

# PREDICTING THE CHARACTERISTICS OF DRIVER'S LICENSE APPLICANTS AT SATPAS POLRESTA MANOKWARI USING HIERARCHICAL MULTIPLE REGRESSION

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## Abstract

This research aims to predict the characteristics of driver's license (SIM) applicants at the SATPAS (Driver's License Issuance Unit) Polresta Manokwari using Hierarchical Multiple Regression analysis. The study explores six key variables: gender, age, occupation, city, type of driver's license, and type of application, as predictors of applicant characteristics. The analysis was conducted using SPSS version 29, with data collected from the population of driver's license applicants since 2023. Three models were tested, with Model 3 being identified as the best predictor, explaining 7% of the variance in applicant characteristics ( $R^2 = 0.070$ ). This model incorporates the variables of age, occupation, city, and type of application, while gender and driver's license class were found to have no significant individual impact. The partial t-test results show that age, occupation, city, and type of application significantly influence applicant characteristics, with negative regression coefficients indicating that an increase in these variables leads to a decrease in the predicted characteristics of SIM applicants. The study highlights practical implications for SATPAS, suggesting that service processes could be improved by considering demographic factors such as age and occupation in order to optimize resource allocation and reduce service complexity. However, the study has several limitations. The use of secondary data limits the completeness and accuracy of the analysis, and the limited number of variables results in a narrow interpretation of the factors influencing SIM applicants. Additionally, the model explains only a small portion of the variance in applicant characteristics, suggesting that other unmeasured factors, such as education level or driving experience, may play a more significant role. Furthermore, the findings are not generalizable to other regions, as local conditions may impact license application patterns. Future research should address these limitations by collecting primary data, expanding the range of variables, employing more sophisticated analytical methods, and exploring other regions. This would provide a more comprehensive understanding of the factors affecting driver's license applicants and contribute to enhancing the quality of SIM issuance services in Indonesia.

**Keywords:** Driver's License, Prediction, Hierarchical Multiple Regression, Applicant Characteristics

## I. INTRODUCTION

A Driver's License (SIM) is a registration and identification document issued by the Indonesian National Police (POLRI) for individuals who have met the administrative requirements, possess good physical and mental health, understand traffic rules, and are capable of driving motor vehicles skilfully[1]. According to Article 1 of Law No. 22 of 2009 concerning Traffic and Road Transportation, every person driving a motor vehicle on the road is required to have a Driver's License[2]. In accordance with Article 81 paragraph (2) letter a, it is stated that the minimum age for motor vehicle drivers is 17 years and they must possess a National Identity Card (KTP)[3].

The driver's license (SIM) plays a crucial role in traffic safety, in line with its purpose according to Regulation of the

Chief of National Police No. 9 of 2012 Article 52 paragraph 2, which aims to ensure that motor vehicle drivers possess high-quality competence, thereby realizing security, safety, order, and smooth traffic flow[4] Based on the case study conducted by R. Dwi and H. Lucia Yovita [5], it is evident that possessing a driver's license influences traffic accidents. Drivers who have obtained a driver's license on average drive more responsibly because they are acquainted with and understand traffic regulations, compared to drivers without a driver's license.

The rapid growth of the population has led to increased mobility and daily activities, ultimately driving a surge in driver's license applications to meet their transportation needs[6]. According to data from the Electronic Registration Identification (ERI) of the West Papua Regional Police in

2024, the number of vehicles, particularly in the Manokwari District, has reached 138.913 units[7]. This increase also impacts the number of motor vehicle drivers, affecting the demand for driver's licenses in the Manokwari District. The rising number of driver's license applicants has led to complexities in the driver's license issuance services at the Driver's License Administration Unit (SATPAS) of the Manokwari Regional Police. Common complexities include prolonged processing times, starting from registration blank acquisition to the receipt of the license by the applicant, often resulting in bottlenecks, shortages of materials (blanks, SIM cards, or printing ribbons/ink), and network disruptions affecting service efficiency[8].

