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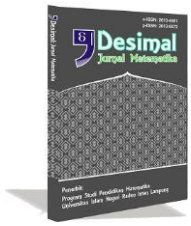

Analysis of the annual vehicle tax payment service system using Petri net model

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ABSTRACT

Service is the process of meeting needs through the activities of others directly. Service is usually synonymous with queues, and queues are what many people complain about. Most of the taxpayers complained about the queues, indirectly they would blame the poor service because of the queues that had piled up. Queues can be reduced by improving services, while one way to improve services is to analyze services using the Petri Net model. Petri Net is mathematical modeling for discrete event systems. Petri Net can be used to model and analyze algebraic problems of transportation networks, manufacturing systems, telecommunications networks, parallel process systems, and so on. In this study, a Petri Net Model of the annual vehicle tax payment service system was created as many as 16 places, 14 transitions, 2 operators, and 30 arcs using WOPED 3.2.0 software. The length of time for tax payment services for taxpayers who have completed the file is faster with a total time of 27 minutes compared to those who have not completed the file with a total time of 35 minutes. The Petri Net model of the annual type of vehicle tax payment service system can be presented in the form of a backward incidence and forward incidence matrix which is used to see the queuing pattern at Samsat Oku Timur 1 with a mathematical model. Columns in the backward incidence matrix can be used to determine which transitions are enabled.

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INTRODUCTION

The role of mathematics cannot be separated from advances in technology and science at this time. For almost all problems in life, the role of mathematics is to provide solutions that can be used both conceptually and in other ways. Even in everyday life, a situation often occurs where a person must wait for services. Service is the process of meeting needs directly through other people's activities. Service aims to help other people's work easier and more helpful. However, that does not mean that the service does not have weaknesses. Services are usually synonymous with queues, which many people complain about it.

In previous studies, Petri Net applications have been discussed, including research on Petri Net: Properties, Analysis, and Applications (Murata, 1989), modeling the composition of web services using Petri Net (Sanjoyo et al., 2011), the scheduling of inner-city bus lines using the Petri Net and Max Plus Algebra models (Winarni, 2011), Petri Net applications in electricity bill payment system PT. PLN (Persero) Rayon Ambon Timur (Wattimena et al., 2012), making an ATM machine service model using Petri Net (Rahakbauw, 2013), the application of Petri Nset on outpatient service system participants access at the regional general hospital Dr. Haulussy Ambon (Lesnussa & Tutupary, 2013), modeling the service system for issuing a Driver's License (SIM) using Petri Net (Aini, 2017), pharmacy service queue models using Petri Net and Algebra Max Plus (Mustofani & Ahmad, 2018), Max Plus and Petri Net Algebra Models in the end semester examination registration service system (Nurmalasari & Rayungsari, 2018), and Petri Net Model in the process of submission for customer credit (Octavia et al., 2021).

The queuing system consist of waiters, customers, and rules that regulate the arrival of customers (Bahar et al., 2008). Queues are generally caused by the number of customers who want to be served, while the number of available writers is few. Such incidents occur because the arrival of customers and service times are not known in advance. Queuing also causes increased service time, with queues that accumulate while the limited number of servants will cause taxpayer payment service time. Although most taxpayers complained about queuing, they would indirectly blame the poor service because of the accumulated queues (Ginting & Rahardjo, 2014). Queues can be reduced by improving services, while one way to improve services is by analyzing services using the Petri Net Model.

Carl Adam Petri, a German mathematician, first developed Petri Net in 1962. In the early 1960s, he defined a general-purpose mathematical model to describe the relationship between conditions and events (David & Alla, 2005). The part of mathematics and computer science concerning a mathematical structure graph, which is expressed in terms of G where G consists of a set V containing points (vertices or nodes) is called graph theory (Rufaidah, 2008). Petri Net is a direct bipartite graph that has 2 points which are called places and transitions. Arrows represent arcs, the place is represented as circles, and transitions are represented as rectangles. Arc indirectly connects places with places or transitions with transitions but connects places with transitions or transitions with places. Each place can contain one or more tokens represented by dots, materials, or materials transferred in a Petri Net system (Wattimena et al., 2012).

