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Kano approach for developing learning experiences in an educational service industry

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Abstract---*This research aimed to identify the learning process and assessment to develop students' learning experiences using the Kano approach. The objects of this research were students of industrial engineering and civic education programs. The sampling technique implemented was proportionate stratified random sampling by taking samples at all students' levels of the academic year. By adopting the National Higher Education Standard to build the attributes, the result showed that there were differences in learning experiences between industrial engineering and civic education programs on ten attributes (29,41%). The highest satisfaction coefficient for industrial engineering students was attributed no. 4, The lecturer implements a simulation learning method (0,52), and the highest dissatisfaction coefficient was attributed no. 2, implementation of the learning process in accordance with SLD (-0,62). While For civic education students, the highest satisfaction coefficient was attributed no. 17, the lecturer implements a community engagement form of learning (0,50); the highest dissatisfaction coefficient was attributed no. 2, implementation of the learning process in accordance with SLD (-0,44). Follow-up recommendations were proposed to develop better learning experiences for attributes categorized in must-be, attractive, and one-dimensional to improve satisfaction in the future.*

Keywords---*Kano model, satisfaction coefficient, proportionate stratified random sampling, higher education*

I. Introduction

Service industries play an important role in developing the economy and society. Higher education, as part of the educational service industry, provides programs in a wide variety of subjects. Education that has been considered as a public good becomes intricate in the competitive knowledge marketplace (Pucciarelli and Kaplan, 2016). The ever-changing requirements of customers in this sector turn into challenges that need a proper strategy. This research conducted in a growing university in Indonesia by taking case studies at the industrial engineering program compared to the civic education program as both programs got input from students in the area of learning process and assessment. Although both programs showed an increasing tendency in the number of students per academic year, some input that uncovered in counseling activity showed dissatisfaction signals. This research aimed to investigate students' learning experiences to get a better understanding by using the Kano model.

Some research has been carried out in investigating better understanding using the Kano model in the area of products and services. Kano originally designed to analyze attributes related to product (Kano et al., 1984 in Matzler, 1996) until the latest research (Violante & Vessetti, 2017; Yao et al., 2018; Lin et al., 2017, Biggora et al., 2018), but this method also performed to analyze attributes related to service (Ma *et al.*, 2019; Pakizehkar *et al.*, 2016; Hemati & Ghorbanian, 2011;

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Qiting *et al.*, 2011; Chen, 2012). Some of the research also applied to higher education object (Madzik *et al.*, 2019; Purwati & Sitompul, 2017; Szeliga-Duchnowska & Szewczyk, 2018, Hamzah *et al.*, 2018 dan Arefi *et al.*, 2010).

The Kano application in higher education has become a useful quality measurement tool. This research developed a framework in the area of learning process and assessment by adopting the national higher education mandate. By using the Kano model, both programs (industrial engineering and civic education), which belong to exact and non-exact fields were analyzed to get better learning experiences. It is a challenge of the educational service provider to accommodate customer requirements but still lead to specified learning outcomes. The more focus on the customers' needs means better understanding and better customer satisfaction. It is essential for the educational service providers to be able to organize learning processes that can create graduates who have competitiveness in the future.

Based on the guidelines of higher education curriculum preparation, the curriculum paradigm as a program shows that the learning process has an input in the form of Semester Learning Design (SLD), and the output produced is graduates who have the ability according to Graduates Learning Outcomes (GLO). Current national higher education standards administer graduates' competency, learning content, learning process, learning assessment, lecture and educational staff, facilities and infrastructure, learning management, and learning financing. This research confined to the analysis of the process & assessment of learning, which is closely related to the interaction of lecturers and students in building student learning experiences and still in the area of individual lecturer's control in developing the course strategies.

Learning means the interaction process between students, lecturers, and resources in a learning environment. Students' learning experiences were manifested in task descriptions that must be accomplished by the students for one semester. It is a chosen learning activity to achieve the expected ability in each step of learning. This process includes the assessment process and students' learning results. The national learning process standard is a minimum criterion in the execution of a learning program to obtain GLO. The learning process characteristics should be interactive, holistic, integrative, scientific, contextual, thematic, effective, collaborative, and students' centered while the scope of learning assessment should be educative, authentic, objective, accountable, and transparent.

