

## Dynamic Analysis of Tolerant City Index: Applying Differential Equations to Address Intolerance in Indonesia

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### Abstract

*The key factors that shape the Tolerant City Index in Indonesia are explored, and seeks to develop a mathematical model to predict its future trends. The research raises concerns about a possible decline in tolerance levels, primarily due to discriminatory regulations and the lack of proactive efforts by local governments to promote inclusivity. Using a combination of quantitative data analysis and mathematical modelling. The object of the IKT study is 94 cities from a total of 98 cities Indonesia. This method provides an objective evaluation of tolerance trends while identifying the primary factors influencing them. The findings indicate that the index is projected to increase from 4.92 (2024) to 5.12 (2025), suggesting progress in city governments' efforts to reduce discriminatory policies and implement initiatives that promote tolerance. This upward trend reflects the potential impact of proactive governance, community engagement, and institutional support for diversity. Policymakers are encouraged to continue strengthening inclusive and responsive policies that address the needs of diverse communities, thereby fostering a more tolerant and cohesive society. A comparative analysis with Turkey further illustrates that while Indonesia's growing tolerance is largely shaped by government initiatives, Turkey's challenges remain deeply rooted in cultural, educational, and religious interpretations.*

**Keywords:** *Tolerant City Index, mathematical model, differential equation, policy, comparative perspective*

### Introduction

Tolerance has a very important role in maintaining social harmony and stability in the midst of social diversity (Huda et al., 2020; Tyas & Naibaho, 2020). Tolerance is the ability to accept differences, both in terms of religion, culture, ethnicity, and political views, which is a hallmark of modern society (Triandafyllidou, 2012). In an increasingly pluralistic society, tolerance is the basis for healthy interactions, mutual respect, and minimizing potential conflicts (Al-Kubise & Haq, 2023; Lundie, 2022). When the citizens of a community are able to understand and appreciate differences, they create an inclusive and open environment, where each individual feels welcome and valued (Singha & R, 2024). This not only encourages a sense of solidarity and unity, but also improves the quality of life and overall social well-being.

The importance of tolerance is also the basis for measuring the Tolerance City Index (Indeks Kota Toleran = IKT (in Indonesian)), a tool to assess how inclusive and welcoming a city is towards diversity (Naipospos, 2018). This index serves as an indicator that shows the extent to which a city provides space for citizens from various backgrounds to coexist harmoniously (Li et al., 2024; Yan & Liu, 2023). Cities with high levels of tolerance usually have policies that support religious freedom, protect the rights of minority groups, and encourage citizen participation in creating an

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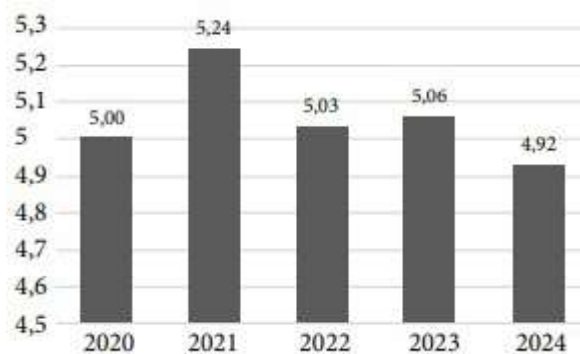
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inclusive environment (Anas et al., 2025; Rosenblum, 2021). By understanding the importance of tolerance, local governments and communities can work together to improve their position in this index, ultimately contributing to a more positive image of the city and sustainable social progress (Turmudi, 2021).



**Figure 1.** National Average Score of the Tolerant City Index

The increase IKT in 2021 compared to 2020, and also 2022 to 2023, is influenced by several factors that reflect improvements in the implementation of tolerance values in various cities in Indonesia. This increase was driven by breakthroughs by the city government in issuing regional legal products that promote the advancement of tolerance (I. Yosarie et al., 2025).

One of the main factors is the increased commitment of local governments in adopting more inclusive and pro-diversity policies (Martínez-Ariño et al., 2019). Many cities have begun to strengthen regulations protecting minority rights, including religious freedom, as well as enacting rules that prevent discrimination based on ethnicity, religion, race, and inter-group (SARA) (Maymon & Miodownik, 2025; Thio, 2024). Cities that receive high rankings in IKT generally succeed in creating a more harmonious social environment by prioritizing this inclusive policy.

In contrast to Indonesia, where the fluctuation of the Tolerant City Index is strongly tied to the presence or absence of inclusive policies at the municipal level, studies in Turkey reveal that tolerance levels are more influenced by cultural, religious, and educational variables. Research by Altýnođlu, (2017) indicates that higher religiosity, particularly when based on textualist or traditionalist interpretations of scripture, often correlates with lower levels of tolerance toward minority or out-group members. Meanwhile, individuals with higher education, especially in the humanities, tend to exhibit greater levels of what is referred to as “warm tolerance” (Byrne et al., 2022). These findings show that unlike Indonesia, where municipal leadership plays a dominant role, Turkey’s tolerance landscape is more deeply rooted in long-standing social and ideological structures, suggesting that efforts to increase tolerance there require broader shifts in societal and cultural attitudes.

In addition, the active role of civil society and local organizations in promoting the values of tolerance also has a significant impact (DeLue & Dale, 2021; Elayah, M., & Verkoren, 2020). Interfaith dialogue activities, anti-discrimination campaigns, and educational programs that emphasize the importance of diversity are increasingly being held in various cities (Anas et al., 2025; Intxaurbe Vitorica, 2023). Community participation in efforts to maintain social harmony also strengthens the tolerance ecosystem in urban areas (Arsal et al., 2023; Elyta & Herlan, 2021). Another factor contributing to this increase is the firmer handling of intolerant acts, both in the form of law enforcement against violations and supervision of groups that spread hate speech (Demczuk, 2020). This combination of government policies and community initiatives helped create a real improvement in the Tolerant Cities Index in 2021.