By using Petri Net theory, a system can be modeled into a Petri Network, which is a mathematical representation. The theory of Petri Networks is based on the use of Petri Networks in modeling and designing systems (Peterson, 1981). Petri net can be represented in backward incidence and forward incidence matrices. These two matrices are of size $n \times m$, where n is the number of places and m is the number of transitions. The elements of this matrix are non-negative integers (Adzkiya, 2008). The elements in the backward incidence matrix are the arc weights that connect the place to the transition, while the elements in the forward incidence matrix are the arc weights that connect the transition to the place. If there is no arc connecting the place to the transition, then the arc weight is filled with zero (Cassandras & Lafortune, 1993).

The researcher intends to research and analyze the annual type of vehicle tax payment service system using the Petri Net model formed with the help of WOPED 3.2.0 software to make a Petri Net from the Samsat Oku Timur 1 queuing pattern associated with time and present it in the form of a backward incidence matrix and forward incidence matrix. Also, this research helps regulate service patterns in Samsat Oku Timur 1 to make it more effective and efficient.

METHOD

This research method uses the library method where data collection about the service system of annual vehicle tax payments through literature studies. Data collection was carried out on February 1, 2021. The research was conducted at SAMSAT Region, South Sumatra Province, Oku Timur Region 1 Jl. Adiwiyata Kotabaru Martapura East Oku.

The stages of this research start from a literature study by studying references to understand the theories that will be used and also information on the service procedures for paying annual vehicle taxes, and secondary data collection is required. Next, we make a flow diagram to facilitate the Petri Net modeling process. The next step is to create a Petri Net model, perform a simulation using WOPED 3.2.0 software to verify and validate the Petri Net model, and determine the matrix representation.

RESULTS AND DISCUSSION

This section will explain the Petri Net model for a public service that involves queues. One example of a public service system built using the Petri Net model is the annual vehicle tax payment service system in Samsat Oku Timur 1.

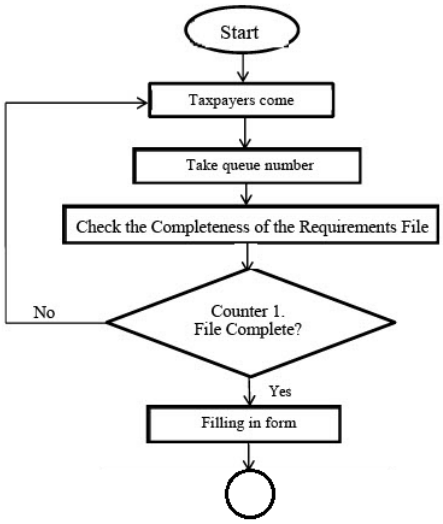
Samsat Oku Timur 1 has two service counters and officers, one police officer and one Raharja service officer. The second service counter one Bank of South Sumatra. The first service counter consists of five Bapenda consists of five Bapenda officers. Bank Sumsel consists of one bank officer. The service counter is in charge of serving the service for checking the completeness of files, data input, correcting, printing payment quotes, and printing SKPD/STNK. While Bank Sumsel l is in charge of serving taxpayers who will make payments after all processes are complete.

When the taxpayer arrives, what the Bapenda officers do at the first service counter is to check the completeness of the files. If the file is complete, the process will be continued for a physical check of the vehicle by the Bapenda officer. After completing the physical check, data input will be carried out by the Bapenda officer, followed by checking the motorized vehicle by the police officer. After checking the motorized vehicle, Bapenda officers print and check the payment quote. Furthermore, an SWDKLLJ (Mandatory Road Traffic Accident Fund Contribution) will be checked by Jasa Raharja officers. Then, taxpayers make payments at Bank Sumsel and wait a few minutes for the SKPD/STNK print process by Bapenda officers at service counters two. Finally, the idle Bapenda officer calls the taxpayer to provide SKPD/STNK. Bapenda officers and idle bank officers will call the following queue number if the file is incomplete.

