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IMPLEMENTATION OF LEAN LEADERSHIP IN HIGHER EDUCATION MALAYSIA: THE RELATIONSHIP BETWEEN COMPETENCIES AND PRINCIPLES IN STARTING LEAN IN COMMUNITY COLLEGE MALAYSIA

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Abstract

Lean is a success process to eliminate waste or non-productive activities to improve organizational process efficiency and effectiveness and create continuous improvement. Lean has been applied in manufacturing sector and had been introduced to educational sector. The research conducted to top management to analysis the understanding of principles, competencies and the starting lean factors to achieve good culture of lean. The research study undertaking the procedures, methods and techniques in testing the reliability and validity of the questionnaires instrument with Alpha Cronbach test to unbiased the objective. The result finding of the study will be analysis using 25 Statically Package Software SPSS 25 software version and SEM-PLS equation model to develop the reflective measurement model and will be interpreted using graphic user interface.

Keywords: lean, lean management, learning higher education, quality improvement

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INTRODUCTION

Lean is a methodologies used to improve business process (Caldera, Desha, & Dawes, 2018) with different forms of elimination of waste (muda), overburden (muri), inconsistency(mura) (Antony, Rodgers, & Cudney, 2017) or non-value activities such as transport, motion, inventory, waiting, overproduction, over processing, defects in legacy and system, energy loss and knowledge loss (Wade, 2016) (Shazali, Habidin, Ali, Khaidir, & Jamaludin, 2013) or steps (Antony, Krishan, Cullen, & Kumar, 2012a), a set of tools (Cañizares et al., 2015) and proved to be powerful steps(Authors, 2014) for continuous improvement for operational productivity and organization performance (Tay & Low, 2017a) and distinctive concept of lean production (Wade, 2016). Lean could be a good starting point to establishing business process, which

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focuses on the speed which a process can perform its function (Authors, 2014) to improve the efficiency and effectiveness of the college or university processes (Womack & Jones, 2003) in (Balzer, Francis, Krehbiel, & Shea, 2016a) and finish just in time (Nadeau, 2017). This may reduce cycle time and creating a healthy work environment (Balzer et al., 2016a) and may create fast, innovative and flexible system (Thomas L. Jackson & Karen R. Jones, 1995) to be more quality culture (Authors, 2015).

Lean also define as a specific, but evolving, body of knowledge and practise. Lean method generate the need for systems thinking and continuous improvement for perfection (Albliwi, Antony, Lim, & van der Wiele, 2014) by reducing all waste for the production purposes (Authors, 2017), and as Quality Excellence philosophy which promoted continuous improvement culture in organisations (Lu, Laux, & Antony, 2017a) empowerment by everyone. On the other hand, leaders ensure all employees are fully engaged and involved in daily improvement activities (Aij & Teunissen, 2017) should understand the seven lean leadership principles and Burten and Border (2003) has described five lean leadership competencies. Leader should enhance both pillar before starting lean. There is a relationship between competencies and seven principles for lean leadership (Balzer et al., 2016a) to produce a good knowledge of lean culture in the organization. The critical role lean leaders provide rationale for lean leadership understanding and education. Lean culture will have created continuous improvement to sustain efficient and effectiveness.

HISTORY OF LEAN FROM INDUSTRIES

Lean philosophy introduced by Toyota Motor Company (Cañizares et al., 2015) to establish operational excellence as a strategic cornerstone and comprehensive approach(Cudney, Sandilya, Venuthurumilli, Materla, & Antony, 2018) was a manufacturing model. The Toyota Way emphasized continuous improvement and respect of employees to enhance product quality. Toyota's Taiichi Ohno, the founder of lean defined waste as anything in a process that does not add value to a product or service. "Value" is what a well-informed customer would be willing to pay for a perfect product delivered on time (Cañizares et al., 2015). Toyota motor reinvented production by applying simple concept of “doing more” “with less” which explain less to human resource, inventory and space. Lean management philosophy is derived primarily from the Japanese manufacturing industry. Lean management represents the core values, attributes and attitudes of management organizational components intended to sustain long term value and provide for continuous improvement (Tay & Low, 2017b).

