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Prediction of Flick Density in the Rainy and Dry Seasons Based on Health Services, Behavior, Environmental Conditions, and Breeding Place in Banjarbaru City Using Partial Least Square

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ABSTRACT

Background: Dengue fever is a serious public health threat and becomes an economic burden throughout the tropics. The indicator of success in eradicating dengue hemorrhagic fever (DHF) is related to the presence of mosquito larvae, namely the density of larvae. Climate change from the rainy season to the dry season has led to the proliferation of disease vectors such as the Aedes mosquito. Environmental factors play a very big role in addition to behavior, health services, and heredity. Other factors that are also at risk of infection and the growing development of dengue fever are population growth that does not have a specific pattern, unplanned urbanization factors.

Materials and Methods: The sample in this study was a housewife selected in twelve endemic villages in Banjarbaru city. This study examined the larva density model with a partial least square approach, so that by knowing the influential factors in the decrease in the density of flicks is expected to be used as a reference for prevention and control of DHF events cases.

Results: The results showed that the prediction model of flick density in the rainy season and dry season with Partial Least Square (PLS) approach is a fit and highly accurate model based on criteria R^2 and Q^2. The density model of flicks in the rainy season can be explained by behavioral health services, environmental conditions, and Breeding Place by 87.7%, while in the dry season it is 80.8%. The decrease in larva density in the rainy season is heavily influenced by environmental conditions, behavior and health services, while in the dry season is influenced by breeding place / site. The rainy season prefers fogging (0.714) and counseling (0.795) indicators on the health service factor, while in the dry season the dominant indicators are larvasidation (0.847) and Periodic Larva Check (PLC) (0.729). Furthermore, behavioral factors in the rainy season prioritize knowledge indicators (0.716), while during the dry season the dominant indicators are attitude (0.899) and action (0.890). Environmental conditions in the rainy season pay more attention to water pH (0.588), while in the dry season the indicators considered are water temperature (0.991) and water type (0.774). In the rainy season, the breeding place factor pays more attention to the type of container (0.950), while in the dry season the dominant indicators are container material (0.970), container color (0.959), and container cover (0.924).

Conclusion: The breateau index and house index indicators are dominant in forming larva density. The breeding place is a dominant factor in directly affecting the density of larvae in the dry season. Container material affects the growth of microorganisms that feed larvae, especially in containers that are rarely drained. The magnitude of the influence of breeding places in the dry season is more due to the infrequent draining of water for supply, so that larvae reproduction is more frequent.

Keywords: Flick Density, Health Service, Behavior, Environmental Conditions, Breeding Place, R^2, Q^2, PLS

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INTRODUCTION

Indonesia is one of the hyper endemic countries of dengue, and the second country in the world with the highest number of dengue cases after Brazil. In addition, dengue infection in Indonesia causes an economic burden of more than 300 million US dollars per year or the equivalent of 3.9 trillion IDR [1]. Until now, this disease can be prevented by breaking the chain of vector transmission even though the vaccine for this disease has been tested by WHO since 2016 but has not yet entered the basic immunization program. Among the indicators of success in eradicating dengue hemorrhagic fever (DHF) are those related to the presence of mosquito larvae, namely the density of larvae [2]. DHF can only be controlled by breaking the chain of vector transmission because until now the vaccine for this disease is still being tested, and a study in Australia shows that stopping mosquito control can increase the cost of epidemic management compared to sustainable surveillance and early detection strategies [3]. One of them is monitoring the larvae. According to WHO, dengue fever is a vector-borne disease and the fastest spreading virus with an epidemic potential of 30 times, and an increase in the last 50 years [4]. Dengue fever is a serious public health threat and an economic burden throughout the tropics [5]. The socio-economic and social impacts of dengue are also very large and there will likely be an epidemic explosion that paralyzes the community and even the state [6]. This was identified in a study [7], which stated that in carrying out dengue control in semi-urban communities, mistakes were made which resulted in high dengue fever [8].

In Indonesia, dengue hemorrhagic fever is still a major health problem and until now the drug and vaccine are not yet available, even though this disease can be transmitted quickly by the Aedes aegypti mosquito so that it has the potential to cause an outbreak [9]. East Kalimantan and South Kalimantan, there were 433 districts / cities out of 508 districts / cities (85.2%) who had contracted dengue with a total of 100,347 cases (morbidity rate: 39.83 per 100,000 population) with 907 deaths (Mortality Rate: 0.90%) in 2014 and in 2015 there were 9 provinces that experienced an increase in DHF cases and there were 2 provinces that had dengue incidence rates above the national target of 49 per 100,000 population [10].

