



Modified Delphi Technique: The Development of Measurement Model for Innovative Instructional Leadership in Technical and Vocational Education Systems

Irdayanti Mat Nashir¹, Ramlee Mustapha²,
 Nurul Nazirah Mohd Imam Ma'arof³, Tang Jing Rui⁴

^{1,2,3,4}Universiti Pendidikan Sultan Idris, Tanjong Malim, Perak, 35900, MALAYSIA

*Corresponding Author

DOI: <https://doi.org/10.30880/jtet.2020.12.01.003>

Received 17th August 2018; Accepted 18th July 2019; Available online 31st March 2020

Abstract: This study aimed to determine the constructs and to develop measurement model of innovative instructional leadership for polytechnics system in Malaysia. The study used Hallinger and Murphy model as the underpinning theoretical framework. This study has utilized a model development approach as its research design. In the earlier stage, a Modified Delphi technique was used to gather initial data regarding innovative instructional leadership. Eleven experts were selected based on their expertise and experience. They confirmed 13 constructs of innovative instructional leadership for the polytechnics system. Stratified random sampling was used in this study to select the respondents. A new instrument was developed which consisted of 13 constructs and 188 items and distributed to the respondents in the selected polytechnics to determine the innovative instructional leadership of the polytechnic administrators. Empirical data collected were analyses using descriptive and inferential statistics that included confirmatory factor analysis. The results showed that lecturers at the polytechnics did not agree that their administrators possess the innovative instructional leadership particularly related to strategic thinking, innovative thinking and network management. In addition, the study also found that the administrators of the polytechnics have moderate level of innovative instructional leadership for most of the constructs. Based on confirmatory factor analysis, it was found that only 68 items out of 188 items that are important to the innovative instructional leadership in the polytechnics system in Malaysia. In conclusion, this research study has obtained nine importance of innovative instructional leadership in the polytechnic system in Malaysia. Importance of acquired is expected to improve the technical competence of the organization, particularly polytechnics to achieve the aspirations outlined transformation. In addition, these studies also acquire instruments for innovative instructional leadership to guide the administrator to assess the weaknesses and constraints existing in themselves. It is hoped that the results of this study could assist the top management in polytechnics to spearhead the direction and leadership of the polytechnics towards a more creative and innovative system in line with the government's desire to transform the polytechnic system to becoming a preferred choice of higher education institution.

Keywords: Measurement Model, Delphi Technique, leadership, innovative, instructional, TVET

1. Introduction

Leadership is a critical aspect of an organization. Generally, leaders have to assemble a strategic plan where leaders give directions. According to Staub (1996) and Yang (2014), motivate followers to carry out the aspired strategic planning arranged by the organization. (Thompson, 2012). This is a conventional leadership concept. However, the evolution of the leadership concept produces many theories and leadership strategies. According to Jo Owen (2011), leadership is something enigmatic as it does not have the consensus about a specific leadership definition. From a historical chronology, there had been several great leaders that portrayed unique leadership traits. A great leader may

*Corresponding author: irdayanti@ftv.upsi.edu.my

have to have leadership skills like Genghis Khan, Nelson Mandela and Niccolo Machiavelli. Genghis Khan was very skilled in terms of setting war strategies till he was able to unite Mongolians and then founded the Mongolian Empire by conquering a huge part of Asia, including North China (Jin Dynasty), West Xia, Central Asia, Persia and Mongolia. Nelson Mandela was famous for being a leader who fought for independence through anti-apartheid activities which ended the white minority regime and discrimination towards black people in South Africa (Zoll, 2012). Whereas Machiavelli was famous for his political theory in retaining ruling powers (Avolio, Walumbwa, & Weber 2009). By looking at these successes, one can figure out how amazing these leaders were even though they had different leadership traits.

The innovative theory was said to have sparked by Joseph Schumpeter in the early 20th century. He was an economic and political thinker. He believed that innovation is the key to economic development. He also pictured a new innovative action replacing old innovations as creative destruction where innovative development cannot be avoided with economic continuity. Therefore, an investment of innovative individuals is critical to generate economic development (Schumpeter 1942). Romer (1997) stated that economic development will not be stable without an innovative leader because leaders need creative and innovative ideas to develop an organization.

According to Bennis and Goldsmith (1997), to instill an innovative culture, leaders need to give incentives to employees that contribute ideas that are non-conventional and out of the box. Fisk (2010) stated that an idea is valuable in determining the success of a company or organization. The former president of the *Massachusetts Institute of Technology* (MIT), Charles technique (1997) also voiced out that future competitions depend on who is able to create a new idea and build innovation. A proactive, innovative and competitive leader is highly needed in the era of globalization. (Bradt 2011; Husnuzan 2012; Ramlee 2013). Globalization is a phenomenon specific to human behavior in which companies and organizations are racing to create success or they will be left behind. (The Levin Institute 2015). The presence of Information and Communication technology has fastened globalization changes (Anderson 2010). The rapid world economy in the era of globalization has caused leaders to be competitive and innovative.

Uncertainty and great competition in the world economy need a country like Malaysia to continue competing in a global level. Model Baharu Ekonomi (MBE) was introduced and focused on increasing the productivity of organizations. However, it is not easy to reach that objective. Leaders need to constantly be able to come up with new creative and innovative ideas where they will be able to break through, think outside of the box and beyond the limit. (Harrari 2007; Marianne Abib-Pech 2013). According to MBE, the government needs to outline a few main strategies to develop and maintain Malaysia as a high-income earning country. In one of the strategies, the government attempted to elevate tertiary education by transforming technical and vocational education. (PTV). Although many strategies have been carried out there are still a few weaknesses in the PTV system including the polytechnic system. A few experiments show that polytechnic administrators still practice conventional leadership without inserting creative and innovative elements in organization management. (Azila & Rohana 2011; Zuraidah 2013). Therefore, it is critical to evaluate PTV's leadership, especially in a polytechnic system.