SATPAS (Public Service Agency for Driver and Vehicle Registration) has several main tasks, including: a) Conducting technical training for driver registration and identification (driver's license); b) Managing the procurement, distribution, and storage of blank forms and other necessary equipment for driver registration; c) Ensuring the formal and material accountability of driver registration facilities issued; d) Issuing driver's licenses and their administrative processes for applicants who meet the required qualifications according to applicable regulations; e) Conducting driver's license related exams; f) Conducting retests, license cancellations and their administration, revocations by judges, as well as the Violation Plan/Punishment system imposed on license holders; g) Managing the administration of the results of driver's license issuance activities; h) Conducting research and development activities in the field of driver's licenses; i) Coordinating supervision and control of driving school activities; j) Supporting relevant agencies in issuing driver's licenses; k) And, facilitating cross-functional relationships between the police force and other sectoral agencies[9].

Although SATPAS is responsible for the issuance process of driving licenses and managing the applicant characteristics in the Manokwari district, there is still uncertainty regarding the factors that can predict the characteristics of driving license applicants at the SATPAS Polresta Manokwari. Therefore, this study is conducted to address this research gap by predicting the characteristics of driver's license applicants, aiming to reduce the complexity issues in driving license services[10]. Additionally, this research aims to analyze the factors that can predict the characteristics of driving license applicants using the Hierarchical Multiple Regression method, and to determine the significant influence of each factor on the characteristics of driving license applicants. The study will also assess whether Hierarchical Multiple Regression can be relied upon in predicting and analyzing the characteristics of driving license applicants at the SATPAS Polresta Manokwari.

Previous related research indicates that the Hierarchical Multiple Regression method significantly yields effective results in making predictions. For instance, the study conducted by M. S. Omar, R. Ahmad, and C. S. Mustaffa [11] employed Hierarchical Multiple Regression as a testing tool to assess the influence of motivation on performance and demonstrated that this method significantly and positively affects the research outcomes. Moreover, the study by Preeti and Peeyush [12] also utilized Hierarchical Multiple Regression to evaluate the relationship between TEI and PH

in medical students and to predict psychological stress, concluding that TEI is a strong and unique predictor of better PH and plays a positive role. However, unlike these studies, the present research focuses specifically on predicting the characteristics of driver's license applicants in an underexplored area, namely the SATPAS Polresta Manokwari, making it a unique contribution to the literature.

Thus, this research is expected to provide significant results in making predictions and have a positive impact on the SATPAS Polresta Manokwari by improving the efficiency of driver's license services and preventing the occurrence of complexities in service delivery.

Based on the explanation previously mentioned, the author is interested in conducting a study entitled "**Predicting The Characteristics of Driver's License Applicants at Satpas Polresta Manokwari Using Hierarchical Multiple Regression.**"

## II. METHODOLOGY

In this study, to predict the characteristics of driver's license applicants, a certain amount of research data is required[13]. The data utilized in this research is derived from secondary data retrieved from the computer archives of SATPAS Polresta Manokwari. The dataset comprises 1.155 driver's license applicants with seven attributes: applicant characteristics, gender, age, occupation, city, type of application, and license category. This data will then be analysed using the Hierarchical Multiple Regression (HMR) method, leveraging the statistical software SPSS version 29 [14].

Hierarchical Multiple Regression is a type of data analysis that examines the amount of variance explained in a dependent variable by more than one predictor variable[15]. Before applying HMR analysis, the data obtained from SATPAS Polresta Manokwari undergoes several processing steps to ensure it is suitable for analysis. These steps include:

1. **Checking for Missing Values:** The data is imported into SPSS version 29 software for verification. This step identifies whether there are any missing values in the data, which could influence the analysis and interpretation. In this case, there are no missing values in the data.
2. **Data Normalization and Transformation:** Since the HMR analysis method requires numerical data, string data is converted into numerical format. Additionally, data ranges are adjusted to facilitate the research process (the data range is shown in Table 4).
3. **Variable Encoding Based on Categories:** Variables such as gender, occupation, city, type of application, and driver's license category are encoded using dummy coding techniques to prepare the data according to the requirements of the regression model.
4. **Data Grouping Based on Variables:** Independent variables are grouped into hierarchical models according to the order of the models used. Each regression model is then introduced gradually to test its effect on the dependent variable.

Hierarchical Multiple Regression is conducted to assess the relationship between independent variables (gender, age, city,

occupation, type of application, and driver's license category) and the dependent variable (applicant characteristics)[12]. This method allows for specifying the precise order in which variables are entered to control for the effects of covariates or to test the impact of predictors (independent variables) on the dependent variable[16].