The decline IKT in 2022 compared to 2021 (Figure 1) is due to several factors that show challenges in maintaining the sustainability of tolerance values in various cities. One of the main causes of this decline is the increase in the incidence of intolerance in several regions, both in the form of acts of discrimination and hate speech involving ethnic, religious, racial, and inter-group (SARA) issues (Kurniawan et al., 2023). Some cities experience increased social tensions related to religious or cultural differences, which are not balanced by policies and decisive actions on the part of local governments to defuse conflicts or protect minority rights (Avruch, 2022). This shows that existing regulations have not been able to be consistently implemented to prevent or overcome intolerance (Fleischer et al., 2021).

The comparison with Turkey also illustrates that institutional inaction or societal rigidity can both lead to a decline in tolerance, though through different pathways. While Indonesia struggles with the implementation and continuity of inclusive policies, Turkey's challenges stem largely from the interaction between religious conservatism and limited educational exposure to pluralistic values. This highlights the importance of both state-level interventions and grassroots-level transformations in education and religious interpretation. As Hjerm et al. (2020) argue, societal tolerance is most effectively fostered when both structural (policy-driven) (Ashafa et al., 2025) and cultural (belief-based) factors are addressed in a complementary manner (Imrek et al., 2017). Therefore, understanding the underlying causes in both contexts emphasizes the need for strategic and multi-level efforts, from legal reforms in Indonesia to educational and interpretive shifts in Turkey, to cultivate sustainable tolerance.

Meanwhile, the decrease in the IKT score from 2023 to 2024 was due to methodological factors, considering that IKT 2024 developed indicators as an effort to strengthen the tolerance ecosystem, in general in Indonesia and specifically in cities. Thus, cities that have promotional legal products for tolerance will receive higher scores, as well as the opposite consequences.

Other factors contributing to the decline in IKT are weak community participation and lack of initiatives in programs that encourage interfaith dialogue and strengthen inclusivity values (Sihotang, 2024). Many cities that have experienced a decline in the index have not made significant efforts in creating discussion spaces that bring together various community groups to build understanding and harmony (Ali et al., 2021). In addition, local political dynamics that use SARA issues to gain political support have also exacerbated social tensions, widened the distance between groups, and lowered the level of tolerance in some cities (Hinkle et al., 2020). The lack of preventive and educational measures in several regions contributed to the decline in the overall tolerance achievement the IKT in 2022.

Several previous studies have also been conducted related to the Tolerant City Index, including research on tolerance and pluralism in Indonesian cities. Several studies have examined the Tolerant City Index (IKT) in Indonesia, each focusing on different aspects of urban tolerance and pluralism. For example, research conducted by the Institute (2021), emphasized the importance of assessing tolerance levels across Indonesian cities using the IKT framework. While this study contributed to a broader understanding of how tolerance is distributed, it primarily focused on categorization rather than predictive modeling or causal analysis.

Similarly, Ramadhani & Santoso (2020), explored the impact of local government policies on tolerance levels, revealing a positive correlation between inclusive policies and higher tolerance indices. However, their research mainly centered on policy analysis without incorporating predictive methods to anticipate future trends in tolerance.

Meanwhile, Sahide, A., Azhar, M., & Jatmika (2022), conducted a comparative study of tolerant cities such as Jakarta, Manado, and Yogyakarta. Their findings highlighted key factors influencing tolerance levels, including community openness, city government policies, and civil society engagement. While their research provided valuable insights into differences among cities, it did not develop a mathematical model to quantify or predict changes in the Tolerant City Index over

time.

Building on these previous studies, this research combines quantitative data analysis with mathematical modelling to predict future trends in IKT. This study introduces a predictive framework to anticipate potential declines in tolerance levels. The findings suggest that the index is likely to increase in 2025. In 2024, 61 regional legal products were found that promote tolerance, with details of 11 regional regulations, 16 mayoral regulations, and 34 other forms, which may include circulars, decrees, and so on, be part of a positive trend. This highlights the pressing need for policy reforms that promote a more inclusive and pluralistic society. These studies offer valuable insights into the factors that influence the Tolerant Cities Index, as well as how cities in Indonesia can develop policies that foster tolerance and social cohesion.

Predicting IKT is very important to understand social dynamics in a multicultural society like Indonesia. By predicting IKT, governments and stakeholders can identify factors that contribute to tolerance and intolerance in different cities. This allows them to formulate more targeted policies to address issues of intolerance, reduce discrimination, and create a safe and inclusive environment for all citizens. In addition, IKT predictions also help in monitoring the development of tolerance over time, providing the necessary data for policy evaluation and improvement.

Differential equations can be used to predict a variety of dynamic phenomena (Zwillinger & Dobrushkin, 2021), including changes in the value of IKT. Although it is commonly used in disciplines such as physics, biology, and economics to model sustainable change, this approach is also relevant for social analysis if there is adequate quantitative data (Cleason et al., 2017). In the context of IKT prediction, differential equations can describe how various discriminatory events or policies affect the index value gradually.

Another benefit of predicting IKT is increasing public awareness of the importance of tolerance and diversity (Hjerm et al., 2020). By understanding the tolerance index in their city, citizens can be more sensitive to social issues that may disrupt harmony between groups. This encourages active community participation in programs that promote interfaith dialogue, diversity education, and social activities that strengthen cooperation between communities. A more aware and engaged society can be an effective agent of change in creating a more tolerant and harmonious environment (Wijanarka & Sari, 2023), thereby contributing to sustainable social development.