2. Overview of Leadership

Even during ancestral times, the nature of protecting and cooperating has existed in human's mannerism. This cooperation can be seen in society's way of defending lives against ferocious animals and surroundings. That is where the nature of cooperation and leadership come from. Those appointed as leaders from a particular community were said to be strong and brave until there comes an arrangement agreed together. For example, a leader had to be born from a noble family, healthy, strong, brave, and wise, have influence and a few others. Until now leaders need to have specific requirements because leaders are meant to lead a group. (Gardner & Laskin 2011)

Several theories explain the concept of leadership. The genetic theory explains that the root of leadership is a trait that is passed on from generation to generation, usually from a father to a son (Weatherford 2005) The social theory is that a leader can be chosen and shaped, in other words not through inheritance but each individual is able to be a leader (Weatherford 2005). Scholars and philosophers have written about the characteristic of a leader and their roles since the beginning of human civilization. Plato in the renowned book *The Republic* displayed the life story of Plutarch. Plutarch was a Greek historian that wrote about the life and heroic characteristics of Greek leaders such as *Alexander the Great*. According to Plutarch, leadership depends on specific traits and this is according to leadership that they possess and according to leadership history that was passed down and followed to be used as a guide in the reap of the ruling. (Stumpf & Fieser 2012).

In the 21st century, there have been several leadership theories such as distributed leadership that focus on the distribution of several different expertise in an organization. (Harris, 2002). According to Harris (2002), distributed leadership is the tendency for higher-ups to distribute work to followers based on expertise, skills, and knowledge of the particular follower. However, he stressed that the key factor of a successful distributed leadership depends on how it is made easier, moved and given support. Next, everlasting leadership founded by Hargreaves and Fink came about in the year 2003. Hargreaves and Fink (2003) defined everlasting leadership as an initiative among leaders and followers in developing organizations without affecting the development and other environments now and in the future. Everlasting and distributed leadership has led to a new dimension in education. Everlasting and distributed leadership

are connected based on the practice and principle that are more open and emphasize on continuity as well as collaboration in an organization.

Furthermore, innovative leadership that was expanded by Sloane (2007) classified innovative leadership as a new approach in developing an organisation. Innovative leadership supports the accomplishment of the mission and vision of an organization or group by using technology and new processes. Innovative leaders need to have an innovative mindset to ensure continuous success and retain to be competitive (Kapsali 2011). The need for innovation in an organization has led to a new focus on the roles of leaders in creating strategies and a more creative venture. Next, several other leadership theories such as Prime Leadership, Resonant Leadership, Futureristic Leadership and Digital Leadership. Although many theories and leadership models have been developed researches had chosen Instructional Leadership and Innovative Leadership as a core in this research. This is because the researched polytechnic is an institution that is involved with the teaching and learning process where it is important to be more creative and innovative in the future. Therefore polytechnic needs to have instructional organization management that is more creative and innovative to increase polytechnic quality in a more competitive direction.

3. Methodology

Research design has two aims which are to prepare answers to research questions and to control variables (Chua 2009; Kahn 2006). This research is a model development. According to Richey and Klein (2007:65), a model development type of research is the systematic study of design, development and evaluation processes to establish an empirical basis for creation of instructional and non-instructional products and tools and new or enhanced models that govern their development. Model development type of research aims to build a model, software, instructional or non-instructional product, tools or new module. Richey, Klein and Nielson (2004) explained that a model development research involved design, development, evaluation and the whole or a part of a process of a certain section. In the context of this research, researchers use design research which is product research because this research constructs a measurement model that involves design process, development and evaluation. These levels of model development in first type research are carried out because each level is dependent to produce measurement models.

In the first phase, this research uses the Modified Delphi technique to achieve the initial results regarding innovative instructional leadership. The Modified Delphi is a cycle series technique with specialists that are chosen to predict future events and to achieve a unanimous agreement (Custer 2000). To develop construct and an item regarding the innovative instructional leadership in Malaysia's polytechnic system, researchers have used the Modified Delphi technique to develop the construct and item with specialists from the reinforced polytechnic leadership in Malaysia. Skulmoski et al., (2007) and Custer (2000) stated that this technique is suitable for roaming and exploring construct development from the specialists' perception including a literature review. Besides that, this technique also aims to form an agreement among the specialists regarding the issue. This was certified by Loo (2002) and Christensen (2011) that through such technique, the agreement among the specialists will be obtained for the confirmation of domain or future construct development. The rational use of such technique compared to other techniques is the agreement in getting specialists' point of view towards an item without the need to face others, thus the identity of each chosen specialist will be kept confidential which will allow the specialist to freely give their point of views and mark the given modifying scale based on their professional knowledge. The data received from the Modified Delphi panel of specialists are used for the construct development and item in this leadership research.

When the instrument research is constructed based on Delphi's specialist, it should be verified and administered to the target sample which is the polytechnic administrators. The research instrument constructed a set of questionnaires where the data gained from the sample using questionnaires can involve more, wider and thorough respondents. Zainuddin (2012) specified that the main benefit of the questionnaire is that if it is presented well, it can produce a more trusted result. This research uses a questionnaire that is build based on the construct that has been verified by a Modified Delphi panel that was carried out in the earlier phase. According to Mohd. Majid (2005), the use of questionnaire towards a larger population is more practical and effective, saves time and money as well as its execution. Questionnaires are said to be easy to be administrated and are easy to be understood by respondents. Next, the developed questionnaires are distributed to samples in five polytechnics that were randomly chosen to obtain confirmatory factor analysis value (CFA) by developing the innovative instructional leadership measurement model in the context of the polytechnic.