II. Literature Review

Kano is a method to categorize attributes of product or service based on the perception of customers, and it's effect on customer satisfaction. This method was developed by Professor Noriaki Kano in the 1980s, which categorizes attributes into threshold (basic) or primary need, performance, and excitement (delighter).

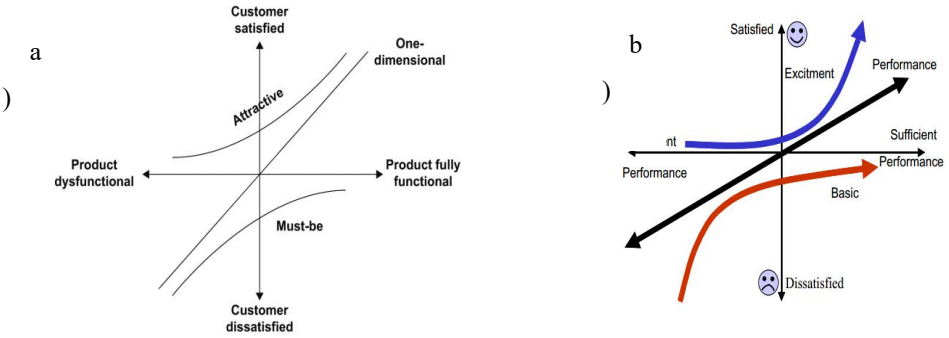

Figure 1 Kano Model: [a)]Berger *et al.* (1993) in Matzler *et al.* (1996);

[b)]Tontini (2007) adapted from Matzler *et al.* (1996)

In the determination of Kano attributes, there are two parts of the questionnaire, functional and dysfunctional. The choice of the answer is I like it that way, it must be that way, I am neutral, I can live with it that way, I dislike it that way (Benjabutr, 2018). Each question that asked positively and negatively was then evaluated based on Table 1.

Table 1 Kano Evaluation Table

CRs		DYSFUNCTIONAL				
		like	must-be	neutral	live with	dislike
FUNCTIONAL	Like	Q	A	A	A	O
	must-be	R	I	I	I	M
	Neutral	R	I	I	I	M
	live with	R	I	I	I	M
	Dislike	R	R	R	R	Q

A = Atractive **M = Must-be** **R = Reverse**
O = One-dimensional **I = Indifferent** **Q = Questionable**

Source: Matzler *et al.* (1996)

Table 1 shows that the responses of the questionnaire could be categorized into

a) *Must-be* or *Basic* is an attribute, function, or feature that must be present in a product or service. The absence of this attribute results in customer dissatisfaction, complaints, or loss customer. But if this attribute present or fulfilled customers will be neutral, it will not increase above neutral. Basic needs are not an option, but it must be present in the product or service.

b) *Performance* or *One-dimensional* is a *satisfier* obligation. The better the performance of the attribute, the higher the customer satisfaction level. Otherwise, the worse performance of attribute will decrease customer satisfaction

c) *Excitement* or *attractive* attribute is the unestimated attribute by the customer. The presence of this attribute will give a higher satisfaction level and create '*wow experience*.' The absence of this attribute will not cause dissatisfaction. This attribute usually needs that are not expressed directly by the customer, and maybe not even though of them.

d) *Indifferent* shows customers who don't care about the attribute offered. The presence or absence of this attribute will not affect to increase or decrease of customer satisfaction. *Questionable* shows questioning attribute. This is because of *user misunderstands* of the survey question and can not express his opinion correctly (Yuan & Guan, 2014).

Madzik et al. (2019) explored the possibility of a better understanding of the requirements of customer & stakeholder in the process of product creation in academic service. Seven requirements were analyzed, practical orientation, ethics

orientation, research orientation, resource quality, innovation orientation, skill orientation, and staff quality. Research results showed that practical orientation and resource quality are the most stable requirements, while staff quality is the most unstable requirement.

Purwati and Sitompul (2017) investigated the quality of private higher education in Pekanbaru based on students' perspectives using the Kano method. The variables analyzed in the research were the learning process, research and community engagement, academic system, facilities, and & infrastructure with 28 attributes involved. The result of the research showed that attributes needed to develop were curriculum oriented to field variety of science, technology, the field of skill, and professional expertise. Textbook, teaching materials/handout can be well understood, the atmosphere of the learning process is fun, creative, interactive, and motivate students, and also lecturer interaction outside the learning process.

