

Paper 1

by Tyo Teo

Submission date: 03-Jun-2021 11:19AM (UTC+0700)

Submission ID: 1599439412

File name: AIPCP_Article_Template_-_Yaning_T.H..docx (77.84K)

Word count: 3320

Character count: 17526

Online Learning Quality Measuring using Kano

Yaning Tri Hapsari¹, Theofilus Bayu Dwinugroho², Guntur Samodro³

^{1,2,3} Department of Industrial Engineering, Faculty of Science and Technology, PGRI Yogyakarta University, Indonesia

yaning.yth@upy.ac.id

Abstract. The Covid 19 pandemic that began in Indonesia since March 2020 has had an impact in various fields, one of which is in the field of education. The education system, which initially took place face-to-face, has switched to online learning. Online learning has shortcomings, one of which is that the material is difficult for students to understand because it cannot meet face to face directly. This study aims to measure the quality of online learning using the Kano method based on student perceptions. The Kano method is a method that aims to categorize the attributes of a product or service, how well the product or service is able to satisfy consumer needs. This method can explain the attributes that affect online learning so that it can be used to improve further learning. The results of processing using the Kano method show 8 attributes which are categorized as must-be, 1 attribute is indifferent category, 1 attribute is one-dimensional category, and 7 attributes are attractive category. The category that needs to be improved first is must-be because must-be is a category that must exist, namely attributes 1, 2, 3, 4, 6, 7, 8, and 17.

INTRODUCTION

The Covid 19 pandemic that began in Indonesia since March 2020 has had an impact in various fields, one of which is in the field of education. The education system, which initially took place face-to-face, has switched to online learning. The previously lesser known platforms that provide online video facilities have become popular since the time of this pandemic. Students and lecturers are required to get used to and adapt to using the platform. Online learning has its own advantages and disadvantages compared to offline learning. By using the internet network, students and lecturers do not need to meet face to face, thereby reducing the risk of being exposed to Covid 19 [4]. In addition, online learning can be carried out anywhere and anytime, in other words it is not limited by time and place, as long as there is an internet network

Apart from the above advantages, online learning also has its drawbacks. One of them is that the material is difficult for students to understand, especially practicums and courses that require a calculation process. In addition, network constraints are not evenly distributed in each region, causing online lectures to be intermittent because the signal is less stable. The need for cooperation between educational institutions and the government to deal with these obstacles. Institutions need to provide convenience in online learning, for example the existence of e-learning facilities and media to meet face to face online (google meet, zoom, and others). In addition, lecturers also need to improve their quality in providing material online. If institutions and lecturers cannot improve their quality, it will reduce student satisfaction with online learning. In addition, it also reduces the competitiveness of the institution against other institutions.

Based on this background, it is necessary to evaluate and analyze online learning to determine the quality of learning during this pandemic. This quality measurement is expected to be the basis for improvement in online learning so that the quality of service to students can increase.

Previous research on the quality of online learning was conducted by Udo [5] using the Servqual dimension. The study only produced 4 Servqual dimensions which play an important role in assessing online learning, namely Assurance, Empathy, Responsiveness, and Website Content. Irawati and Jonatan [1] previously conducted research on evaluating the quality of online learning using the Service Quality (Servqual) and Importance Performance Analysis (IPA) methods.

In addition to the Servqual method, several studies use the Kano method in assessing quality, such as research conducted by Utami [6] which examined the improvement of the quality of teaching and learning activities. Wijaya and Suwastika [8] used Kano to assess e-learning user satisfaction. Zhao and Dholakia [9] used Kano to measure customer satisfaction in using interactivity websites. Oh [3] used Kano to determine the quality attributes of e-shopping malls.

This study aims to measure the quality of online learning using the Kano method based on student perceptions. The Kano method is a method that aims to categorize the attributes of a product or service, how well the product or service is able to satisfy consumer needs. This method can explain the attributes that affect online learning so that it can be used to improve further learning.

METHOD

Data Collection

Data was collected by distributing questionnaires to new students of the 2020/2021 class UPY, Faculty of Science and Technology. The questionnaire uses a Likert scale of 1 to 5. Attributes to the Servqual dimension are based on the research of Irawati and Jonathan [1]. The five Servqual dimensions used to assess the quality of the online learning process, namely tangible, reliability, responsiveness, assurance, and empathy are described in Table 1.