3.1 Research Implementation Procedure

The research implementation procedure explains the implementation of four phases in developing the measurement model which is the first phase until the fourth phase. Diagram 1 shows the executing procedure of those phases. The first phase involves the research definition process that covers the determining process, development and purification of the construct. This stage is very important in ensuring that a valid conclusion can be obtained from the research carried out (Hair et al., 2010). Researchers determined the constructs used in this research by adapting past researches and redeveloped it by using the Modified Delphi technique. Interview sessions with experts have been carried out to determined and develop the items and constructs.

The second phase covers the determining process such as research design, location, population sample technique, analysis unit and the determination as well as the execution of data collecting procedure. The third phase involves the process and development of a research instrument to be distributed to target samples in five chosen polytechnic based on random stratified samples. Based on the empirical data that was collected using the research instrument, the measurement model has been developed and tested. It also involves the determining relationship between the latent variable and the observed variable. The fourth phase includes the development process and validity assessment of measurement model based on the comparability model guides, convergent validity determination, discriminant and nomological.

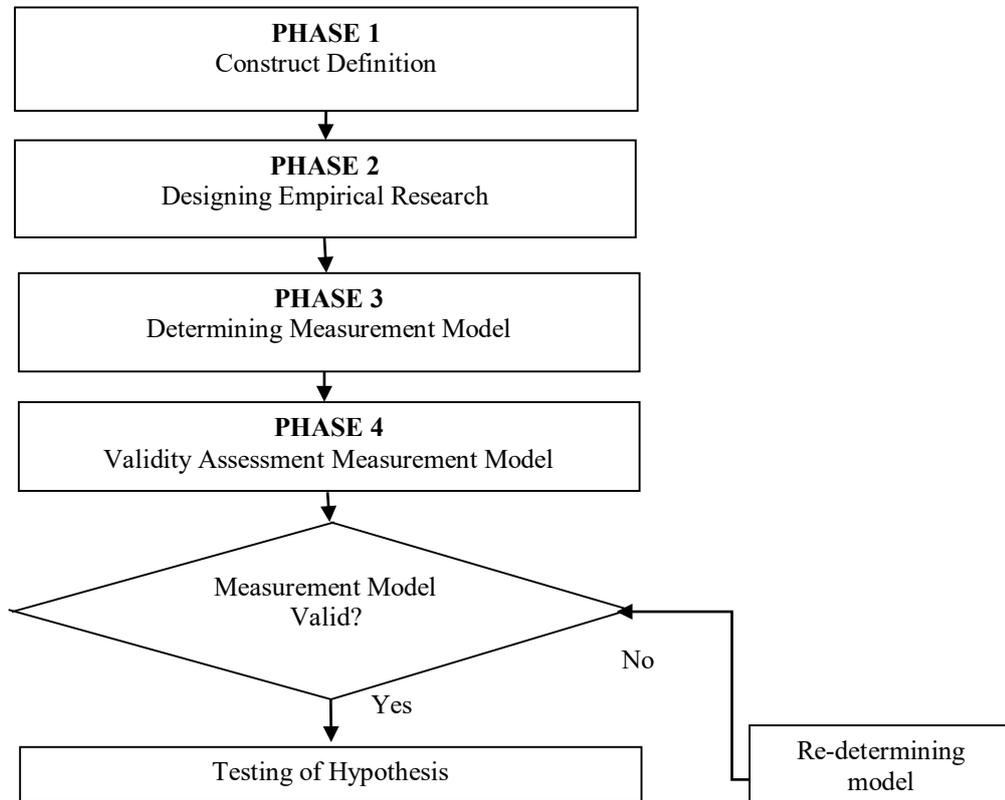


Fig. 1 - Research Execution Procedure

3.1.1 Phase 1: Research Construct Definition

Defining the research construct is the main step in ensuring the chosen item in the research is able to measure each construct accurately (Hair et al. 2010) as pictured in Fig. 1.

3.1.2 Phase 2: Designing the Empirical Research

This phase involves the data collection process for the empirical research that covers the research design, credibility, normality, population and the sampling technique as well as data collection procedure. Besides that, the tests to satisfy the Confirmatory Factor Analysis (CFA) were also carried out in this stage.

3.1.3 Phase 3: Determination of Measurement Model

The measurement model is formed by the relationship of the latent variable, indicator variables and variant errors. The compatibility of the measurement model with research data is important because it shows the credibility of the development of the measurement model. If measurement models are not compatible with the research data then the built measurement model is not valid. Therefore, the first step in the Confirmatory Factor Analysis (CFA) is to determine the compatibility of measurement models. The results of this analysis show the credibility of indicator variables (data that was obtained from respondents through questionnaire items) represent the latent variable concept in the measurement model. In other words, if the confirmatory factor analysis result shows that the items do not represent the resilient latent variables significantly. The resilient measurement model is said to be unreliable and the confirmatory factor analysis, therefore, has no meaning. Since indicator variables usually are formed from questionnaire items, researchers need to ensure that those items have high credibility because an item that has low credibility will affect the

decision-making of the measurement model development. Therefore, the results of CFA’s credibility is very important (Hair et al. 2010).

Confirmatory Factor Analysis (CFA) was carried out using the software *Analysis of Moment Structure* (AMOS) 20.0 version. This analysis aims to determine the suitability of 13 constructs that were developed and can be used to administer the polytechnic system in Malaysia. All items loaded in the CFA measurement model need to achieve convergent validity (Hair et al. 2010). Three indicators were used to evaluate the convergent validity which is based on the weighting factor value (λ) more than >0.50 (Hair et al. 2010), the extracted average variant value of each construct ≥ 0.50 (Fornell & Larcker 1981; Hair et al. 2010), and the credible construct value > 0.60 (Hair et al. 2010). Besides that, comparability (good fit) between construct and research data model CFA is determined based on the combination of at least one *Absolute Fit Indices* and one *Incremental Fit Indices* (Hu & Bentler 1999; Hair et al. 2010).