Szeliga-Duchnowska & Szewczyk (2018) analyzed Kano's application to assess the quality level of teaching staff involved nine attributes of staff quality. The research revealed that the university should provide lecturers with good theoretical knowledge and the ability to deliver knowledge to the students well.

Hamzah et al. (2018) evaluate the quality of private higher education institutions in Pekanbaru using Kano and QFD with 32 attributes. The research revealed that nine priorities needed were student achievement index, research supervision by the lecturer, lecturer's discipline, the ability of technology adoption, lecturer's assessment method, patience and hospitality of academic staff in delivering services, English speaking fluency, teaching and learning atmosphere, the effectivity of academic information.

Arefi et al. (2012) analyzed the application of the Kano model to increase the quality of higher education in psychology master's degree programs in state universities of Tehran. There were seven dimensions of Kano questionnaire covered of objectivity, material, learning method, professor attribute, structure, facility, and assessment of progress learning, with 27 total customer requirements.

This research investigates the learning process and assessment in higher education. A total of 34 attributes were developed based on the National Standard of Higher Education stated at the mandate. A Kano questionnaire distributed to the students of the industrial engineering program and civic education program to capture the learning experiences.

III. Research Methodology

The type of research is descriptive, mixed-method. The research describes the phenomenon in the learning system at the industrial engineering program compared to the civic education program. The Kano questionnaire applied using qualitative data to find out the phenomenon of learning at both programs. This questionnaire then statistically compared to know whether there are any differences between students' responses to both programs. Primary data was collected from the Kano questionnaire to get the students' perspective on the learning process and assessment. The information gathered from the national standard of higher education to build the research attributes. Observation and interview, along with questionnaire distribution, were executed as the technique to collect the data from respondents.

Thirty-four attributes accommodate in the Kano questionnaire. Eighteen attributes in the area of the learning process and sixteen attributes in the area of learning assessment. The eighteen attributes of learning process are Semester Learning Design (SLD) is prepared for each course (1), implementation of learning process in accordance with SLD (2), lecturer implements group discussion method (3), lecturer implements simulation learning method (4), lecturer implements collaborative learning method (5), lecturer implements cooperative learning method (6), lecturer implements project-based learning method (7), lecturer implements problem-based learning method (8), lecturer implements discourse learning

method (9), lecturer implements e-learning method (10), lecturer implements college form of learning (11), lecturer implements response and tutorial form of learning (12), lecturer implements guest lecturer/seminar (13), lecturer implements practicum form of learning (14), lecturer implements field practice form of learning (15), lecturer implements research form of learning (16), lecturer implements community engagement form of learning (17), lecturer implements short semester (for remedial or acceleration) (18).

The fourteen attributes of learning assessment are Lecturer implements observation assessment technique (19), Lecturer implements participation assessment technique (20), Lecturer implements performance demonstration assessment (21), Lecturer implements written test technique (22), Lecturer implements oral test technique (23), Lecturer implements questionnaire assessment technique (24), Lecturer implements rubric assessment instrument (25), Lecturer implements portfolio/design work instrument (26), Assessment mechanism agreed between assessor and assessed (27), Assessment mechanism give feedback and opportunity to ask the result to the students (28), Gradual assessment procedure (29), Reassessment procedure (30), Assessment performed by lecturer (team) (31), Assessment performed by lecturer (team) and involving students (32), Assessment performed by lecturer (team) with relevant stakeholders (33), Assessment result announced after one learning phase due to learning design (34).

Probabilistic sampling was applied using proportionate stratified random sampling. The sample size was calculated based on Yamane in Israel (1992) using the formula:

$$n = \frac{N}{1+N\,(e)^2}$$

Information:

n: sample size needed

N: population number

e: sampling error

The population in this research is the number of industrial engineering program (1053 students) and civic education program (171 students). The industrial engineering program is a favorite program at this university. The number of students in each academic year for industrial engineering program was 159 students, the year 2015 (15.1%), 241 students, the year 2016 (22.9%), 324 students, the year 2017 (30.8%) and 329 students, the year 2018 (31.2%) respectively. On the other hand, the number of students in each academic year of civic education program were 15 students, year 2015 (8,8%), 40 students, year 2016 (23,4%), 53 students, the year 2017 (31%) and 63 students, the year 2018 (36,8%) respectively. By using a 5% sampling error, the total samples obtained 290 samples for industrial engineering students and 120 samples for the civic education program. The stratified proportionate random sample size was 44 samples (2015), 66 samples (2016), 89 samples (2017) and 91 samples (2018) for industrial engineering students respectively while the samples for civic education were 11 samples (2015), 28 samples (2016), 37 samples (2017) and 44 samples (2018) respectively.

