitate a process of continuous improvement and flexibility (Minerals Council of Australia, 2006). Sustainability is a complex and multidimensional area that is undergoing continuous development. Although the existing assessments contribute to the sustainability agenda, established tools are not yet effective (Gibson, 2006). Wulf, Werker, Ball, Zapp and Kuckshinrichs (2019) addressed the definition of sustainability's dimensions and the desire or need for multi criteria decision analysis. Sustainability is a metric that assesses a person's ability to operate independently and ensure their long-term survival (Schweitzer, 2015). The idea of sustainability mostly consists of three elements/dimensions: environmental, economic and social. In addition, the notions of the planet, people and profits also go along with this interpretation of sustainability (Gencturk, Hossain & Lahourpour, 2016). In addition, the categorization of sustainability assessment tools considers three main factors: temporal characteristics and the focus and integration of nature society systems (Ness, Urbel-Piirsalu, Anderberg & Olsson, 2007).

The importance of sustainable education and social action should be focused on the future (Leuciuc et al., 2020). In addition, sustainability has the most significant importance for organizations and important roles in sustainable university development, which lead to innovation and success (Grabara, Hussain & Szajt, 2020).

The goal of sustainability assessment is to pursue 'plans and activities that make an optimal contribution to sustainable development' (Verheem, 2002) and sustainability assessment is a methodology that can help decision-makers and policymakers decide what actions they should take and should not take in their attempt to improve the

sustainability of society (Devuyst, 2001). The term 'sustainability assessment' is used in both the literature and practice in two very different contexts. First, it is used in the context of checking if a community or organization is progressing towards sustainability, and second, it serves more as an impact assessment process in which it attempts to assess the sustainability of proposed projects, plans, policies or legislation before they are implemented (Devuyst., 2000). In addition, two key methodologies for sustainability assessment are elaborated: the monetary aggregation method was primarily used by economists and physical indicators are used by scientists and researchers (Dewan, 2006). The framework for assessing sustainability consists of three steps: traceability in the product's sustainable management, assurance and continuous improvement (Muñoz-Torres et al., 2019). In addition, sustainability assessment includes three categories of measures: indicator-based, product-related and integrated measures (Ness et al., 2007).

2.2. Assessment of Educational Sustainability

The assessment of educational sustainability of educational projects can be carried out through analysing the nature of a project that has not yet been started, is in progress or is completed (Chianchana, 2021); the indicators used to assess sustainability anticipate and assess conditions or historical trends, provide early warning information to prevent adverse outcomes, benchmark against other systems, communicate ideas, support decision-making, formulate strategies, establish improvement goals and track progress (Fiksel, Eason & Frederickson, 2012). They can also be based on self-reliance and sustainable resource utility (German Society for International Cooperation, 2015). Regarding the criteria for the assessment of sustainability aspects, Singh, Murty, Gupta and Dikshit (2012) stated that the assessment criteria were data availability, flexibility and transparency. Economic growth, social inclusion and environmental sustainability are the three dimensions of sustainable development today. Cost–benefit analysis, impact assessment, green accounting, social impact analysis and safeguard compliance should all be included in a sustainability assessment (Thomas, 2017). However, these are absent in educational fields. It is therefore critical to conduct a comprehensive review of educational sustainability. The construction of models or evaluation models for sustainable continuous development is an effective solution to the problem and the cause of the problem (Power et al., 2006). This is in keeping with the secretariat of the Education Council's research proposals, which suggest that future research should focus on increasing sustainable development (Narot, 2007).

In the educational sustainability assessment model, it is important for the assessment to last in the long run and be useful for education. The novelty of this study is that the newly designed educational sustainability assessment model has practical implications for assessors who want to utilise it to evaluate educational sustainability. The Delphi technique is a systematic and qualitative forecasting technique that collects opinions from a group of panel experts through several rounds of questioning to achieve a data consensus. After obtaining the educational sustainability assessment model framework that leads to the pilot study, the conceptual research framework of the educational sustainability assessment model is applied, as shown in Figure 1.

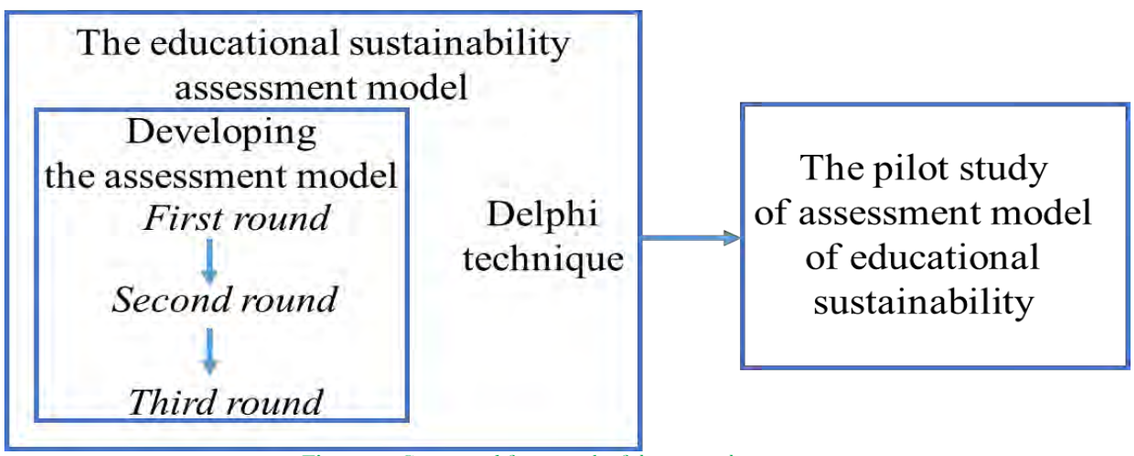

Figure 1. Conceptual framework of the research.