Lean management, by contrast, invites vertical, horizontal, and diagonal bands of cross-functional coordination and cooperation-and never isolation. Lean management helps a company realign its pathways of authority so that leaders and managers are expected to contribute their skills within the context of teams. It aligns company functions to compete not against each other but against the firm's competitors, and also against its most difficult adversary-organizational inertia. Any latent autocratic tendencies among managers are replaced with team-work, team-play, and team-building.

The manager is the key player for lean organization and responsible of manager which are maintaining and improving resistant process to drive new leadership style by the need for quality, speed and flexibility, require clear communication. Lean management system as one in

which managers have four fundamental areas of responsibility: risk management, asset management, resource management, and performance management. Risk, asset, and resource management are typically referred to as the maintenance or control complements, while (Lean) management is typically referred to as the improvement portion of management responsibilities in their production (Authors, 2016a). Firms with prior experience in total quality management, JIT, or total productive maintenance-strategies that build effective work cultures-will probably require at least three years for successful implementation. Firms without significant experience will require at least five years to fully implement this system (Rich Charron, H. James, Harrington, Frank Voehl, 2015)

IMPLEMENTATION OF LEAN IN HIGHER EDUCATION

Higher education is defined as education beyond the secondary level. Higher education courses are usually studied at universities, university colleges and higher education institutions. Higher education also includes certain college-level institutions which include vocational schools and career colleges that award academic degrees or professional certifications. The difference between education institutions and higher education institutions need not be looked at only from the higher-grade degrees' perspective (Ely & Laux, 2017).

External pressures for change are forcing higher education to consider new modes of operation. Public opinion generally regards institutions of higher education as inefficient, expensive, and labour intensive (Authors, 2013).

Economic challenges have reduced public funding to higher education. Declines in the number of traditional aged college bound students and a more crowded marketplace (including the growth in online and for-profit) has increased competitiveness for students.

Lean Higher Education (LHE) (Balzer, 2010) has enabled post-secondary institutions to seek similar improvements in response to the demands of the higher education marketplace: exceeding the expectations of students, faculty and other constituents; reducing expenses in an age of rising costs and declining financial resources; meeting demands for public accountability in terms of efficiency and effectiveness; and, most importantly, strategically leveraging all available institutional resources to fulfil the educational, scholarship and outreach missions of higher education (Balzer et al., 2016a; Cañizares et al., 2015).

Lean's may be applied followed by four steps which are firstly identify the beneficiaries of the process and what they value the most, secondly analyses the current process to eliminate waste step and effort and improve the remaining process, rebuild the new process using lean tools and techniques, thirdly implement and evaluate the process using metrics and what its reflect from the beneficiary of usage and the last step to be undertaken is achieve perfection and continuously improve the process for additional lean solution (Balzer, Francis, Krehbiel, & Shea, 2016b; Fisher, 2015). Processes such as "performance measurement, quality control, and audit aimed at improving the effectiveness and accountability of HEI have at the same time contributed to the creation of additional bureaucratic layers of control which have often been experienced as inhibiting organizational effectiveness and responsiveness" (Lu, Laux, & Antony, 2017b) and documented consequences (Antony, Krishan, Cullen, & Kumar, 2012b). In a lean workplace, people matter more, and maintaining the proper relation between people

and machines becomes one of leadership's key objectives. Neither lean leadership nor effective lean communication paths can emerge overnight (Caldera et al., 2018).