DHF cases in South Kalimantan, from 13 regencies / cities, Banjarbaru City in the last three years also experienced an increase, even in 2015 IR jumped sharply to 230.73 per 100,000 population from the previous year's IR of 89.48 per 100,000 population and in 2015. years down to 11.45 per 100,000 population [11]. Dengue hemorrhagic fever (DBD) in Banjarbaru is still a problem that worries many parties. Especially during the rainy season, when the Aedes Aegepty mosquitoes breed well, even though various interventions are carried out to reduce high dengue cases, such as fogging, eradicating mosquito nests (PSN) or 3M plus [12[[11].

Researchers have developed many models related to dengue fever cases, including by Lauren Gardner, who stated that air transportation is also a risk factor for the spread of dengue [4]. Environmental factors play a very big role in addition to behavior, health services, and heredity. Other factors that are also at risk of infection and the development of dengue fever are population growth that does not have a certain pattern, unplanned and well-controlled urbanization factors, an increasingly advanced transportation system that facilitates population mobilization, a waste management system and clean water supply, inadequate, the development of the spread and density of mosquitoes, the lack of an effective mosquito control system, as well as the weakening of the public health structure, the immunological status of a person, the infectious virus strain, age, sex [12] and genetic history also affect transmission disease. Global climate change which causes an increase in average temperature, changes in patterns of the rainy and dry seasons [2] is closely related to high humidity in the rainy season which provides an optimal environment for the incubation period and increased vector activity in biting [2].

Several studies related to modeling the incidence of dengue fever include, [7] with cross-sectional studies using linear regression analysis, student tests and chi square to describe factors that influence the incidence of dengue fever in urban areas of Malaysia. The use of linear regression in cases of dengue fever occurs in violation of assumptions, especially if the use is a latent variable, as is the assumption of error independence or an identical diversity of unfulfilled errors [13]. While research [14] forms only one latent variable model using Pearson's correlation and linear regression, so that other latent variables are not observed.

Dengue fever disease is one of the diseases that can be explained by both concepts, namely the concept of Blum and the concept of triangular epidemiology including the vector of the disease (mosquito) in this case is the flick of mosquitoes. The interaction of these components in influencing the onset of dengue fever not only comes from one factor but can also be from several factors. Risk factors that affect DHF are latent variables, such as environmental, vector and human conditions. One of the analytical techniques often used to describe complex relationships or influences between latent variables is structural equation modelling (SEM). SEM has the ability to analyze the pattern of relationship between latent constrace and its indicators, or latent constrace with each other, as well as direct measurement errors.

Methods related to latent variables are Confirmatory Factor Analysis (CFA) (Brown, 2006, N. Rusdi et. al., 2014)) [15] [16] and Structural Equation Modeling (SEM) (Mulaik, 2009 [17]; Raykov & Marcoulides, 2006 [18]; Hair et.al., 2010 [19]; Bollen, 1989 [20]). Otok et. al., (2018) [21], Weak physical condition, social economy less prosperous, and the emergence of a degenerative disease that can lead to decreased productivity, thus affecting social life, it is necessary to study the quality of life index of elderly global, urban and coastal communities in Surabaya. Anuraga & Otok (2013) [22], estimated the parameters of the PLS model on poverty problems. Fischer (2012) [23] shows that in health decision making, SEM PLS is more perspective and realistic for empirical analysis. Deboeck, et. al., (2020) [24], examined predictive model values in a SEM model used as the basis for inference and prediction. Azomahou, et.al., (2010) [25], the data analysis approach if the available information about the regression curve is limited and it is difficult to make assumptions about the form of regression, then the largest part of the information lies in the data pattern, so that to predict the regression curve regression nonparametric whose analysis is not based on a certain distribution. Otok, et.al., (2019) [26] used a non-parametric model structure to estimate the poverty model by meta-analysis.