3. Research Methodology

This research, which took the form of a research and development used the Delphi technique method and followed up on development with a pilot study. The details of the research method are as follows:

3.1. Development of the Educational Sustainability Assessment Model

1) Participants

The 19-person expert panel specialised in educational measurement and evaluation and sustainability development was formed via purposive sampling. The panelists had over 15 years of expertise and experience in educational measurement and evaluation and relationship with educational sustainability or sustainability in other areas. On the minimum number of participants necessary for this research, Dalkey (1975) found that 15 or more experts can maximise the reliability or minimise the group error on the degree of consensus, and Okoli and Pawlowski (2004) stated that 14 is a good number of experts in Delphi studies.

2) Instrumentation

The instrument used in the Delphi process was an open-ended questionnaire on the assessment of educational sustainability for the first round; the assessment comprised five factors of the educational sustainability assessment model for the second and third rounds. The language used in all items was verified by language experts.

3) Analysis

The qualitative data were analysed using content analysis and the quantitative data were analysed using frequency, median (Mdn) and quartile deviation (QD). For this study, the consensus level was divided into three levels (high, medium and no consensus), and the importance level was divided into two levels (very high and low). This was done to determine whether the consensus level was high (if quartile deviation is less than or equal to 0.5), medium (if quartile deviation is in between 0.5 and 1) or showed no consensus (if quartile deviation is more than 1) and if the importance level was very high (in which the median value is 4 and above) (Ab Latif, Dahlan, Mulud & Nor, 2017; Fong, Ch'ng & Por, 2013).

3.2. Test of the Educational Sustainability Assessment Model

1) Participants

The 20 participants of the educational project chosen via purposive sampling tested an educational sustainability assessment model. The participants were stakeholders in the educational project. Hertzog (2008) recommended a sample size of 20–25 for intervention efficacy pilot studies.

2) Instrument

The instrument used for testing the educational sustainability assessment model consisted of the five-level initial sustainability assessment form that focused on the feasibility of sustainability (before conduct or pre-conduct) with 18 items. The assessment form for the types of standards of the five-level educational sustainability assessment model consisted of feasibility standards (3 items), propriety standards (7 items), accuracy standards (11 items) and utility standards (5 items). The content validity was verified by a consistency ranging from 0.60 to 1.00 by the five experts.

3) Analysis

The means and standard deviations of the data were analysed.

3.3. Research Steps

1) Developing an educational sustainability assessment model. In the first round, the Delphi process traditionally begins with an open-ended questionnaire. It serves as the cornerstone of soliciting specific information about a content area from the Delphi subjects (Custer, Scarcella & Stewart, 1999). The information obtained in this stage was in the form of qualitative data and data analysis was conducted using content analysis.

2) Developing an educational sustainability assessment model. In the second round, the items from the first step were given to each Delphi panelist. The panelists then received a second questionnaire through which the items were reviewed with ratings and definitions at five levels. The results of the data analysis using medians and quartile deviations were summarised by the researcher.

3) Developing an educational sustainability assessment model. In the third round, each Delphi panelist received a questionnaire that included the items, ratings and definitions to again confirm the responses, which were analysed using medians and quartile deviations. There is a high level of consensus and a high level of importance if the quartile deviation is less than or equal to 0.5 and the median is 4 or above.

4) The pilot study and test of the educational sustainability assessment model were tested on one educational project. The assessment of educational sustainability and the assessment of the assessment model were then examined (Figure 2).

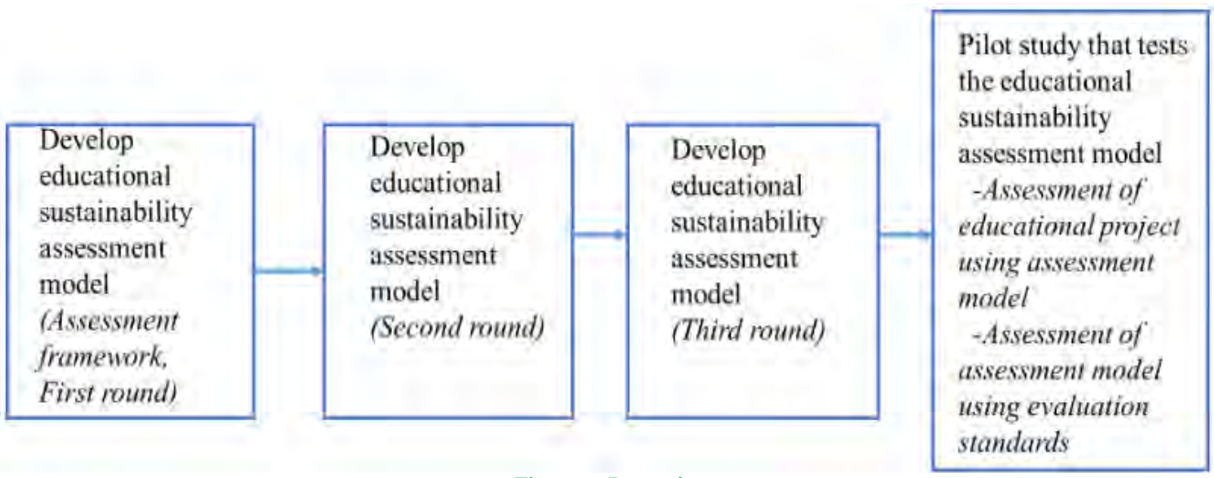

Figure 2. Research steps.