Based on the observations, tax payment services that do not have complete files are more extended than those that already have complete files. It happens because tax payment services that do not submit complete documents must complete the files first. Then, the taxpayer must complete the file and return it to Samsat to continue the tax payment process. Meanwhile, those who pass the completeness of the file will immediately continue the process at Samsat until finished.

The results of observations at Samsat Oku Timur 1, can be obtained

queuing models and flow diagrams of the tax payment service. The queuing model for tax payment services at Samsat Oku Timur 1 is based on the order of service flow. First, Taxpayers come. Taxpayers take a queue number. An idle Bapenda officer calls the taxpayer queue number to be served. Bapenda officers check the completeness of taxpayer files. If the files are complete, the Bapenda officer will inform the taxpayer to check the vehicle's physical check. If the file is incomplete, the Bapenda officer is idle again. After the files are complete, a physical check of the vehicle will be carried out by the Bapenda officer. After the physical check of the vehicle, data input will be carried out by the Bapenda officer. An idle BAPENDA officer gives a file to the police officer for checking the motor vehicle. After checking the motorized vehicle, the Bapenda officer will print the payment quote and check the payment quote. After that, the Jasa Raharja officer checks the SWDKLLJ. After checking the payment quotation, the idle bank officer calls the taxpayer. The bank clerk informs the amount to be paid. After the notification is made, the taxpayer pays the amount due. Bank officers are obliged to provide proof of payment to taxpayers for taking SKPD/STNK. After obtaining proof of the taxpayer's payment directly to the second service counter to collect SKPD/STNK, the Bapenda officer has printed it.



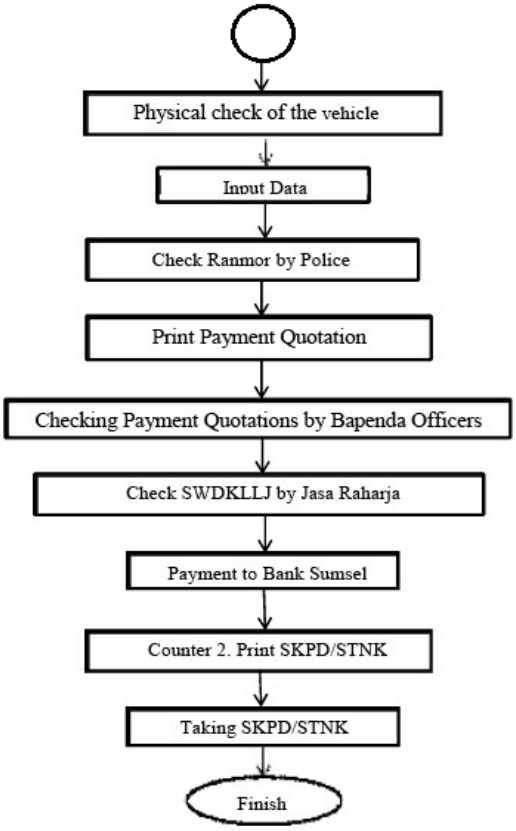


Figure 1. Flowchart of Annual Vehicle Tax Payment Service.

An Annual Tax Payment Service Model can be formed from the queuing system obtained, simulated into the Petri Net with the WOPED version 3.2.0 software. Every event that occurs is related to transitions and places that must be met for the transition to occur. For example, the Petri Net model of the Annual Tax Payment Service System is shown in Figure 2, consisting of 16 places and 14 transitions.