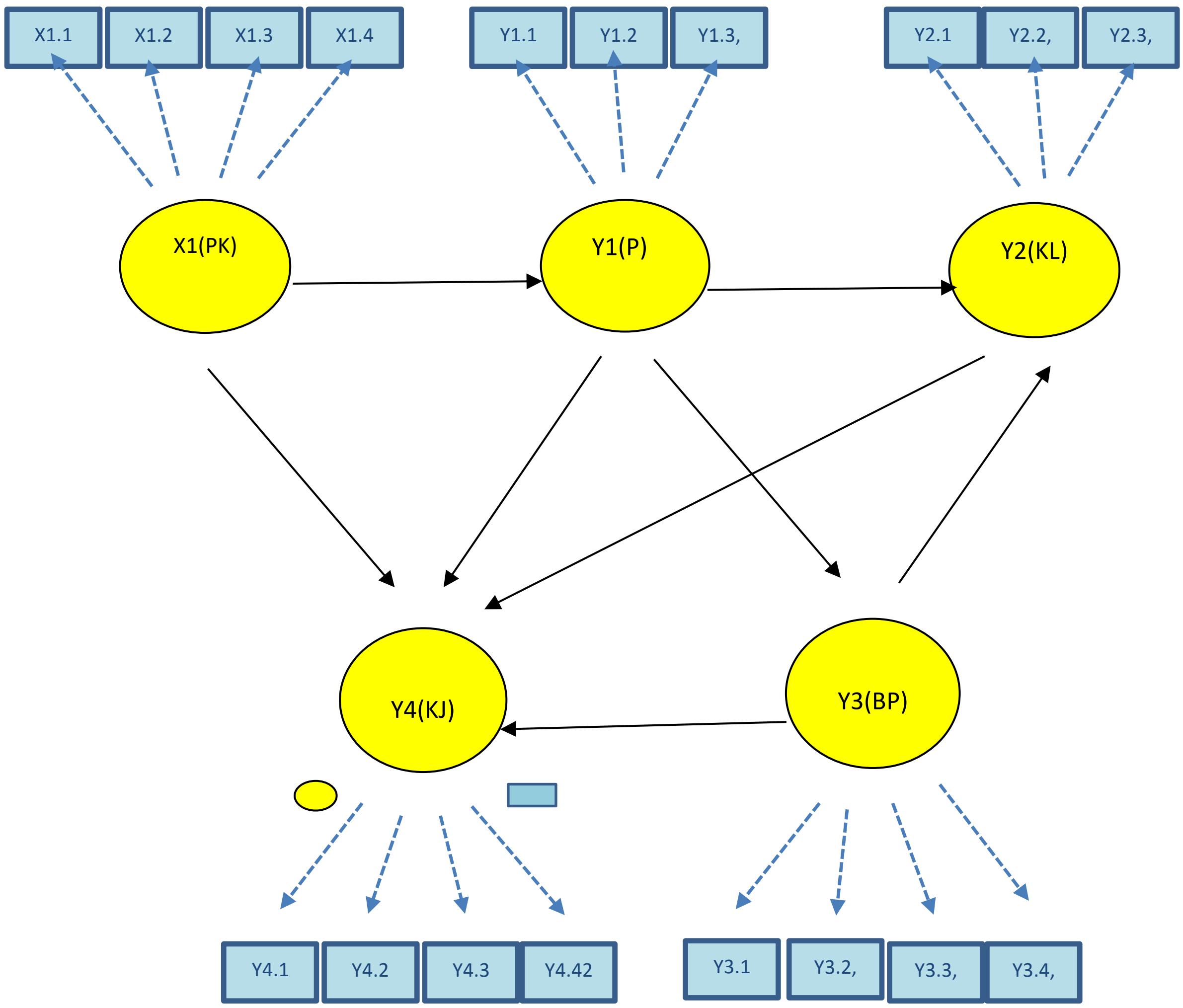
PLS does not assume the absence of a specific distribution for parameter estimation, hence the parametric technique for testing parameter signification is not required [27]. PLS evaluation model based on prediction measurement that has nonparametric properties. Measurement models or outer models whose reflexive indicators are evaluated with convergent and discrimined validity of their indicators and composite reliability for indicator blocks. While the outer model with formative indicators is evaluated based on its substantive content which is to compare the relative weight size and see the signification of the weight size [27]. Structural model or inner model evaluated by looking at the value for latent R^2 construct response with using stone-geisser size test, Q^2 [28] [29], and also seeing the magnitude of the structural path coefficient of this estimate was evaluated using the t-test statistic obtained from the bootstrapping procedure [30]. Bootstrap to test the research hypothesis through the t test, and bootstrap stops if between the original estimate and the bootstrap estimate has a close value.

The high density of mosquito larvae can result in high cases of DHF, and if not addressed it will always result in high cases of DHF. This study examines the larva density model with the partial least square approach, so that by knowing the factors that influence the reduction of larva density, it is hoped that it can be used as a reference for prevention and control of DHF cases.