All this process needs a discipline and positive openness acceptance and trust, visionary, ready to change and a leader may lead with different level of teamwork. Lean management may be achieved successfully followed by some of the factors such as, readiness and awareness, leadership support and understanding about lean management by senior management who fully engage in communicating requirements and expectations, solidifying support, and leveraging momentum gained through LHE activities, lean strategic planning must be the foundation core to become its culture and a planning forms are complemented by easy-to-use reporting forms that tell managers and cross-functional teams about progress and problems to address, creating and strengthening lean organization structure (Rich Charron, H. James, Harrington, Frank Voehl, 2015) and through lean activities, creating pilot demonstration project to create visibility and credibility to making a formal commitment by the employees through working environment and job performance (Andreadis, Garza-Reyes, & Kumar, 2017). All this process describes as Lean Body of Knowledge (BOK) which develop by leadership theories which leadership is the main player for successful of lean activities which affect process (Authors, 2018) and organization dynamic with no explicit laws (Doman, 2011a).

Many higher education institutions have adopted a Lean initiative to improve the efficiency of processes by scientifically eliminating waste and non-value-added activities (Doman, 2011a).

Some observers nevertheless view the lean method and its derivatives as being suitable for academic institutions and holding much promise for increasing the competitiveness of universities that make a serious commitment to applying them. Like any organisation, a university must deal with uncertainty and with continued change at an ever-increasing pace (Nadeau, 2017).

Most applications of Lean and Six Sigma in higher education discuss best practices for teaching methodology in the classroom (Fryer, Antony, & Ogden, 2012; Vijaya Sunder M, Sanjay Mahalingam, 2017; Cudney et al., 2018) rather than apply the methodology to university practices (Antony, Krishan, Cullen, & Kumar, 2012c; Yigit Kazancoglu, 2019).

In the year of 2012, there are some citation of lean failure because of wrong understanding of terminologies, vision, lean principles, lean application where many people are uncomfortable in using a number of tools and techniques which were proved to be effective in manufacturing and service sectors. Lack of management understanding, awareness of the lean benefit, strategy of achieving leanness (Bortolotti, Boscari, & Danese, 2015a) and training, un prioritisation project selection may cause un proper process and problem solving occurred. A project must be completed at least six-month period of time with a maximum cost reduction (Rich Charron, H. James, Harrington, Frank Voehl, 2015).

Many firms focus on implementing lean tools and techniques (i.e., hard practices) but pay little attention to human-related practices (i.e., soft practices) (Bortolotti, Boscari, & Danese, 2015b). Evidence also points to the OC as a key determinant of LM success or failure. It is because the management fail to plan accurate strategic planning through lean, allocate resources, more to silo culture and one-way communication which didn't enter the employees work force. For a conclusion, lean initiative is a continuous improvement process, not a quick

fix which wrongly defined by some people (Authors, 2016b) and as a tool kit rather than philosophy or mind set of improvement.

In addition, several author had proposed to further research in the field of higher education and continuous improvement to focus on implementation of lean management to increase the success story of I the implementation of lean initiatives (Balzer et al., 2016a; Azim Khairi & Rahman, 2018; Wade, 2016; Douglas, 2015; Aij & Teunissen, 2017; Tay & Low, 2017b; Doman, 2011b).

Although a number of manufacturing and service organisations are utilising the power of this integrated methodology, it has been clear through the authors' research that the higher education institutions (HEIs) Malaysia are far behind in the introduction and development of this process excellence methodology.

The previous studies from some scholar content the success factors that affect the organizational performance. Although the findings are different, but it's reflect the implementation of lean in higher education. The research study is to understand the principle and competencies and analysis the interrelated of competency and principles in starting successful lean adoption in Community College Malaysia. The finding may approach to good culture of lean.

RESEARCH METHODOLOGIES

This paper explores about the understanding of lean by top management and finding of significant interrelated relationship between competency and principles in starting lean the particular institution. To the date, a paper has been published on related study about lean leadership principles, competency in the year of 2016, and for lean starting success factors in 1998, 2012 and 2015, lean six sigma in the year 2012, 2017&2018. A systematic literature review has been undergone from 47 academic journal from academic publisher and well known academic databases such as Elsevier and emerald from the year 2012 to 2018 in related study to ensure the finding is up to date.