3.1.4 Phase 4: Assessment Validity Construct of Measurement Model

The validity of the construct shows the validity of items in measuring a latent construct. This means that the validity of the construct is closely related to the accuracy of measurements. Constructs that reached an acceptable level of validity shows that measuring items obtained from research samples truly describe the nature that exists in a population. There are three forms of construct validity which are convergent validity, discriminant validity and nomological validity. Convergent validity shows how far the item for a construct, in general, can contribute several variants for that particular construct (Hair et al., 2010). There are three methods to measure convergent validity which is through the determination of standard weighting factor value, extracted average variant and credibility of the construct (Hair et al., 2010; Fornell & Larcker 1981).

A discriminant validity shows how far unique is that particular construct. A discriminant validity indicator can prove how a particular construct is truly different from other constructs based on the studied phenomenon (Byrne 2010; Hair et al., 2010). There are two methods to measure discriminant validity. The first method is to make a comparison between the average value of extracted variants (AVE) and the construct that has a squared correlation value (r^2) (Fornell & Larcker 1981; Hair et al., 2010) for both the tested construct. The squared correlation value is obtained through both the squared correlation value from two constructs. To fulfil the need for discriminant validity between constructs, the AVE value needs to be bigger than the squared correlation value (Byrne 2010). The determining method for discriminant validity is used for the whole measurement model. The second method to determine discriminant validity is when there are no cross-loading happening between observation variables or error terms in a model that reached a good correspondence (Hair et al., 2010). This method is used for the measurement model developed for each construct. Nomological validity determined the level of relationship between the construct that have been accurately tested whether it is according to a theoretical forecast or backed up literature (Hair et al., 2010).

4. Finding and Analysis

In the development phase of this construct, the first stage is the requirement analysis where researchers have collected past researches related to this. After the collection of the materials, the interview protocol inventory has been developed and went through the validation process by three experts as well as the declaration form was distributed to those involved. The expert panel to be interviewed has been determined. Interviews have been arranged. Once done interviewing the 11 experts, the findings were analysed and coded. The codes were arranged in the questionnaire to be distributed to the previous experts for the second and fourth cycles. Based on the interviews with the 11 experts based on the protocol inventory, the experts were in the opinion that 13 out of the following 17 constructs need to be in the questionnaire for the second cycle. The construct before the interview (17 constructs) and after the interview (13 constructs) are displayed in Table 1.

Table 1 - Developed Constructs

Item	Indicators before Interview	Indicators after Interview
1	Setting vision and mission	Setting vision and mission
2	Providing necessities and verification	Providing necessities and verification
3	Concerns	Concerns
4	Self-personality	Self-personality
5	Creating a conducive environment	Creating a conducive environment
6	Managing educational management functions	Managing educational management functions
7	Team work	Team work
8	Promoting the academic climate of learning	Promoting the academic climate of learning

Table 1 – (Continue)

Item	Indicators before Interview	Indicators after Interview
9	Organizing abilities	Organizing abilities
10	Monitor the teaching and learning process	Monitor the teaching and learning process
11	Strategic thinking	Strategic thinking
12	Innovative thinking	Innovative thinking
13	Networking construction	Networking construction
14	Class supervision	Not chosen by experts
15	Clear pedagogical presentation	Not chosen by experts
16	Endurance	Not chosen by experts
17	Managing changes	Not chosen by experts

After 11 specialists returned the questionnaire that was distributed, the descriptive Centered Tendency Measurements analysis statistics were obtained which are median and range between quartiles (IQR). The median value 4 and 5 show the approval between specialists towards the items while IQR that shows the value 0 and 1 indicates the unanimous decision of specialists towards the items developed. Table 2 is the summary of item findings for the second, third and fourth cycle construct. Based on the level of approval, all 188 items reached a high level of approval which is the median value of 4 and 5 while the high agreement value is in the IQR value of 0 and 1. This portrays all 188 items are approved and agreed between 11 specialists in the fourth cycle.

Table 2 - The followings are the Findings in the Second Cycle

Item	Cycle	Second	Third	Fourth
	Construct			
1	Setting vision and mission	11	9	9
2	Providing necessities and verification	13	13	13
3	Concerns	11	11	11
4	Self-personality	12	12	12
5	Creating a conducive environment	16	16	16
6	Managing educational management functions	16	16	16
7	Teamwork	16	16	16
8	Promoting the academic climate of learning	15	16	16
9	Organizing ability	17	17	17
10	Monitor the teaching and learning process	12	12	12
11	Strategic thinking	18	18	18
12	Innovative thinking	11	11	11
13	Networking construction	17	21	21

Based on the findings of the Delphi technique, the measurement model research consists of 13 constructs with 68 innovative instructional leadership items (IIL). Confirmatory analysis factor (CFA) with the 20th version of AMOS software used to verify and produce this measurement model. Table 3 is a short suggestion for CFA variables that was suggested by researchers to represent each variable that is needed to be analysed.

Table 3 - Summary of Symbols Used in SEM

Symbol	Explanation
1	Strategic thinking construct element
2	Innovative thinking construct element
3	Strategic management construct element
4	Setting vision and mission construct element
5	Providing necessities and verification construct element
6	Concerns construct element
7	Self-personality construct element
8	Creating a conducive environment construct element
9	Organizing educational management functions construct element
10	Team work construct element
11	Promoting the academic climate of learning item element
12	Organizing ability item element
13	Monitor teaching and learning process item element
i1-i8	Strategic thinking item element
i11-i22	Innovative thinking item element
i29-i33	Network construction item element
i36-i42	Self-personality item element
i49-i61	Creating a conducive environment item element
i70-i75	Organizing educational management functions item element
i79-i82	Team work item element
i100-i103	Promoting the academic climate of learning item element
i120-i125	Organizing ability item element
i131-i135	Monitor teaching and learning process item element
i148-i152	Strategic thinking item element
i157-i160	Innovative thinking item element
i172-i185	Networking construction item element

Fig. 2 shows the items and the constructs that have reached a good comparability level. The analysis model in Table 3 shows that the model formed have reached a good comparability level based on the fixed indicator. (CMIN/DF=3.25, CFI=0.96 and RMSEA=0.06). This gives the justification that the data matches the measurement model that has been hypothesized in Table 3.