4. Results

4.1. Results of the Development of the Educational Sustainability Assessment Model, Round 1

The educational sustainability assessment framework derived from the responses to the questionnaires by the 19 experts provided an assessment framework that focused on indicators/factors for educational sustainability assessment, along with additional explanations. The results found that the educational sustainability assessment framework consisted of the following indicators/factors: before conducting (pre-conduct) (9 items), conducting (process conduct) (12 items), after conducting (post-conduct) (13 items) and criteria (9 items). These are given in Table 1.

Table 1. Summary of frequencies (*f*), indicator items and criteria of educational sustainability assessment.

Indicator list (Pre-conduct)	f	Indicator list (Process conduct)	f	Indicator list (Post-conduct)	f	Assessment criteria list	f
Feasibility of self-reliance	3	Participation of stakeholders in operations	5	Impact on society	6	Such criteria must clearly reflect the definition of sustainability in each dimension	4
Corporate vision related to education	1	Supporting and encouraging colleagues to be aware of social responsibility	2	The budget or costs invested were worthwhile	3	Ease in communicating criteria	2
Policies that promote mobility in the organisation	1	Ability to be self-reliant	1	Information was used to benefit	3	Criteria that reflect equality and fairness in society	2
Long-term operational planning	1	Supervision and assessment	1	Continuity in action	3	Flexible criteria	1
Feasibility of conducting	1	Survival of action	1	Using resources and learning resources were worthwhile	2	Sustainability assessment criteria are likely to be criteria in the form of developments to see clear transition trends, such as starting levels, continuous levels and sustainability levels	1
Feasibility of impact on stakeholders	1	Continuity in action	1	Continuous monitoring and assessing	2	Assessment criteria based on what is happening today, but should reflect what will happen in the future	1
Feasibility of impact on individual and agency	1	Commitment to human resource development	1	Ability to be self-reliant	1	Assessment criteria were divided into sustainability levels in each dimension ranging from non-sustainability levels to sustainability levels that lead to good practices	1
Feasibility of benefit for individual and agency	1	Creating a work culture	1	Congruence between operations and needs	1	Educational sustainability assessments are not interested in achieving the criteria but are interested in the long-term problems and they should analyse the causes of the problem	1
Managing and making a positive impact on the working environment	1	Thorough communications within the organisation	1	Managing and making a positive impact on the working environment	1	Criteria that can measure the ability and quality of work	1
		Happiness in work	1	Impact on self and agency	1		
		Good attitude towards action	1	Self-improvement is always present	1		
		Management was dedicated and transparent	1	Regularly conducting activity	1		
				Happily conducting activity	1		

4.2. The Results of the Development of the Educational Sustainability Assessment Model, Round 2 and Round 3

After analysing the second round of data by the 18 experts, the suggestions were as follows: add definitions for precision, correct the language in some areas and remove items that are redundant.

The experts evaluated the educational sustainability assessment model, including educational sustainability assessment indicators and criteria, which were obtained from the first round. The results showed that the assessment indicators included pre-conduct, process conduct and post-conduct activities/projects/activities and there were nine items of assessment criteria. A median between 4.00 and 5.00 indicated a high level of opinion on the indicators and assessment criteria, and a quartile deviation from 0.00 to 1.00 indicated a consistent opinion. Cronbach's alpha was 0.93. The results from the third round with 18 experts showed that the assessment indicators included activities/projects/objects that addressed the 3P conduct sustainability: pre-conduct (the initial sustainability assessment focused on the feasibility of sustainability), process conduct (in the process of moving towards sustainability) and post-conduct (a true stage of natural sustainability). There were nine items of assessment criteria related to pre-conduct, process conduct and post-conduct sustainability; the criteria can be classified into two types for interpretation as follows: possible opportunities in sustainability (for pre- and process conduct) and true sustainability (for post-conduct). A median between 4.50 and 5.00 indicated a very high level of opinion on the indicators and assessment criteria, and a quartile deviation between 0.00 and 0.50 indicated a consistent opinion. Cronbach's alpha was 0.93; the details are given in Table 2.

Table 2. The educational sustainability assessment model.