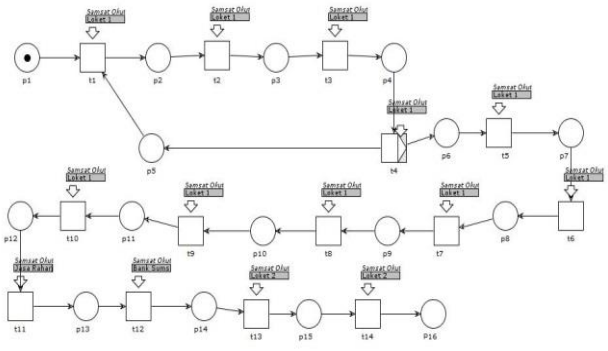


Figure 2. Petri Net Flow of Annual Vehicle Tax Payment Service System

Annotation:
p_1= Start (start), p_2 = Place queue number
p_3 = service counters 1, p_4 = taxpayer provides a file of requirements
p_5 = Idle Bapenda officers
p_6 = The BAPENDA officer provides a reg. form
p_7 = Physical check room of the vehicle
p_8 = Return to service counter 1
p_9 = p_{10} = p_{11} = p_{12} =Taxpayers are waiting
p_{13} = Idle bank clerk calls taxpayers for payment
p_{14} = Taxpayers provide proof of payment to Bapenda officers
p_{15} = SKPD / STNK completed
p_{16} = Taxpayer go back, t_1 = Taxpayer arrives, t_2 = taxpayer takes queue number
t_3 = Service started
t_4 = Check the completeness of the file by the Bapenda officer
t_5 = Taxpayers fill out the form
t_6 = Check the physical vehicle
t_7 = Input data ; t_8 = Checking motorized vehicles by police officers
t_9 = Print payment quotation
t_{10}= Checking payment quotation
t_{11}= Checking SWDKLLJ (Mandatory Contribution of Road Traffic Accidents)
t_{12} = Process payment, t_{13} = Print SKPD / STNK, t_{14}= Taking SKPD / STNK

Furthermore, the flow diagram that has been converted to Petri Net is analyzed using Woped with the results shown in Figure 3.

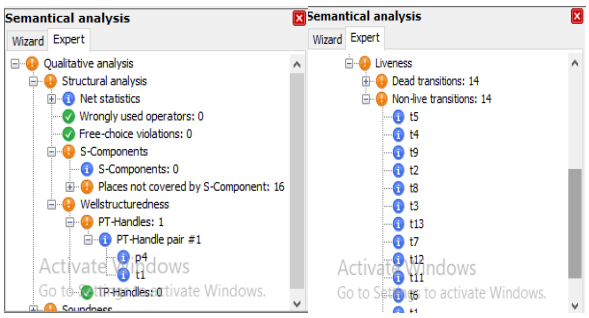


Figure 3. Structural analysis and Liveness Petri Net analysis of the Annual Vehicle Tax Payment Service System

From Figure 3, it is known that the process has 1 PT-Handle, which makes well-structuredness unfulfilled and non-live transitions. Furthermore, Figure 4 below describes an error in the Annual Tax Payment Process, which causes the existence of PT-Handle, as shown in the Petri Net diagram (red circle).

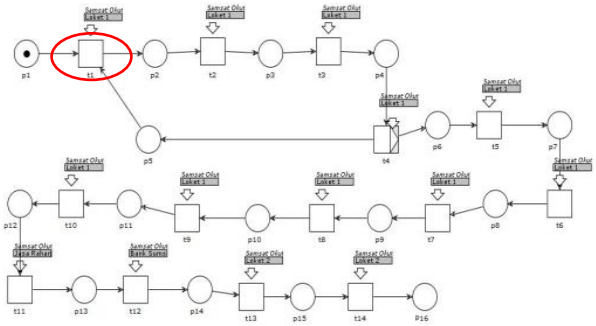


Figure 4. Petri Net Flow Error in the Annual Vehicle Tax Payment Service System

After being analyzed, it is found that t_1 must have an XOR join element. Where if there is an XOR split, it will be closed with an XOR join. The way to calculate the split XOR is by "source" on the place element, with "target" on the transition element. The number of XOR splits corresponds to the target number of the transition elements, as shown in Figure 5.

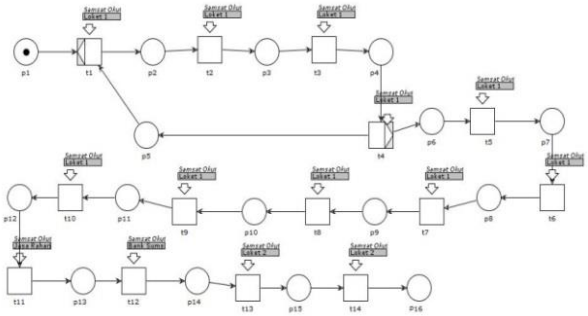


Figure 5. Petri Net Service System for Payment of Annual Types of Vehicle Taxes After Repair

After being analyzed by WOPED, the results are shown in Figure 6 that the Petri Net for the payment service process is sound, and the characteristics of well-structuredness and liveness have been met.