## **Research Method**

The combination of quantitative approaches and types of mathematical model research refers to the use of analytical and numerical methods to develop and analyze mathematical models that describe numerically measurable phenomena (Ardyan et al., 2023). In this study, researchers used quantitative data to formulate differential equations that reflect the relationship between variables (Pratama et al., 2022). This approach is often used in a variety of fields, including natural sciences, engineering, economics, and social sciences, to model complex systems and understand the dynamic behavior of those systems (An et al., 2021). The availability and quality of relevant quantitative data play a critical role in ensuring that the resulting model accurately represents real-world phenomena (Andini et al., 2024).

The data used in this study is usually in the form of numbers and numerical information that has been presented from the research that has been carried out by the authorities adjusted to the phenomenon being studied. The object of the IKT study is 94 cities from a total of 98 cities throughout Indonesia. The selection of cities from regencies as objects of study was based on the consideration that the composition of the population in urban areas should be more heterogeneous when compared to regencies. In addition, considering the effectiveness and efficiency of the research, the city area is considered to have demographic similarities and administrative patterns compared to the 416 regencies spread across 38 provinces in Indonesia.

This study utilizes the Tolerant City Index data from 2020 to 2024 as the primary variable

influencing the constructed mathematical model. The index, which evaluates aspects such as government regulation, social inclusion, freedom of belief, and acts of discrimination, serves as a key indicator to track the progression or regression of tolerance across various Indonesian cities. By analyzing this longitudinal dataset, the research aims to detect emerging patterns, identify cities at risk of increasing intolerance, and forecast future trajectories. This foundational data enables the model to reflect real-world socio-political dynamics and assess the efficacy of local governance in promoting inclusive urban environments.

In addition to primary index data, this study also incorporates secondary data sources to support and validate the modeling process. These include academic publications that explore theoretical frameworks on tolerance, government reports detailing policy implementations, national statistics on demographic and social variables, and open-access databases that track human rights and civil liberties. Such diverse sources provide a broader socio-cultural and political context that helps interpret the quantitative findings. By integrating both empirical data and qualitative insights, the study is able to offer a more comprehensive analysis of the factors influencing tolerance at the municipal level in Indonesia.

The data analysis process in this study includes several important steps (Pratiwi, 2023): 1) Mathematical Model Formulation, the researcher starts by formulating mathematical equations, often in the form of differential equations, based on relevant theories and data that has been collected (Banerjee, 2021). This model includes the variables that influence and the relationships between them; 2) Differential Equation Solution, after the model is formulated, the researcher searches for a solution from the differential equation (Rihan, 2021). Where possible, analytical solutions can be sought. However, if not, numerical methods such as the Runge-Kutta method or other methods are used to obtain approximation solutions; 3) Model Validation, the resulting model is then tested and validated by comparing the model's predictions against empirical data (Saud et al., 2020). This is important to ensure that the model can provide accurate and reliable results; 4) Interpretation of Results, the researcher analyzes the results of the mathematical model and draws conclusions related to the phenomenon being studied. These results can be used to make predictions, provide policy recommendations, or gain a deeper understanding of the system being studied.

The results of the model are then searched for the MAPE value (Surur et al., 2024). MAPE (Mean Absolute Percentage Error) is one of the metrics used to measure the level of accuracy of a mathematical model by calculating the mean error in the form of a percentage between the value predicted by the model and the actual value (Koutsandreas et al., 2022). MAPE provides an overview of how far the model's predictions deviate from the actual data on a percentage scale, thus allowing researchers to understand the relative error rate in the context of the predicted values (Hewamalage et al., 2023). In its application to established mathematical models, MAPE helps evaluate the overall performance of the model and can be used as a tool to compare different models. A lower MAPE value indicates that the model has more accurate predictions, while a higher value indicates that the model needs to be refined (Wang et al., 2023). To interpret the level of model accuracy, the resulting MAPE value is then matched against standard categories, such as "Excellent," "Good," "Reasonable," or "Not accuracy", which help determine the practical reliability of the model's predictions.

**Table 1.** Categories MAPE (Lewis, 1982)

<b>MAPE</b>	<b>Accuracy</b>
<10%	Excellent
10% - 19%	Good
20% - 49%	Reasonable
>500%	Not accuracy

With this approach, researchers can construct mathematical models that not only describe complex social phenomena but also serve as predictive tools to anticipate future developments. In the context of tolerance studies, modeling allows for the identification of variables that significantly influence shifts in societal attitudes, such as government policy, education, and cultural trends. These models help simplify multifaceted interactions into quantifiable patterns, making it easier to test hypotheses and evaluate the potential impact of different scenarios. As a result, researchers can bridge the gap between abstract theoretical frameworks and tangible, data-driven insights.

Furthermore, the use of mathematical modeling provides a structured framework for informed decision-making and targeted interventions. Policymakers can use the outcomes of these models to design more inclusive regulations, allocate resources efficiently, and prioritize cities or communities that are most vulnerable to intolerance. By simulating various policy outcomes, mathematical models offer a low-risk method for forecasting the effectiveness of different strategies. This empowers governments, educators, and civil society actors to make decisions grounded in evidence rather than assumptions, ultimately contributing to the development of more tolerant.