Indicators of educational sustainability assessment	Round 2				Round 3			
	Mdn	QD	Max	Min	Mdn	QD	Max	Min
Pre-conduct								
1.Feasibility of self-reliance	5.00	0.50	5.00	3.00	5.00	0.50	5.00	4.00
2.Corporate vision related to education	4.50	0.50	5.00	2.00	5.00	0.00	5.00	3.00
3.Policies that promote mobility in the organisation	5.00	0.00	5.00	3.00	5.00	0.00	5.00	4.00
4.Long-term operational planning	5.00	0.50	5.00	3.00	5.00	0.50	5.00	4.00
5.Feasibility of conducting	5.00	0.50	5.00	4.00	5.00	0.50	5.00	3.00
6 Feasibility of impact on yourself and the agency	4.00	0.50	5.00	2.00	5.00	0.50	5.00	3.00
7.Feasibility of impact on society	5.00	0.50	5.00	4.00	5.00	0.50	5.00	4.00
8.Feasibility of benefit for yourself and the agency	5.00	0.50	5.00	3.00	5.00	0.50	5.00	3.00
9.Managing and making a positive impact on the working environment	4.00	0.75	5.00	3.00	4.00	0.50	5.00	3.00
Process conduct								
1.Ability to be self-reliant	5.00	0.50	5.00	4.00	5.00	0.00	5.00	4.00
2.Supervision and assessment	5.00	0.25	5.00	2.00	5.00	0.00	5.00	4.00
3.Participation of stakeholders in operations	5.00	0.50	5.00	3.00	5.00	0.00	5.00	4.00
4.Survival of action	4.00	0.50	5.00	3.00	5.00	0.50	5.00	4.00
5.Continuity in action	5.00	0.50	5.00	1.00	5.00	0.00	5.00	4.00
6.Commitment to human resource development	5.00	0.50	5.00	4.00	5.00	0.50	5.00	4.00
7.Creating a work culture	5.00	0.50	5.00	3.00	5.00	0.50	5.00	4.00
8.Thorough communication within the organisation	5.00	0.50	5.00	4.00	5.00	0.13	5.00	4.00
9.Supporting and encouraging colleagues to be aware of social responsibility	5.00	0.50	5.00	4.00	5.00	0.13	5.00	4.00
10.Happiness in work	4.50	0.50	5.00	3.00	5.00	0.50	5.00	4.00
11.Good attitude toward action	5.00	0.13	5.00	4.00	5.00	0.00	5.00	4.00
12.Management is dedicated and transparent	5.00	0.50	5.00	3.00	5.00	0.50	5.00	4.00
Post-conduct								
1.Ability to be self-reliant	5.00	0.50	5.00	4.00	5.00	0.50	5.00	4.00
2.Using resources and learning resources are worthwhile	5.00	0.50	5.00	1.00	5.00	0.13	5.00	4.00
3.Congruence between operations and needs	4.50	0.50	5.00	2.00	5.00	0.00	5.00	4.00
4.The budget or costs invested were worthwhile	5.00	0.50	5.00	2.00	5.00	0.50	5.00	3.00
5.Information was used to benefit	5.00	0.00	5.00	3.00	5.00	0.00	5.00	4.00
6.Continuous monitoring and assessing	5.00	0.13	5.00	3.00	5.00	0.13	5.00	4.00
7.Continuity in action	5.00	0.50	5.00	2.00	5.00	0.13	5.00	4.00
8.Managing and making a positive impact on the working environment	4.00	0.13	5.00	2.00	5.00	0.50	5.00	3.00
9.Impact on self and agency	5.00	0.50	5.00	4.00	5.00	0.00	5.00	4.00
10.Impact on society	5.00	0.13	5.00	4.00	5.00	0.00	5.00	4.00
11.Self-improvement is always present	4.00	0.50	5.00	2.00	5.00	0.50	5.00	3.00
12.Regularly conducting the activity	4.00	0.63	5.00	2.00	5.00	0.50	5.00	3.00
13.Happily conducting the activity	4.00	0.50	5.00	2.00	5.00	0.50	5.00	4.00
Criteria of educational sustainability assessment								
1.Flexible criteria	4.00	0.50	5.00	3.00	5.00	0.00	5.00	4.00
2.Sustainability assessment criteria are likely to be criteria in the form of developments to see clear transition trends, such as starting levels, continuous levels and sustainability levels	5.00	0.50	5.00	4.00	5.00	0.00	5.00	4.00
3.Easy to communicate criteria	5.00	0.50	5.00	4.00	5.00	0.00	5.00	4.00
4.Assessment criteria based on what is happening today, but should reflect what will happen in the future	5.00	0.50	5.00	4.00	5.00	0.13	5.00	3.00
5.Such criteria must clearly reflect the definition of sustainability in each dimension	5.00	0.00	5.00	4.00	5.00	0.13	5.00	4.00
6.Assessment criteria are divided into sustainability levels in each dimension ranging from non-sustainability levels to sustainability levels that lead to good practices	5.00	0.50	5.00	3.00	5.00	0.00	5.00	4.00
7.Criteria that can measure the ability and quality of work	5.00	0.25	5.00	3.00	5.00	0.00	5.00	4.00
8.Criteria that reflect equality and fairness in society	5.00	0.50	5.00	3.00	5.00	0.50	5.00	4.00
9.Educational sustainability assessments are not interested in achieving the criteria but are interested in long-term problems and should analyse the causes of the problem	4.00	1.00	5.00	3.00	4.50	0.50	5.00	3.00

The educational sustainability assessment model is shown in Figure 3.