RESEARCH METHODOLOGY

The study population was all housewives in twelve endemic sub-districts in the city of Banjarbaru, and the study sample was selected housewives [31]. Endogenous latent variables are Larva density Y4 (KJ), (Y4.1: Larva Density Index, Y4.2: House Index, Y4.3: Container Index, Y4.4: Breuteu Index). The intervening latent variables are Behavior Y1 (P), (Y1.1: Knowledge, Y1.2: Attitude; Y1.3: Action). Environment condition latent variable Y2 (KL), (Y2.1: Clean water Source, Y2.2: water temperature, Y2.3: Water pH). Breeding Place / site Y3 (BP) latent variables, (Y3.1: Container material, Y3.2: Container Type, Y3.3: Container Cover, Y3.4: Container Color). While the exogenous latent variables are Ministry of Health X1(PK), (X1.1: Larvasidation, X1.2: Fogging, X1.3: Periodic Larva examination, X1.4: Counseling Services)

(Isnawati et.al, 2018) [31]. The conceptual of larva density research is presented as follows.



Note: : laten variable, : indicator; ----> : influence; - - -> : loading factor

Figure 1. Conceptual framework for predicting Aedes sp. Larva density with modifications [31]

The data analysis technique used is Partial Least Square (PLS). PLS is a component or variant based Structural Equation Modeling (SEM) equation model. PLS is an alternative approach that shifts from a covariance-based to variant-based SEM approach. PLS is more of a predictive model. PLS is a powerful analytical method [21], because it is not based on many assumptions. PLS modeling requires two stages to assess the Fit Model of a study. These stages include the analysis or evaluation stage of the measurement model and structural model analysis. The measurement model tests the validity and reliability of the research instrument.

Partial Least Square (PLS) modeling with 3 schemes covering the outer model and inner model [32]. Test the validity and reliability (outer model), namely convergent validity, average variance extracted (AVE), discriminant validity, and composite reliability. The indicator is called valid if it has a loading factor value> 0.5, the latent variable is called valid discriminant if the AVE root is> 0.5 and the latent variable is said to be reliable if the composite reliability value is > 0.6. Inner Model, this test is seen from the inner weight value to test the research hypothesis through t test on the bootstrap sample and the goodness of fit model. The model can be declared to have a goodness of fit if it has an R-Square value > 0 and a Q^2 value> 0.35 giving high accuracy. The outer and inner model coefficients of this estimate are evaluated using the statistical test- t obtained from the bootstrapping procedure [30], and the bootstrap stops if between the original estimate and the bootstrap estimate are nearly the same.

ANALYSIS AND DISCUSSION

The validity of the indicators used confirmatory factor analysis for each latent variable. Reliability is a measure of the internal consistency of the indicators of a formation variable that shows the degree to which each indicator indicates a commonly formed variable. The complete results are presented in Table 1 below.

Table 1. Convergent Validity, Discriminant and Reliability Value of Research Variables in Rainy and Dry Seasons

Variable	Indicators	Convergent Validity Loading Factor		Average Variance Extracted (AVE)		Composite Reliability	
		Seasons		Seasons		Seasons	
		Rainy	Dry	Rainy	Dry	Rainy	Dry
Health Care (X)	Larvasidation (X1)	0.691	0.847	0.695	0.843	0.799	0.843
	Fogging (X2)	0.714	0.654				
	PLC (X3)	0.601	0.729				
	Counseling (X4)	0.795	0.790				
Behavior (Y1)	Knowledge (Y1.1)	0.716	0.366	0.643	0.786	0.669	0.786
	Attitude (Y1.2)	0.708	0.899				
	Actions (Y1.3)	0.562	0.890				
Environmental Conditions (Y2)	Water type (Y2.1)	0.649	0.774	0.603	0.815	0.670	0.815
	Water temperature (Y2.2)	0.665	0.991				
	pH Water (Y2.3)	0.588	0.502				
Breeding Place/site (Y3)	Container material (Y3.1)	0.963	0.970	0.898	0.973	0.708	0.973
	Container type (Y3.2)	0.950	0.939				
	Container cover (Y3.3)	0.920	0.924				
	Container color (Y3.4)	0.957	0.959				
Flick density (Y4)	Larvae density index (Y4.1)	0.864	0.785	0.652	0.919	0.973	0.919
	House index (Y4.2)	0.459	0.925				
	Container index (Y4.3)	0.894	0.730				
	Breateau index (Y4.4)	0.925	0.979				

Source: processed data, (Isnawati et.al, 2018)