## Results and Discussion

### 1) IKT (Indeks Kota Toleran (Tolerant City Index))

The Tolerant City Index is a study measuring city performance, including city government and community elements in managing diversity, tolerance and social inclusion. The IKT measurement combines the paradigm of citizens’ constitutional rights according to constitutional guarantees, human rights according to international human rights law standards and inclusive governance (I. Yosarie et al., 2025). IKT is a framework for measuring the level of religious freedom or the degree of tolerance of a country. In this framework, Çokgezen & Hussen compiled 3 main indicators to measure the level of religious freedom or the degree of tolerance, namely: (1) Favoritism or government favoritism towards certain religious groups; (2) Government regulations that restrict religious freedom, and (3) Social regulations that restrict religious freedom (Çokgezen & Hussen, 2021).

The object of the IKT study is 94 cities out of a total of 98 cities throughout Indonesia. The selection of cities from districts as the object of study is based on the consideration that the composition of the population in urban areas should be more heterogeneous when compared to districts. In addition, considering the effectiveness and efficiency of the research, the city area is seen as having similar demographics and administrative patterns compared to 416 districts spread across 38 provinces in Indonesia.

Referring to the operational definition and based on the indexing framework, the IKT study establishes 4 (four) variables with 8 (eight) indicators as a measuring tool. The 8 indicators are the elements inherent in a city, as well as the elements that form the tolerance ecosystem that is being continuously encouraged and promoted by the SETARA Institute through the IKT study, which is presented in Table 2. The results of the IKT are presented in figure 1.

**Table 2.** Tolerane City Index Indicator

No	Indicator	Percentage (%)
1	RPJMD	10
2	Absence of discriminatory policies	20
3	Absence of intolerance events	20
4	Dynamics of civil society	10
5	Public statement of the city government	10
6	Concrete actions of the city government	15
7	Religious heterogeneity	5
8	Socio-religious inclusion	10

Table 2 presents the key indicators used to measure the Tolerant City Index, offering a comprehensive framework for evaluating how well a city promotes inclusivity, protects minority rights, and fosters intergroup harmony through both policy and societal dimensions.

(1) RPJMD (Regional Medium-Term Development Plan)

The RPJMD (Rencana Pembangunan Jangka Menengah Daerah) is a strategic planning document prepared by regional governments in Indonesia for a five-year period, aligning with the term of the regional head. Effective integration of inclusive policies into the RPJMD can enhance local government accountability and commitment to pluralism (Baskoro, 2025).

(2) Absence of Discriminatory Policies

The absence of discriminatory policies refers to the nonexistence of laws, regulations, or local government actions that marginalize or exclude specific social, ethnic, or religious groups (Faizah et al., 2022). Ensuring that no group is unfairly treated under regional legal frameworks is essential for promoting human rights and tolerance. Such an environment fosters equal opportunity and reduces the likelihood of intergroup conflict (Al Ramiah & Hewstone, 2013).

(3) Absence of Intolerance Events

The absence of intolerance events indicates a region's success in preventing incidents such as religious violence, hate speech, intimidation, or disruptions of minority group activities. This variable reflects the stability of intergroup relations and the effectiveness of law enforcement in protecting civil rights. Cities with few or no documented intolerance incidents tend to demonstrate stronger social cohesion and civic trust (Institute, 2021).

(4) Dynamics of Civil Society

The dynamics of civil society refer to the vitality, diversity, and activity level of non-governmental organizations, community groups, religious associations, and other societal actors in advocating for public interests and rights. A strong and engaged civil society plays a pivotal role in promoting democratic values, defending minority rights, and holding governments accountable (Mohyeddin, 2024).

(5) Public Statement of the City Government

Public statements made by city officials reflect the formal stance and messaging of local governments toward diversity, inclusion, and minority rights. Positive, inclusive public declarations signal a commitment to uphold pluralism and counter hate narratives. These statements also set the tone for societal discourse and influence public attitudes (Widmann & Simonsen, 2025).

(6) Concrete Actions of the City Government

Concrete actions by city governments include specific programs, funding, services, or policies aimed at strengthening tolerance, preventing discrimination, and protecting vulnerable groups. This can involve facilitating interfaith forums, supporting education on diversity, or ensuring safe public spaces for minority activities. While statements are symbolic, tangible actions reflect implementation and political will (Yanow, 1993).

(7) Religious Heterogeneity

Religious heterogeneity refers to the degree of religious diversity within a city or region. Areas with higher levels of religious heterogeneity tend to require more proactive efforts in fostering interfaith dialogue and maintaining social harmony. While diversity itself does not automatically result in conflict, unmanaged differences can lead to tension if not addressed through inclusive governance (Ferdman, 2017).

(8) Socio-Religious Inclusion

Socio-religious inclusion is the process of ensuring that individuals and communities from different faith backgrounds are actively involved and respected in all aspects of social, political, and economic life. Inclusive policies contribute to a sense of belonging and reduce marginalization, which are essential for sustainable peace and development (Fariza, 2025; Oyeyipo et al., 2024).

This mutual respect reflects religious tolerance and moderation.

The average result of the weighting combination is measured into a scoring scheme. In this study, scoring uses a positive hypothesis scale with a value range of 1-7, which describes a gradative (tiered) range from low to high quality, with a value of (1) for low quality and (7) for highest quality. In addition, to ensure the validity of the scoring data, three validity test techniques were also carried out at once, namely (1) source triangulation, (2) self-assessment questionnaire and (3) expert meeting series or series of meetings of experts to provide judgement (Ikhsan Yosarie et al., 2024).