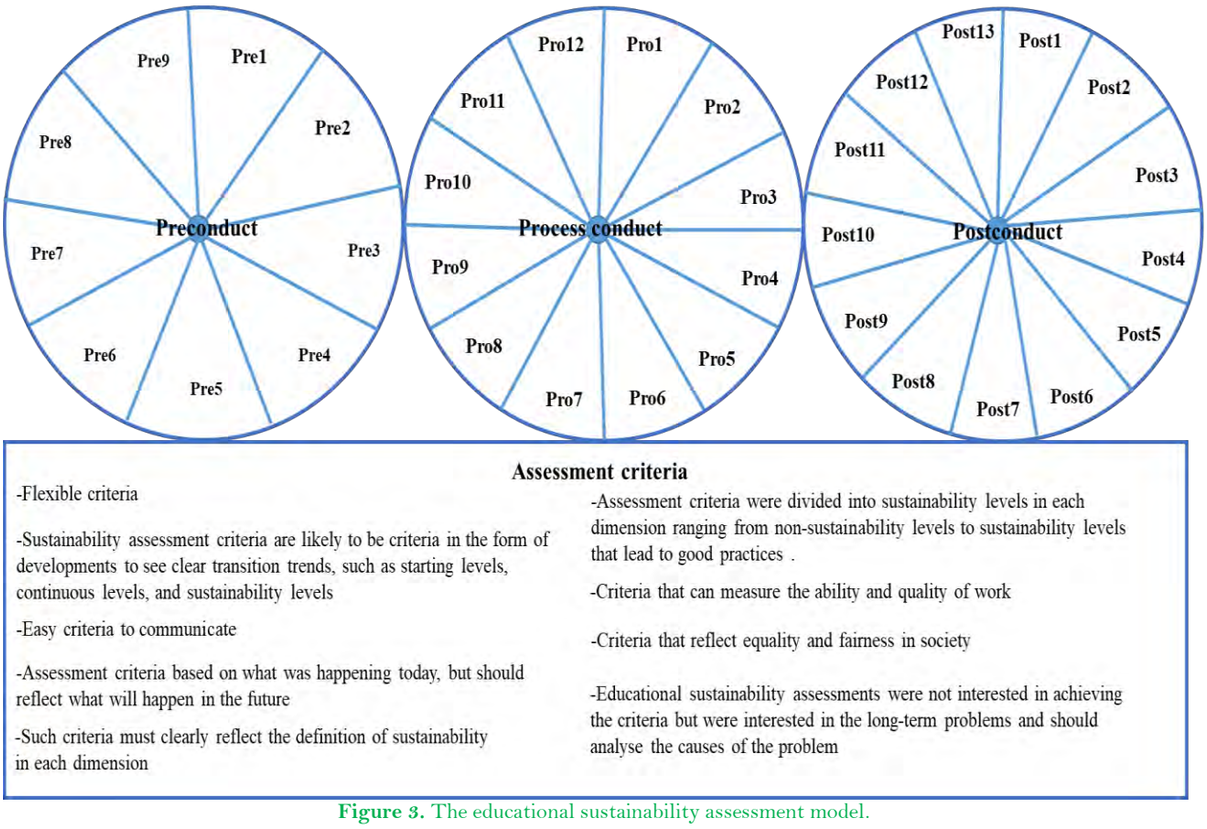

Figure 3. The educational sustainability assessment model.

4.3. Pilot Study Testing the Educational Sustainability Assessment Model

The pilot study educational project for testing the educational sustainability assessment model was the project on the training/development of the academic knowledge of learners. It was the initial sustainability assessment that focused on the feasibility of sustainability (pre-conduct). The assessment criteria of the mean is as follows: very low (1.00–1.49), low (1.50–2.49), medium (2.50–3.49), high (3.50–4.49) and very high (4.50–5.00). The summary research results found that this project had the opportunity to achieve sustainability at a very high level, and all items had the opportunity to achieve sustainability at a very high level. The reliability of the project assessment was equal to .60, as shown in Table 3. In addition, regarding the assessment of the assessment model, the research results showed the following: all model assessment standards including the feasibility, propriety, accuracy and utility standards were at a very high level, and the reliability of model assessment was equal to 0.77, as shown in Figure 4.

Table 3. The assessment of the initial sustainability assessment focuses on the feasibility of sustainability (pre-conduct).

Assessment list	Mean	SD
1. Projects had the opportunity to work with resources that were appropriate for the situation	4.80	0.41
2. Projects were able to run on an adequate budget	4.60	0.50
3. The project had obvious evidence of sustainable development guidelines	4.55	0.51
4. The project included data that reflected real-world possibilities	4.75	0.44
5. The project was part of a work-oriented policy	4.75	0.44
6. The project was worthwhile in light of contemporary circumstances	4.80	0.41
7. The project's details were included in the action plan	4.60	0.50
8. The initiative had an action plan with real-world applications	4.80	0.41
9. The project had the potential to achieve its objectives	4.55	0.51
10. There were no potential roadblocks to the project's implementation	4.65	0.49
11. The project had the potential to have a self-reinforcing effect	4.80	0.41
12. Organisation was expected to be impacted by the initiative	4.80	0.41
13. Stakeholders were expected to be impacted by the project	4.75	0.44
14. The project had the potential to have a social impact	4.70	0.47
15. Self-benefits were a possibility with this initiative	4.65	0.49
16.The project had the potential to be beneficial to the organisation	4.80	0.41
17. The project had the potential to foster a positive workplace environment	4.80	0.41
18. The project allowed for the creation of a learning-to-work environment	4.85	0.37
Summary	4.72	0.45
Reliability = 0.60		