Table 2 is the validity and reliability value of the flick density measurement model in the rainy season and dry season. The flick density measurement model in the rainy season shows that indicators on all latent variables provide a factor loading value greater than 0.5, except on the house index indicator (Y4.2) on latent variables the flick density (Y4) provides a loading value of 0.459 which is smaller than 0.5, as it is conceptually an indicator that forms the density of the flick then is assumed to be valid in substance and remains involved in modeling. Discrimination validity and reliability the rainy season measurement model all provide ave root value > 0.5 and composite reliability value > 0.6, so the assumptions are met. While the flick density measurement model in the dry season shows that indicators on all latent variables provide a loading factor value greater than 0.5, except in the knowledge indicator (Y1.1) on latent variable behavior (Y1) provides a loading value of 0.366 which is smaller than 0.5, because it is conceptually an indicator that forms behavior then still remains included in the modeling. Discrimination validity and reliability Drought measurement models all provide ave root values greater than 0.5 and composite reliability values greater than 0.6, so the assumptions are met. The Health Service Factor (X) in the rainy season prioritizes fogging indicators (0.714) and counseling (0.795), while in the dry season the dominant indicators are larvae (0.847) and PLC (0.729). In the rainy season, behavioral factors prefer knowledge indicators (0.716), while in the dry season the dominant indicators are attitude (0.899) and action (0.890). Environmental factors in the rainy season pay more attention to the pH of water (0.588), while in the dry season the indicators observed are water temperature (0.991) and water type (0.774). In the rainy season, the breeding place factor pays more attention to container type (0.950), while in the dry season the dominant indicators are container material (0.970), container color (0.959), and container cover (0.924).

Furthermore, structural model suitability test on Flick Density. The test results of the model with the SmartPLS program can be seen from the R-Square Value which describes the goodness-of-fit of a model. The recommended R-Square value is greater than zero. The results of processing this research data using SmartPLS provide an R-square value as presented in Table 2.

Table 2. Goodness of Fit from R-Square Rainy and Dry Season

Variable	R-Square	
	Rainy Season (Isnawati et.al, 2018)	Dry Season
Health Care (X1)→ Behavior (Y1)	0.204	0.201
Behavior (Y1), Breeding Place/Site (Y3) →Environmental conditions (Y2)	0.229	0.216
Environmental conditions (Y2) →Breeding Place/Site (Y3)	0.303	0.297
Health Care (X1), Behavior (Y1), Environmental Conditions (Y2), Breeding Place/Site (Y3) → Flick density (Y4)	0.571	0.565

Table 2 shows that:

- The proportion of health service variables (X1) in explaining variations around behavior variables (Y1) is 0.204 in the rainy season, and by 0.201 in the dry season.
- The contribution or proportion of the Behavior variable (Y1), Breeding Place / Site (Y3) in explaining the variation around the environmental condition variable (Y2) is 0.229 in the rainy season, and 0.216 in the dry season.
- The contribution or proportion of the environmental condition variable (Y2) in explaining the variation

around the Breeding Place / Site (Y3) variable is 0.303 in the rainy season, and 0.297 in the dry season.

- The contribution or proportion of the Health Service variable (X1), Behavior (Y1), environmental conditions (Y2), Breeding Place / Site (Y3) in explaining the variation around the Larva Density variable (Y4) is 0.571 in the rainy season, and is 0.565 in dry season.

The R-square value in Table 2 gives a value greater than zero. This means that this research model has met the required Goodness of Fit. While the accuracy of the model in the rainy season and dry season is calculated from the Q square value as follows.

Rainy Season : $Q^2 = 1- ((1- 0.204) \times (1- 0.229) \times (1- 0.303) \times (1- 0.571)) = 0.877$

Dry Season : $Q^2 = 1- ((1- 0.201) \times (1- 0.216) \times (1- 0.297) \times (1- 0.565)) = 0.808$