The attributes were asked to the respondents in the Kano questionnaire and continue to be evaluated into the final grade (attractive, one-dimensional, must-be, indifferent, reverse, questionable). After being classified into Kano categories, customer satisfaction and dissatisfaction coefficient were calculated.

$$\text{Customer Satisfaction (CS)} = \frac{(A+O)}{(A+O+M+I)}$$

Customer Dissatisfaction (CD) = - $\frac{(O+M)}{(A+O+M+I)}$

Recommendations are given to build better learning experiences as a strategic step to satisfy the customer.

IV. Result and Discussions

The respondents of the research are the students of the industrial engineering program and civic education program of the academic year 2015, 2016, 2017, and 2018 which are taken using *stratified random sampling* — profile of respondents described in Table 3.

Table 3 Respondent Profile of Kano Questionnaire

Category	Response	Industrial engineering		Civic Education	
		Frequency	Percentage	Frequency	Percentage
Gender	**Female**	32	11.00%	75	62.50%
	Male	258	89.00%	45	37.50%
Age	**< 19 year**	58	20.00%	27	22.50%
	20 – 29 year	222	76.55%	90	75.00%
	30 – 39 year	10	3.45%	3	2.50%
	> 40 year	0	0%	0	0%
Status	**Single**	257	88.62%	114	95.00%
	Merried, no children	12	4.14%	2	1.67%
	Merried, with children	21	7.24%	4	3.33%
Job	**Unemployment**	127	43.79%	77	64.17%
	Government Employee	2	0.69%	2	1.67%
	Private Employee	139	47.93%	22	18.33%
	Entrepreneur	14	4.83%	8	6.67%
	Others	8	2.76%	11	9.17%
Shift/Non Shift	**Shift**	124	63.59%	21	39.62%
	Non Shift	71	36.41%	32	60.38%

A test result of validity for the pilot test of 30 students using SPSS 23 obtained validity coefficient higher than r Table, so all attributes declared valid. On the other hand, the reliability coefficient showed a value of 0.901, which means reliable due to the higher value compared to the critical value of 0.6.

Due to un-normal data obtained, Mann Whitney's non-paired difference test (which doesn't need normality assumptions) was performed to compare the response between industrial engineering students and civic education students. The result showed that there was a variation of response between industrial engineering students and civic education programs. There were difference response of industrial engineering students to civic education students in the attribute number 1,4,5,7,8,12,14,15,16,18,25,26,27,28,30,32,33, and 34. This could happen due to different students' background in both programs. Most of the industrial engineering students are male, work as a private employee (some were going to a working shift), while most civic education students are female and unemployment. Besides, industrial engineering is an exact program, while civic education is a non-exact program. So the way they think and experience learning might be different. But, the final result of the Kano questionnaire was analyzed using the Kano evaluation table and accommodating Blauth's formula (Walden, 1993) by choosing the maximum category between attribute O, A, M, or I, R, Q. In this formula the condition is:

1. If the sum values of (One-dimensional+Attractive+Must-be) > the sum values of (Indifferent+Reverse+Questionable), then the final grade obtained is the maximum value between One-dimensional, Attractive, Must-be.
2. If the sum values of (One-dimensional+Attractive+Must-be) < the sum values of (Indifferent+Reverse+Questionable), then the final grade obtained is the maximum value between Indifferent, Reverse, Questionable.
3. If sum values of (One-dimensional+Attractive+Must-be) = the sum values of (Indifferent+Reverse+Questionable), then the final grade obtained is the maximum value between One-dimensional, Attractive, Must-be Indifferent, Reverse, Questionable.

The distribution of the questionnaires' responses and Kano analysis of industrial engineering and civic education students presented in Table 4.