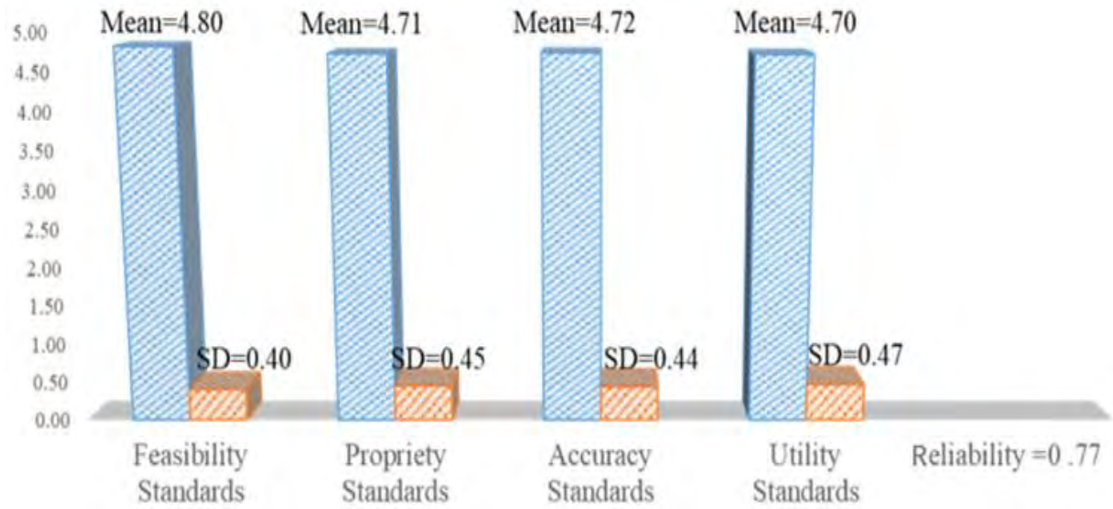

Figure 4. The standards of model assessment.

5. Discussion

The assessment indicator showed the ability to be self-reliant. It reflected every assessment of the 3P conduct. The ability to be self-reliant being the social and economic ability of an individual, a household or a community has to have essential needs in a sustainable manner (United Nations High Commissioner for Refugees, 2005). The term 'sustainability' refers to one's ability to function in the face of adversity with self-reliance (Schweitzer, 2015). Self-reliant living is a viable means of caring for nature and other human beings and, hence, for sustainability (Marinova & Hossain, 2006). Self-reliance and sustainable development are associated with a series of normative principles, which include the preoccupation of human well-being (Ite, 2016) and the assessment sustainability based on self-reliance (German Society for International Cooperation, 2015). In addition, Nwaigburu and Eneogwe (2013) offered evidence on the importance and relationship between self-reliance and sustainability to provide combined support as suggested strategies in order to improve self-reliance and sustained development. In other words, self-reliance is a feature that reflects educational sustainability that has been characteristic before, during and after conduct. In addition, this concept is in accordance with the phases-based assessment concept of Chianchana (2021) which has been a one stop implementation for assessment.

The assessment indicators are policies that promote mobility in an organisation (pre-conduct) and the information is used to achieve benefits (post-conduct). The experts formed a consensus during the second and third rounds (Mdn=5.00, QD=0.00) regarding the policies that promote mobility in an organisation (pre-conduct). This may be because having a good corporate policy will support the operations within an organisation to achieve success. Once successful, an organisation will see the importance of sustainability. Therefore, in corporate policy, there is an opportunity for sustainability related to the Association of Cooperate Consel (2017) which states that good policies are a dynamic body of shared standards used to strengthen and support successful organisations, and clearly identifying policies will be a response strategy. Solving problems in an organisation will make that organisation a priority. Once the person in the organisation sees the importance, it will lead to sustainability in the organisation. As previously stated by Mynbayeva, Yesseyeva and Anarbek (2015), a policy is a strategy accepted to solve or improve the quality of a problem. In addition, Silvius, Schipper and Nedeski (2012) stated that sustainability in projects and project management is seen in the development, delivery and management of project-organised change in policies.

As for the assessment indicators, the information is used to achieve benefits (post-conduct). Such an indicator is of great importance due to the completion of activities reflecting sustainability and the information can be utilised to the organisation's advantage. It has real value leading to sustainability; the German Society for International Cooperation (2015) stated that the assessment of sustainability should be based on sustainable resource utility while Franc, Laroussinie and Karjalainen (2001) stated that assessing the *sustainability* of the other functions, goods and *benefits* needs to be developed.Serra and Kunc (2015) further stated that the impact of intermediate benefits, costs and other benefits can be enhanced to improve a project. All of these factors empower the realisation of greater benefits which are more sustainable. In addition, sustainable project management is also a clear definition of usefulness that reflects sustainability.Silvius and Schipper (2014) stated that sustainable project management would imply proactive involvement of stakeholders in project activities, such as the definition of benefits.