## 2) Differential Equations

Logistic equations are differential equations that can be used to predict something. Logistic equations belong to the type of Bernoulli differential equations of degree 2. The logistical equation used is

$$\frac{dP}{dt} = kP, k > 0,$$

$P(t)$  = population at  $t$  (time)

$$\frac{dP}{dt} = kP \text{ (eq 1)}$$

$$\frac{dP/dt}{P} = k f(P)$$

$$\frac{dP}{dt} = k P f(P) \text{ (eq 2)}$$

$K$ : IKT in an area, with a maximum score of 7

$$f(K) = 0; f(0) = r; f(P) = c_1P + c_2; c_1 = -\left(\frac{r}{K}\right); c_2 = r$$

And reasoning, then it is obtained  $a = kr$ ,  $b = k\left(\frac{r}{K}\right)$

$$\frac{dP}{dt} = P(a - bP) \text{ (eq 3)}$$

$$P(t) = \frac{ac_3}{e^{-at} + bc_3} \text{ (eq 4)}$$

$$P = \frac{a}{b + [e^{-at}]ac} \text{ (eq 5)}$$

This equation 5 will be used in predicting. The data used in equation 5 is graph image 1, and then transformed into table 1.

**Table 3.** National Average Score of the Tolerated City Index 2020 – 2024

Year	2020	2021	2022	2023	2024
IKT	5,00	5,24	5,03	5,06	4,92

Based on table 1 above, it will then be used in predicting IKT in the following year, namely in 2024. The formation of the model is carried out three (3) times in order to obtain the model that is closest to reality.

(1) Model 1

Model 1 utilizes data points from the years 2020, 2021, and 2024 to construct the differential equation. In this model, the time variable  $t$  is assigned values based on the corresponding years:

2020 is taken as the baseline with  $t = 0$ , 2021 as  $t = 1$ , and 2024 as  $t = 4$ . These time designations help structure the model chronologically and allow researchers to trace the trajectory of the Tolerant City Index over this specific period, forming the basis for further predictions.

In addition to generating a mathematical equation, Model 1 also serves as a predictor by providing a MAPE value, which measures the model's predictive accuracy. By comparing the model's output with actual data, the MAPE value quantifies how close the predicted values are to real-world outcomes. This metric is essential for determining how reliable Model 1 is compared to other models and for identifying the model that offers the best balance between complexity and predictive precision.

(2) Model 2

Model 2 utilizes data points from the years 2021, 2022, and 2024 to construct the differential equation. In this model, the time variable  $t$  is assigned values based on the corresponding years: 2021 is taken as the baseline with  $t = 0$ , 2022 as  $t = 1$ , and 2024 as  $t = 3$ . These time designations help structure the model chronologically and allow researchers to trace the trajectory of the Tolerant City Index over this specific period, forming the basis for further predictions.

In addition to generating a mathematical equation, Model 2 also serves as a predictor by providing a MAPE value, which measures the model's predictive accuracy. By comparing the model's output with actual data, the MAPE value quantifies how close the predicted values are to real-world outcomes. This metric is essential for determining how reliable Model 2 is compared to other models and for identifying the model that offers the best balance between complexity and predictive precision.

(3) Model 3

Model 3 utilizes data points from the years 2022, 2023, and 2024 to construct the differential equation. In this model, the time variable  $t$  is assigned values based on the corresponding years: 2022 is taken as the baseline with  $t = 0$ , 2023 as  $t = 1$ , and 2024 as  $t = 2$ . These time designations help structure the model chronologically and allow researchers to trace the trajectory of the Tolerant City Index over this specific period, forming the basis for further predictions.

In addition to generating a mathematical equation, Model 3 also serves as a predictor by providing a MAPE value, which measures the model's predictive accuracy. By comparing the model's output with actual data, the MAPE value quantifies how close the predicted values are to real-world outcomes. This metric is essential for determining how reliable Model 3 is compared to other models and for identifying the model that offers the best balance between complexity and predictive precision.

Model	r	K	a=r	$b = \frac{r}{K}$	P(0)	P(1)
1	5	7	1,76	0,714	5	5,24
2	5,24	7	1,76	0,714	5,24	5,03
3	5,03	7	1,76	0,714	5,03	5,06

Information:

$$K = \max \text{IKT} = 7$$

$$r = P(0)$$

Model 1, from the calculation using equation 5 and the data in table 4, the results are obtained, meaning that 2024, according to the prediction of the IKT value, is 5,84. Furthermore, the value MAPE is 18,7 % (good category). Model 2, from the calculation using equation 5 and the data in table 4, the results are obtained, meaning that 2024, according to the prediction of the IKT value, is 4,57. Furthermore, the value MAPE is 7,2 % (excellent category). Model 3, from the calculation

using equation 5 and the data in table 4, the results are obtained, meaning that 2024, according to the prediction of the IKT value, is 5,09. Furthermore, the value MAPE is 3,4 % (excellent category).

From the three models, it can be concluded as follows:

**Table 5.** IKT prediction results with 3 models in 2024

	Model 1	Model 2	Model 3
<b>IKT prediction (2024)</b>	5,84	4,57	5,09
<b>MAPE (%)</b>	18,7	7,2	3,4

From the table above, the one that has the smallest MAPE is used, namely model 3. Furthermore, from the model 3 equation, IKT will be sought in 2025 with  $t = 3$ . From the calculation above, the result is obtained which means that from 2025 according to the prediction of the IKT value is 5,12, where there is a decrease from 2024 is 4,92 (table 3).

This predicted increase suggests a positive shift in tolerance levels across Indonesian cities, signaling gradual progress in inclusive governance practices. A higher IKT score indicates improvements in addressing discriminatory policies, strengthening civil society engagement, and enhancing local government efforts to promote intergroup harmony. The findings from Model 3, identified as the most accurate due to its lowest MAPE value, provide a data-driven basis for anticipating future opportunities and guiding strategic policies that can sustain and further accelerate this upward trend toward a more tolerant and cohesive urban society.