Table 4. Kano Analysis of Industrial Engineering & Civic Education Students

ATTRIBUTES		PROG R	UNIT	KANO CATEGORY						∑	E	CS	CD
				M	O	A	R	Q	I				
1	Semester Learning Design (SLD) was prepaed for each course	IE	%	36,21	13,10	13,45	0,69	1,38	35,17	100	M	0,27	-0,50
		CE	%	28,33	5,00	10,83	1,67	0,83	53,33	100	I	0,16	-0,34
2	Implementation of learning	IE	%	34,48	25,17	11,03	1,72	1,38	26,21	100	M	0,37	-0,62

ATTRIBUTES		PROG R	UNIT	KANO CATEGORY						∑	E	CS	CD
				M	O	A	R	Q	I				
	process in accordance with SLD	CE	%	17,5	24,17	15,83	2,5	3,333	36,67	100	O	0,42	-0,44
3	Lecturer implements group disscussion method	IE	%	6,21	9,31	33,45	2,41	2,41	46,21	100	I	0,45	-0,16
		CE	%	4,167	7,50	34,17	5,00	1,667	47,5	100	I	0,45	-0,13
4	Lecturer implements simulation learning method	IE	%	4,14	13,45	36,55	2,07	2,07	41,72	100	A	0,52	-0,18
		CE	%	9,17	2,50	21,67	5,00	1,667	60,00	100	I	0,26	-0,13
5	Lecturer implements colaborative learning method	IE	%	3,10	8,62	27,59	1,72	1,38	57,59	100	I	0,37	-0,12
		CE	%	3,33	3,33	17,5	5,00	0,83	70	100	I	0,22	-0,07
6	Lecturer implements cooperative learning method	IE	%	5,86	10,34	27,59	2,07	0,69	53,45	100	I	0,39	-0,17
		CE	%	3,33	5,83	23,33	4,17	1,67	61,67	100	I	0,31	-0,10
7	Lecturer implements project based learning method	IE	%	4,14	7,93	31,03	2,41	1,72	52,76	100	I	0,41	-0,13
		CE	%	3,33	5,00	18,33	5,00	5,00	63,33	100	I	0,26	-0,09
8	Lecturer implements problem based learning method	IE	%	6,55	7,24	28,62	3,79	1,72	52,07	100	I	0,38	-0,15
		CE	%	2,50	2,50	24,17	5,00	3,33	62,50	100	I	0,29	-0,05
9	Lecturer implements	IE	%	9,66	9,66	17,24	8,62	1,38	53,45	100	I	0,30	-0,21

ATTRIBUTES		PROGRAM	UNIT	KANO CATEGORY						∑	SCALE	CS	CD
				M	O	A	R	Q	I				
	discourse learning method	CE	%	22,50	4,17	18,33	5,00	1,67	48,33	100	I	0,24	-0,29
10	Lecturer implements e-learning method	IE	%	4,83	6,90	24,48	5,17	2,76	55,86	100	I	0,34	-0,13
		CE	%	2,50	2,50	29,17	7,50	2,50	55,83	100	I	0,35	-0,06
11	Lecturer implements college form of learning	IE	%	21,03	13,45	16,55	1,72	1,38	45,86	100	M	0,31	-0,36
		CE	%	22,50	13,33	17,50	0,83	0,00	45,83	100	M	0,31	-0,36
12	Lecturer implements response and tutorial form of learning	IE	%	7,93	16,21	32,41	2,76	2,41	38,28	100	A	0,51	-0,25
		CE	%	5,00	9,17	26,67	0,83	0,00	58,33	100	I	0,36	-0,14
13	Lecturer implements guest lecture/seminar	IE	%	6,90	11,72	30,34	2,41	2,41	46,21	100	I	0,44	-0,20
		CE	%	5,00	5,00	36,67	3,33	4,17	45,83	100	I	0,45	-0,11
14	Lecturer implements practicum form of learning	IE	%	15,86	19,66	27,93	2,07	1,38	33,10	100	A	0,49	-0,37
		CE	%	5,00	11,67	22,50	5,00	2,50	53,33	100	I	0,37	-0,18
15	Lecturer implements field practical form of learning	IE	%	9,66	20,69	26,21	0,69	1,38	41,38	100	A	0,48	-0,31
		CE	%	6,67	14,17	25,83	1,67	2,50	49,17	100	I	0,42	-0,22
16	Lecturer implements research form of learning	IE	%	11,72	15,86	31,72	2,07	1,03	37,59	100	A	0,49	-0,28
		C	%	10	8,	21	1,	0,	56	1	I	0	-