TABLE 1. Five Dimensions Servqual

Kode	Tangible
X1	Use of interactive tools for online learning
X2	Ease of access and connection of online learning platforms
X3	Selection of varied online learning platforms
Kode	Reliability
X4	The consistency of lecturers in delivering lectures is good
X5	Lecturers are reliable in managing classes during online learning
X6	Lecturers are reliable in using online learning platforms
Kode	Responsiveness
X7	Lecturers respond quickly and efficiently to student needs while studying online
X8	Lecturers are able to adapt from conventional learning to online learning
X9	Lecturers welcome student questions and comments
Kode	Assurance
X10	Lecturers teach according to their fields
X11	Lecturers are fair and impartial in the assessment
X12	Lecturers are willing to answer student questions
X13	Lecturers master the material being taught
Kode	Empathy
X14	Lecturers encourage and motivate students to do the best learning in the online learning process
X15	Lecturers understand the difficulties of students in the online learning process
X16	Lecturers concern with students during online learning
X17	Lecturers instill a long-term interest in students to stay afloat in the online learning process

Data Processing

Data processing begins with a validity and reliability test. Furthermore, the data were processed using the Kano method. Validity and reliability testing was carried out with the help of IBM SPSS Statistics 25.

Validity Test

Testing the validity with the Pearson correlation can be done by comparing r count with r table or by comparing the Sig. (2-tailed) with a real level. This study uses the real level or $\alpha = 0.05$. The questionnaire question is said to be valid if the calculated r value obtained is greater than the value of r table. When comparing the Sig. (2-tailed) with the real level, then the question is valid if the value is Sig. (2-tailed) < actual level used.

Reliability Test

The instrument reliability test was performed using the Cronbach Alpha formula. Manual calculations with Cronbach Alpha are as follows.

$$r = \left(\frac{n}{n-1} \right) \left(1 - \frac{\sum \sigma_i^2}{\sigma_t^2} \right) \quad (1)$$

Information:

r = reliability

n = number of questions

$\sum \sigma_i^2$ = the amount of variance in the score for each question

σ_t^2 = the total variance

If the reliability value is greater than 0.7, the instrument / questionnaire is said to be reliable.

Processing by the Kano Method

The processing steps using the Kano method are as follows.

1. Determine the attribute category of each respondent. How to determine the category of each attribute based on the Kano classification method is described in Table 2 below.

TABLE 2. Kano classification method

Consumer Needs		Dysfunctional				
		1. Like it	2. Expect	3. Neutral	4. Tolerance	5. Don't like it
Functional	1. Like it	Q	A	A	A	O
	2. Expect	R	I	I	I	M
	3. Neutral	R	I	I	I	M
	4. Tolerance	R	I	I	I	M
	5. Don't like it	R	R	R	R	Q

Information:

Q = Questionable

A = Attractive

O = One Dimensional

R = Reverse

I = Indifferent

M = Must be

2. Count the number of each Kano category in each attribute based on the Kano classification method.
3. Determine the Kano category for each attribute using Blauth's formula, as follows.
 - If each attribute has total value (one dimensional + attractive + must be) > total value (indifferent + reverse + questionable) then grade is obtained by choosing the maximum value from (one dimensional, attractive, must be).
 - If each attribute has a total value (one dimensional + attractive + must be) < total value (indifferent + reverse + questionable) then the grade is obtained by selecting the maximum value from (indifferent, reverse, questionable).
 - If each attribute has a total value (one dimensional + attractive + must be) = total value (indifferent + reverse + questionable) then the grade is obtained by selecting the maximum value among all

11

Kano categories, namely (one dimensional, attractive, must be and indifferent, reverse , questionable).

4. Calculate the ES (Extent Of Satisfaction) and ED (Extent Of Dissatisfaction) values to determine the level of satisfaction and the level of dissatisfaction with the following formula.

$$ES = \frac{A+O}{A+O+M+I} \quad (2)$$

$$ED = \frac{O+M}{(A+O+M+I) \times (-1)} \quad (3)$$

The value of the level of satisfaction ranges from 0 to 1, the closer to 1, the more it affects the level of satisfaction. Conversely, if the value is close to 0 then it does not affect satisfaction. The value of the level of dissatisfaction between the values of -1 to 0, the closer to -1, the effect on user disappointment is very strong if the attribute is not met. Meanwhile, if the value is close to 0, it can be said that this attribute does not affect customer disappointment. The minus sign in front of the consumer disappointment level coefficient is to emphasize the negative effect of customer satisfaction on unmet product quality.

