

# Mathematical Modeling to Measure the Level of Terrorism Deradicalization Effectiveness

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**Abstract**—The general aim of deradicalization is to make terrorists or groups of perpetrators of violence willing to leave or break away from acts and activities of terrorism. The method in this study is quantitative-descriptive which will provide mathematical modelling to calculate the number of terrorist prisoners in Indonesia that have been successfully handled by the National Counter-Terrorism Agency (*Badan Nasional Penanggulangan Terorisme*) through a deradicalization program. The purpose of this study is to determine the effectiveness of the deradicalization program of the National Counter-Terrorism Agency in reducing the number of terrorist prisoners in Indonesia. The deradicalization program carried out by the government through the National Counter-Terrorism Agency aims to neutralize the ideological foundations of both militant and radical groups. The deradicalization used by the BNPT is the formula currently being implemented to deal with the threat of terrorism and also those related to radical groups. The mathematical model for terrorist deradicalization efforts by the National Counter-Terrorism Agency is

$$\frac{dN(t)}{dt} = T - E - kN(t) - pN(t) - lN(t).$$

**Keywords**— *radicalism; terrorist; the National Counter Terrorism Agency; the ideological foundations; militant*

## 1 INTRODUCTION

The terrorist movement is not easy to understand when they will commit terrorists with suicide bombings "Terrorism is a social phenomenon that is difficult for even the terrorists to understand, it is like a ghost, exists but is invisible and can appear suddenly without suspected by its sporadic actions and surprising targets. Even when they are still citizens in correctional institutions, terrorist convicts are determined to carry out acts of terror if they are released later" [1]. Terrorism in Indonesia is carried out individually as well as in groups, depending on how many targets are to be destroyed. Influencing terrorist actors, which consist of nationalist fighters, separatists, oppositionists, revolutionary militants, and bandits, economic bandits, who aim to fight for their group and also consist of various types of adherents of religions and beliefs as well as other anarchist groups, which in general housed in a relatively small organization, closed and moving underground in secret. In general, secret organizations are operated in full secrecy, which means that they are clandestine, they operate a compartmentalized.

Deradicalization is a strategy for overcoming the problem of terrorism radicalism, which is a recovery in nature (improvement or healing) for actors and other parties involved in this movement. Those perpetrators of terror have often been indoctrinated or experienced the ideological nation of the radicalism movement. The ideological process causes them to become people who suffer from "radicalism". The development of radicalism based on religion and politics is growing rapidly in Indonesia so it becomes a very serious threat to the sustainability of the nation and state. The impact resulting from radicalization is very dangerous for the sustainability of the Unitary State of the Republic of Indonesia because it will replace the state ideology that has been accepted by society with group ideology without considering the ideological interests of other groups. Bringing social instability in society, changing the education paradigm quickly, having anarchic tendencies, and the impact of radicalism can threaten state leaders who are legally elected based on applicable regulations [2]. Based on the background of this problem, although this research is not the first research on deradicalization, researchers have an interest in the deradicalization process in countering radicalism in Indonesia which was carried out by the Badan Nasional Penanggulangan Terorisme (BNPT).

Terrorism becomes a frightening threat to many countries because radicalism is the most important aspect of radicalism itself, and it has intangible or invisible characteristics. People who are exposed to radicalism can take action. This includes our country, where to this day the best formula is still being sought to deal with it. In Indonesia, since terrorism has become one of the big problems facing this nation, the government has been trying to find the best ways to deal with it. Terrorism is coordinated attacks aimed at arousing feelings of terror against a group of people. Acts of terrorism mean that the terrorist attacks are inhumane and without justification, and therefore the perpetrators deserved a cruel response. In Indonesia, lately many cases of terrorism have occurred.

Various threats and modes carried out by these terrorists can threaten public security and order, and can be a

threat to the sovereignty of the State. Efforts to punish perpetrators of criminal acts of terrorism need special guidance. Handling terrorism is actually a resistance shown to the ideology adopted by terrorists and their spread. One of them is deradicalization an effort to neutralize radical understanding for those who are involved in acts of terrorism and their sympathizers. Initially, the BNPT was an institution that was developed from the Terrorism Eradication Coordinating Desk (DKPT), which was formed by President SBY in 2002. The DKPT is an institution under a Coordinating Minister. DKPT has the task of assisting the Coordinating Ministry for Political, Legal and Security Affairs to formulate policies for eradicating criminal acts of terrorism, which includes aspects of deterrence, prevention, control, termination of settlement, and all necessary legal actions. The BNPT itself was formed through Presidential Regulation No. 46 of 2010 concerning the Establishment of the National Counterterrorism Agency (BNPT). This presidential regulation was amended by Presidential Decree No. 12 of 2012. The formation of the BNPT is a national policy for combating terrorism in Indonesia.