4.1 Validity of Constructs

Based on Table 5 the weighting factor value has the highest credibility which is an item of 73 in the sixth construct which is to manage the functions of education management with the value 0.93. However, all items have a high weighting factor value of 0.73-0.93 therefore it adheres the internal credibility value of ≥ 0.7 . Next, for convergence validity, all items have high significant levels that satisfy the AVE value of 0.5 or higher for each construct. Lastly is CR which is the composite credibility value which satisfies the value of ≥ 0.6 for each construct. All the result finding values satisfy the IIL comparability model and is also in line with the opinions of (Hair et al., 2009) and (Bentler & Yuan 2000) The second level innovative instructional leadership CFA model in Diagram 2 also shows that IIL construct has reached a discriminant validity where there aren't any items that are cross-loading or is redundant with other items (Hair et al., 2010). This shows that all items contained in this construct can unidimensional measure each construct as well as achieving validity and credibility that is required in the model development. In conclusion, this model has a good fit, convergent validity, discriminant, and a good composite credibility. This is based on the overall findings of the measurement model in Table 4 and 5.

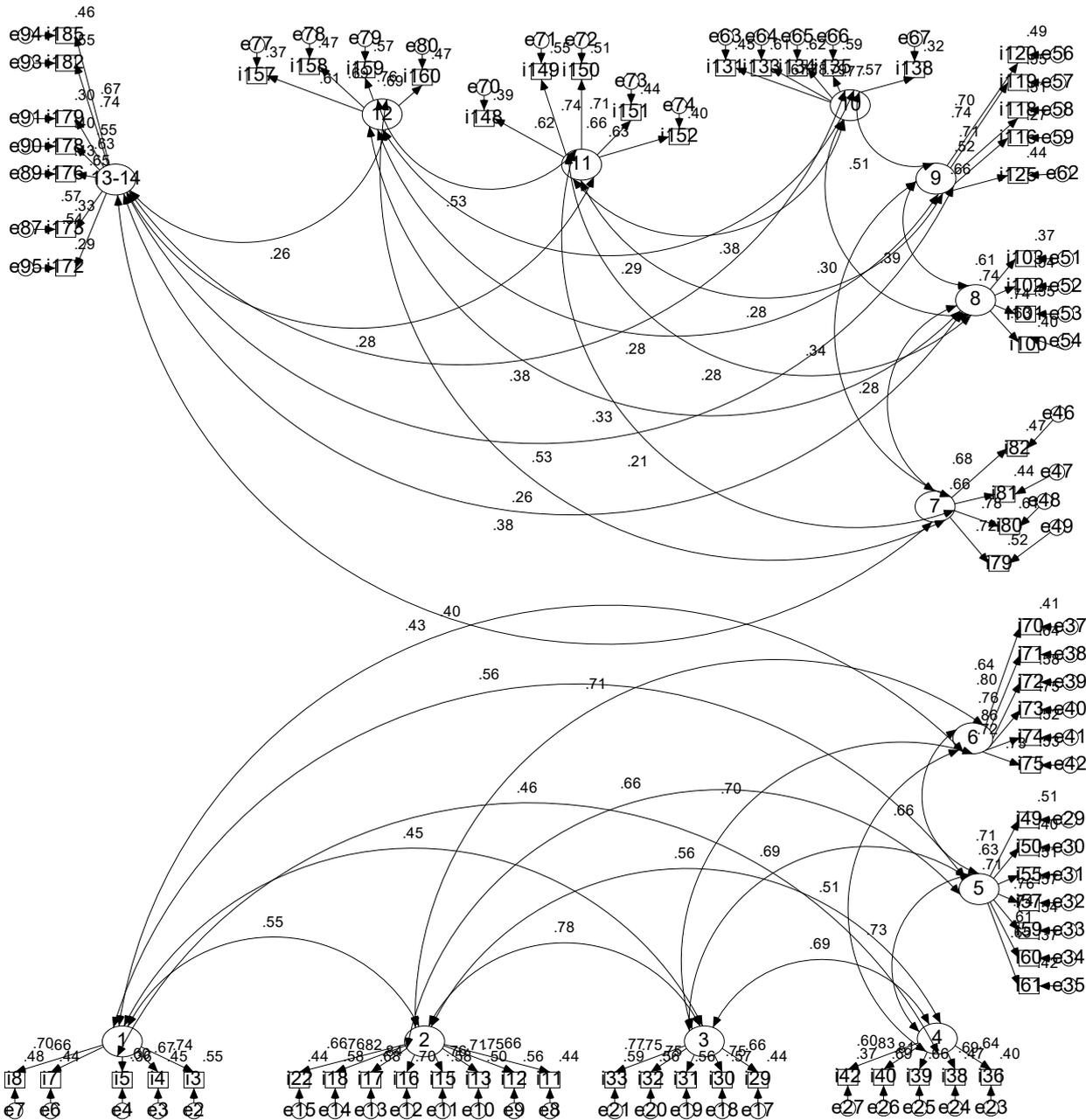


Fig. 2 - Confirmatory Factor Analysis Measurement Model (CFA) Innovative Instructional Leadership (IIL)