5. Mapping Kano to classify these attributes into the Kano method. The classification is:
- Must-be requirement: (if the extent to satisfaction value <0.5 and extent to dissatisfaction <-0.5)
 - One-Dimensional: (if the extent to satisfaction value > 0.5 and the extent to dissatisfaction <-0.5)
 - Attractive Requirement: (if the extent to satisfaction value > 0.5 and the extent to satisfaction value > -0.5)
 - Indifferent: (if the extent to satisfaction value <0.5 and the extent to dissatisfaction > -0.5)

Analysis

The data that has been processed is analyzed to determine which attributes need to be improved or improved in quality. The research method is described in the flow chart in Figure 1.

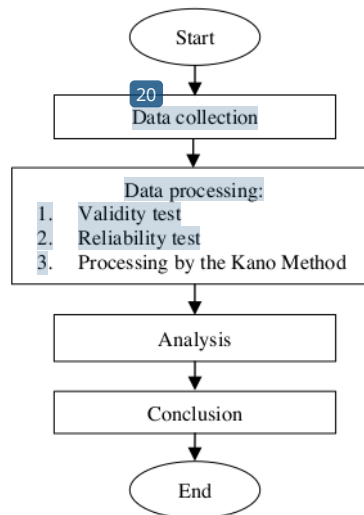


FIGURE 1. Research flow diagram

RESULTS AND DISCUSSION

Data collection has been carried out by producing 49 questionnaire data. Respondents consisted of 23 women and 26 men. Age range of respondents from 18 - 21 years. Meanwhile, the highest number of respondents was from the Architecture Study Program with 12 people and 13 least was Electrical Medicine with 2 respondents. The number of respondents per Study Program is described in Table 3.

TABLE 3. Number of respondents per study program

Study program	Number of Respondents
Industrial Engineering	9
Electromedical	2
Pharmacy	5
Nutrition	10
Informatics	8
Architecture	12
Biomedical Engineering	3

The validity test using IBM SPSS Statistics 25 results that all functional and dysfunctional questionnaires are valid, that is, if the value is sig. (2 tailed) is smaller than the real level of 0.05. Table 4 below describes the results of the validity test of 49 respondents.

TABLE 4. Validity test results

Question	Functional			Dysfunctional		
	r count	Sig. (2-tailed)	Conclusion	r count	Sig. (2-tailed)	Conclusion
1	0,546	0,000	Valid	0,618	0,000	Valid
2	0,667	0,000	Valid	0,762	0,000	Valid
3	0,560	0,000	Valid	0,684	0,000	Valid
4	0,508	0,000	Valid	0,747	0,000	Valid
5	0,768	0,000	Valid	0,670	0,000	Valid
6	0,746	0,000	Valid	0,693	0,000	Valid
7	0,601	0,000	Valid	0,881	0,000	Valid
8	0,617	0,000	Valid	0,728	0,000	Valid
9	0,476	0,000	Valid	0,862	0,000	Valid
10	0,505	0,000	Valid	0,781	0,000	Valid
11	0,395	0,000	Valid	0,825	0,000	Valid
12	0,543	0,000	Valid	0,772	0,000	Valid
13	0,517	0,000	Valid	0,819	0,000	Valid
14	0,688	0,000	Valid	0,662	0,000	Valid
15	0,633	0,000	Valid	0,840	0,000	Valid
16	0,627	0,000	Valid	0,885	0,000	Valid
17	0,514	0,000	Valid	0,817	0,000	Valid

The Cronbach Alpha reliability test with SPSS shows that the functional and dysfunctional questionnaire questions are consistent so that the data is free from random error variance. The Cronbach Alpha values from the results of the functional and dysfunctional questionnaires were 0.878 and 0.956, respectively. These results explain that the attribute questions that have been filled in by students are reliable because the value is greater than 0.7.

The determination of Kano's category for each attribute using Blauth's formula is described in Table 5 below. There are 9 attributes that are included in the Indifferent category, 1 attribute including Attractive, and 7 attributes including One-dimensional.