ATTRIBUTES		PROGRE	UNIT	KANO CATEGORY						∑	E	CS	CD
				M	O	A	R	Q	I				
		E		,83	33	,67	67	83	,67	00		,31	0,20
17	Lecturer implements community engagement form of learning	IE	%	11 ,38	18 ,62	26 ,21	0, 69	0, 69	42 ,41	1 00	A	0 ,45	- 0,30
		CE	%	16 ,67	25 ,00	24 ,17	0, 83	1, 67	31 ,67	1 00	O	0 ,50	- 0,43
18	Lecturer implements short semester (for remedial or acceleration)	IE	%	13 ,10	12 ,07	11 ,72	7, 93	1, 72	53 ,45	1 00	I	0 ,26	- 0,28
		CE	%	6, 67	6, 67	10 ,00	11 ,67	5, 00	60 ,00	1 00	I	0 ,20	- 0,16
19	Lecturer implements observation assessment technique	IE	%	6, 21	8, 62	26 ,90	1, 72	1, 03	55 ,52	1 00	I	0 ,37	- 0,15
		CE	%	5, 83	10 ,83	26 ,67	0, 83	0, 83	55 ,00	1 00	I	0 ,38	- 0,17
20	Lecturer implements participation assessment technique	IE	%	8, 28	9, 66	19 ,66	2, 41	1, 38	58 ,62	1 00	I	0 ,30	- 0,19
		CE	%	5, 83	7, 50	18 ,33	0, 83	3, 33	64 ,17	1 00	I	0 ,27	- 0,14
21	Lecturer implements performance demonstration assessment	IE	%	5, 17	8, 97	21 ,72	1, 38	1, 38	61 ,38	1 00	I	0 ,32	- 0,15
		CE	%	2, 50	10 ,83	15 ,00	1, 67	1, 67	68 ,33	1 00	I	0 ,27	- 0,14
22	Lecturer implements written test technique	IE	%	10 ,69	5, 17	18 ,62	3, 10	1, 03	61 ,38	1 00	I	0 ,25	- 0,17
		CE	%	3, 33	11 ,67	16 ,67	2, 50	4, 17	61 ,67	1 00	I	0 ,30	- 0,16
23	Lecturer implements oral	IE	%	5, 86	3, 79	20 ,34	9, 31	2, 76	57 ,93	1 00	I	0 ,27	- 0,11

ATTRIBUTES		PROG R	UNIT	KANO CATEGORY						∑	E	CS	CD
				M	O	A	R	Q	I				
	test technique	CE	%	0,83	2,50	21,67	16,67	3,33	55,00	100	I	0,30	-0,04
24	Lecturer implements qustionnaireassessment technique	IE	%	3,79	3,45	15,17	3,45	3,79	70,34	100	I	0,20	-0,08
		CE	%	1,67	1,67	15,83	6,67	2,50	71,67	100	I	0,19	-0,04
25	Lecturer implements rubric assessment instrument	IE	%	5,52	2,07	15,52	4,83	1,03	71,03	100	I	0,19	-0,08
		CE	%	3,33	0,83	10,00	7,50	2,50	75,83	100	I	0,12	-0,05
26	Lecturer implements portofolio/design work instrument	IE	%	3,10	6,21	24,14	4,83	1,03	60,69	100	I	0,32	-0,10
		CE	%	0,83	4,17	16,67	6,67	1,67	70,00	100	I	0,23	-0,05
27	Assessment mechanism agreed between assessor and assessed	IE	%	9,31	17,93	22,07	2,07	2,07	46,55	100	I	0,42	-0,28
		CE	%	9,17	7,50	21,67	5,83	0,00	55,83	100	I	0,31	-0,18
28	Assessment mechanism give feedback and opportunity to ask the result to the students	IE	%	9,66	16,55	24,48	1,03	1,38	46,90	100	A	0,42	-0,27
		CE	%	7,50	15,83	10,83	2,50	1,67	61,67	100	I	0,28	-0,24
29	Gradual assesment procedure	IE	%	6,90	7,59	22,07	2,76	1,72	58,97	100	I	0,31	-0,15
		CE	%	5,83	10,00	15,83	1,67	0,83	65,83	100	I	0,26	-0,16
3	Reassessmet	I	%	5,	5,	14	10	2,	61	1	I	0	-