6. Conclusion

The development of an educational sustainability assessment model has an assessment framework consisting of the following indicators: 9 items of pre-conduct, 12 items of process conduct, 13 items of post-conduct and 9 items of criteria and assessment criteria related to pre-conduct, process conduct and post-conduct. This can be classified into two types for interpretation: possible opportunities in sustainability for pre-conduct and process conduct and true sustainability for post-conduct. The assessment from the expert panel showed the assessment indicators and educational sustainability criteria to be at a high level. In addition, the assessment indicators and educational sustainability criteria were at a very high level. The pilot study was an application of the assessment model to an educational project testing the project of the training/development of the academic knowledge of learners. It was the initial sustainability assessment that focused on the feasibility of sustainability (pre-conduct). The summary of the research results showed that this project had the opportunity to achieve sustainability at a very high level and all items had the opportunity to achieve sustainability at a very high level. Regarding the assessment of the

assessment model, all model assessment standards were at a very high level. The assessment model is necessary for educational sustainability assessments that will lead to the creation of information for the development of sustainability.

7. Recommendations and Limitations

Recommendations for implementation and for stakeholders in educational sustainability assessment include educational activities, plans, projects and programmes. These must be determined according to the nature of the assessed period, regardless of whether it is before conduct, during conduct or after conduct, to reflect the possible opportunities of sustainability and true sustainability. Recommendations for future research on the educational sustainability assessment model should be studied in all 3P case studies in a continuous and comprehensive educational context. Research on educational sustainability assessment should be designed in multiple contexts and mixed methods should be used for research applications.

The limitations of this study are characteristic of studies in the field of education through the provision of expert information via judgment; it has not been implemented in a variety of projects. However, this research can expand the references by applying them to a variety of contexts to make them feasible and appropriate; the results will broaden the scope of the next study.

References

Ab Latif, R., Dahlan, A., Mulud, Z. A., & Nor, M. Z. M. (2017). The Delphi technique as a method to obtain consensus in health care education research. *Education in Medicine Journal*, *9*(3), 89-102.Available at: https://doi.org/10.21315/eimj2017.9.3.10.

Association of Cooperate Consel. (2017). *Abridged definitive guide to policy & procedure management* (2nd ed.). Washington, DC: Navex Global.

Buosonte, R. (2009). Directions and areas of current issues in educational research and assessment (2012-2009). Retrieved from http://www.rattanabb.com/html/Directions.pdf.

Chianchana, C. (2017). Creating and developing model. *Silpakorn Educational Research Journal*, *9*(1), 1-11.

Chianchana, C. (2021). Implementation of an assessment model of educational sustainability: Application of phases-based assessment. *Cypriot Journal of Educational Sciences*, *16*(4), 1533-1548.Available at: https://doi.org/10.18844/cjes.v16i4.6010.

Custer, R. L., Scarcella, J. A., & Stewart, B. R. (1999). The modified Delphi technique: A rotational modification. *Journal of Vocational and Technical Education*, *15*(2), 1-10.

Dalkey, N. C. (1975). Towards theory of group estimation. In H. A. Linstone, & M. Turoff (Eds.), The Delphi method techniques and applications (pp. 236-261). Massachusetts: Addison-Wesley Publishing.

Devuyst, D. (2001). *How green is the city? Sustainability assessment and the management of urban environments* (Vol. 457). New York: Columbia University Press.

Devuyst., D. (2000). Linking impact assessment and sustainable development at the local level: The introduction of sustainability assessment systems. *Sustainable Development*, *8*(2), 67-78.Available at: https://doi.org/10.1002/(sici)1099-1719(200005)8:2%3C67::aid-sd131%3E3.0.co;2-x.

Dewan. (2006). *Sustainability index: An economic perspective.* Paper presented at the 40th Annual Meeting of the CEA.

Fiksel, J., Eason, T., & Frederickson, H. (2012). *A framework for sustainability indicators at EPA.* Washington, DC: Office of Research and Development.

Fong, S. F., Ch'ng, P. E., & Por, F. P. (2013). Development of ICT competency standard using the Delphi technique. *Procedia-Social and Behavioral Sciences*, *103*, 299-314.Available at: https://doi.org/10.1016/j.sbspro.2013.10.338.

Franc, A., Laroussinie, O., & Karjalainen, T. (2001). *Criteria and indicators for sustainable forest management at the forest management unit level.* Paper presented at the EFI Proceedings No. 38, Nancy: European Forest Institute.

Gencturk, B., Hossain, K., & Lahourpour, S. (2016). Life cycle sustainability assessment of RC buildings in seismic regions. *Engineering Structures*, *110*, 347-362.Available at: https://doi.org/10.1016/j.engstruct.2015.11.037.

German Society for International Cooperation. (2015). Measuring results, contributing to results. *German Society for International Cooperation.*

Gibson, R. B. (2006). Sustainability assessment: Basic components of a practical approach. *Impact Assessment and Project Appraisal*, *24*(3), 170-182.Available at: https://doi.org/10.3152/147154606781765147.

Grabara, J., Hussain, H. I., & Szajt, M. (2020). Sustainable university development through sustainable human resources and corporate entrepreneurship: The role of sustainable innovation and work environment. *Amfiteatru Economic*, *22*(54), 480-495.Available at: https://doi.org/10.24818/ea/2020/54/480.

Hertzog, M. A. (2008). Considerations in determining sample size for pilot studies. *Research in Nursing & Health*, *31*(2), 180-191.Available at: https://doi.org/10.1002/nur.20247.

