

**ANALYSIS OF SERVICE SCIENCE-BASED ACADEMIC SERVICE  
DEVELOPMENT IN THE MANAGEMENT STUDY PROGRAM OF UPN  
"VETERAN" EAST JAVA**

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**Abstract**

In this era of digitalization, service science plays a vital role as a support for the successful implementation of the tri dharma of higher education in education, this can be done by developing innovations in terms of e-service quality using chatbots. The purpose of this research is to develop academic services for the UPN "Veteran" East Java Management undergraduate program through e-service quality innovation using chatbots. To determine satisfaction, measurements use the attributes of e-service quality, chatbot, and satisfaction. This research method uses descriptive quantitative through the measurements used are Customer Satisfaction Index (CSI) and Importance Performance Analysis (IPA). The sample in this study used was non-probability with a purposive sampling method. The results obtained in this study indicate that the level of student satisfaction is at a value of 76% which is included in the satisfied criteria. Of the 13 attributes used, only 2 attributes are in accordance with student expectations, namely the attributes of natural language understanding and willingness to recommend.

**Keywords:** Service science, E-Service Quality, Chatbot, Satisfaction

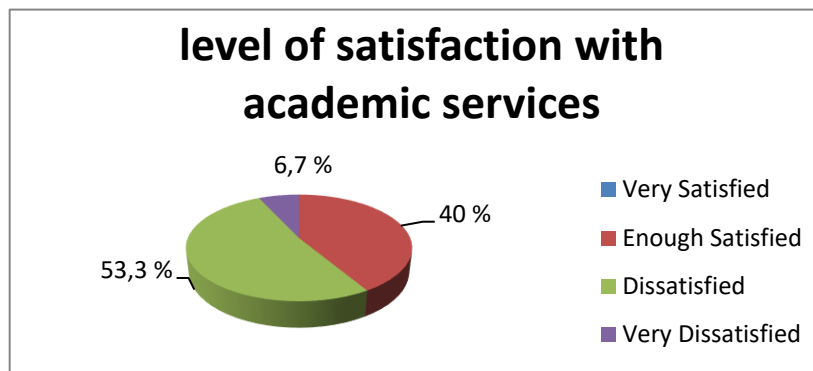
## INTRODUCTION

In the era of digitalization, service science plays a pivotal role in supporting the successful implementation of higher education's tri dharma in education. According to Maglio & Spohrer, service science is a discipline that studies service systems with the aim of creating a foundation for systematic service innovation. Service science is an interdisciplinary field of study that focuses on the development and application of knowledge, skills, and best practices in providing quality services. According to Maglio & Spohrer in (Bock et al., 2020), technology and information can play a vital role together, making service science a promising approach to service delivery.

In today's digital era, services that were once manual and face-to-face are now increasingly utilizing technology. As a result, e-service quality plays a crucial role in driving the success of service providers. According to (Rukmana, 2023), electronic service quality refers to the extent to which a website, web application, AI, or similar platform can meet and facilitate consumers or service targets online. In measuring e-service quality, (Salome et al., 2022) following dimensions ease of use, reliability, fulfillment, responsiveness, security, and personalization. Other studies have identified different dimensions of e-service quality. For example, (Maharani Intan Az Zahra, Hartuti Purnaweni, 2023) following dimensions are efficiency, fulfillment, system availability, privacy, responsiveness, return of compensation, and contact.

In the realm of digital services, numerous tools and methods exist to elevate e-service quality. This is where service science plays a pivotal role, fostering service innovation and driving continuous improvement. One such innovative approach is the utilization of chatbots. Chatbots are intelligent agents that facilitate text-based communication through programmed responses based on a vast repository of data. Upon receiving input, chatbots generate output in the form of replies or prompts. Chatbot implementation has gained widespread adoption among companies, organizations, and institutions that engage in frequent, real-time interactions with their customers or users (Erlina et al., 2023). According to (Soetiyono et al., 2024), several key indicators are employed to measure chatbot performance responsiveness, clarity, accessibility, availability, natural language understanding, reliability, learning ability, security, and multitasking ability.