ATTRIBUTES		PROG R	UNIT	KANO CATEGORY						∑	E	CS	CD
				M	O	A	R	Q	I				
0	procedure	E		17	86	,83	,34	41	,38	00		,24	0,13
		CE	%	5,83	6,67	6,67	8,33	4,17	68,33	100	I	0,15	-0,14
31	Assessment performed by lecturer (team)	IE	%	7,24	5,86	13,45	8,28	0,69	64,48	100	I	0,21	-0,14
		CE	%	5,00	10,83	10,83	10,83	2,50	60,00	100	I	0,25	-0,18
32	Assessment performed by lecturer (team) and involving students	IE	%	7,24	7,24	21,03	7,93	2,07	54,48	100	I	0,31	-0,16
		CE	%	5,00	6,67	9,17	8,33	5,00	65,83	100	I	0,18	-0,13
33	Assessment performed by lecturer (team) with relevant stakeholders	IE	%	6,21	5,52	18,97	7,24	1,03	61,03	100	I	0,27	-0,13
		CE	%	3,33	5,83	15,00	10,83	2,50	62,50	100	I	0,24	-0,11
34	Assessment result announced after one learning phase due to learning design	IE	%	15,17	18,62	17,93	2,07	1,38	44,83	100	O	0,38	-0,35
		CE	%	10,83	15,00	20,00	3,33	1,67	49,17	100	I	0,37	-0,27

Informations:

A = *Atractive* **M = *Must-be*** **R = *Reverse***

O = *One-dimensional* **I = *Indifferent*** **Q = *Questionable***

IE = Industrial Engineering ***CE=Civic Education***

Based on Kano's analysis, there are alikeness and differences between learning experiences between industrial engineering students and civic education students. Ten attributes (29,41%) consisted of attributes 1,2,4,12,14,15,16,17,28,34 were rated differently. On the other hand, 24 attributes (70,59%) were rated the same, consisted of attributes 3,5,6,7,8,9,10,11,13,18,19,20,21,22,23,24,25,26,27,29,30,31,32,33. The satisfaction and dissatisfaction coefficient described in Figure 3. The highest satisfaction coefficient for IE students was attributed to no. 4; the lecturer implements the simulation learning method (0,52), which means the existence of this attribute can increase the satisfaction

by 52%. While the highest dissatisfaction coefficient was attributed no. 2, implementation of the learning process in accordance with SLD (-0,62), which means the absence of this attribute can decrease satisfaction by 62%. For CE students, the highest satisfaction coefficient was attributed to no. 17, the lecturer implements a community engagement form of learning (0,50), which means the existence of this attribute can increase satisfaction by 50%. While the highest dissatisfaction coefficient was attributed no. 2, implementation of the learning process in accordance with SLD (-0,44), which means the absence of this attribute can decrease satisfaction by 44%.