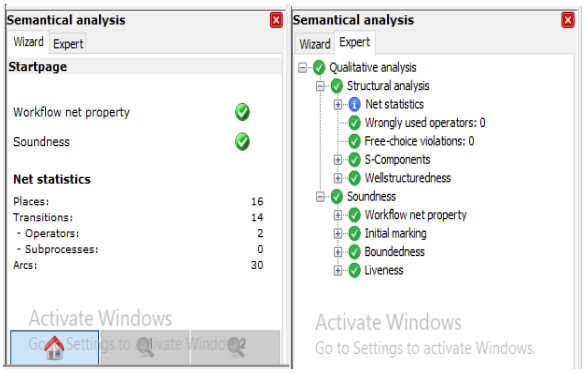


Figure 6. Results of Structural analysis and Soundness Petri Net Service System for Annual Vehicle Tax Payment that has been Improved

The following table shows the simulation analysis of game tokens on WOPED software that has been analyzed.

Table 1. Results of the Game Token Simulation Analysis on WOPED Software

Qualitative Analysis	*Structural Analisis*	*Not Statics*	*Places*	16
			Transitions	14
			Operators	1
			Arcs	30
		Wrongly used operators		Yes
		Free-choice violations		Yes
		S-Components		No
		Wellstructuredness		No
	Soundness	*Workflow net*		Yes
		Initial marking		Yes
		Boundness		Yes
		Liveness		No

By taking the same steps, an analysis of an annual tax payment service process can be carried out, whether it is sound or not, so that revisions or corrections can be made to the flow events that have been implemented that are valid and correct.

Long queues because the service capacity is slow, it will obviously cause queue lines so that customers are harmed by time. If customers feel that waiting is more profitable than leaving the queue, then they prefer to wait even though it takes a fairly long duration. However, on the contrary, if customers feel that leaving the queue is more profitable than waiting, they will leave the queue (Oktaviyanty, et al., 2018).

The first process is carried out at the first service counter by checking files by the BAPENDA officer, for checking files an average of about 2 minutes. The second process is the physical check of the vehicle; for an average vehicle physical check for about 5 minutes. The third process is data input, for data input an average of about 1 minute. The fourth process is checking motor vehicles by the police, to check motor vehicles for about 2 minutes. The fifth process is printing payment quotes, for printing payment quotes an average of about 4 minutes. The sixth process checks the payment quote, checking the payment quote for an average of about 3 minutes. The seventh process is checking SWDKLLJ (Mandatory Contribution of Road Traffic Accidents) for checking SWDKLLJ an average of about 2 minutes. The eighth process is payment to the Sumsel bank, for an average payment of about 5 minutes. The ninth process is printing SKPD / STNK, for primary SKPD / STNK an average of about 2 minutes. Finally, the tenth process takes SKPD / STNK, for the replay SKPD / STNK an average of about 1 minute. So the annual vehicle tax payment process is carried out an average of about 27 minutes for the time it takes taxpayers to complete the process.

However, it is different for taxpayers who have not completed the documents because there will be additional time. Taxpayers must complete the existing requirements, such as bringing the original KTP and STNK (Vehicle Registration Certificate). Usually, taxpayers bring a photocopy of an ID card, not an original one, because the requirements to pay taxes must submit the original KTP so that the taxpayer meets the existing requirements. If it is equipped, the taxpayer returns to the

Samsat office to continue the process and start queuing again.