Table 4 - Overall Good Fit Measurement Model of each Construct IIL

Item	Construct	CFI	RMSEA	CMIN/df	GFI
		≥ 0.9	≤ 0.08	< 5.0	≥ 0.9
1	Setting vision and mission	0.99	0.01	1.07	0.99
2	Providing necessities and verification	0.96	0.08	4.45	0.95
3	Concerns	0.98	0.08	4.99	0.98
4	Self-personality	0.99	0.06	3.26	0.99
5	Creating a conducive environment	0.97	0.08	4.46	0.96
6	Organizing educational management functions	0.98	0.07	4.73	0.98
7	Team work	0.94	0.04	1.81	0.99
8	Promoting the academic climate of learning	0.99	0.08	4.43	0.99
9	Ability to organize	0.95	0.03	4.40	0.99

Table 4 – (Continue)

Item	Construct	CFI	RMSEA	CMIN/df	GFI
		≥ 0.9	≤ 0.08	< 5.0	≥ 0.9
10	Monitor teaching and learning process	0.98	0.07	4.06	0.99
11	Strategic thinking	0.94	0.07	3.99	0.99
12	Innovative thinking	0.95	0.04	1.71	0.99
13	Networking construction	0.92	0.01	1.11	0.99

Table 5 - Overall Good Fit CFA IIL Construct

	Hypothesized measurement model	Recommended values	Source
CMIN/df	3.25	≤ 5.00	Hair et al (2006); Steiger et al., (1985); (McGrath 2011)
CFI	0.96	≥ 0.90	Bagozzi and Yi (1988); Hair et al., (2006); Tanaka and Huba (1985); (McGrath 2011)
RMSEA	0.06	≤ 0.08	Browne and Cudeck (1993); Hair et al., (2006); Zainudin Awang (2012); (McGrath 2011)

Table 6 - Construct Validity Evaluation

Item	Construct	Item	λ (KC) ≥ 0.7	AVE ≥ 0.5	pc / CR ≥ 0.6
1	Setting vision and mission	I4	0.79	0.66	0.89
		I5	0.78		
		I7	0.88		
		I8	0.80		
2	Provide necessities and verification	I11	0.75	0.56	0.91
		I12	0.73		
		I13	0.78		
		I15	0.77		
		I16	0.86		
		I17	0.84		
		I18	0.76		
3	Concerns	I22	0.65	0.74	0.93
		I29	0.81		
		I30	0.87		
		I31	0.86		
		I32	0.86		
4	Self-personality	I33	0.88	0.71	0.93
		I36	0.70		
		I38	0.84		
		I39	0.88		
		I40	0.93		
5	Create a conducive environment	I42	0.78	0.69	0.94
		I49	0.84		
		I50	0.78		
		I55	0.83		
		I57	0.88		
		I59	0.88		
6	Organize educational management functions	I60	0.76	0.75	0.95
		I61	0.82		
		I70	0.80		
		I71	0.90		
		I72	0.88		
		I73	0.93		
		I74	0.85		
		I75	0.85		

Table 6 – (Continue)

Item	Construct	Item	λ (KC) ≥ 0.7	AVE ≥ 0.5	pc / CR ≥ 0.6
7	Team work	I79	0.84	0.71	0.91
		I80	0.89		
		I81	0.82		
		I82	0.83		
8	Promote academic learning climate	I100	0.79	0.68	0.90
		I101	0.88		
		I102	0.86		
		I103	0.78		
9	Ability to organize	I118	0.84	0.71	0.91
		I119	0.89		
		I120	0.82		
10	Monitor teaching and learning process	I125	0.80	0.76	0.93
		I131	0.83		
		I133	0.90		
		I134	0.89		
11	Strategic Thinking	I135	0.87	0.68	0.91
		I148	0.78		
		I149	0.85		
		I150	0.86		
12	Innovative Thinking	I151	0.82	0.69	0.90
		I152	0.79		
		I157	0.78		
		I158	0.84		
13	Network Construction	I159	0.86	0.54	0.80
		I160	0.84		
		I176	0.75		
		I178	0.72		
		I179	0.80		
		I182	0.73		
		I185	0.80		

Note: λ = Weighting Factor (Cronbach Coefficient) (KC), CR = AVE Credibility Composite = Average Variance Extracted

Based on Table 5 the weighting factor value has the highest credibility which is an item of 73 in the sixth construct which is to manage the functions of education management with the value 0.93. However, all items have a high weighting factor value of 0.73-0.93 therefore it adheres to the internal credibility value of ≥ 0.7 . Next, for convergence validity, all items have high significant levels that satisfy the AVE value of 0.5 or higher for each construct. Lastly is CR which is the composite credibility value which satisfies the value of ≥ 0.6 for each construct. All the result finding values satisfy the IIL comparability model and is also in line with the opinions of (Hair et al. 2009) and (Bentler & Yuan 2000) The second level innovative instructional leadership CFA model in Diagram 2 also shows that IIL construct has reached a discriminant validity where there aren't any items that are cross-loading or is redundant with other items (Hair et al. 2010). This shows that all items contained in this construct can unidimensional measure each construct as well as achieving validity and credibility that is required in the model development. In conclusion, this model has a good fit, convergent validity, discriminant, and a good composite credibility. This is based on the overall findings of the measurement model in Table 4 till Table 7.