In the realm of education, service plays a pivotal role in facilitating the teaching and learning process for all stakeholders involved in an institution or university. Universities, as organizations that provide services to both academics and the general public, can significantly enhance their reputation and standing by prioritizing quality service delivery. UPN "Veteran" East Java's Management Study Program exemplifies this commitment to excellence by employing various technology-driven services to streamline and improve the dissemination of academic data and information. These services, include the e-learning web, SIAMIK web, FEBIS web, and the recently introduced Manbot (Management Chatbot) on WhatsApp.



**Figure 1. 1**  
**Level of Satisfaction with Academic Services**

The current electronic services employed by the Management Study Program's academic services have failed to yield a positive impact on student satisfaction. Based on interviews conducted with 30 active students, only 40% of students expressed satisfaction, while the remaining 60% indicated dissatisfaction with the Management Study Program's electronic services. This research aims to investigate student satisfaction with academic services using a chatbot. According to Indrawati (Ramadhini, 2022), student satisfaction can be measured by indicators such as fulfillment of expectations, willingness to recommend, and interest in revisiting or reusing the service. In another study, Lupiyoadi (Revika, 2023), five indicators to measure student satisfaction, including service quality and availability, ease and comfort in service, timeliness and accuracy of service, transparency of information, and student evaluation.

Measuring customer satisfaction and identifying attribute conditions will be used to evaluate service development. The measurement methods employed are the Customer

Satisfaction Index (CSI) to gauge satisfaction levels and Importance Performance Analysis (IPA) to assess the alignment with expectations and determine the quadrant placement of each attribute, indicating areas for improvement or maintenance.

## **REVIEW OF LITERATURE**

### **Service Science**

According to Maglio & Spohrer in (Revika, 2023), service science is an academic discipline that delves into service systems to establish a foundation for systematic service innovation. It is an interdisciplinary field of study that focuses on developing and applying knowledge, skills, and best practices in delivering high-quality services. The advancement of service science benefits all aspects of life, encompassing both the business and education sectors.

### **Chatbot**

The term "chatbot" is derived from two words: "chat" and "bot." In the realm of computer science, "chat" refers to text-based communication, while "bot" denotes a program equipped with specific data that generates an output (response) upon receiving an input. According to (Ningtyas, K. D, Kurniawan, 2023), chatbots have emerged as indispensable tools for digital businesses, offering a multitude of benefits. Chatbot is a virtual robot that plays a vital role in digital businesses because of its various benefits, including being available 24 hours non-stop, saving customer time, improving the quality of customer experience, saving service costs, increasing the volume of products sold, and providing customer satisfaction.

These chatbots have often been implemented by companies, organizations, or institutions that require instant yet accurate interactions with their customers or users (Erlina et al., 2023). Most universities interact a lot with their students in delivering the information they need, so by having a chatbot, the officer who provides the information does not need to spend too much effort. The use of chatbots in higher education is one example of the impact of the rise of artificial intelligence. According to (Guntoro et al., 2020), chatbots are very useful if implemented in an educational context, especially in higher education, which has the aim of providing services and answering questions from students.

## **E-Service Quality**

Service by definition comes from the basic word “*layan*” which means providing assistance or providing things needed by other parties to provide services. Service is any activity or activity that is intangible and does not become any ownership provided by one party to another, according to Kotler in (Utomo & Maskur, 2022) .In simple terms, service is a series of activities in the form of efforts to meet customer needs or desires carried out by individuals, organizations, or institutions. Along with the development of technological life, services are not only manual face-to-face but can also be through the internet network or e-service. Simply put, E-Service is a service provided on an electronic basis. according to (Rukmana, 2023) the quality of electronic services is the extent to which a site, web, AI, and the like can fulfill and facilitate consumers or target services online. According to (Mayasari et al., 2021) efficiency and effectiveness in a service are part of the strategy in providing optimal service to users or consumers.