In this study, several regression models were constructed by adding variables to the previous model at each step[17]. The results of the Hierarchical Multiple Regression analysis will be interpreted based on the contribution of the independent variables entered at each stage of the model. The coefficients of each independent variable model indicate the influence on the characteristics of the driver's license applicants. This model will also provide information on how each independent variable, such as gender, age, or driver's license category, can explain the variance in the characteristics of the applicants.

The testing of Hierarchical Multiple Regression consists of the R2 Test or the Coefficient of Determination test and the Partial Test (t-Test) [18]. The research model can be seen in Figure 1:

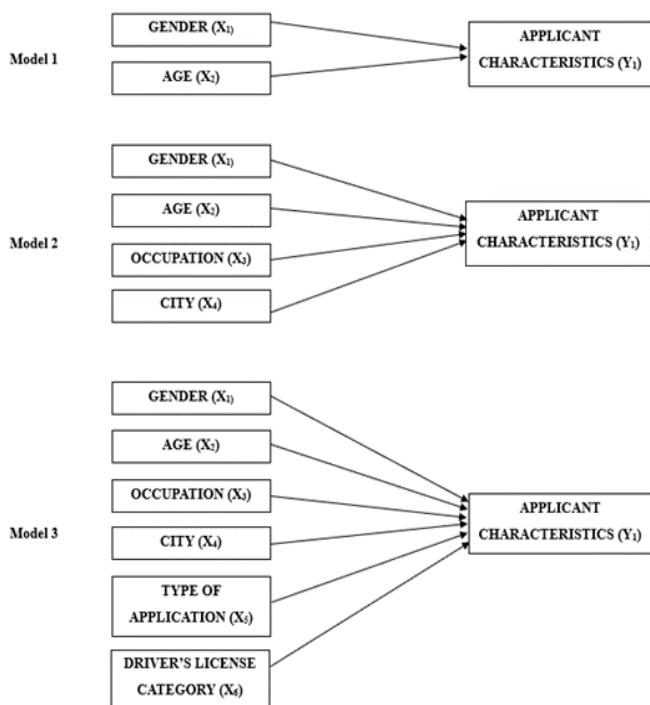


Figure 1. Research Model of Hierarchical Multiple Regression

With the regression equation values as follows:  
 $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6$

Where:

- Y = Applicant Characteristics
- X<sub>1</sub> = Gender
- X<sub>2</sub> = Age
- X<sub>3</sub> = Occupation
- X<sub>4</sub> = City
- X<sub>5</sub> = Type of Application
- X<sub>6</sub> = Driver's License Category

The Hierarchical Multiple Regression method was chosen because it allows for the assessment of the influence of each independent variable on the dependent variable incrementally. Consequently, this analysis provides a more comprehensive understanding of the factors affecting the characteristics of driver's license applicants at the SATPAS Polresta Manokwari.

### III. RESULT

#### A. Research Description

The data collection results use the population of driver's license applicants at the SATPAS Polresta Manokwari who have applied for a driver's license. The data has been collected since 2023[19], with the detailed data shown in Table 1 below:

Table 1. Research Data Description

	Category	Value	Count	Percentage
Gender	Male	1	959	83%
	Female	2	196	17%
Age	17-25 Years	1	375	32.5%
	26-35 Years	2	394	34.1%
	36-45 Years	3	243	21%
	46-55 Years	4	106	9.2%
	>56 Years	5	37	3.2%
Occupation	ASN/Police/Military	1	161	13.9%
	Private Employee	2	105	9.1%
	Entrepreneur/Private Sector	3	636	55%
City	Student/College Student	4	95	8.2%
	Other	5	159	13.8%
Application Type	Manokwari	1	617	53.4%
	Other	2	538	46.6%
Driver's License Class	New	1	622	53.9%
	Renewal	2	344	29.8%
	Lost	3	92	8%
	Upgrade	4	97	8.4%
Applicant Characteristics	A	1	260	22.5%
	A General	2	26	2.3%
	BI - BI General	3	30	2.6%
	BII - BII General	4	344	29.8%
	C	5	495	42.9%
Time between registration-printing			1.155	100%

Source: Data processed by the author, 2023

#### B. Result

This test utilized SPSS version 29, where the raw data was input into the software, and the initial text data was converted into numerical data to facilitate the testing[20]. The analysis employed was Hierarchical Multiple Regression, using the Coefficient of Determination (R2) test and the Partial test (t-test).