Tabel 2. Results of the Analysis of the Duration of the Service Duration of the Annual Vehicle Tax Payment Service Period

No	Type of service	Average service time (minutes)	
		WP file Complete	WP File Incomplete
1	Check file completeness	2	10
2	Physical check of the vehicle	5	5
3	Entry data	1	1
4	Check Ranmor	2	2
5	Printing quote payment	4	4
6	Checking payment quote	3	3
7	Check SWDKLLJ	2	2
8	Payment to Bank Sumsel	5	5
9	Print SKPD/STNK	2	2
10	Taking SKPD/STNK	1	1
The average amount of service time		27	35

From Table 2, it is obtained that the service time of the annual type of tax payment that completes the file is faster with an average service time of 27 minutes, while those who have not completed the file are longer, with an average service time of 35 minutes.

This section examines the representation of Petri Net in matrix notation and simulates it with the WOPED version 3.2.0 software. Petri net can be represented in two matrices called backward incidence and forward incidence. These two matrices are of size $n \times m$ where n is the number of places and m is the number of transitions. The elements of this matrix are non-negative integers (Adzkiya, 2008).

The elements in the backward incidence matrix are the arc weights that connect the place to the transition, while the elements in the forward incidence matrix are the arc weights that connect the transition to the place. If no arc connects the place to the transition, the arc weight is filled with zero (Cassandras & Lafortune, 1993).

Based on the Petri Net model in Figure 5, there are 16 places and 14 transitions, so that the number of rows (n) is equal to 16, and the number of columns (m) is equal to 14. Therefore, the numbers will form a backward incidence matrix and forward incidence matrix. Therefore, the representation in the form of an incidence matrix is as follows:

$$A_b = \begin{bmatrix} 1&0&0&0&0&0&0&0&0&0&0&0&0&0 \\ 0&1&0&0&0&0&0&0&0&0&0&0&0&0 \\ 0&0&1&0&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&1&0&0&0&0&0&0&0&0&0&0 \\ 1&0&0&0&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&0&1&0&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&1&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&1&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&1&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&1&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&1&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0&1&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&1&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&0&1&0 \\ 0&0&0&0&0&0&0&0&0&0&0&0&0&1 \\ 0&0&0&0&0&0&0&0&0&0&0&0&0&0 \end{bmatrix}$$

A_b is a backward incidence matrix.

$$A_f = \begin{bmatrix} 0&0&0&0&0&0&0&0&0&0&0&0&0&0 \\ 1&0&0&0&0&0&0&0&0&0&0&0&0&0 \\ 0&1&0&0&0&0&0&0&0&0&0&0&0&0 \\ 0&0&1&0&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&1&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&1&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&0&1&0&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&1&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&1&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&1&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&1&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&1&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0&1&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&1&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&0&1&0 \\ 0&0&0&0&0&0&0&0&0&0&0&0&0&1 \end{bmatrix}$$

A_f is a forward incidence matrix.

Based on the previous Petri Net model, the above matrices were obtained. The backward incidence matrix and the forward incidence matrix have elements with a value of 0 and 1, which means that if there is an arc that connects the transition to place or place to the transition, the matrix element is 1. In contrast, if no arc connects the place and the transition, the metric element has a value of 0. Next, From the formed matrix, it is found that the queuing pattern of the annual type of vehicle tax payment's service system in Samsat Oku Timur 1 and the column in the backward incidence matrix can be used to determine which transitions are enabled.

CONCLUSIONS AND SUGGESTIONS

Petri Net is a tool for modeling a discrete event system that can be expressed mathematically. For example, the annual-vehicle tax payment service system can be modeled with a Petri Net of 16 places, 14 transitions, two operators, and 30 arcs using the WOPED 3.2.0 software. From the observations of the length of time for the annual vehicle tax payment service process, taxpayers who have completed the required documents finish faster with an average time of 27 minutes, and taxpayers who have not completed the required documents take longer with an average time of 35 minutes.

The annual type of vehicle system tax payment service model can be presented in the form of a backward incidence matrix A_b and forward incidence matrices A_f. These matrices can be used to see queuing patterns in East Samsat Oku 1. Columns on the backward incidence matrix can be used to determine which transitions are enabled.