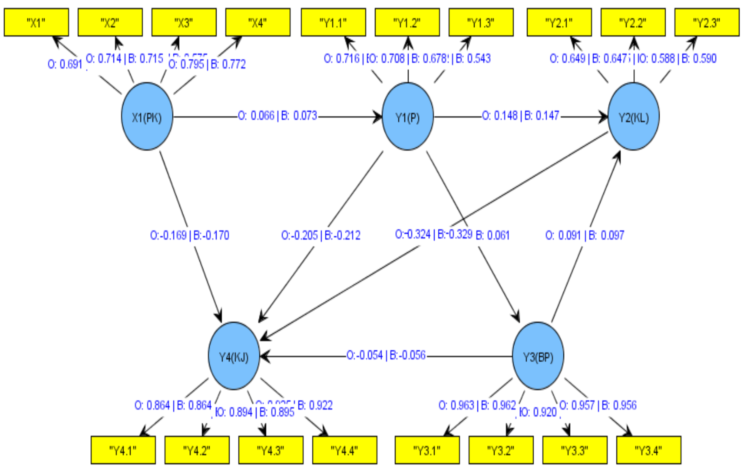
It can be interpreted that the model is able to explain the Density of Flick (Y4) in the rainy season of 87.7%, and the rest is explained by other variables outside the model. While in the dry season the Density of Flick (Y4) is 80. 8%, and the rest is described by other variables outside the model. From the appropriate model, it can be interpreted each coefficient of the path. The coefficients of these pathways are hypothesized in this study. The results of the structural path coefficient *(Inner Weight)* along with the full significance value are displayed in Table 3.

Table 3. Inner Weight Test of Larva Density in Rainy and Dry Season with Bootstrap Sample

Variables	Rainy Season (Isnawati et.al, 2018) [31]			Dry Season		
	Coefficient Orginal	(Bootstrap B=500)		Coefficient Orginal	(Bootstrap B=500)	
		Coefficient	T-Statistics		Coefficient	T-Statistics
Health Care (X1)→ Behavior (Y1)	0.066	0.073	1.988	0.114	0.118	6.889
Behavior (Y1)→ Environmental Conditions (Y2)	0.148	0.147	5.257	0.101	0.102	2.585
Breeding Place/Site (Y3)→ Environmental conditions (Y2)	0.091	0.097	3.262	0.084	0.068	1.983
Health Care (X1)→ Flick Density (Y4)	-0.169	-0.170	5.714	-0.157	-0.159	6.805
Behavior (Y1)→ Flick Density (Y4)	-0.205	-0.212	6.676	-0.194	-0.200	10.853
Environmental Conditions (Y2)→ Flick Density (Y4)	-0.324	-0.329	11.956	-0.049	-0.034	2.931
Breeding Place/Site (Y3) → Flick Density (Y4)	-0.054	-0.056	1.993	-0.100	-0.099	3.642
Behavior (Y1)→ Breeding Place/Site (Y3)	0.059	0.061	2.138	0.054	0.055	2.561

Note: →: Influence

In bootstrap sample testing B = 500 provides significant results, both in rainy season and dry season models. This can be seen from a T-Statistical value greater than 1.96, and the form of diagram models and structural equations is presented as follows:



Structural Equation of Larva Density Rainy Season (Isnawati, et.al,2018)

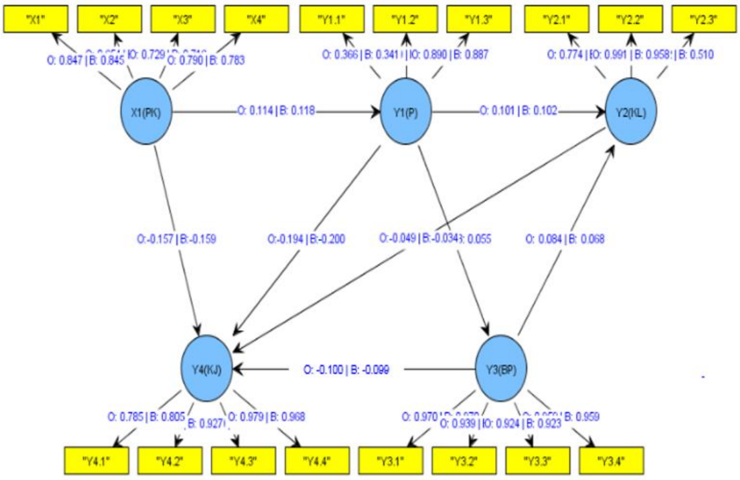
$Y1 = 0.066\ X1$, $R^2 = 0.204$
(1.988)

$Y2 = 0.148\ Y1 + 0.091\ Y3$, $R^2 = 0.229$
(5.257) (3.262)

$Y3 = 0.059\ Y1$, $R^2 = 0.303$
(2.138)

$Y4 = -0.169\ X1 - 0.205\ Y1 - 0.324\ Y2 - 0.054\ Y3$, $R^2 = 0.571$
(5.714) (6.676) (11.956) (1.993)

(a) Rainy Season [31]