Table 2. Results of the Coefficient of Determination (R2) Test

Model	R	R <sup>2</sup>	Model Summary		Change Statistics		
			Adjusted R <sup>2</sup>	Std. Error of the Estimate	R <sup>2</sup> Change	F Change	Sig. F Change
1	.074a	.005	.004	9.285	.005	3.129	.044
2	.221b	.049	.045	9.088	.043	26.209	<.001
3	.264c	.070	.065	8.996	.021	12.823	<.001

- a. Predictors: (Constant), Age, Gender
- b. Predictors: (Constant), Age, Gender, City, Occupation
- c. Predictors: (Constant), Age, Gender, City, Occupation, Type\_of\_Application, Driver's\_License\_Class

Source: IBM SPSS 29

Based on the test results from Table 2, Model 1, which uses age and gender as predictors of applicant characteristics, shows that the R value is 0.074, indicating a positive relationship between the predictor variables and the characteristics of the driver's license applicants, although the relationship is weak. The R<sup>2</sup> value is 0.005 (or 0.5%), with significance at F (2, 1152) = 3.129, p < 0.05, indicating that 0.5% of the variance in the characteristics of the driver's license applicants can be explained by the variables age and gender.

Model 2, which includes age, gender, city, and occupation as predictors, shows a significant increase with an R<sup>2</sup> value of 0.049, indicating that these variables collectively explain about 4.9% of the variance in the characteristics of the driver's license applicants. This represents a substantial improvement in explanatory power compared to Model 1, which only explained 0.5% of the variance. The change in R<sup>2</sup> is highly significant, with F (2, 1150) = 26.209, p < 0.05, indicating that city and occupation are important predictors of applicant characteristics.

The third and final model, which consists of six predictors (age, gender, city, occupation, type of driver's license, and type of application), yields an R value of 0.264 and an R<sup>2</sup> of 0.070, meaning that 7.0% of the variance in applicant characteristics can be explained by this model. The change in R<sup>2</sup> is highly significant compared to the previous two models, with F (2, 1148) = 12.823, p < 0.05. This indicates that the type of driver's license and type of application contribute significantly to the characteristics of the motorcycle license applicants [1]

Tabel 3. Partial Test Results (t-test) Model 1

Model	Coefficients <sup>a</sup>		Beta	t	Sig.
	Unstandardized Coefficients	Standardized Coefficients			
	B	Std. Error			
1 (Constant)	3,902	1,052		3,709	<.001
Gender	,760	,728	,031	1,044	,297
Age	-,574	,253	-,067	-2,266	,024

a. Dependent Variable: Applicant's\_Characteristics

Source: IBM SPSS 29

Based on the data in Table 3, it can be inferred that the gender variable has a significance value of 0.297 > 0.05. This indicates that partially, the gender variable does not have a significant influence on the characteristics of driver's license applicants. Conversely, the age variable has a significance value of 0.024 < 0.05. This result suggests that partially, age has a positive relationship with the characteristics of driver's license applicants.

Tabel 4. Partial Test Results (t-test) Model 2

Model	Coefficients <sup>a</sup>		Beta	t	Sig.
	Unstandardized Coefficients	Standardized Coefficients			
	B	Std. Error			
1 (Constant)	12,081	1,556		7,766	<.001
Gender	,659	,763	,027	,863	,388
Age	-,818	,251	-,095	-3,263	,001
Occupation	-1,030	,247	-,125	-4,175	<.001
City	-3,040	,559	-,163	-5,435	<.001

a. Dependent Variable: Applicant's\_Characteristics

Source: IBM SPSS 29

Based on Table 4, it can be observed that the variable of gender has a significance value of 0.388 > 0.05. This indicates that partially, the gender variable does not have a positive influence on the characteristics of driver's license applicants. On the other hand, the variables of age, occupation, and city have significance values of 0.001; <0.001; <0.001 with significance values <0.05. This implies that partially, the variables of age, occupation, and city have a positive relationship with the characteristics of driver's license applicants.