### 3) Strategic steps to reveal IKT that are likely to increase

The use of Model 3, which has the smallest MAPE value, indicates that it provides the most accurate prediction among the models tested. Based on its equation, the predicted Tolerant City Index (IKT) value for 2025 is 5.12, a decline from the 2024 figure. This projected decrease suggests that, without significant intervention, the level of tolerance in urban areas may continue to weaken. Such predictions highlight the importance of not only understanding past and current trends but also anticipating future challenges in promoting social inclusion and diversity.

However, this forecast stands in contrast to the broader institutional trend of increasing support for tolerance through regional legal frameworks. Various local governments have introduced legal instruments, such as regional regulations, mayoral decrees, and official circulars, that explicitly promote tolerance and inclusivity (Ikhsan Yosarie et al., 2024). The continued emergence of such legal products indicates a growing awareness and commitment at the policy level. Therefore, while the model projects a decline in the IKT, this may be counterbalanced in the future if legal reforms are effectively implemented and accompanied by active monitoring and public engagement.

The development of this indicator is part of a positive trend, namely the growth of tolerance-promoting legal products in cities. Regional legal products that promote tolerance were found: Regional Regulations, Mayoral Regulations, and other forms that can include Circulars, Decrees, and so on. This trend continues with the detection of new legal products that promote tolerance (Ikhsan Yosarie et al., 2024).

#### (1) Strengthening socio-cultural identity

The strengthening of socio-cultural identity within a city often serves as a double-edged sword. On one hand, it can foster pride and cohesion among majority communities. On the other hand, without socio-religious inclusion, such identity reinforcement can marginalize minority groups. Cities with low religious heterogeneity or where cultural dominance is pronounced may face difficulties embracing pluralism. In this context, the presence of inclusive RPJMDs and proactive public statements by city leaders is essential to frame diversity not as a threat but as a shared civic

value. Moreover, civil society dynamics play a vital role in bridging cultural gaps and promoting inter-group dialogue.

The stagnation or low tolerance scoring score in several cities in Indonesia is often caused by the strengthening of socio-cultural identity in the community. This identity, which includes ethnicity, religion, race, and class (SARA), is increasingly used as a dividing tool in social life. The strengthening of exclusive group identities makes people tend to limit interactions with other different groups, both ethnically and religiously. As a result, patterns of discrimination and intolerance emerge that strengthen the barriers between groups. In some cities, this phenomenon can be seen in the increasing incidence of social conflicts, rejection of the construction of houses of worship, and the spread of hate speech based on socio-cultural differences. This tension between groups decreases social tolerance, which is then reflected in the low scoring score on the tolerance index.

In addition, the strengthening socio-cultural identity is often politicized, especially ahead of general elections or regional head elections. Political groups are exploiting this cultural sentiment to gain mass support by promoting a “us versus them” narrative. This strategy exacerbates societal polarization and triggers increased exclusivity between groups. When group identities are politicized, there is a tendency to reject the diversity and plurality that exists. The impact is the erosion of inclusive values in society, thus creating resistance to differences that should be acceptable. This condition clearly has a negative impact on the tolerance index of cities that are trapped in the dynamics of narrow socio-cultural identity.

(2) The weakening of the city’s structural legal dimension in enforcing the constitution to ensure freedom of religion and belief

The weakening of the city’s structural legal dimension in upholding constitutional guarantees, such as freedom of religion and belief, manifests in the absence of concrete legal actions, lack of enforcement, or even the presence of discriminatory policies. Tolerance values need to be translated into real actions, not just ideals. This requires consistent government policies, active involvement of religious leaders, and the practice of principles that support inclusive social life (Pauzian, 2025). While some cities refrain from overt acts of intolerance, their inaction in legally protecting vulnerable groups reflects passive complicity. Concrete actions by the city government, including the formulation of anti-discrimination bylaws, are crucial to correct this. The absence of intolerance events alone is not sufficient; structural safeguards must be institutionalized to prevent regression and ensure rights are protected proactively.

One of the factors that causes stagnation or low tolerance scoring in several cities in Indonesia is the weakening of the structural legal dimension in enforcing the constitution, especially related to the guarantee of freedom of religion and belief. Local governments in some cities do not fully enforce laws that protect minorities’ rights to worship or express their beliefs. In many cases, weak enforcement of religious rights violations, such as restrictions on the establishment of houses of worship, exclusion of religious minorities, or even acts of violence related to religious issues, are left unpunished. As a result, vulnerable groups feel unprotected, and intolerance is allowed to flourish without adequate legal intervention.

In addition, regulations at the local level, such as discriminatory local regulations, often conflict with the principles of religious freedom guaranteed by the constitution. Some cities have policies that structurally narrow the space for religious freedom, such as restricting religious activities of minority groups or imposing permits to establish places of worship that are too difficult to fulfill. When laws and regulations do not side with all groups fairly and constitutionally, tensions between groups increase, and the space for tolerance becomes narrower. This weakening of the structural legal dimension results in a lack of protection for different groups, so that tolerance scores in these cities remain low or even stagnant over time.

(3) Stagnation of conditions in the promotion of tolerance.

Stagnation in tolerance promotion often arises when governments rely solely on symbolic gestures without systemic change. This stagnation may persist even in contexts where no visible acts of intolerance occur. For cities to move beyond this plateau, a shift toward socio-religious inclusion, policy innovation, and active civic engagement is required. Cities must go beyond rhetoric by integrating pluralistic values into urban planning documents such as the RPJMD, ensuring that tolerance becomes a measurable governance objective. Without such integration, even culturally diverse cities may fail to sustain long-term tolerance.