## **Student Satisfaction**

Satisfaction comes from two syllables, namely *satis* and *facto*. Satis means good enough while *facto* means to do, so satisfaction means an effort to do something good enough or adequate. Satisfaction is a person's feeling when comparing results or performance with his expectations. If the performance is below the level of expectation, then the customer is said not to be satisfied, but if the performance or results match or are even greater than customer expectations, it can be said to be satisfied. Students are someone who is undergoing their studies in higher education, therefore it can be concluded that student satisfaction is the level of conformity between the expectations desired by students for the services they get and the reality that exists (Wijana & Dwi Rusiawati, 2021).

## **RESEARCH METHOD**

This type of research uses descriptive quantitative. The research subjects were active students of the management study program of UPN “Veteran” East Java while the research object was the management study program of UPN “Veteran” East Java. The sample used is a non-probability sample with a purposive sampling method. The sample used from all active students amounted to 1916, processed using the Slovin formula to 95 active students in the 2023 college batch totaling 24 students, the 2022 college batch amounted to 22 students, the

2021 college batch amounted to 23 students, the 2020 college batch amounted to 17 students, the 2019 college batch amounted to 5 students, the 2018 college batch amounted to 2 students, the 2017 college batch amounted to 2 students. This study uses primary data obtained through interviews and questionnaires, for secondary data through literature studies of journals and books and previous research. After the questionnaire results are obtained, the data is analyzed using the validity and reliability test method using SPSS software version 26, then analyzed using the customer satisfaction index (CSI) method to determine the level of satisfaction and importance-performance analysis (IPA) to determine the level of conformity and know where the attributes are located in what quadrant to know the strategies needed to improve services.

**RESULTS AND DISCUSSION**

This research begins with the creation of a chatbot using sendpulse web which is used as an academic service. After the system is finished, primary data is collected through the documentation process, interviews, and questionnaire answers from respondents which are used as data to use the CSI and IPA methods. Questionnaires were distributed to 95 active students of the UPN “Veteran” East Java Management study program. The table below shows the attributes used as questionnaire statements.

**Table 1**  
**Attributes Used as Questionnaire Statements**

No	Variable	Indicator	Statement
1	E-Service Quality	Efficiency (1)	Using a chatbot can get information easily and quickly without spending a lot of effort.
		Security (2)	Chatbot guarantees the security of personal data that is the privacy of the user
		Fulfillment (3)	Chatbot provides results according to user expectations in terms of promised services.
		System Availability (4)	Chatbot runs smoothly without any bug or freeze constraints
		Responsiveness (5)	Chatbot is able to provide responsive service

		assistance when facing problems	
	Contact (6)	I can contact a waiter instead of an artificial intelligence	
	Ease of Use (7)	Chatbot can be easily accessed and used	
<b>2</b>	<b>Chatbot</b>	Natural Language Understanding (8)	Chatbot is capable of understanding natural language
		Learning Ability (9)	Chatbot is able to learn and improve performance over time
		Multitasking Ability (10)	The chatbot interacts with multitasking
		Willingness to Recommend (11)	I would recommend to other students to use chatbot services
<b>3</b>	<b>Student Satisfaction</b>	Interest in visiting or using services again (12)	I will use chatbot services again
		Service Accuracy (13)	The service provided is correct in time and information

**Recapitulation of Questionnaire Results**

The table below shows the results of the recapitulation of the questionnaire on the level of importance of each statement attribute answered by respondents.