Table 7- Construct Validity Evaluation

No.	Construct	Item	λ (KC) ≥ 0.7	AVE ≥ 0.5	pc / CR ≥ 0.6
1	Setting vision and mission	I4	0.79	0.66	0.89
		I5	0.78		
		I7	0.88		
		I8	0.80		
2	Provide necessities and verification	I11	0.75	0.56	0.91
		I12	0.73		
		I13	0.78		

Table 7- (Continue)

No.	Construct	Item	λ (KC) ≥ 0.7	AVE ≥ 0.5	pc / CR ≥ 0.6
		I15	0.77		
		I16	0.86		
		I17	0.84		
		I18	0.76		
		I22	0.65		
3	Concerns	I29	0.81	0.74	0.93
		I30	0.87		
		I31	0.86		
		I32	0.86		
		I33	0.88		
4	Self-personality	I36	0.70	0.71	0.93
		I38	0.84		
		I39	0.88		
		I40	0.93		
		I42	0.78		
5	Create a conducive environment	I49	0.84	0.69	0.94
		I50	0.78		
		I55	0.83		
		I57	0.88		
		I59	0.88		
		I60	0.76		
		I61	0.82		
6	Organize educational management functions	I70	0.80	0.75	0.95
		I71	0.90		
		I72	0.88		
		I73	0.93		
		I74	0.85		
		I75	0.85		
7	Team work	I79	0.84	0.71	0.91
		I80	0.89		
		I81	0.82		
		I82	0.83		
8	Promote academic learning climate	I100	0.79	0.68	0.90
		I101	0.88		
		I102	0.86		
		I103	0.78		
9	Ability to organize	I118	0.84	0.71	0.91
		I119	0.89		
		I120	0.82		
		I125	0.80		
10	Monitor teaching and learning process	I131	0.83	0.76	0.93
		I133	0.90		
		I134	0.89		
		I135	0.87		
11	Strategic Thinking	I148	0.78	0.68	0.91
		I149	0.85		
		I150	0.86		
		I151	0.82		
		I152	0.79		
12	Innovative Thinking	I157	0.78	0.69	0.90
		I158	0.84		
		I159	0.86		
		I160	0.84		

Table 7- (Continue)

No.	Construct	Item	λ (KC) ≥ 0.7	AVE ≥ 0.5	pc / CR ≥ 0.6
13	Network Construction	I176	0.75	0.54	0.80
		I178	0.72		
		I179	0.80		
		I182	0.73		
		I185	0.80		

Note: λ = Weighting Factor (Cronbach Coefficient) (KC), CR = AVE Credibility Composite = Average Variance Extracted

5. Discussion and Conclusion

The analysis that has been carried out has produced 13 constructs as well as 68 items in the construct towards innovative instructional leadership (IIL) for the polytechnic system in Malaysia. The descriptive analysis used is min values, median, standard deviation, and quartile between ranges (IQR) where to get a unanimous agreement between 11 experts. Besides that, the percentage value and standard deviation are needed to analyse respondent profiles in the review research that had been carried out.

Confirmatory analysis factor (CFA) had been carried out to determine the IIL measurement model based on review research data that consist of 575 respondents. A *fit of indices* measurement model CFA analysis results have been formed with the value of (CMIN/DF=3.25, CFI=0.96 and RMSEA=0.06). Overall, this research has obtained the instruments for innovative instructional leadership to be used as a guide for administrators to measure weaknesses and loopholes among themselves. Therefore, the models used which are Grayson and Baldwin (2007), Hallinger and Murphy (1985), Liedtka (1990), McEwan (1998), Moss and Jerome (1994), Murphy (1990), NASSP (2001) as well as Sloane (2007) are found to be relevant in this innovative instructional leadership context.

Next is the development of an innovative instructional leadership measurement model that can be used as the base and guidance to relevant parties such as the Polytechnic Education Department to increase their administrative professionalism specifically in the technical institution.

In conclusion, research regarding innovative instructional leadership (IIL) was carried out because leadership plays an important role in increasing the quality of achievements and success in the management of polytechnic system. To produce an effective leadership system, aspects regarding leadership objectives, execution and direction have to be given proper attention so that any weaknesses can be overcome. This research not only look at the important leadership aspects in the learning and teaching process in classrooms but covers all aspects that is related to the management of innovative instructional leadership in organization level. Failure for leaders to improve themselves in leadership will cause an organization to not experience any changes, viable and competitive.

Research findings have also self-implicated basic education, administrative organization, and administrative professionalism. Based on the findings, polytechnic administrators lack the practice of innovative instructional leadership. This is based on the questionnaire analysis that was done before this. Therefore, it is hoped that the development of the new innovative instructional leadership measurement model will give a positive impact on relevant parties and technical administrators mainly the polytechnic system in Malaysia.

Acknowledgement

The authors would like to thank all the respondents who participated as the panels in the development of Innovative Instructional Leadership measurement models. This study is supported by the Geran Penyelidikan Khas Universiti Berteraskan Pendidikan 2017 by Universiti Pendidikan Sultan Idris entitled "Pembangunan Konstuk dan Model Pengukuran Kepimpinan Instruksional Berinovatif" with the research code of 2017-0307-107-01.

Reference

- Anderson, B. R. (2010). Evaluating the Effects of Globalisation. *Ethos*. Retrieved from <http://ezproxy.hope.ac.uk:2071/ehost/pdfviewer/pdfviewer?vid=3&hid=14&sid=2ae8b295-f6e2-4317-9841-a2e6a80931ca@sessionmgr14>
- Andrew Yang. (2014). *Smart People Should Build Things*. (J. A. Metsch, Ed.) (1st ed.). New York, London: HarperCollins.
- Avolio, B. J., Walumbwa, F. O., & Weber, T. J. (2009). Leadership: Current Theories, Research, and Future. *Annual*

Review of Psychology, 421–49. doi:10.1146/annurev.psych.60.110707.163621

Azila Dason, Rohana Hamzah, A. U. (2011). Hala Tuju Pendidikan Teknik dan Vokasional ke arah Memartabatkan Falsafah, 1–13. Retrieved from http://eprints.utm.my/14935/1/Hala_Tuju_Pendidikan_Teknik_dan_Vokasional_ke_arah_Memartabatkan_Falsafah_Pendidikan_Negara.pdf

Bentler, P. M., & Yuan, K.-H. (2000). On Adding a Mean Structure to a Covariance Structure Model. *Educational and Psychological Measurement*. doi:10.1177/00131640021970574

Chua, Y. . (2009). *Statistik Penyelidikan Lanjutan 1: Buku 1*. Kuala Lumpur: McGraw-Hill (Malaysia) Sdn.Bhd.