The low or stagnant tolerance scoring value in several cities in Indonesia is also triggered by stagnation in the promotion of tolerance itself. Many cities do not innovate or take new initiatives in an effort to increase tolerance in society. Programs that are supposed to encourage interfaith dialogue, inclusive education, and the strengthening of diversity values often run in place or are not well integrated into public policy. The inability of local governments and communities to adapt to new challenges, such as the increasing flow of digital information that can reinforce intolerance, is also one of the factors that causes this stagnation. Without an active and sustainable program, the space to build understanding and mutual respect between groups is narrowing.

In addition, this stagnation is exacerbated by a lack of coordination between various parties, both governments, civil society organizations, and local communities, in encouraging tolerance. Without solid cooperation, many programs to promote tolerance do not achieve their goals or are only symbolic. Inconsistent efforts to educate the public about the importance of diversity and tolerance create conditions where intolerance can persist or even increase in some cities. When tolerance programs do not evolve with the challenges of the times, tolerance scoring values remain low and there is no significant improvement.

The following table presents the thematic linkages between key challenges in urban tolerance, such as socio-cultural identity reinforcement, structural legal weaknesses, and stagnation in tolerance promotion, and the relevant indicators of the Tolerant City Index. By mapping these connections, the table illustrates how each issue manifests through specific dimensions of policy, governance, and social dynamics, thereby offering a framework for more targeted interventions.

**Table 6.** Thematic Linkages between Issues and Indicators

<b>Issue</b>	<b>Related IKT Indicators</b>	<b>Explanation</b>
Strengthening socio-cultural identity	Religious heterogeneity, RPJMD, Public statements	Identity narratives must be balanced with inclusive planning and public leadership.
Weakening of structural legal enforcement	Discriminatory policies, Concrete actions, RPJMD	Legal gaps or passive governance undermine protection of religious freedom.
Stagnation of tolerance promotion	Absence of intolerance events, Socio-religious inclusion, Civil society dynamics	Stagnation may occur in “silent” environments without proactive inclusion or grassroots engagement.

There is a tendency in society to prioritize religious identity by claiming it as a public agreement which then encourages the city government to agree into intolerant attitudes. The expression of majoritarianism can be seen in cases of refusal of lectures to certain religious leaders, misdirection of certain religious sects and old problems in the form of rejection of worship activities and the establishment of houses of worship.

- (1) The increase in local regulations such as “sharia regional regulations” (sharia-based regional

regulations) is often driven by religious leaders and power actors. These policies create an environment that normalizes intolerance, as happened in East Java where religious fatwas were used to impose restrictions on minority religious groups (Hamid, n.d.).

- (2) These regulations often have the backing of public opinion, as groups claiming to represent the “public consensus” urge local governments to take an intolerant stance. As a result, the resulting policies marginalize minority groups, restrict religious freedom, or exacerbate social fragmentation (Santini, 2020).
- (3) The Ahmadiyya community in Surabaya describes how the local government enacted regulations restricting their religious practices, despite the fact that there were legal protections nationally (Soedirgo, 2018).

The existence of discriminatory legal products that are still normatively valid until now also contributes to perpetuating the practice of intolerance that is camouflaged into these public agreements. Instead of stopping it, the city government used articles and arguments to avoid public uproar to ignore the constitution and Pancasila in guaranteeing religious freedom. Some city governments even believe that the decision to agree with intolerant groups is part of a ‘wise’ effort to maintain religious harmony. This situation is illustrated that Pancasila and the Constitution are often defeated in responding to the practices of intolerance and discrimination (Ikhsan Yosarie et al., 2024). Reports in Indonesia show that Pancasila and the Constitution are often defeated in responding to intolerance and discrimination practices, especially when facing pressure from intolerant groups in some regions. This situation reflects weakness in the application of Pancasila values and the 1945 Constitution as a legal basis that guarantees freedom for all citizens (Saraswati, 2023). Programs related to Pancasila education are often only symbolic, not having a major impact in improving public understanding of tolerance (Mubarok, 2024).

This condition also illustrates that the decline in the national average score in IKT is not only due to discriminatory events/regulations, but also the lack of breakthroughs from certain city governments in promoting tolerance.

#### 1) A quick comparison with the tolerance index in Turkey

Research highlights a complex relationship between religiosity and tolerance in Turkey. A study found that individuals with higher levels of religiosity tend to exhibit lower tolerance toward out-groups. This suggests that as religious commitment deepens, acceptance of different social groups may decline (Hendek, 2021).

Educational background plays a crucial role in shaping tolerance levels. Yildirim (2010), studied university students and found that female students, as well as those from humanities faculties, displayed higher levels of “warm tolerance.” Additionally, non-religious students were found to be more tolerant than their religious counterparts, further reinforcing the link between education and openness to diversity.

Cultural perspectives also influence tolerance levels. Usman et al., (2023) examined the impact of religious interpretation on social tolerance, finding that individuals who adhere to a textualist-traditionalist approach-characterized by a strict, literal interpretation of religious texts, tend to have lower levels of social tolerance. In contrast, those who adopt a more flexible and contextual understanding of religion are generally more accepting of diverse social groups.

Overall, these studies suggest that tolerance levels in Turkey are shaped by a combination of religiosity, education, and cultural attitudes. Higher education and a more adaptable approach to religious beliefs are linked to greater social tolerance, while increased religiosity-particularly when rooted in traditionalist interpretations-may correspond with lower acceptance of diversity.