Structural Equation of Larva Density Dry Season:

$$Y1 = 0.114\ X1 \quad , R^2=0.201$$
(6.889)

$$Y2 = 0.101\ Y1 + 0.084\ Y3 \quad , R^2=0.216$$
(2.585) (1.983)

$$Y3 = 0.054\ Y1 \quad , R^2=0.297$$
(2.561)

$$Y4 = -0.157\ X1 - 0.194\ Y1 - 0.049\ Y2 - 0.100\ Y3 \quad , R^2=0.565$$
(6.805) (10.853) (2.931) (3.642)

(b) Dry Season

Figure 2. The Effect of Health Services, Behavior, Environmental Conditions, Braiding Place on the Larva Density Index in the Rainy and Dry Seasons with Bootstrap Estimation

Based on Table 3, and Figure 2 the interpretation of each path coefficient is as follows:

- Health services (X) have a significant and positive effect on behavior (Y1) in both the rainy season and the dry season. This can be seen from the path coefficient which is positive which is 0.066 with a T-statistic value of 1.988 in the rainy season, and in the dry season it is 0.114 with a T-statistic value of 6.889 which is greater than t-table = 1.96. Thus, the effect of health services (X) on behavior (Y1) in the dry season is greater than the rainy season. Good health services from health workers can affect the behavior of housewives in an effort to prevent dengue fever, especially handling larvae in households [33]. The health communication process carried out by health workers through larvasidation, fogging, PLC, and counseling is more dominant in the form of Interpersonal Communication (face to face communication) where the health worker meets face to face with the community [34].
- Behavior (Y1) has a significant and positive effect on environmental conditions (Y2) in both the rainy season and the dry season. This can be seen from the path coefficient which is positive for 0.148 with a T-statistic value of 5.257 during the rainy season, and in the dry season at 0.101 with a T-statistic value of 2.585 which is greater than t-table = 1.96. Thus, the effect of behavior (Y1) on environmental conditions (Y2) in the rainy season is greater than in the dry season. The influence of the behavior variable of housewives in preventing DHF through controlling Aedes larvae, sp is direct and positive in both seasons. With good knowledge, attitudes and behavior from housewives such as cleaning, draining, burying and observing larvae in water reservoirs as breeding grounds for larvae, the environmental conditions of larvae can be controlled and controlled.
- Breeding Place / Site (Y3) has a significant and positive effect on environmental conditions (Y2) both during the rainy season and the dry season. This can be seen from the path coefficient which is positive, which is 0.091 with a T-statistic value of 3.262 in the rainy season, and in the dry season of 0.084 with a T-statistic value of 1.983 which is greater than t-table = 1.96. Thus, the effect of Breeding Place / Site (Y3) on environmental conditions (Y2) in the rainy season is greater than the dry season. Most of the materials for containers are made of plastic, cement, metal. Besides being able to conduct containers, they can also be the main insulation for heat [35], these conditions can affect the temperature of the water in the container, besides the air temperature which also affects, especially at ± 3oC of water temperature [36] as well as whether there is a cover, type and color of the container.
- Health Service (X) has a significant and negative effect on larva density (Y4) both during the rainy season and the dry season. This can be seen from the path coefficient which has a negative sign of 0.169 with a T-statistic value of 5.714 in the rainy season, and in the dry season of 0.157 with a T-statistic value of 6.805 which is greater than t-table = 1.96. Thus, the effect of Health Services (X) on the reduction of larva density (Y4) in the rainy season is greater than in the dry season. The better the health worker service, the less larva density will be. The direct effect of health services which have indicators of larvasidation, fogging, CHD, and counseling which have a direct impact, especially on the container index and larval density index and will have an impact on the reduction of positive home larvae so that the larva density will decrease. During the rainy season, the larvae observed were Aedes aegypti, Aedes albopictus, and in the dry season besides the two species above, Aedes longirostis was also found, whose life characteristics were almost the same as Aedes albopictus. Bionomic mosquito Aedes, sp related to the pleasure of mosquitoes, including the pleasure of choosing their brood, with larvasidation, and CHD have a direct effect on the life of larvae in containers, because the two methods used by these health workers are aimed at eradicating larvae.
- Behavior (Y1) has a significant and negative effect on larva density (Y4) in both the rainy season and the dry season. This can be seen from the path coefficient which has a negative sign of 0.205 with a T-statistic value of 6,676 in the rainy season, and in the dry season of 0.194 with a T-statistic value of 10,853 which is greater than t-table = 1.96. Thus, the effect of behavior (Y1) on the decrease in larva density (Y4) in the rainy season is greater than in the dry season. The behavior of housewives in Banjarbaru City has a direct effect on the larva density variable, the better the behavior, the greater the decrease in larva density. Behavior variables which are formed from indicators of Knowledge, Attitudes, and Actions. The actions of

housewives in implementing PSN, 3M plus, and routine larva observation are a major contribution of behavioral variables to reduce the high larva density rate in each household [33].