**Table 2**  
**Results of the Recapitulation of the Questionnaire on the Level of Importance**

Indicator	Assessment												
	i.1	i.2	i.3	i.4	i.5	i.6	i.7	i.8	i.9	i.10	i.11	i.12	i.13
1 (Very Dissatisfied)	1	0	0	0	1	0	1	1	0	2	1	1	0
2 (Dissatisfied)	2	3	3	1	1	4	1	8	1	3	3	1	1
3 (Enough Satisfied)	26	30	9	23	28	31	20	33	27	27	35	28	17
4 (Satisfied)	41	49	58	46	47	40	41	35	47	36	40	43	52

5 (Very Satisfied)	25	13	25	25	18	20	32	18	20	27	16	22	25
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The table below shows the results of the recapitulation of the performance level questionnaire of each statement attribute answered by respondents

**Table 3**  
**Results of the Recapitulation of the Performance Level**

Indicator	Assessment												
	p.1	p.2	p.3	p.4	p.5	p.6	p.7	p.8	p.9	p.10	p.11	p.12	p.13
1 (Very Dissatisfied)	0	0	1	0	2	0	1	2	0	0	1	0	0
2 (Dissatisfied)	4	6	6	3	5	5	4	7	6	7	3	2	1
3 (Enough Satisfied)	22	29	25	29	28	29	21	31	26	27	33	33	25
4 (Satisfied)	46	46	45	43	40	43	43	37	39	41	41	43	40
5 (Very Satisfied)	23	14	18	20	20	18	26	18	24	20	17	17	29

**Validity Test**

The validity test is carried out to measure the level of validity or validity of a question or statement on the questionnaire. Questions or statements are said to be valid or valid if the value of  $r_{\text{Count}} > r_{\text{Table}}$ . The validity test uses the help of SPSS version 26 software with 95 respondents, then for the level of confidence using 0.05 or 5%. In this validity test with a sample of 95 people, the  $r_{\text{table}}$  obtained is 0.1698.

**Table 4**  
**Validity Test**

Validity Test Statements of Important (i)    Validity Test Statements of performance (p)

Statement	R Count	R Table	Description	Statement	R Count	R Table	Description
i.1	0,564	0,1698	Valid	p.1	0,689	0,1698	Valid
i.2	0,538	0,1698	Valid	p.2	0,483	0,1698	Valid
i.3	0,626	0,1698	Valid	p.3	0,612	0,1698	Valid
i.4	0,606	0,1698	Valid	p.4	0,564	0,1698	Valid
i.5	0,610	0,1698	Valid	p.5	0,640	0,1698	Valid
i.6	0,661	0,1698	Valid	p.6	0,704	0,1698	Valid

i.7	0,628	0,1698	Valid	p.7	0,605	0,1698	Valid
i.8	0,611	0,1698	Valid	p.8	0,504	0,1698	Valid
i.9	0,634	0,1698	Valid	p.9	0,721	0,1698	Valid
i.10	0,713	0,1698	Valid	p.10	0,643	0,1698	Valid
i.11	0,623	0,1698	Valid	p.11	0,657	0,1698	Valid
i.12	0,605	0,1698	Valid	p.12	0,619	0,1698	Valid
i.13	0,455	0,1698	Valid	p.13	0,609	0,1698	Valid

Source : SPSS

### Reliability test

A reliability test is a test to identify how unbiased (error-free) the measurement is and therefore ensure that the measurements are consistent when various times and items in the instrument. Attributes are said to be reliable if the Cronbach's Alpha value obtained is greater than 0.60.

**Table 5 Statement Level of Importance**

Reliability Statistics	
Cronbach's Alpha	N of Items
.856	13

**Table 6 Statement Level of Performance**

Reliability Statistics	
Cronbach's Alpha	N of Items
.865	13

### Calculation of Customer Satisfaction Index (CSI)

Customer Satisfaction Index (CSI) is a method used if you want to know the level of customer or user satisfaction by looking at the level of importance and performance of all measured attributes. The CSI method looks thoroughly at the level of performance and the level of importance of a product or service being measured (Karima et al., 2022).