The authorized institution in Indonesia to deal with terrorists is the National Counter-Terrorism Agency (BNPT) "As an institution that has a national role and responsibility in dealing with terrorism in Indonesia. BNPT also uses this deradicalization strategy in carrying out its duties. There were at least three major deradicalization programs launched by the BNPT in tackling terrorism in Indonesia in 2010-2011. BNPT was also formed as an elaboration of Law no. 34 of 2004 concerning the TNI and Law no. 2 of 2002 concerning the Police, to regulate more detailed provisions regarding the "Rules of Engagement" (rules of involvement) of the TNI, related to the duties of Military Operations other than War (OMSP), including regulations regarding the involvement of the TNI in overcoming terrorism, as well as the TNI's assistance duties to the Police. The BNPT is structurally responsible to the president. The BNPT has five functions to eradicate terrorism: prevention, protection, prosecution, preparation of national preparedness and deradicalization. Related to the deradicalization function, this institution carries out activities against radical ideological propaganda, prevention of radical ideology, and implementation of re-education and re-socialization programs.

Deradicalization is a program with various objectives, centred on overcoming the problem of terrorism as a whole. Several things, such as carrying out counter-terrorism, preventing the process of radicalism, preventing provocation, spreading hatred, and enmity between religious adherents, preventing people from being indoctrinated, increasing public knowledge to reject terrorism, and enriching the treasury by comparing different views, are part of the from the deradicalization program. This research refers to research that has been conducted by Fitriana who came to the conclusion that the deradicalization program coordinated by the BNPT was prepared in a comprehensive, inclusive and neutral manner, involving various government and non-government institutions, layers of society, and related stakeholder [3]. The deradicalization program launched by the BNPT only touches on the side of one's ideology so that what is emphasized is counter-ideology but does not significantly shift the political spectrum. In addition, the deradicalization program launched by the BNPT pays little attention to a person's perspective on



the nature of people [4]. From various studies that have been carried out by previous researchers, the results show that it is only an analysis of the process of implementing the deradicalization program. So that in this study, researchers will perform calculations regarding the effectiveness of the deradicalization program carried out by the BNPT using mathematical modeling.

## 2 METHOD

The method in this study is quantitative-descriptive which will provide mathematical modeling to calculate the number of terrorist prisoners in Indonesia that have been successfully handled by The National Counter-Terrorism Agency through a deradicalization program. Through the compiled model, an overview of the accumulated effectiveness of the programs that have been carried out will be obtained which increases and decreases the number of prisoners based on the factors that influence it. The focus is on the link between the deradicalization program and the number of terrorists represented in the form of a mathematical equation, simulations and case studies can be carried out on estimates of the increase or decrease in the number of terrorist convicts in Indonesia based on several influencing factors. The aim of modeling is to create a mathematical model that can be used to measure the level of effectiveness of a program. Mathematical modeling is the process of deriving a mathematical model of a phenomenon based on the assumptions used.

The purpose of having a mathematical model is to enable a decision-making process to be carried out regarding real situations by analyzing the model. There are several steps that must be taken to obtain modeling. The beginning is starting from descriptive analysis, then determining inhibiting factors and determining supporting factors, so that they can be illustrated in a compartment diagram. After that, mathematical modeling is continued with construction models and looking for solution models. If the right model has been obtained, the next step is data application and prediction of the number of terrorist convicts in the future. Finally, the analysis and conclusion regarding the effectiveness of the deradicalization program carried out by the BNPT. The following Figure 1 is a flowchart in this study.

## 3 RESULT AND DISCUSSION

Counterterrorism experts say that the term terrorist refers to perpetrators who are not members of a known armed force or do not comply with the regulations of the armed forces. Acts of terrorism also imply that terrorist attacks are inhumane and have no justification. Therefore, the perpetrators ("terrorists") deserve the appropriate punishment. As a result of the negative meanings contained in the words "terrorist" and "terrorism", terrorists generally refer to themselves as separatists, liberation fighters, militants, mujahideen, and others. But in the justification in the eyes of terrorism: "The true meaning of jihad, mujahideen are far from acts of terrorism that attack civilians when they are not involved in war". Though Terrorism itself often appears in the name of religion.