A descriptive research study had been conducted to this study which describe systematically the situation problem and had undertaking the procedures, methods and techniques in testing the reliability and validity of the questionnaires instrument with Alpha Cronbach test to unbiased the objective. 'Reliability' refers to the quality of measurement procedures that provided repeatability and accuracy of the study. 'Unbiased and objective' that has been taken to draw the best conclusion of the study. The Cronbach's a measure of reliability of study construct is between 0.877 and 0.943. Nunnally (1978) allowed a slightly lower minimum limit such as 0.6 for exploratory work involving the use of newly developed scales. Since, Cronbach's a value for each factor above 0.70, all factor is accepted as being reliable for the research. Closed ended questions has been designed to target the top management who are decision makers, middle management or assistant manager who plan the strategic outcomes and lastly to the implementer or employee of lean to this research (Kumar, 2011).

The survey instrument for this study using five scale Likert, representing the range of perception low (strongly disagree-1) to very high (strongly agreed-5). A pilot study was conducted to determine the clarity relevance of the questions, clear meaning and jargon

normally used in the higher education, time taken to complete the whole questionnaire, and to test the internal reliability of the measures.

The respondent of the research are the top management of community college and systematic sampling methods is used for sampling purposes which mean each ordering the population and selecting at regular intervals. There are around 102 of top management in the study area. The sample size representative of top director which are 80 samples from krejcie and Morgan determination table Krejcie & Morgan (1970). Distribution of questionnaires to 27 female director and 75 male director in Community College has been given and conducted by email, telegram, telephone and face to face by the researcher. The descriptive statistic survey using quantitative method and analysis by Statistical Package SPSS 25 divided into part a: demography which contain hierarchy or flow of management, department handling lean and the process being undertaken for lean management to see the result of lean implementation in the community college. Part b explain about interrelated of principles and competency of lean management and Part C explain the success factor in starting lean. The research finding will utilize acceptable scientific methodology to solve problems and create new knowledge that generally applicable. PLS-SEM Equation Model has been used to develop the structural model of research.

ANALYSIS AND RECOMMENDATION

Survey Questionnaires had been distributed to the top management and 47 questionnaires received from 80 samples for the selecting studies. 27 questionnaires return from female directors Community College director, 10 from East Coast Community College directors and the other or collected randomly from other part of Community Colleges which contain 58.75% of the return percentage.

Cronbach's Alpha has been used to test the reliability and validity of the data. Table 4 shows the value of Cronbach's α value is above 0.6 (i.e 0.938, 0.937 and 0.948) for all subject in the study. The research finding as follows above:

RESPONDENT DEMOGRAPHY ANALYSIS INFORMATION

Respondent Demographic Information is to obtain basic information of the respondent as well as to justify and increase the validity of data crossing the spectrum of the respondent involved in the study. The findings show the department and process of lean starting in the institution. First and foremost, there are four different higher position in the organization chart followed by different types of directors' post such as DH54, DH52, DH48 and DH44 standardized by Public Service Department (JPA) of higher education. The research findings claim that 34.9% lean management structured and organized by Deputy Director of Management, 46.5% Deputy Director (director DH44), 11.6% Deputy Academic Director and 7% Quality Department. The finding analysis show 75% of college has allocated lean management under the same organization chart so that similar control and exercise carried out by the same department officer in community college. Community College also have internal quality department which plan, structure and organize the standard procedure of management which cater 72.1% in the organization, 7% having International Organization of Standard (ISO) and 20.9% implemented

Public Sector Conducive Ecosystem (EKSA). Internal Quality Department will standardize the progress of organization to providing uniformity in managing the organization in order to be more harmonies, effective and efficient.