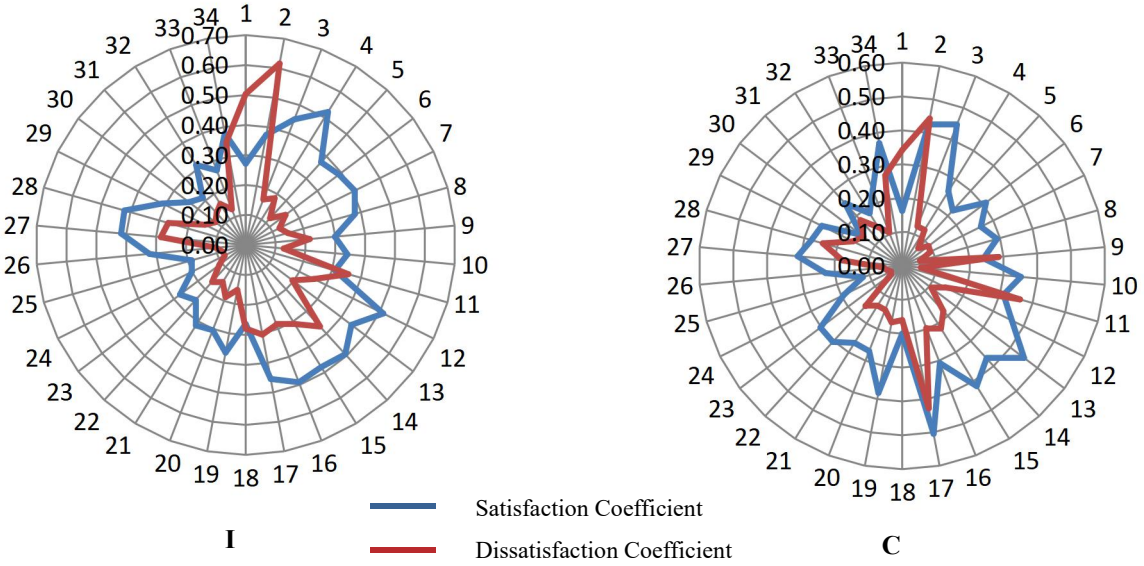

Figure 3 Satisfaction and Dissatisfaction Coefficient of IE and CE Students

Based on Table 4, the final grade of the IE Kano category for attributes no. 1,2 and 11 were M (must-be). It showed that IE students consider that SLD should be prepared for each course, the implementation of the learning process must be in accordance with the SLD, and lecturers must implement a college form of learning. Attribute no. 4,12,14,15,16,17,28 for IE in the A (attractive) category that showed IE students found it is interesting if lecturer implement simulation learning methods, response and tutorial, practicum, field practice, research, and community engagement form of learning, also assessment mechanism provide feedback and opportunity to ask the result to the students. They like learning that tries to bring real situations into the classroom with a maximum degree of resemblance. While response and tutorials were preferred, especially in subjects that were loaded with counts, as the IE program is part of engineering where most of the subjects are exact sciences with characteristics of counts or maths. Practicum is considered interesting for IE students because it can complement lectures in practice. Field practice is also interesting because it can bring students to the real world of learning as they can compare with the theoretical knowledge obtained in the class. While research and community engagement are interesting to devote and implement the knowledge they have gained. Attribute no 34 in the O (one-dimensional) category, which showed if assessment result is announced to the students after one learning phase will increase satisfaction and vice versa. Other attributes categorized indifferent means IE students do not care about the existence of those attributes

Kano's analysis of CE students showed that attributes no 2 and 17 were in the O (one-dimensional). It means that if the implementation of the learning process in accordance with SLD and lecturer provides a community engagement form of learning will increase satisfaction. The absence of these attributes will increase dissatisfaction. Attribute no 11 is included in M (must-be) category. Lecturers must provide a college form of learning in the class that accommodates face to face learning with the students. If this attribute does not exist can increase dissatisfaction because it supposes to be present. In this form of learning, students can give questions directly to the lecture to increase understanding and also more interactive. Other attributes were considered indifferent by CE students. It showed that they do not care about the existence of those attributes.

V. Recommendations

To improve students' learning experiences related to the learning process and assessment should concentrate on attributes categorized into must-be, one-dimension, and attractive that have the biggest impact. Students' Learning Design (SLD) must be prepared for all courses and learning processes in accordance with SLD. The lecturer should hold on to SLD in delivering the course as much as possible, neither adding nor reducing the learning process that is not mentioned in SLD. For industrial engineering program where most subjects are exact sciences, simulation become interesting and should expand coverage of subjects that implement this learning method to increase satisfaction. Either response and tutorial, or practicum, field practice, research, community engagement form of learning should also be maintained to increase satisfaction. Lecturers should give feedback to students of what they have gained from the learning process and give the opportunity to ask the result. The assessment should be announced to the students that give transparency in the assessment.

VI. Conclusions

From the total thirty-four attributes of learning process and assessment, ten attributes (29,41%) were rated differently (attributes 1,2,4,12,14,15,16,17,28,34) and 24 attributes (70,59%) were rated the same (attributes 3,5,6,7,8,9,10,11,13,18,19,20,21,22,23,24,25,26,27, 29,30,31,32,33). The highest satisfaction coefficient for industrial engineering (IE) students was attributed no. 4, lecturer implements simulation learning method (0,52), and the highest dissatisfaction coefficient was attributed no. 2, implementation of the learning process in accordance with SLD (-0,62). The highest satisfaction coefficient for civic education (CE) students was attributed to no. 17, the lecturer implements a community engagement form of learning (0,50), and the highest dissatisfaction coefficient was attributed no. 2, implementation of the learning process in accordance with SLD (-0,44). Recommendations proposed a strategy to improve the satisfaction of students' learning experiences related to the learning process and assessment that concentrate on attributes categorized into must-be, one-dimension and attractive that have the biggest impact.

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