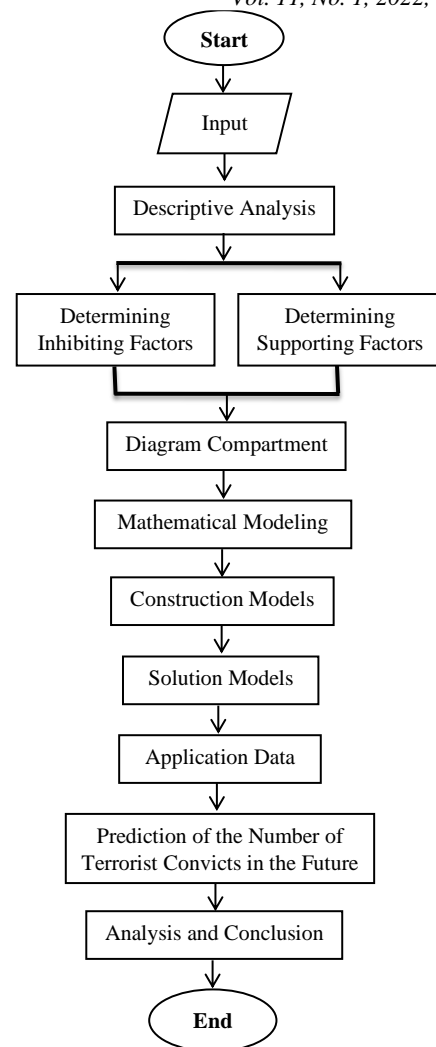


Figure 1. Research Flowchart

Deradicalization in language comes from the word "radical" which gets the prefix "de" and the ending "kal". The word deradicalization is taken from the English term "deradicalization" and the root word radical comes from "radix" the Latin. So, what is meant by "deradicalization" is a step to change attitudes and perspectives that are considered hard to become soft; tolerant, pluralist, and moderate. Deradicalization is any effort to neutralize radical ideas through an interdisciplinary approach, such as law, psychology, religion, and socio-culture for those who are influenced or exposed to radical ideas [5]. The current phenomenon of radicalism is increasingly occurring in the reality of life. Various demonstrations, political, social, economic, cultural and religious coloured people's lives. In the end, these problems tend to be responded with violence, which in this case is certainly counter-productive. One of the implications is that violence as radicalism becomes the dominant variable in various acts of violence in the name of religion. Religion that originally had a mission of peace is reduced by actions that are contrary to it. Just as Islam is known as a religion of tolerance and moderation, however, the West considers it a religion that teaches acts of violence or Islam is a religion of terrorism. It is only because there are



people who act in the name of religion by committing acts of violence or terrorist acts that Islam becomes a world threat.

Radicalism and terrorism are one of the serious threats to the sovereignty of every country because they pose a danger to security, world peace and harm the welfare of society. This crime of terrorism is a unique crime, because the motives and factors that cause it are very different from those motives for other crimes. These acts of terrorism can be motivated by certain motives such as holy war motives, economic motives, revenge motives and motives based on certain beliefs. Radicalism and terrorism, which are extraordinary crimes, also require handling using extraordinary methods. In the Qur'an, there are many editorial verses that discuss war with the words qitâl and jihad. It is from these two sayings that many Muslim circles misunderstand the meaning of the words mentioned above. They think that the meanings of qitâl and jihad only have the meaning of war with enemies outside of Islam, without understanding the text and the meaning of the verses in depth. They are very literal in understanding the verses of qitâl and jihâd, misunderstand the word infidel, and also have a revolutionary attitude [6].

Deradicalization is a program with various objectives, centered on overcoming the problem of terrorism as a whole. Several things, such as carrying out counter-terrorism, preventing the process of radicalism, preventing provocation, spreading hatred, and enmity between religious communities, preventing people from being indoctrinated, increasing public knowledge to reject terrorism, and enriching the treasury of comparisons of different understandings, are part of the deradicalization program. According to John Horgan in his writing entitled "Deradicalization or Disengagement", deradicalization is a combination of two terms that have different meanings, but the ultimate goal is the same, namely to make terrorists want to leave or release acts of terrorism in the form of violence [7]. The deradicalization process is one of the methods in handling terrorism cases where the rehabilitation and reintegration of a terrorist perpetrator to the wider community is the main goal. In Indonesia itself, there are many examples of radicalism, one of which is terrorism [8]. One of the special institutions for tackling or preventing terrorism in Indonesia is the BNPT.

Terrorism is an understanding that is a frightening threat to many countries because radicalism is the most important aspect, which is in it, and has intangible or invisible characteristics [9]. People who are exposed to radicalism can act. This includes in our country, where to this day efforts to overcome it are still looking for the best formula. In Indonesia, since terrorism has become one of the major problems faced by this nation, the government is trying to find the best ways to deal with it [10]. In Islamic law, anyone who commits terror and frightens others will be subject to severe punishment [11]. They are what are called people who do mischief on earth like robbers. They will be subjected to severe punishment so that their evil actions will no longer be repeated, as well as to protect the property, blood and honor of others. About this kind of person mentioned in the verse,

إِنَّمَا جَزَاءُ الَّذِينَ يُحَارِبُونَ اللَّهَ وَرَسُولَهُ وَيَسْعَوْنَ فِي الْأَرْضِ فَسَادًا أَنْ يُقَتَّلُوا أَوْ يُصَلَّبُوا أَوْ تُقَطَّعَ أَيْدِيهِمْ وَأَرْجُلُهُمْ مِنْ خِلَافٍ أَوْ يُنْفَوْا مِنَ الْأَرْضِ ذَلِكَ لَهُمْ خِزْيٌ فِي الدُّنْيَا وَلَهُمْ فِي الْآخِرَةِ عَذَابٌ عَظِيمٌ

“Verily, the vengeance for those who fight against Allah and His Messenger and cause mischief on earth is only that they are killed or crucified, or their hands and feet are cut off reciprocally, or banished from the country (where they live). That is (as) an insult to them in this world, and in the Hereafter, they will have great torment.” (QS. Al Maidah: 33).