Tabel 5. Partial Test Results (t-test) Model 3

Model	Coefficients <sup>a</sup>		Beta	t	Sig.
	Unstandardized Coefficients	Standardized Coefficients			
	B	Std. Error			
1 (Constant)	13,989	1,730		8,085	<.001
Gender	-,070	,770	-,003	-,091	,927
Age	-1,108	,258	-,128	-4,298	<.001
Occupation	-,990	,244	-,121	-4,052	<.001
City	-1,945	,596	-,104	-3,261	,001
Type_of_Application	-1,648	,330	-,165	-5,000	<.001
Driver's_License_Class	,181	,170	,031	1,061	,289

a. Dependent Variable: Applicant's\_Characteristics

Source: IBM SPSS 29

Based on the data in Table 5 above, it is known that the variables of gender and driver's license category have significance values of 0.927 and 0.289 respectively, which

are  $> 0.05$ , meaning that partially the gender and driver's license category variables do not have a positive influence on the characteristics of SIM applicants, whereas the variables of age, occupation, city, and type of application have significance values of  $<0.001$ ;  $<0.001$ ;  $0.001$ ;  $<0.001$  respectively, with significance values  $<0.05$ , indicating that partially the age, occupation, city, and type of application variables have a positive relationship with the characteristics of SIM applicants.

Therefore, the best model used to predict the characteristics of SIM applicants is model 3 with a combination of constants, age, occupation, city, and type of application.

Using the Hierarchical Multiple Regression modeling formula as follows:

$$Y (\text{Applicant Characteristics}) = \beta_0 + \beta_1(\text{Age}) + \beta_2(\text{Occupation}) + \beta_3(\text{City}) + \beta_4(\text{Type of Application})$$

$$Y = 13.989 - 1.108 X_1 - 0.990 X_2 - 1.945 X_3 - 1.648 X_4$$

Explained as follows[22] :

- $\beta_0 = 13.989$  indicates that if there is no influence from factors such as Age ( $X_1$ ), City ( $X_2$ ), Occupation ( $X_3$ ), and Type of Application ( $X_4$ ), then the average value of applicant characteristics for driver's license application is 13.989.
- $\beta_1 = -1.108$  shows that the regression coefficient for Age  $X_1$  is -1.108. This means that for every 1 point increase in Age, the average value of applicant characteristics for driver's license application at SATPAS Polresta Manokwari ( $Y$ ) decreases by 1.108, assuming other factors remain constant.
- $B_2 = -0.990$  indicates that the regression coefficient for Occupation  $X_2$  is -0.990. This means that for every 1 point increase in Occupation, the average value of applicant characteristics for driver's license application at SATPAS Polresta Manokwari ( $Y$ ) decreases by 0.990 assuming other factors remain constant.
- $B_3 = -1.945$  indicates that the regression coefficient for City  $X_3$  is -1.945. This means that for every 1 point increase in City, the average value of applicant characteristics for driver's license application at SATPAS Polresta Manokwari ( $Y$ ) decreases by 1.945 assuming other factors remain constant.
- $-B_4 = -1.648$  indicates that the regression coefficient for Type of Application  $X_4$  is -1.648. This means that for every 1 point increase in Type of Application, the average value of applicant characteristics for driver's license application at SATPAS Polresta Manokwari ( $Y$ ) decreases by 1.648 assuming other factors remain constant.

The results of this study have several important practical implications for the SATPAS (Driver's License Issuance Unit) of the Manokwari City Police. By understanding that factors such as age, occupation, city, and type of application have a significant influence on the characteristics of driver's license applicants, SATPAS can make adjustments in their service processes. For example, the study shows that age and occupation variables significantly affect the characteristics of

license applicants, which means applicants from certain age groups and occupations may require a different service approach. The SATPAS of the Manokwari City Police can use this information to optimize their resources, such as providing targeted outreach or training for specific demographic groups that tend to face challenges in the application process.

Additionally, the significant influence of the city and type of application variables also provides insights that can help SATPAS tailor their service strategies in certain areas. For instance, areas with a high demand for driver's license applications could be prioritized for additional facilities to reduce wait times and improve applicant satisfaction.