- Environmental conditions (Y2) have a significant and negative effect on larva density (Y4) in both the rainy season and the dry season. This can be seen from the path coefficient which has a negative sign of 0.324 with a T-statistic value of 11,956 in the rainy season, and in the dry season of 0.049 with a T-statistic value of 2,931 which is greater than t-table = 1.96. Thus, the effect of environmental conditions (Y2) on the decrease in larva density (Y4) in the rainy season is greater than the dry season. Larval development is highly dependent on environmental conditions, especially temperature, availability of food, and larval density [2]. Environmental indicators that make up the model are the type of water, temperature, and humidity that contribute to the high and low density of larvae, both on the Larval Density Index, House Index, and Container Index. In the rainy season the temperature that supports the development is greater than in the dry season, so the magnitude of the influence is different.
- Behavior (Y1) has a significant and positive effect on Breeding Place / Site (Y3) both during the rainy season and the dry season. This can be seen from the path coefficient which is positive, which is 0.059 with a T-statistic value of 2.138 during the rainy season, and in the dry season it is 0.054 with a T-statistic value of 2.561 which is greater than t-table = 1.96. Thus, the effect of behavior (Y1) on the increase of Breeding Place / Site (Y3) in the rainy season is greater than that of the dry season. The behavior of active housewives can arrange or select container materials as an indicator of the variable breeding places / sites. The type of mosquito Aedes, sp prefers to lay eggs in containers made of metal and plastic [37] so that the number of larvae in these materials is also more than other materials. The activity of housewives in cleaning and draining containers greatly affects the presence of larvae, including the use of container covers.
- Breeding Place / Site (Y3) has a significant and negative effect on larva density (Y4) in both the rainy season and the dry season. This can be seen from the path coefficient which has a negative sign of 0.054 with a T-statistic value of 1.993 in the rainy season, and in the dry season of 0.100 with a T-statistic value of 3.642 which is greater than t-table = 1.96. Thus, the effect of Breeding Place / Site (Y3) on the reduction of larva density (Y4) is -0.054, which means that every increase in Breeding Place / Site (Y3) in the dry season is greater than the rainy season. Material, type, color, and container cover can directly affect the density of larvae. Container material can also affect the growth of microorganisms that feed the larvae, especially in containers that are rarely drained. The magnitude of the influence of breeding places in the dry season is more due to the infrequent draining of water for supply, so that larvae reproduction is more frequent.

An indirect relationship occurs between exogenous latent variables (health services (X)), with intervening endogenous latent variables (behavior (Y1), environmental conditions (Y2), Breeding Place / Site (Y3)) and endogenous latent variables (larvae density). The indirect effect of behavior (Y1) on health services (X) on larva density (Y4) is -0.014, environmental conditions (Y2) on behavior (Y1) on larva density (Y4) is -0.048, and at the breeding place / site (Y3) on larva density (Y4) is -0.029, while the indirect effect of breeding place / site (Y3) on behavior (Y1) on larva density (Y4) is -0.003.

CONCLUSION

The results showed with the partial least square approach that the larva density model in the rainy and dry seasons has met the Goodness of Fit based on the criteria R^2 and Q^2. The larva density model in the rainy season can be explained by health services, behavior, environmental conditions, Breeding Place / Site (Y3) by 87.7%, and the rest is explained by other variables outside the model. Health Services, Behavior, Environmental Conditions, and Breeding Place / site have an effect on larva density. Health Services with the highest indicator of counseling, latent variables of behavior with the highest indicators of knowledge, latent variables of Environmental Conditions with the highest indicators of water temperature, latent variable Breeding Place / site with the highest indicator of container material, and latent variable density of larvae with the highest indicator of Breateau index. The larva density model in the dry season can be explained by health services, behavior, environmental conditions, Breeding Place / Site by 80.8%, and the rest is explained by other variables outside the model. In the dry season the latent variable of Health Services with the highest indicator of larvasidation, latent variable of behavior with the highest indicator of attitude and action, latent variable of Environmental Conditions with the highest indicator of water temperature, the latent variable Breeding Place / site with the highest indicator of container material, and latent variable density of larva with the highest indicator of Breateau index and house index.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper

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