In this case, the author briefly describes several opinions related to the characteristics of radicalism and terrorism. There are five characteristics of radicalism and terrorism movements in matters of religious understanding, including:

- Often claim a single truth and mislead other groups who disagree with them. Claims of truth always emerge from among them as if they were prophets who never made a mistake, even though they are ordinary humans. Truth claims cannot be justified because humans only have relative truth, and only Allah knows absolute truth. Therefore, if there are groups who feel self-righteous, indirectly they have acted arrogantly to seize God's authority.
- Radicalism and terrorism make it difficult for the light religion of Islam by considering sunnah worship as if it were obligatory and makruh as if it were forbidden. Radicalism is characterized by religious behaviour that prioritizes secondary issues and overrides the primary ones. Examples are the phenomenon of lengthening the beard and raising the pants above the ankles. Muslims should prioritize obligations over trivial sunnah matters.
- Most radical groups are exaggerated in religion which is out of place. In their preaching they set aside the gradual method used by the prophet, so that their preaching actually made ordinary Muslims feel fear and objection.
- Rough in interacting, loud in speaking and emotional in preaching. The characteristics of preaching like this are in stark contrast to the grace and gentleness of the prophet's preaching.
- Radical groups are easily prejudiced against other people outside their group. They always look at other people only from the negative aspects and ignore the positive aspects. This must be shunned by Muslims, because the base of radicalism is prejudice against other people. Radical groups often appear to feel sacred and regard other groups as experts on heresy and heresy.
- It's easy to dismiss others who don't agree with them. There are groups who like to disbelieve other groups, but no acts of terror and violence have been carried out, and



also groups who like to make infidels and be included in acts of terror. The author adds something like ISIS.

approaches: Re-education, Rehabilitation, Resocialization and Reintegration.

Initially, the BNPT was an institution that was developed from the Terrorism Eradication Coordinating Desk (DKPT), which was formed by President SBY in 2002. The DKPT as an institution that is under a Coordinating Minister, has the task of assisting the Coordinating Ministry for Political, Legal and Security Affairs to formulate policies for eradicating criminal acts of terrorism, which includes aspects of deterrence, prevention, control, termination of settlement, and all necessary legal actions. The BNPT itself was formed through Presidential Regulation No. 46 of 2010 concerning the Establishment of the National Counterterrorism Agency (BNPT). This Presidential Decree was amended by Presidential Decree No. 12 of 2012. The formation of the BNPT is a national policy for countering terrorism in Indonesia [12]. BNPT was also formed as an elaboration of Law no. 34 of 2004 concerning the TNI and Law no. 2 of 2002 concerning the Police, to regulate more detailed provisions regarding the "Rules of Engagement" (rules of involvement) of the TNI, related to the duties of Military Operations other than War (OMSP), including regulations regarding the involvement of the TNI in overcoming terrorism, as well as the TNI's assistance duties to the Police. The BNPT is structurally responsible to the president. The BNPT has five functions to eradicate terrorism, namely prevention, protection, prosecution, preparation of national preparedness and deradicalization. Related to the deradicalization function, this institution carries out activities against radical ideological propaganda, prevention of radical ideology, implementation of re-education and re-socialization program.

### 3.1. Factors Inhibiting

Factors inhibiting are factors that reduce the number of terrorist convicts in Indonesia. Emigration here means the number of terrorist convicts who are released from prison and do not return to being terrorists in period t. From Sidney Jones' research data, there were 70 convicts who were released during the 2018 period. So that  $E = 72$ . And the number of terrorists who were detained was 400 people, it can be written  $N_0 = 400$ .

The death of terrorist convicts in detention cells will affect the decrease in the number of terrorist convicts. The convict who is in the detention cell does not rule out the possibility of dying while in detention. The causes varied, ranging from illness, riots in prisons, to suicide. Data was obtained that there were 9 convicts who died in detention for various reasons. So that the convict death rate is obtained  $k = \frac{9}{400} = 0,0225$ . Next, namely the BNPT deradicalization program.

According to Irfan Idris, Director of Deradicalization BNPT, the design of deradicalization in Indonesia has four

- Re-education is deterrence by teaching enlightenment to the public about radical understanding, so that there is no neglect of the development of this understanding. Whereas for terrorism convicts, re-education is carried out by providing enlightenment related to deviant doctrines that teach violence so that they are aware that committing violence such as suicide bombings is not jihad which is identified with acts of terrorism [13]. Re-education (Educational Pathway) is a method of deterrence which is carried out by providing teaching and enlightenment to convicts about deviant doctrines (its contents include violence), so that convicts are aware that violence is not part of "jihad" [14]. This re-education is carried out through a series of activities such as seminars, workshops, and others. In 2018, out of 325 ex-convicts who had received the deradicalization program, 128 of them became resource persons at deradicalization events held by the BNPT. From these data it can be concluded that the parameter size of the re-education factor is as shown in Equation 1.