The analysis shows the Community College had applied lean especially in student registration process which contain 65.1% to reduce student waiting time in each semester. This is to avoid long waiting time by parent when registered their children in Community College and also reduce complaints from parents. According to Balzer, 2016 &Nadeau 2017 common areas that need to be improved in the process of lean is student admission in their research study.

Budget Constraint is one of the purpose of lean and now there is a policy of cutting budget for non-productive activity in the government sector where by the activity plan according to regularly basis and budgeting will be conducted every 3 months by the department. The finding shows, there is a 58.1% budget cut implementation across all over the Community Colleges. The decision of financial budgeting normally follows by strategic planning in the early part of the year. 30.2% implemented system integration as part of their lean management where paperless concept has been adapted.

UNDERSTANDING OF SEVEN PRINCIPLES OF LEAN LEADERSHIP

Table 1: Seven Principles of Lean Leadership

No Item	Question	Mean	Percentage				Cronbach's α
			SA	A	N	D	
1	Lean Leader has adopted a competency holistic approach to enterprise/ college transformation)	3.79	14	58.1	20.9	7	0.928
2	The higher department is focusing on enterprise effectiveness before efficiency	3.88	20.9	53.5	18.6	7	0.929
3	Ensure stability and flow with across the organization.	4.04	25.6	60.5	7	7	0.923
4	Cultivate leadership to support and drive enterprise interrelationship.	4.16	30.2	58.1	9.3	2.3	0.939
5	Address internal and external enterprise interdependencies.	4.09	34.9	44.2	16.3	4.7	0.925
6	Identify relevant stakeholders and determine the value prepositions.	4.04	27.9	53.5	14	4.7	0.932
7	Emphasize organization learning.	4.13	34.9	51.2	7	7	0.924
	Total	**4.02**					**0.938**

Scale: SA=Strongly Agree A= Agree N=Neutral D=Disagree

According to Table 1, most of top management understand the principle of lean leadership which 58.1% had agreed holistic approach has been adopted for college transformational, 53.1 % top management focus in efficient and effectiveness, 60.5% ensure organization flow and stability, 58.1 % top management cultivate leadership to support and drive enterprise interrelationship, 42.1% address internal and external enterprise interdependencies,53.5% identify relevant stakeholders and determine the value prepositions and 51.2 % emphasize organization learning.

UNDERSTANDING OF FIVE COMPETENCIES OF LEAN LEADERSHIP

Table 2: Five Competencies of Lean Leadership

No Item	Question	Mean	Percentage				Cronbach's α
			SA	A	N	D	
8	Specify value in a service, process or operation from stakeholder.	3.93	20.9	55.8	18.6	4.7	0.915
9	Translate value into system improvement.	4.02	27.9	51.2	16.3	4.7	0.919
10	Design or reengineer culture, structure or process to flow with rather than against the value stream	4.02	27.9	51.2	16.3	4.7	0.935
11	Allocate resources based on the stakeholder value	4.13	32.6	53.5	9.3	4.7	0.914
12	To sustain continuous improvement technique to strive for perfection.	4.23	37.2	51.2	9.3	2.3	0.926
	Total	**4.07**					**0.937**

Scale: SA=Strongly Agree A= Agree N=Neutral D=Disagree

Table 2 explain the top management are able to understand the competencies of lean leadership which contain 55.8% agreed top management need to specify value in a service, process or operation from stakeholder, 51.2% translate value into system improvement and design or reengineer culture, structure or process to flow with rather than against the value stream, 53.5 % agreed top management allocate resources based on the stakeholder value and 51.2% sustain continuous improvement techniques to strive for perfection.