REFERENCES

Adzkiya, D. (2008). *Membangun Petri Net Lampu Lalu Lintas Dan Simulasinya*. Institut Teknologi Sepuluh Nopember Surabaya.

Aini, N. S. (2017). Pemodelan sistem pelayanan penerbitan surat izin mengemudi (SIM) menggunakan petri net. J*ournal of Technology Science and Engineering*. **1**(2):128-138.

Bahar, M. S., Mananohas, M. L, & Montolalu, C. E. J. C. (2008). Model sistem an-trian dengan menggunakan pola kedatangan dan pola pelayanan permohonan SIM di satuan penyelenggaraan administrasi SIM Resort Kepolisian Manado. *d'Cartesian: Jurnal Matematika dan Aplikasi*. **7**(1):15-21.

Cassandras, C. G., & Lafortune, S. (1993). *Introduction to Discrete Event Systems* (Second Ed.). Springer Science and Business Media.

David, R. & Alla, H. (2005). *Discret, Continuous and Hybrid Petri Nets.* Springer-Verlag. Germany.

Ginting, P. L. & Rahardjo. (2014). Analisis sistem antrian dan optimalisasi layanan teller. *Jurnal Studi Manajemen Organisasi*. **11**: 58-66.

Murata, T. (1989). Petri Net: Properties, analysis, and applications. *Proceedings of the IEEE*. 77:541-580.

Mustofani, D. & Ahmad, A. (2018). Model antrian pelayanan farmasi menggunakan petri net dan aljabar max plus. *JMPM: Jurnal Matematika dan Pendidikan Matematika*. **3(**1): 33-43.

Nurmalasari, D. & Rayungsari, M. (2018). Model aljabar max plus dan petri net pada sistem pelayanan pendaftaran ujian akhir semester. *Aksioma: Jurnal Matematika dan Pendidikan*

Matematika. **9**(2): 47-55.

Oktaviyanty, H., Dwidayati, N. K., & Agoestanto, A. (2018). Optimasi sistem antrian pada pelayanan servis sepeda motor berdasarkan model tingkat aspirasi studi kasus Bengkel Ahass Handayani Motor (1706) Semarang, *UNNES Journal of Mathematics*. **7**(2).

Octavia, M., Fitriani, & Faisol, A. (2021). Petri net model in the process of submission for customer credit of BPR Lambang Ganda Serang, *BAREKENG : Jurnal Ilmu Matematika Dan Terapan,* **15**(3):565-574.

Peterson. J. L. (1981). *Teori Petri Net dan Pemodelan Sistem.* Pretince Hall. New York.

Rahakbauw, D. L. (2013). Diagram unified modelling language untuk memodelkan ayanan automated teller machine dengan Petri net. *BAREKENG : Jurnal Ilmu Matematika Dan Terapan*, **7**(1): 9-14.

Rufaidah, V. W. (2008). Kolaborasi dan graf komunikasi artikel ilmiah peneliti bidang pertanian : Studi kasus pada jurnal penelitian dan pengembangan pertanian serta indonesia. *Journal of Agricultural Science*. **17**(1): 10-21.

Sanjoyo, B. A., Subiono & Sarno, R. (2011). Pemodelan komposisi web service dengan menggunakan Petri net. *Prosiding Nasional Matematika dan Pendidikan Matematika*. Yogyakarta.

Lesnussa, Y. A. & Tutupary, F. S. (2013). Aplikasi Petri net pada sistem pelayanan pasien rawat jalan peserta akses di Rumah Sakit Umum Daerah Dr. Hauslussy Ambon. *Jurnal Gamatika.* **3**(2).

Wattimena, F. N., Pentury, T., & Lesnussa, Y. A. (2012). Aplikasi Petri Net pada sistem pembayaran tagihan listrik PT. PLN (Persero) Rayon Ambon Timur. *BAREKENG : Jurnal Ilmu Matematika Dan Terapan*, ***6***(1), 23–30.

Winarni. (2011). Penjadwalan jalur bus dalam kota dengan model Petri net dan aljabar max plus (studi kasus Busway Transjakarta). *Jurnal Cauchy*. ***1****: 192-206*.

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