$$e = \frac{\text{Many former convicts } N(t) \text{ are aware}}{\text{Many ex terrorist convicts have been deradicalized}} \quad (1)$$

$$e = \frac{128}{325} = 0.3938$$

- Rehabilitation has 2 meanings: fostering independence and fostering personality. Independence coaching is training and nurturing ex-convicts to prepare useful skills and expertise so that after they leave the penitentiary, they already have the expertise and can open jobs. Meanwhile, personality development is an approach to dialogue with terrorist convicts so that mindset can be straightened out and they have a comprehensive understanding and can accept those who are different from them. The rehabilitation process is carried out in collaboration with various parties such as the police, Correctional Institutions, the Ministry of Religion, and others. It is hoped that this program will provide provisions for them in living life after leaving the penitentiary.
- Rehabilitation has two meanings: fostering independence and fostering personality. The independence development that is carried out is by training and fostering ex-convicts in preparing skills and expertise, so that when they leave the penitentiary, ex-convicts can have the expertise to live a life after being released from detention. One of the programs is in the form of fostering entrepreneurial skills so that ex-convicts can live normally and be able to support their families after



leaving prison. Personality development is an approach that is carried out by having dialogue with convicts so that their perspectives can be straightened out and then have a comprehensive understanding and can accept different perspectives of other people, in other words the goal is for convicts to become tolerant individuals [15].

- BNPT cooperates with Pop Warungs to provide working capital for convicts to sell. Throughout 2018, there have been 107 Pop Warungs in Jabodetabek and 10 in Solo. In total there are 117 Pop Warungs run by ex-convicts. While the target until 2019 is 1200 Pop Warung. If it is assumed that the success is 70%, the parameters for the rehabilitation factor can be calculated using Equation 2 as follows:

$$h = \frac{\text{Number of former terrorist convicts who have businesses}}{\text{Business target for former terrorist convicts}} \times 70\% \quad (2)$$

$$h = \frac{117}{1200} \times 70\% = 0.0625$$

- Resocialization is by guiding ex-convicts in socializing and reuniting with society. Stage Resocialization is an integrative coaching effort in uniting socially assisted citizens and their families peacefully. Meanwhile, efforts to develop integrative personality and independence to return the inmates to society in the life of the nation and state are specific targets [16]. There is fear for socially assisted members of society when they return to society, so personal assistance with psychological support in building self-confidence in blending in with the community is an effort to strengthen the understanding and practice of religious teachings that are moderate, peaceful and respect differences, while fostering independence is providing training. Expertise in accordance with the interests and talents of the inmates or family as capital in continuing a normal life like other residents.
- The term resocialization refers to the regulation of the Head of BNPT No.PER-01/K.BNT/I/2017 concerning the Organization and Work Procedures of the BNPT and the deradicalization blue print which has the same understanding as reintegration. This program is intended as an overall effort to return terrorist convicts or ex-convicts and their families so that they can live and interact properly with the community. Therefore the scope of work of the resocialization program is not only for prisoners or ex-convicts and their families, but also the community where the ex-convicts live.
- Deradicalization, which refers to the Deradicalization blueprint published in 2014,

provides a general definition that resocialization is an integrative coaching effort in uniting socially assisted citizens and their families in peace. Meanwhile, efforts to develop integrative personality and independence to return the inmates to society in the life of the nation and state are specific targets. In addition, there is fear for socially assisted members of society when they return to society, so personal assistance with psychological support in building self-confidence in blending with society is an effort to strengthen the understanding and practice of religious teachings that are moderate, peaceful and respect differences, while fostering independence is to provide skills training in accordance with the interests and talents of the inmates or family as capital in continuing a normal life like other residents.

- For the general public, resocialization is an effort to provide understanding as well as prepare the community so that they can accept their presence again without causing fear and suspicion. The target of this program is the prisoners or prisoners who are about to finish their rehabilitation period and are preparing to return to society. The second target is the families of former convicts or socially assisted members, namely the nuclear family, namely husbands or wives and children. if his closest family is seen as having indications of radical views or providing support or acts of radical terrorism. The third target is society; namely a place where former terrorist convicts and their families will live in society.
- Reintegration, this approach is carried out by guiding them to reunite with society. Reintegration is closely related to resocialization. During 2017 to 2019, there were 144 ex-convicts who have been or will be released from detention and are returning to socialize and interact in their home environment. This means that the parameters for reintegration are calculated using Equation 3:

$$i = \frac{\text{Free terrorist convicts}}{N(t)} = \frac{144}{400} = 0.36 \quad (3)$$

- So that the rate of the BNPT deradicalization program is calculated using Equation 4.

$$p = e + h + i \quad (4)$$

$$p = 0.3938 + 0.2925 + 0.36$$

$$p = 0.689$$

- According to the Head of the BNPT, Suhardi, it is impossible for the BNPT to tackle terrorism cases without the involvement of related parties. Because



tackling terrorism must be from upstream to downstream. That is, this is very influential in reducing the number of terrorists in Indonesia. There are many ministries that can work together and coordinate with each other to make the deradicalization program successful in Indonesia. Of the 34 ministries and state agencies in Indonesia, so far the BNPT has coordinated with 36 ministries/state agencies, but of course cooperation with the 36 ministries/agencies has been running optimally. If it is assumed that cooperation with a third can succeed 70%, it can be obtained that the success parameters of coordination factors between government agencies are calculated using Equation 5.

$$l = \frac{12}{36} \times 70\% \quad (5)$$

$$l = 0.2333$$

- Based on a journal entitled "Regarding Deradicalization" by Wildan Nasution, the factors described above are strategies that greatly influence the deradicalization of terrorists by the BNPT in Indonesia. Therefore, these four factors are not eliminated.