STARTING LEAN HIGHER EDUCATION

Table 3: Starting Lean Higher Education (LHE) in institution

No Item	Question	Mean	Percentage				Cronbach's α
			SA	A	N	D	
13	Lean has to adopt to the work climate which contain readiness, climate of standard, professional development and growth of employees and employee commitment.	4.06	30.2	53.5	9.3	7	0.944
14	Lean applied with workshop awareness, understanding and support.	4.06	27.9	58.1	7	7	0.939
15	Leadership enhance with top management commitment and support.	4.23	44.2	41.9	7	7	0.939
16	Using a pilot demonstration projects to gain visibility and credibility.	3.97	23.3	58.1	11.6	7	0.945
17	Gain visibility and support of Polytechnic and Community College Department (JPPKK)	4.00	30.2	44.2	20.9	4.7	0.947
18	Creating and strengthening organizational structures to launch and support JPPKK	4.13	37.2	41.9	18.6	2.3	0.940
19	Strategic Planning as the guidelines of action plan.	4.13	37.2	44.2	14.0	4.7	0.939
20	Facilitating an institution – wide transition to JPPKK	4.11	30.2	55.8	9.3	4.7	0.937
	Total	**4.09**					**0.948**

Scale: SA=Strongly Agree A= Agree N=Neutral D=Disagree

Table 3 explain starting lean factor where 53.5% respondent agreed lean has to adapt to the work climate which contain readiness, climate of standard, professional development and growth of employees and employee commitment, 58.1% lean applied with workshop

awareness, understanding and support, 44.1% leadership enhance with top management commitment and support, 58.1% had using a pilot demonstration projects to gain visibility and credibility, 44.2% agreed in gaining visibility and support of Polytechnic and Community College Department and having a yearly strategic planning in structuring lean organization to facilitate the organization objective.

RELATIONSHIP BETWEEN LEAN LEADERSHIP PRINCIPLES AND COMPETENCIES OF LEAN LEADERSHIP IN STARTING LEAN IN HIGHER EDUCATION ANALYSIS

There is a significant relationship between lean leadership principle and competencies which mean the top management should understand the both pillar before starting lean the organization where it is below 0.05 significant with 95% confident interval. Each variable principle and competencies has a significant impact to starting good culture of lean in the organization where the value of R square are 0.875 and adjusted R square 0.869 which are above 0.6 show good predictable result.

Table 4: Relationship between principles and competencies of lean leadership in starting lean in higher education

Correlations

		Principle	competencies	Starting_Lean
Principle	Pearson Correlation	1	.899**	.902**
	Sig. (2-tailed)		.000	.000
	N	47	47	47
competencies	Pearson Correlation	.899**	1	.919**
	Sig. (2-tailed)	.000		.000
	N	47	47	47
Starting_Lean	Pearson Correlation	.902**	.919**	1
	Sig. (2-tailed)	.000	.000	
	N	47	47	47

**. Correlation is significant at the 0.01 level (2-tailed).

Regression Test:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.935[a]	.875	.869	.25269

a. Predictors: (Constant), competencies, Principle

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.597	2	9.798	153.456	.000[b]
	Residual	2.809	44	.064		
	Total	22.406	46			

a. Dependent Variable: Starting_Lean

b. Predictors: (Constant), competencies, Principle

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.093	.234		.397	.693	-.379	.565
	Principle	.419	.128	.400	3.283	.002	.162	.677
	competencies	.570	.124	.559	4.593	.000	.320	.820

a. Dependent Variable: Starting Lean

MEASUREMENT MODEL

The study model is reflective measurement model using SEM-PLS 3.2.6(Ringle et.al, 2015) where the direction of the arrows is from the construct to the indicator variable indicating the assumption that construct cause the measurement. Hypothesis testing has done by bootstrapping method. The t value provided the statistical significant of the causal path relationship between the construct in the hypothesised model. In PLS –SEM model, " the popular critical t values for a two – tailed test are 1.65 (α = 0.10), 1.96 (α = 0.05), or 2.57 (α = 0.01)" (Hair, 2014).