TABLE 5. Processing with Blauth's formula

Questionnaire Attributes	A	M	O	R	Q	I	A+O+M	I+R+Q	Total	Category
1	5	11	11	0	2	20	27	22	49	I
2	7	10	13	0	2	17	30	19	49	I
3	14	8	7	1	2	17	29	20	49	I
4	10	6	14	0	1	18	30	19	49	I
5	15	9	11	0	2	12	35	14	49	A
6	11	7	11	0	1	19	29	20	49	I
7	8	11	9	0	2	19	28	21	49	I
8	7	3	16	0	1	22	26	23	49	I
9	10	7	21	1	0	10	38	11	49	O
10	13	6	20	0	0	10	39	10	49	O
11	8	10	25	0	0	6	43	6	49	O
12	12	5	23	0	0	9	40	9	49	O
13	15	6	20	1	0	7	41	8	49	O
14	9	11	19	0	1	9	39	10	49	O
15	10	15	16	0	1	7	41	8	49	O
16	8	13	11	0	2	15	32	17	49	I
17	8	7	14	0	2	18	29	20	49	I

After calculating with Blauth's formula, each attribute is calculated the value of satisfaction (ES) and dissatisfaction (ED) which is shown in Table 6. There are 8 attributes that fall into the must-be requirement category, namely attributes 1, 2, 3, 4, 6, 7, 8, and 17. Only one attribute is included in the one-dimensional category, namely attribute 5. Attribut which is included in the attractive requirement category, namely 9, 10, 11, 12, 13, 14, and 15. There is only one attribute that is classified as indifferent, namely attribute 16 The ES and ED values were used for the Kano mapping described in Figure 2.

TABLE 6. Kano classification

Questionnaire Attributes	Satisfaction (ES)	Dissatisfaction (ED)	Classification
1	0,340	-0,468	Must-be requirement
2	0,426	-0,489	Must-be requirement
3	0,457	-0,326	Must-be requirement
4	0,500	-0,417	Must-be requirement
5	0,553	-0,426	One-dimensional
6	0,458	-0,375	Must-be requirement
7	0,362	-0,426	Must-be requirement
8	0,479	-0,396	Must-be requirement
9	0,646	-0,583	Attractive requirement
10	0,673	-0,531	Attractive requirement
11	0,673	-0,714	Attractive requirement
12	0,714	-0,571	Attractive requirement

13	0,729	-0,542	Attractive requirement
14	0,583	-0,625	Attractive requirement
15	0,542	-0,646	Attractive requirement
16	0,404	-0,511	Indifferent
17	0,468	-0,447	Must-be requirement

Must-be is the category with the most number, namely 8 attributes or 47.059%. The second most attractive requirement with 7 attributes (41.176%). Meanwhile, one-dimensional and indifferent each has only 1 attribute.

TABLE 7. Percentage of Kano classification

Kano classification	Number of Attributes	Percentage
Must-be requirement	8	47,059
One-dimensional	1	5,882
Attractive requirement	7	41,176
Indifferent	1	5,882
	17	100