### 3.1 Supporting Factors

Supporting factors are factors that can increase the number of terrorist convicts in Indonesia. Immigration here is the number of terrorist convicts who entered the penitentiary in the t. There are still many terrorist incidents that occur in Indonesia with different variants of perpetrators. Starting from Lone wolf, until one family becomes a terrorist. With so many variants of terrorist actors making the deradicalization program where this program has to change the ideology of the terrorists becomes difficult, due to having to understand personally the variants of terrorism [17]. Ex-convicts who have been released may still maintain communication with a member of the terrorist network they once joined, even the terrorist network. This can be one of the media for doctrinating radicalism again so that ex-convicts have the view to return to radicalism [18]. People's views that still tend to be negative and reject the existence of ex-convicts who are free have resulted in ex-convicts having a tendency to make the same mistakes again [19]. So it does not rule out the possibility that ex-convicts can return to the notion of radicalism. Therefore, the role of society that is open and accepts ex-convicts back in their environment is very influential in reducing the number of convicts.

### 3.2 Factor Assumptions

From the existing factors, several factors will be removed, because the effect is not too significant. This is also to facilitate the creation of the mathematical model[20]. The following factors were eliminated, among others; for the

inhibiting factors, there are no factors that are removed because all of them play an important role in reducing the number of convicts in Indonesia. While the supporting factors are as follows:

- Differences in the motives of the perpetrators were removed from the supporting factors because the differences in the motives of the perpetrators of terrorism in Indonesia varied too much, making it quite difficult to map.
- Negative public perception of ex-convicts. When ex-convicts were released from prison and returned to their former community, there were indeed some residents who did not want to accept the presence of ex-convicts again because they were worried that they would carry out similar actions again. But this doesn't happen much. There are only a handful. Because the community also wants to support ex-convicts to return to the right path and not repeat their mistakes again. Therefore, the factor of negative public perception of ex-convicts is eliminated because it has very little effect on the increase in the number of convicts.
- Threatened again by its terrorist network. This factor is omitted because it has very little effect. Because so far the number of ex-convicts who have returned to being terrorists is only 3 people, and even then the last one was in 2018.

Meanwhile the factors that have been maintained are Immigration. The immigration factor is maintained because the number of terrorist convicts who enter each year has a major influence on the effectiveness of the deradicalization program carried out by the BNPT. In the period from May to August 2018, there were 280 convicts who entered. So that  $T = 280$ .

From the several factors previously described, it can be described that the immigration factor had the most influence on the decrease in the number of terrorist convicts. There are several other factors such as death, emigration, coordination between state institutions, and the deradicalization program of the BNPT including resocialization, reintegration, re-education, and rehabilitation which do not significantly affect the number of convicts of terrorism in Indonesia. This can be illustrated in the following compartment diagram in Figure 2.

The following Figure 3 is the prediction of the number of terrorist convicts based on the modelling that has been done, where some data forecasts are obtained which are always decreasing every year. In 2018, the number of terrorist convicts is predicted to be 400 people, in 2019 there will be 291 people, in 2020 there will be 249 people, then in 2021 there will be 233 people, in 2022 there will be 226, then in 2023 it is predicted that there will be 224 terrorist prisoners.



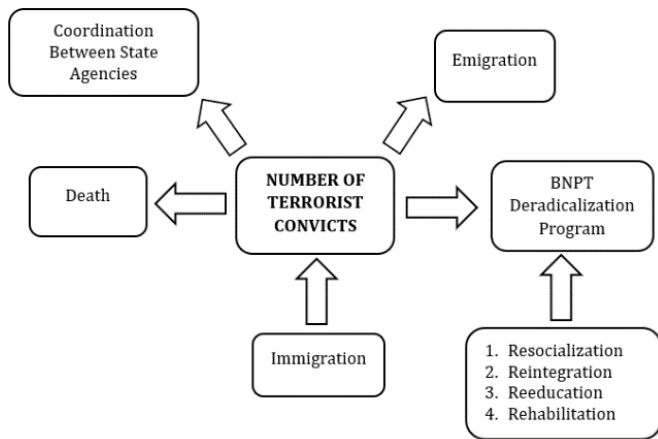


Figure 2. Compartment Diagram

It will be continued in the following years, namely in 2024 and 2025 as many as 223 people, and in 2026 and 2027 it decreased with a total of 222 terrorist convicts. Based on the predictive data obtained, it can be concluded that the number of terrorist convicts has decreased every year.