**Table 7  
Calculation of Weight Score**

No	Attribute	MSI	WF	MSS	WS
1.	Efficiency	3,92	0,08	3,91	0,30
2.	Security	3,76	0,07	3,72	0,28
3.	Fulfilment	4,11	0,08	3,78	0,31
4.	System Availability	4,00	0,08	3,84	0,30
5.	Responsiveness	3,84	0,08	3,75	0,28
6.	Contact	3,80	0,08	3,78	0,28
7.	Ease of Use	4,07	0,08	3,94	0,32
8.	Natural Language Understanding	3,64	0,07	3,65	0,26
9.	Learning Ability	3,91	0,08	3,85	0,30
10.	Multitasking Ability	3,87	0,08	3,78	29

11.	Willingness to Recommend	3,71	0,07	3,74	0,27
12.	Interest in visiting or using services again	3,88	0,08	3,79	0,29
13.	Service Accuracy	4,06	0,08	4,02	0,32
$\Sigma$		50,57	1	49,54	3,81

$$\begin{aligned}
 \text{CSI} &= (\Sigma \text{WS} : \text{HS}) \times 100\% \\
 &= (3,81 : 5) \times 100\% \\
 &= 76\%
 \end{aligned}$$

**Table 8**  
**Criteria CSI Score**

No	Score CSI	Description
1	81 % – 100 %	Very Dissatisfied
2	66 % - 80,99 %	Dissatisfied
3	51 % - 65,99 %	Enough Satisfied
4	35% - 50,99 %	Satisfied
5	0 % - 34,99 %	Very Satisfied

It can be concluded that the level of student satisfaction with academic services using chatbots based on the criteria table above 76% can be concluded Customer satisfaction index in a satisfied level.

**Calculation of Importance Performance Analysis (IPA)**

Importance performance analysis or IPA is a method used to evaluate service quality by knowing which aspects of performance must be maintained and what must be improved. This method can be applied to identify the relationship between importance and performance. IPA is a combined method of measuring the importance and performance level factors in a two-dimensional X and Y graph that makes it easier to read the data and practical suggestions for the matter under study (Mardalena & Andryani, 2021) .In the calculation, respondents are asked to rate the level of performance and importance, and then the results of the average level of performance and importance will be analyzed in the IPA matrix (Adiyansah et al., 2020).

**Table 9**  
**Suitability Level**

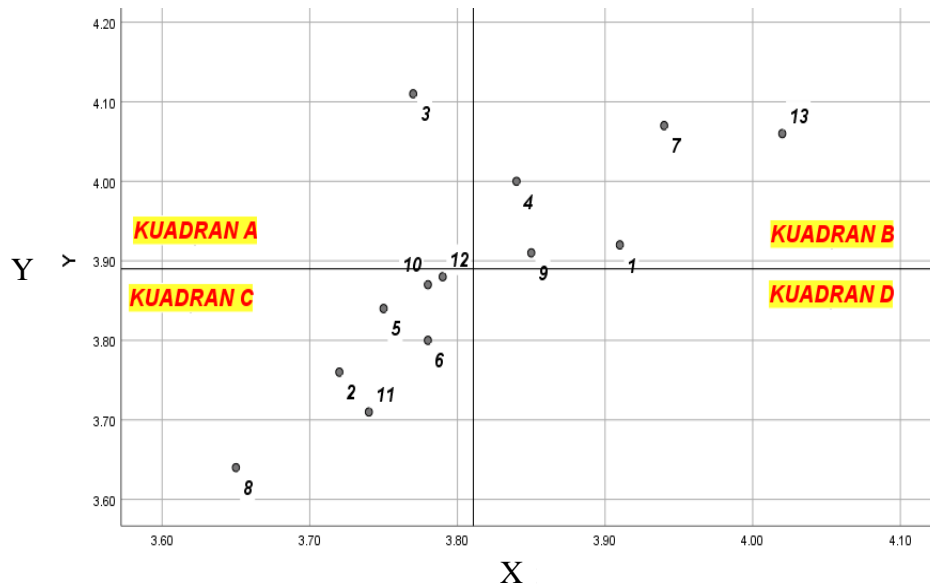
No	Attribute	Level of performance (X)	Level of Importance (Y)	Suitability Level
1.	Efficiency	368	372	98,92 %
2.	Security	353	357	98,87 %
3.	Fulfilment	358	390	91,79 %
4.	System Availability	365	380	96,05 %
5.	Responsiveness	356	365	97,53 %
6.	Contact	359	361	99,44 %
7.	Ease of Use	374	387	96,64 %
8.	Natural Language Understanding	347	346	100,28 %
9.	Learning Ability	366	371	98,65 %
10.	Multitasking Ability	359	368	97,55 %
11.	Willingness to Recommend	355	352	100,85 %
12.	Interest in visiting or using services again	360	369	97,56 %
13.	Service Accuracy	382	386	98,96 %