Ite, U. E. (2016). *Perspectives on self-reliance and sustainable development in Nigeria Conference.* Paper presented at the 2nd National Conference - Academic Staff Union of Polytechnics (ASUP).

Leuciuc, F. V., Ghervan, P., Popovici, I. M., Benedek, F., Lazar, A. G., & Pricop, G. (2020). Social and educational sustainability of the physical education of Romanian students and the impact on their physical activity level. *Sustainability*, *12*(21), 9231.Available at: https://doi.org/10.3390/su12219231.

Marinova, D., & Hossain, A. (2006). *Principles for self-reliance and sustainability: Case study of Bangladesh.* Paper presented at the Proceedings of the Anti-Poverty Academic Conference with International Participation, Institute for Sustainability and Technology Policy, Murdoch University, Perth. 2006 by the Institute for Sustainability and Technology Policy (ISTP), Murdoch University.

Minerals Council of Australia. (2006). Submission No. 94. CANBERRA ACT: Minerals Council of Australia.2. Retrieved from http___www.aphref.aph.gov.au_house_ committee_environ_ charter_subs _sub094%20(2).pdf.

Muñoz-Torres, M. J., Fernández-Izquierdo, M. A., Rivera-Lirio, J. M., Ferrero-Ferrero, I., Escrig-Olmedo, E., & Gisbert-Navarro, J. V. (2019). *Sustainability assessment guide.* Problemveien: University of Oslo.

Mynbayeva, A., Yesseyeva, M., & Anarbek, N. (2015). Research of the educational policy in Kazakhstan: Analysis reflection and modeling. *Procedia-Social and Behavioral Sciences*, *171*, 642-647.Available at: https://doi.org/10.1016/j.sbspro.2015.01.172.

Narot, P. (2007). *Synthesis of knowledge from educational research.* Bangkok: Office of the Education Council.

National Research Council of Thailand. (2016). *Policy and organisation strategy (2017-2021).* Bangkok: An National Research Council of Thailand.

Ness, B., Urbel-Piirsalu, E., Anderberg, S., & Olsson, L. (2007). Categorising tools for sustainability assessment. *Ecological Economics*, *60*(3), 498-508.Available at: https://doi.org/10.1016/j.ecolecon.2006.07.023.

Nwaigburu, K., & Eneogwe, V. N. (2013). Business education for self reliance and sustainable development in Nigeria. *Academic Journal of Interdisciplinary Studies*, *2*(10), 113-113.Available at: https://doi.org/10.5901/ajis.2013.v2n10p113.

Office of The National Economic and Social Development Board of Thailand. (2016). *Summary of the twelfth national economic and social development plan (2017-2021).* Bangkok: Office of The National Economic and Social Development Board of Thailand.

Okoli, C., & Pawlowski, S. D. (2004). The Delphi method as a research tool: An example, design considerations and applications. *Information & Management*, *42*(1), 15-29.Available at: https://doi.org/10.1016/j.im.2003.11.002.

Pattarasen, W. (2017). Sustainability index. *The Stock Exchange of Thailand*, *3*(2), 1-4.

Power, R. B., Stern, M. J., & Ardoin, N. (2006). A sustainable assessment framework and its application. *Applied Environmental Education and Communication*, *5*(4), 231-241.Available at: https://doi.org/10.1080/15330150601059290.

Schweitzer, S. (2015). *Capturing results using contribution analyses.* Bonn and Eschborn: German Society for International Cooperation (GIZ) GmbH.

Serra, C. E. M., & Kunc, M. (2015). Benefits realisation management and its influence on project success and on the execution of business strategies. *International Journal of Project Management, 33*(1), 53-66.Available at: https://doi.org/10.1016/j.ijproman.2014.03.011.

Silvius, A. J. G., Schipper, R., & Nedeski, S. (2012). *Sustainability in project management: Reality bites.* Paper presented at the Proceedings of the 26th IPMA World Congress, Crete.

Silvius., A., & Schipper, R. P. (2014). Sustainability in project management: A literature review and impact analysis. *Social Business, 4*(1), 63-96.Available at: https://doi.org/10.1362/204440814x13948909253866.

Singh, R. K., Murty, H. R., Gupta, S. K., & Dikshit, A. K. (2012). An overview of sustainability assessment methodologies. *Ecological Indicator, 9*(2), 89–112.Available at: https://doi.org/10.1016/j.ecolind.2008.05.011.

Thomas, V. (2017). *Evaluating sustainable development. In Rob D. van den Berg, Indran Naidoo Assessment for Agenda 2030: Providing Evidence on Progress and Sustainability.* Exeter: International Development Assessment Association IDEAS.

United Nations High Commissioner for Refugees. (2005). *Handbook for self-reliance.* Genève: United Nations High Commissioner for Refugees.

Verheem, R. (2002). Recommendations for sustainability assessment in the Netherlands. In: Netherlands Commission for EIA, (Eds.), Environmental Impact Assessment in the Netherlands: Views from the Commission for EIA in 2002. The Netherlands.

World Commission on Environment and Development. (1987). *Our common future.* Oxford: Oxford University Press.

Wulf, C., Werker, J., Ball, C., Zapp, P., & Kuckshinrichs, W. (2019). Review of sustainability assessment approaches based on life cycles. *Sustainability, 11*(20), 5717.Available at: https://doi.org/10.3390/su11205717.