Figure 1 and Table 5 denote the result of bootstrapping method for the structural model signifying the t- value causal the relationship between the construct. At 5% significant interval (t-value=1.96), Competencies – starting lean (t=3.429), principle-competencies (t=18.613) and principle-starting lean (t=2.647) were found to have significant analysis because has meet the acceptable threshold.

Therefore, the hypothesis relationship between principle, competencies and starting lean in the organization are supported. The finding from the analysis indicated that lean leadership is the key indicators which supported the competency efficiency and approached continuously improvement in starting lean culture in the organisation.

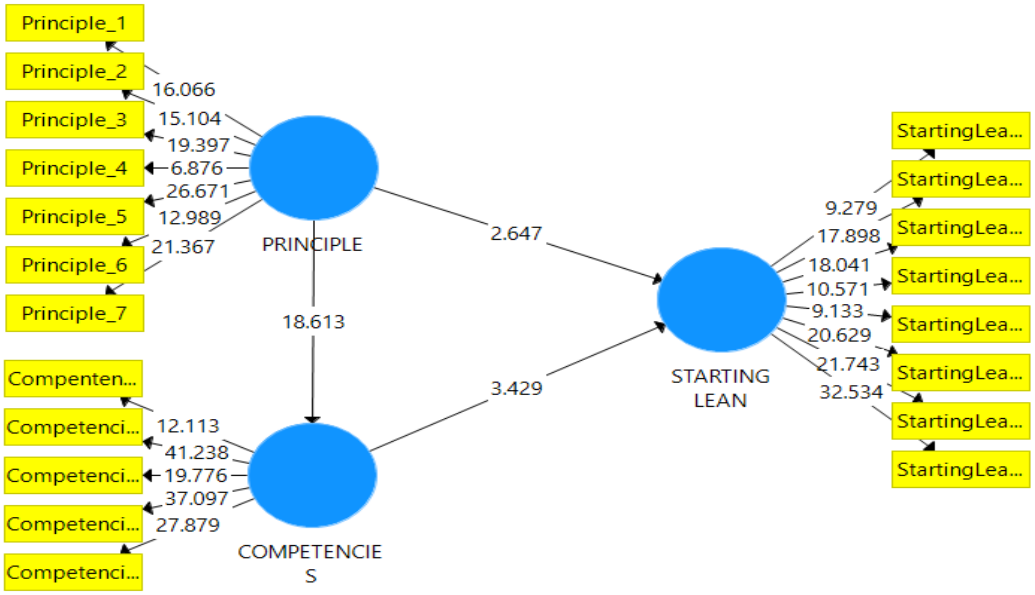

Figure 1 : Bootstrappping result

Table 5: Bootstrapping result

Hypothesis	Relationship	Original sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	t-Statistical (O/STDEV)	p-values
H1	COMPETENCIES -> STARTING LEAN	0.548	0.523	0.160	3.429	0.001
H2	PRINCIPLE -> COMPETENCIES	0.893	0.888	0.048	18.613	0.000
H3	PRINCIPLE -> STARTING LEAN	0.418	0.442	0.158	2.647	0.008

*p<0.1

CONCLUSION AND AGENDA FOR FUTURE WORK

The study focus empirically the lean implementation in higher education. The finding revealed that, the top management play a critical role as a leader to applied lean their organization. In this paper the result indicated that top management had understood the lean leadership principle and competencies. The lean implementation has been applied tremendously in administrative process which affect the improvement of the process system and reduce waiting time and 30% in changing digitalize culture. There is a query regarding the costing effectiveness which need to be analysis directly in the organization. Most of the Community Colleges institution has been given awareness in lean management which the finding shows positive result in implementation of lean. There is a significant relationship with both pillar which need to be understand to provide good culture of lean. Future research of the real process and terminology usage of lean where the research find that community college has adobe both lean and sig sigma in the process

of doing lean in eliminates non-productive activities and improving the current process. The limitation of this research is the result based to Community College Institution only. The research may be carried out to other higher education institutional to analysis the similar and advance finding empirically of lean implementation.

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