Curt Grayson & David Baldwin. (2007). *Leadership Networking:connect, collaborate, create*. North Carolina: Leadership, Center for Creative.

F. Joseph, Jr. Hair, C. William, Black, J. Barry, B. (2009). *Multivariate Data Analysis* (7th ed.).

Fazlina Mohd Yunus. (2007). *Pendidikan Teknik*. Universiti Tun Hussein Onn Malaysia.

George B. Bradt, J. A. C. and J. E. P. (2011). *The New Leaders -100 Day Action Plan* (1st ed.). United States of America: John Wiley & Sons.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2010). *Multivariate data analysis* ((7th ed.)). Saddle River, NJ: Upper Pearson Education.

Hallinger, P.& Murphy, J. (1985). Assessing the instructional leadership behavior of principals. *Elementary School Journal*, 86(2), 217–248.

Hargreaves, A., & Fink, D. (2003). The Seven Principles of Sustainable Leadership by. *Educational Leadership*, 61(December), 8. Retrieved from http://www.marylandpublicschools.org/NR/rdonlyres/F7D49A8D-E9D0-4C49-9DE6-3A878BC9F1F4/18748/seven_principles.pdf

Howard Gardner & Emma Laskin. (2011). *Leading Minds:an anatomy of leadership*. New York: Basic Books.

Husnuzan. (2012). Mengembangkan Karakter Kepemimpinan Mahasiswa Sebagai Generasi Harapan Bangsa Melalui Kepemimpinan Berbasis Kampus. Retrieved from <http://www.indodetik.com/2012/09/mengembangkan-karakter-kepemimpinan.html>

Jack Weatherford. (2005). *Genghis Khan and the Making of the Modern World*. (U. S. A. . Dream Books Company, LLC (Englewood, CO, Ed.). Broadway.

Jo Owen. (2011). *How to Lead* (3rd ed.). Britain: Pearson Education,Inc.

Jörg Achim Zoll. (2012). *Nelson Mandela: Einer, der Gegensätze versöhnte*. (U. K. The Book Depository EURO (London, Ed.). Down to Earth.

Kahn, B. (2006). *Research in Education*. (Boston, Ed.) (10th ed.). Pearson Education,Inc.

Kapsali, M. (2011). Systems thinking in innovation project management: A match that works. *International Journal of Project Management*, 29, 396–407. doi:10.1016/j.ijproman.2011.01.003

Larry B. Christensen, R. B. J. & L. A. T. (2011). *Research Methods, DDesign and Analysis*. (Jeff Marshall, Ed.) (11th ed.). Boston, MA: Allyn & Bacon.

Marianne Abib-Pech. (2013). *The Financial Times Guide to Leadership:How to Lead Effectively and Get Results* (1st ed.). London,England: Pearson Education,Inc.

Mohd. Majid Konting. (2005). *Kaedah penyelidikan pendidikan*. . Kuala Lumpur: Dewan Bahasa dan Pustaka.

Moss & Jerome. (1994). *“Leader Attributes Inventory” Manual*.

Oren Harrari. (2007). *Break from the Pack-How to Compete a Copycat Economy*. New Jersey: FT Press.

Paul Romer. (1997). For Economist Paul Romer, Prosperity Depends on Ideas. *Wall Street Journal*. Retrieved from www.wsj.com/articles/SB853799061723758500

Richey, R.C., & Klein, J. D. (2007). *Design and Development Research*. New York: Routledge.

Robert E.McGrath. (2011). *Quantitative Models in Psychology*. (R. E.McGrath, Ed.) (1st ed.). Washington, DC: American Psychological Association. doi:10.1037/12316-000

Robert Loo. (2002). The Delphi method: a powerful tool for strategic management. *Policing: An International Journal of Police Strategies & Management*, 25(4), 762–769. doi:10.1108/13639510210450677

- Rodney L. Custer, J. A. S. and B. R. S. (2000). The Modified Delphi Technique- A Rotational Modification. *Journal of Vocational and Technical Education*, 15(2), 7.
- Samuel Enoch Stumpf dan James Fieser. (2012). *Philosophy: History and Readings*. (Beth Mejia, Ed.) (8th ed.). New York: McGraw- Hill.
- Schumpeter, J. A. (1942). *The theory of economic development*. Cambridge, MA: Harvard University Press.
- Skulmoski, G. J., Hartman, F. T., & Krahn, J. (2007). The Delphi method for graduate research. *Journal of Information Technology Education*, 6, 1–21. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.151.8144&rep=rep1&type=pdf>
- Steiger, J. H., Shapiro, A., & Browne, M. W. (1985). On the multivariate asymptotic distribution of sequential Chi-square statistics. *Psychometrika*, 50, 253–263. doi:10.1007/BF02294104
- Tanaka & Huba. (1985). A fit index for covariance structure models under arbitrary GLS estimation. *British Journal of Mathematical and Statistical Psychology*, 38, 179–201.
- The Levin Institute. (2015). What Is Globalization? Retrieved from <http://www.globalization101.org/what-is-globalization/>
- Thompson, J. (2012). Transformational leadership can improve workforce competencies. *Nursing Management*, 18, 21–24. doi:10.7748/nm2012.03.18.10.21.c8958
- Zainudin Awang. (2012). *Research Methodology and Data Analysis*. (S. Dee Sega Enterprise, Subang Jaya, Ed.). Shah Alam: Penerbit Uitm Press.
- Zuraidah Mohd Zain. (2013). TVET in Malaysia, (1), 1–4.