The table above, shows that only 2 out of 13 attributes have a value of 100% or above 100%, which means that their performance is in accordance with student expectations, namely indicators of Natural Language Understanding and willingness to recommend, other attributes are still not following student expectations.

**Table 10**  
**Average X and Y**

No	Attribute	Level of performance (X)	Level of Importance (Y)	Average X ( $\sum X/95$ )	Average Y ( $\sum Y/95$ )
1.	Efficiency	368	372	3,91	3,92
2.	Security	353	357	3,72	3,76
3.	Fulfilment	358	390	3,77	4,11
4.	System Availability	365	380	3,84	4,00
5.	Responsiveness	356	365	3,75	3,84
6.	Contact	359	361	3,78	3,80
7.	Ease of Use	374	387	3,94	4,07
8.	Natural Language Understanding	347	346	3,65	3,64
9.	Learning Ability	366	371	3,85	3,91

10.	Multitasking Ability	359	368	3,78	3,87
11.	Willingness to Recommend	355	352	3,74	3,71
12.	Interest in visiting or using services again	360	369	3,79	3,88
13.	Service Accuracy	382	386	4,02	4,06
Average				3,81	3,89



**Figure 2**  
**Attribute in Quadrant**  
 Source: SPSS

The diagram above shows the location of each attribute in what quadrant, each quadrant has its own interpretation which can be explained as follows:

**Quadrant A**

Attributes located in quadrant A have interpretations of attributes that are considered important by students, but their performance is not in line with expectations. There is only 1 attribute, namely the fulfillment attribute which is still in quadrant A, so academic services must be improved continuously.

**Quadrant B**

Attributes located in quadrant B have interpretations of attributes that are considered important by students and the performance of these attributes is also in accordance with student expectations. The attributes in quadrant B are the attributes of efficiency, system

availability, ease of use, learning ability, and service accuracy so that chatbot academic services must maintain their performance.

#### Quadrant C

Attributes located in quadrant C have an interpretation of attributes that are considered less important but also in reality the results of their work are relatively not good according to students. Attributes located in quadrant C are attributes of security, responsiveness, contact, natural language understanding, multitasking ability, willingness to recommend, and interest in visiting or reusing, so attribute enhancements to these attributes must be reconsidered because their level of importance is also not great expected by students.

### CONCLUSION

From the results of the analysis of interests and performance using the CSI and IPA methods, it is concluded that first, the level of student satisfaction with the performance of the chatbot is at a value of 76% in the satisfied criteria, second, based on the level of conformity, only 2 of the 13 attributes whose performance matches student expectations, namely the Natural Language Understanding indicator and the willingness to recommend, and the last conclusion, the fulfillment attribute needs to be improved because it is in quadrant A which is the top priority because of the high level of importance but not yet following performance.

Suggestions that can be conveyed after this research is carried out are that the Management study program institution as a service provider must always improve its main electronic academic services in the use of chatbots, because there are still many indicators that do not meet the expectations of students, even though the level of satisfaction is already in the satisfied criteria. This research can be a reference to continue to innovate in the use of technology to improve services, and can be a reference for further research so that knowledge related to the use of technology to improve services is growing.

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