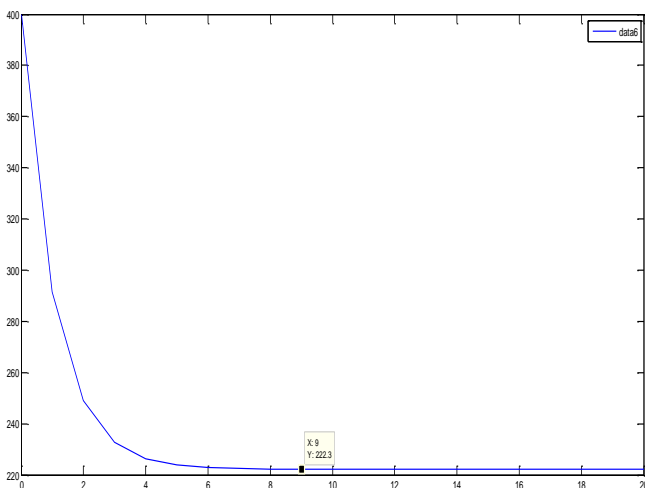


Figure 3. Model Simulation Chart

The prediction data is presented in Table 1. As shown from Table 1, the number of terrorists is decreased from 400 people in 2018 to 222 people in 2027.

Table 1. Prediction Data

Year	Number of Convicts (People)
2018	400
2019	291
2020	249
2021	233
2022	226

2023	224
2024	223
2025	223
2026	222
2027	222

Source: Processed by Researchers

Based on forecasting data on the number of convicts by year, it can be illustrated by the graph as shown in Figure 4:

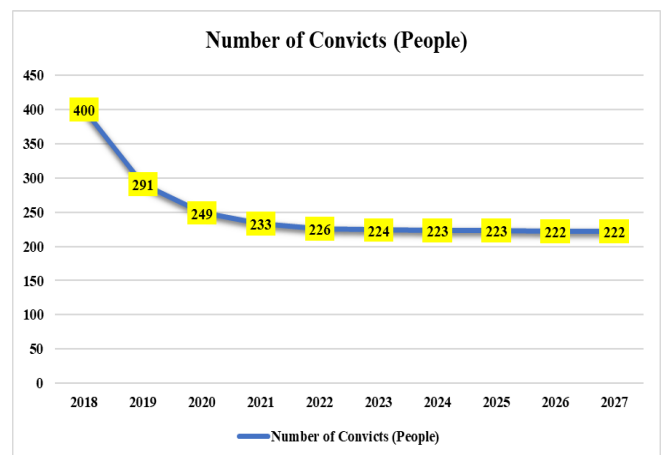


Figure 4. Graph of forecasting data on the number of convicts by year

From the forecasting graph above, it can be seen that the data on the number of terrorist convicts after implementing several programs from the BNPT and other factors has a downward trend every year, starting from 2018 with a total of 400 people until predictions in 2027 with number 222 people. The graph shows constantly a decrement.

## 4 CONCLUSION

### 4.1 Conclusions

Based on the results of the analysis above, a mathematical model was obtained for efforts to deradicalize terrorists by the BNPT as follows:

$$\frac{dN(t)}{dt} = T - E - kN(t) - pN(t) - lN(t)$$

and the specific model solution was obtained

$$N(t) = \frac{((k + p + l)N_0) + (T - E)(e^{(k+p+l)t} - 1)}{(k + p + l)e^{(k+p+l)t}}$$

Therefore, based on the mathematical model that has been made, the effectiveness of the deradicalization program for





terrorist convicts by the BNPT is not maximized. It is because the minimum limit for terrorist convicts in Indonesia stops at 222 people, which is still very high. Ideally the lowest number is close to 0 or in other words there are no more terrorists in Indonesia.

The deradicalization program carried out by the government through the National Counterterrorism Agency (BNPT) aims to neutralize the ideological foundations of both militant and radical groups. The deradicalization used by the BNPT is the formula currently being implemented to deal with the threat of terrorism and also those related to radical groups. Deradicalization is a new approach and also serves as a counterweight to other programs run by the BNPT. Deradicalization is a counseling medium and interactive media for terrorists as a process of changing behavior and perceptions that they believe violate legal norms as well as religious norms. In addition, deradicalization is also a strategy in the form of preventing the flow of radicalism in society. Departing from that, the BNPT with a deradicalization program to make it easier to achieve its targets, needs to involve various parties in its implementation. In this case, the BNPT is deemed necessary to cooperate with community elements. This was done, bearing in mind that the problems of terrorism, radicalism, and extremism are common problems and there must be a joint commitment in dealing with them.

#### 4.2 Recommendations

Deradicalization efforts undertaken by the government through the BNPT have generally yielded positive results. However, in terms of implementation, the community in general does not really understand this deradicalization. Thus, the BNPT must try to find ways that are more effective and easier to understand in disseminating the deradicalization program so that misunderstandings do not occur. In addition, extra caution is needed in handling cases of terrorism and religious radical groups so that misunderstandings do not occur in people's lives. Law enforcement that is more transparent and as fair as possible is also an important part so that there are no suspicions of one another, especially in cases of religious motivation. Affirmation of the legal umbrella for institutions related to combating terrorism and radicalism so that there are no overlaps and confusion in carrying out their respective duties.