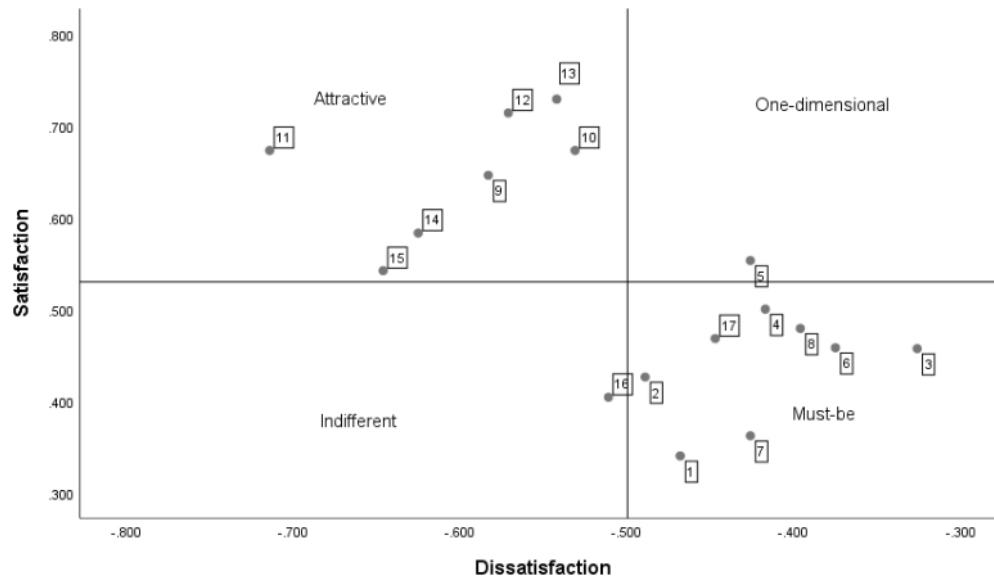


FIGURE 2. Kano Chart

The category that needs to be improved first is must-be because must-be is a category that must exist. Must-be is a basic criterion for a product or service, which means that these criteria have been met by the company. The next priority category is one-dimensional and attractive [2]. The indifferent category is not a priority because the presence or absence of an indifferent attribute will not affect the increase or decrease in the level of student satisfaction. The following table 8 shows the improvement strategies that need to be improved for each attribute.

TABLE 8. Improvement Strategy

Questionnaire Attributes	Classification	Improvement
--------------------------	----------------	-------------

1	Must-be requirement	procurement of interactive tools (e.g. pen tablets)
2	Must-be requirement	cooperation between institutions and the government in granting free internet quotas, the government and the private sector to help with network distribution
3	Must-be requirement	there are various types of online learning platforms provided by the institution, so that lecturers can choose the right platform
4	Must-be requirement	improving the quality of lecturers in giving lectures (lecturers increase their knowledge by participating in training, seminars, etc.)
5	One-dimensional	lecturers improve their teaching skills online (more clearly provide material, provide examples, can control classroom situations)
6	Must-be requirement	the lecturer controls the platform menus used in online learning
7	Must-be requirement	communication between lecturers and students is further improved so that lecturers can respond quickly to student needs
8	Must-be requirement	consistent use of online learning platforms and increasing lecturers' skills in using the platform, for example training on how to use the platform
9	Attractive requirement	answer student questions well
10	Attractive requirement	lecturers teach according to their fields / expertise
11	Attractive requirement	provide fair and transparent grades
12	Attractive requirement	answer students' questions well
13	Attractive requirement	the lecturer deepens the material by attending training, seminars, or from other media
14	Attractive requirement	lecturers motivate students in learning so that students remain enthusiastic about learning and doing assignments
15	Attractive requirement	the lecturer asks the students whether there are difficulties in learning so that later there will be a solution to overcome these difficulties
16	Indifferent	-
17	Must-be requirement	provide motivation to students so that they remain enthusiastic in learning

CONCLUSION

The Kano method is able to explain the attributes that affect online learning so that it can be used to improve further learning. The results of processing using the Kano method show 8 attributes which are categorized as must-be, 1 attribute is indifferent category, 1 attribute is one-dimensional category, and 7 attributes are attractive category. The category that needs to be improved first is must-be because must-be is a category that must exist. Further research can be developed using the QFD (Quality Function Development) method so that it can be used as a comparison with the Kano method in determining needs that can truly satisfy students

REFERENCES

1. Irawati, D. Y., and Jonatan, J., "Evaluasi Kualitas Pembelajaran Online Selama Pandemi Covid-19: Studi Kasus di Fakultas Teknik, Universitas Katolik Darma Cendika," in *Jurnal Rekayasa Sistem Industri*, 9(2), 2020, 135–144. <https://doi.org/10.26593/jrsi.v9i2.4014.135-144>
2. Mustakim, A., Anggraeni, S.K., Sirajuddin, "Analisis Kualitas Layanan Dengan Metode KANO Berdasarkan Dimensi SERVQUAL Pada PT. AKR," in *Jurnal Teknik Industri Untirta*, Vol. 4 No. 2. 2016. <https://jurnal.untirta.ac.id/index.php/jti/article/download/1402/1113>.
3. Oh, J., Yoon, S., and Park, B., "A Structural Approach to Examine the Quality Attributes Of E-Shopping Malls Using the Kano Model," in *Asia Pacific Journal of Marketing and Logistics*, 24(2), 2012, 305–327. <https://doi.org/10.1108/13555851211218075>.
4. Purnomo, B.G., Rohmanto, D., Yoanita, Y.V., Permana, M.P., and Amirudin, M., "Awareness Implementation of The Prevention of Health Protection of Covid-19," in *Journal of Physics: Conference*

Series, Volume 1823, Second UPY International Conference on Applied Science and Education (2nd UPINCASE) 2020. <https://iopscience.iop.org/article/10.1088/1742-6596/1823/1/012061>.