Both Indonesia and Türkiye face significant challenges in maintaining and improving tolerance levels, though the underlying factors shaping these trends differ. In Indonesia, the decline in the Tolerant City Index (IKT) is driven not only by discriminatory regulations but also by the absence

of proactive initiatives from local governments to promote inclusivity. This suggests that government intervention plays a crucial role in shaping tolerance at the municipal level.

In contrast, tolerance levels in Türkiye are influenced by a combination of religiosity, education, and cultural attitudes. Research indicates that individuals with higher levels of education and a more flexible approach to religious beliefs tend to be more tolerant. On the other hand, increased religiosity, particularly when interpreted in a rigid, traditionalist manner, often correlates with lower acceptance of diversity. Unlike Indonesia, where government policies and initiatives have a direct impact on urban tolerance, Türkiye's tolerance levels seem to be more deeply rooted in societal and cultural dynamics, particularly the intersection of religious interpretations and education.

Despite these differences, both cases highlight the importance of proactive efforts in fostering tolerance, whether through government-driven policies in Indonesia or broader societal shifts in education and religious perspectives in Türkiye. The findings underscore that inaction, whether from governments or social institutions, can contribute to declining tolerance levels. This reinforces the need for strategic and inclusive interventions to promote a more tolerant and cohesive society, ultimately contributing to the development of more tolerant.

In the case of Indonesia, the declining trajectory of the Tolerant City Index (IKT), as reflected in Model 3's prediction of a drop to 5.12 in 2025, indicates a stagnation in tolerance-related progress. While legal frameworks such as the RPJMD (Regional Medium-Term Development Plan) exist to uphold inclusive governance, their implementation varies significantly across municipalities. This variation is further compounded by the uneven presence of non-discriminatory policies and the frequent absence of concrete actions by local governments to address intolerance events. When city administrations fail to issue public statements that defend pluralism or to follow through with responsive measures, it signals a weakening structural commitment to the constitutional guarantee of religious freedom and belief (Santoso et al., 2024).

Moreover, the weakening of a city's structural legal dimension often occurs alongside the erosion of socio-religious inclusion. Cities marked by religious heterogeneity may experience heightened tension if not supported by inclusive governance and civil society engagement. Without strategic efforts to foster cross-group dialogue and mitigate exclusivist narratives, religious diversity can become a latent source of conflict rather than a strength (Surur et al., 2025). Therefore, the dynamics of civil society, through community-based interfaith activities, inclusive education, and active monitoring, play a vital role in complementing formal legal structures in promoting tolerance.

Meanwhile, strengthening socio-cultural identity in a plural society must be balanced with broad civic values that transcend sectarian divisions. In the absence of inclusive public narratives, cultural identity risks becoming a basis for exclusion. This becomes especially evident when local governments fail to initiate symbolic and practical efforts, such as issuing inclusive public statements or implementing grassroots tolerance programs, that legitimize the presence of minority communities. Thus, indicators like socio-religious inclusion, religious heterogeneity, and the visibility of local leadership in promoting pluralism are not just abstract metrics; they are active levers in determining the direction of urban tolerance. The predictive modeling and observed MAPE accuracy underscore this, highlighting that mathematical trends reflect broader sociopolitical realities that demand holistic interventions.

## Conclusion

The selection of Model 3, identified by its lowest MAPE value, provides the strongest analytical foundation for projecting future trends in the Tolerant City Index (IKT). According to this model, the IKT is expected to rise from 4.92 in 2024 to 5.12 in 2025, suggesting a gradual strengthening of urban tolerance across Indonesian cities. This upward movement likely reflects ongoing

improvements in inclusive governance, policy reform, and civic engagement, underscoring the critical need to maintain and institutionalize these advancements. Such findings not only confirm the model's predictive reliability but also highlight the importance of embedding tolerance into long-term urban development strategies rather than allowing progress to remain temporary or situational. At the same time, comparative and differential analyses reveal that cities experiencing a decline in tolerance often face stagnation in policy innovation, limited public education initiatives, and weak law enforcement. Discriminatory practices and exclusionary regulations further deepen inequality, reflecting a broader failure to protect minority groups or hold perpetrators accountable. When contrasted with Turkey, where tolerance patterns are shaped more by religiosity, education, and cultural norms, Indonesia's dynamics appear more closely linked to governmental action or inaction, reinforcing the universal need to combine effective policy reforms with deeper societal value transformation.

Future research should continue refining tolerance prediction models by integrating socio-political and economic indicators such as demographic shifts, urban growth, and the influence of digital media. Comparative studies of highly tolerant cities can reveal effective approaches, while longitudinal analyses will help measure the lasting impact of inclusive interventions. Equally important is the exploration of grassroots initiatives, interfaith dialogue, and educational programs that build resilience against intolerance at the community level. To nurture a more inclusive civic environment, policymakers must strengthen anti-discrimination frameworks, promote pluralism through local governance, and embed civic education early in the school curriculum. Enhancing government accountability, supported by civil society partnerships, continuous monitoring, and nationwide awareness campaigns, can further reinforce religious freedom and social cohesion. Through these coordinated and proactive efforts, authorities can safeguard the upward trajectory of the Tolerant City Index and lay the foundation for a more harmonious and equitable society.

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### **Declaration of Generative AI and AI-assisted technologies in the writing process**

This declaration confirms that Generative AI and AI-assisted technologies were employed solely to support the writing process, such as refining sentence structure, clarifying ideas, and ensuring the coherence of the manuscript. No aspect of data collection, data processing, or data analysis was conducted using AI tools. All research procedures, from instrument development to the interpretation of findings, were carried out independently by the author without any involvement of AI technologies.

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