#### AUTHOR'S CONTRIBUTION

As sole author, Anatansyah Ayomi Anandari provided technical and writing contributions to this research. He also obtains ideas and technical aspects from several related sources.

#### COMPETING INTERESTS

Comply with the publication ethics of this journal, Anatansyah Ayomi Anandari as the author of this article

declare that this article is free from Conflict of Interest (COI) or Competing Interest (CI).

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#### REFERENCES

- [1] K. Ghazali, *Aksi Teror Bukan Jihad: Membedah Ideologi Takfiri dan Penyimpangan Jihad di Indonesia*, I. Jakarta: Daulat Press, 2015.
- [2] H. Ramdhani, "Peran Perguruan Tinggi Negeri Sebagai Wahana Deradikalisasi Bagi Mahasiswa: Studi Kasus pada Mahasiswa di Institut Teknologi Bandung," UNIVERSITAS PENDIDIKAN INDONESIA, 2019.
- [3] S. Fitriana, "UPAYA BNPT DALAM MELAKSANAKAN PROGRAM DERADIKALISASI DI INDONESIA," *J. Int. Relations*, vol. 2, no. 3, pp. 187–194, 2016.
- [4] S. Zuhri, "Kebijakan Deradikalisasi Terorisme oleh BNPT: Perspektif Spektrum Politik," *J. Ilmu Kepol.*, vol. 11, no. 2, p. 7, 2017.
- [5] W. B. dan K. J. K. (et.al), *Agama sebagai Sumber Kekerasan? Terjemahan Imam Baihaqie*. Yogyakarta: Pustaka Pelajar, 2003.
- [6] H. Hasan, "Penanggulangan Radikalisme dan Terorisme Menurut Al-Qur'an (Telaah Atas Ayat-Ayat Perang dalam Tafsir Ibn Katsir)," Institut PTIQ Jakarta, 2019.
- [7] R. Febriyansah, M., Khodriah, L., & Wardana, "Upaya Deradikalisasi Narapidana Terorisme di Lembaga Pemasyarakatan (Lapas) Kedung Pane Semarang," *Law Res. Rev. Q.*, vol. 3, no. 2, pp. 91–108, 2017.
- [8] A. Azra, *Konflik Baru Antar Peradaban Globalisasi, Radikalisme dan Pluralitas*. Jakarta: Rajawali Pers, 2002.
- [9] N. Chomsky, *Who are The Global Terrorist?* Basingstoke: Plagrave MacMillan, 2002.
- [10] L. Hakim, *Terorisme di Indonesia*. Surakarta: Forum Studi Islam Surakarta (FSIS), 2004.
- [11] S. Jam Benjamin, Daniel and Simon, *Te Age of Sacred Terror: Radical Islam's War Against America*. New York: Random House, 2002.
- [12] D. Suyanto, "Presiden terbitkan Kepres tentang BNPT 16 Juli 2010," *www.antaraneews.com*, Jakarta, 2010.
- [13] A. Rokhmad, "Radikalisme Islam dan Upaya Deradikalisasi Paham Radikal," *Walisongo J. Penelit. Sos. Keagamaan*, vol. 20, no. 1, 2012.
- [14] Y. . Suprpto, Rohmat, Ocktarani, "Deradikalisasi Agama Melalui Pendekatan Da'i Hijrah," in *Prosiding Seminar Nasional Pendidikan, Sains dan Teknologi Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Muhammadiyah Semarang*, 2017.
- [15] R. Suprpto, "Deradikalisasi Agama Melalui Pendidikan Multikultural-Inklusif (Studi Pada Pesantren Imam Syuhodo Sukoharjo)," *PROFETIKA, J. Stud. Islam*, vol. 15, no. 2, 2014.
- [16] M. Nova, Andi, and Syaquillah, "Implementasi Resosialisasi Oleh Densus 88 Anti Teror," *J. Terror. Stud. Sch. Strateg. Glob. Stud. Univ. Indones.*, vol. 3, no. 1, 2021.
- [17] A. S.B, *Deradikalisasi Nusantara: Mengobarkan Perang Semesta Anak Bangsa Melawan Radikalisme dan Terorisme Berbasis Kearifan Lokal*. Jakarta: Daulat Press, 2016.
- [18] P. Hergianasari, "Pembentukan Deradikalisasi Paham Islam Radikal Terhadap Bangkitnya Terorisme di Indonesia Berdasarkan Perspektif Konstruktivisme," *Cakrawala J. Penelit. Sos.*, vol. 7, no. 1, pp. 45–64, 2018.
- [19] M. A. . Hikam, *Deradikalisasi: Peran Masyarakat Sipil Indonesia Membendung Radikalisme*. Jakarta: Penerbit Buku Kompas, 2016.



- [20] A. R. Sari, "Matematika Penyebaran Ide Radikal dalam Konteks Pemilihan Umum dan Konseptual Manifestasi Serupa dari Tingkah Laku Politik," Universitas Negeri Padang, 2018.