5. Udo, G. J., Bagchi, K. K., and Kirs, P. J, "Using SERVQUAL to Assess the Quality Of E-Learning Experience" in *Computers in Human Behavior*, 27(3), 2011, 1272–1283. <https://doi.org/10.1016/j.chb.2011.01.009>.
6. Utami, E., "Pendekatan Model Kano Pada Quality Function Deployment Untuk Perbaikan Kualitas Kegiatan Belajar Mengajar," in *Jurnal Ilmiah Teknik Industri*, 14(2), 2015, 187–195.
7. Wijaya, T. *Manajemen Kualitas Jasa: Desain Servqual, QFD, dan Kano*. (Jakarta: PT Indeks. 2018)
8. Wijaya, I. G. N. S., dan Suwastika, I. W. K., "Analisis Kepuasan Pengguna E-Learning Menggunakan Metode Kano," in *Jurnal Sistem dan Informatika*, 12(1), 2019, 128–138.
9. Zhao, M., and Dholakia, R. R., "A Multi-Attribute Model of Web Site Interactivity and Customer Satisfaction: An application of the Kano model," in *Managing Service Quality*, 19(3), 2009, 286–307. <https://doi.org/10.1108/09604520910955311>.

Paper 1

ORIGINALITY REPORT

18%

SIMILARITY INDEX

10%

INTERNET SOURCES

9%

PUBLICATIONS

7%

STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Open University of Mauritius Student Paper	4%
2	Bima Cahya Putra, Noni Juliasari, Subandi, Dian Anubhakti. "Analysis and Design E-Arsip Based on Kano and Object Oriented", 2018 International Conference on Applied Information Technology and Innovation (ICAITI), 2018 Publication	2%
3	pinpdf.com Internet Source	2%
4	docplayer.info Internet Source	1%
5	Rahma Fauziyah, Yati Rohayati, Bobby Hera Sagita. "Integrating e-servqual and kano model to improve adorable projects website service quality", Jurnal Sistem dan Manajemen Industri, 2019 Publication	1%
6	core.ac.uk Internet Source	1%

7	Submitted to Binus University International Student Paper	1 %
8	Submitted to Universitas Dian Nuswantoro Student Paper	1 %
9	journal.unpar.ac.id Internet Source	1 %
10	www.sjtpo.org Internet Source	1 %
11	Managing Service Quality, Volume 19, Issue 3 (2009-05-10) Publication	1 %
12	Rosnani Ginting, Juliza Hidayati, Muhammad Zulfin. "Kano Questionnaire for the assessment of product attributes of alternative power plants in Kuala sub-district.", IOP Conference Series: Materials Science and Engineering, 2019 Publication	1 %
13	Awal Kurnia Putra Nasution, Nurul Qomariyah Ahmad. "STUDENT PERCEPTIONS OF ONLINE LEARNING DURING THE COVID-19 PANDEMIC", Jurnal As-Salam, 2020 Publication	<1 %
14	Muh Haerdiansyah Syahnur, Jafar Basalamah, Ackhriansyah Ahmad Gani. "Customer Experience Factor Analysis Towards Customer	<1 %

Satisfaction Online Shopping", Jurnal Analisis Bisnis Ekonomi, 2020

Publication

15

Munir de Sá Mussa, Renata Gomes Cordeiro,
Henrique Da Hora. "Attributes of IT
certifications aligned to organizations' needs",
Journal of Modelling in Management, 2021

Publication

<1 %

16

Dita Lupita Sari, Choirun Niswatin. "Functional
Requirement on Proofreading System",
Journal of Software, 2019

Publication

<1 %

17

Submitted to Universitas Muhammadiyah
Surakarta

Student Paper

<1 %

18

Jong - Chul Oh, Sung - Joon Yoon, Byung - il
Park. "A structural approach to examine the
quality attributes of e - shopping malls using
the Kano model", Asia Pacific Journal of
Marketing and Logistics, 2012

Publication

<1 %

19

iopscience.iop.org

Internet Source

<1 %

20

jemis.ub.ac.id

Internet Source

<1 %

Exclude quotes On

Exclude matches < 10 words

Exclude bibliography On