Overall, these findings can be used to address the complexities in the driver's license issuance process by utilizing data to predict the needs and characteristics of applicants, enabling SATPAS to design more accurate and efficient service policies and strategies.

#### IV. DISCUSSION AND CONCLUSION

This study aims to forecast the characteristics of driver's license (SIM) applicants at SATPAS Polresta Manokwari using the Hierarchical Multiple Regression (HMR) method. The analysis employed various predictors including age, occupation, city, type of application, and SIM class. The results indicate that Model 3, which incorporates all six variables, age, occupation, city, type of application, gender, and SIM clas, explains approximately 7.0% of the variance in applicant characteristics. Although this model provides valuable insights, it also highlights the presence of additional unexplored factors, suggesting that further research is needed to uncover other significant predictors. Practical implications of these findings are substantial for SATPAS Polresta Manokwari. Based on the significant influences identified in the study, the following recommendations are proposed to improve the SIM issuance process: 1) Optimize Resource Allocation: The study's findings suggest that variables such as age and occupation have a significant impact on applicant characteristics. SATPAS should consider allocating resources more effectively to address the needs of different age groups and occupational categories. For instance, specialized support or dedicated service counters for these groups could reduce processing times and enhance service efficiency. 2) Enhance Facility Capabilities: The significant effects of city and type of application on applicant characteristics imply that expanding service facilities or establishing additional service points in areas with high demand could alleviate service bottlenecks. This would help reduce wait times and improve overall applicant satisfaction. 3) Implement Targeted Service Strategies: By utilizing the insights gained from the study, SATPAS can design targeted service strategies. For example, prioritizing applicants based on their specific characteristics, such as age and occupation, could streamline the processing and address common issues like material shortages or network disruptions. 4) Leverage Data for Continuous Improvement: Regular analysis of applicant data should be used to inform policy adjustments and enhance service delivery. Implementing a data-driven approach can help SATPAS preemptively address emerging challenges and adapt to changing applicant needs. In summary, by applying these

recommendations, SATPAS Polresta Manokwari can improve the efficiency and effectiveness of the SIM issuance process. This will lead to better resource management, reduced processing times, and increased satisfaction among applicants.

#### V. LIMITATION OF THE STUDY AND FUTERE RESEARCH DIRECTION

This study has several limitations that impact its findings and interpretations. First, the use of secondary data, which may not be entirely complete or accurate, as the data comes from existing sources that may not have been designed for the purposes of this research. This limitation may affect the accuracy of the results, particularly in terms of representing the characteristics of driver's license applicants.

Second, only a few variables were analyzed in this study, including age, gender, city, occupation, driver's license category, and type of application. The limited number of variables results in interpretations that only cover a small portion of the factors that may be relevant. Although the findings indicate a significant relationship between some variables and the characteristics of driver's license applicants, other unmeasured variables, such as education level or driving experience, may have a greater influence but have not been identified in this study.

Third, the Hierarchical Multiple Regression method used in the study can only explain 7% of the data variation, indicating that many other factors have not been included in the model.

Furthermore, the results of this study at SATPAS Polresta Manokwari may not be generalizable to other regions with different geographic, demographic, or social conditions. Contextual variations between regions, such as infrastructure, transportation patterns, and local policies, may influence the pattern of driver's license applications, making results that are relevant in one location potentially not applicable elsewhere.

To address these research limitations, the following steps are recommended for future studies:

1. Primary data collection: Future researchers could collect primary data through surveys or direct interviews with driver's license applicants, allowing for more focused and relevant research. Primary data allows researchers to obtain more information that may not be recorded in secondary data.
2. Adding additional variables: To provide a more comprehensive picture, future studies could include additional variables to enrich the analysis and provide a deeper understanding of the characteristics of driver's license applicants.
3. Using more complex analytical methods: In addition to Hierarchical Multiple Regression, future studies could use other methods to improve predictive capabilities and identify factors that have not been well-measured previously.
4. Expanding the research area: It is recommended that future research investigate whether the findings from SATPAS Polresta Manokwari apply to other SATPAS locations. By expanding the area, research can provide more comprehensive insights and strengthen the results found.
5. With these recommendations, future research is expected to overcome existing limitations and provide more

significant contributions to understanding the characteristics of driver's license applicants, as well as helping to improve the quality of driver's license services in Indonesia more broadly.

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