I S M O S A T

Proceeding International Symposium For Modern School Development, Social Science And Applied Technologies 2016

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Penulis	:	Choirul Mahfud	Dwi Ajiatmo and
		Imam Robandi	Moch. Tolchah
		Amalia Zidatul Ulum	Muhammad Fikri Hidayattullah
		Yustiahapsari	Fauzy Satrio Wibowo
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		Eko Mulyanto	
Editor	:	Choirul Mahfud	
Layout	:	Samudra Biru	
Cover	:	Samudra Biru	

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Website: www.ismos2016.sdmuhkriyan.sch.id
TEL./FAX: (0291) 7510494

Colaboration With:
Penerbit Samudra Biru (Anggota IKAPI)
Jln. Jomblangan Gg. Ontoseno Blok B No 15
RT 12 RW 30 Banguntapan Bantul
DI Yogyakarta 55198
e-mail/fb: psambiru@gmail.com
(0274) 9494-558/0813-2752-4748

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PREFACE
THE CHAIRMAN OF ISMOSAT 2016

Assalamu'alaikum Wr. Wb.

Today is the valuable and precious milestones for education in Indonesia in general and Muhammadiyah in particular because all levels of education from elementry schools to SD Muhammadiyah Kriyan Jepara get together to build relationship and networking in The International Symposium For Modern School Development, Social Science And Applied Technologies hosted by SD Muhammadiyah Kriyan Jepara Jawa Tengah Indonesia.

This event is a scientific gathering international level in the fields of education, social, health and technology. We invite academics, scientists, students S1 and Pascsarjana, teachers, education activists, industrialists, Researchers, and the Government to present their best works in this very rare event. They will share their success and present the results and discuss, and to contribute in solving the problems of this nation. This is a rare opportunity to share knowledge and spread knowledge in usefulness.

In ISMOSAT 2016 activities split into two activities, the first National Workshop For Robotics Design (Exhibition) and Colouring early childhoodeducationandearly childhoodschool and second International Seminar on the theme International Symposium For Modern School Development, Social Science And Applied Technologies.

On behalf of the committee, we'd like to express our deep gratitude and thanks to all sides for their sincere helps and supports that make this event possible to happen in SD Muhammadiyah Kriyan Jepara. we have tried and done our best in organizing this event, however, we realized that weaknesses and shortcomings may exist. and for that particular reason we'd like to apologize to you all. hopefully, the next year ISMOSAT will be much better and much improved. have a great competition and symposium.

Wassalamu'alaikum Wr. Wb.

Jepara, 6th Maret 2016
The Chairman

Akhmad Faozan, S.Ag,M.Pd.

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THE FUTURE OF MODERN ISLAMIC SCHOOL IN INDONESIA; SOCIETY AND STATE RESPONSIBILITY[1]

Choirul Mahfud
Lecturer and Head of research group on Religion and Society Studies at UPM Social Humanities
Institut Teknologi Sepuluh Nopember (ITS) Surabaya, East Java, Indonesia. 60111.
choirul.mahfud@its.ac.id

Abstrak

Discussing the role of the state and society in developing today's Indonesia modern Islamic schools is very important to see what will happen in the future. In this case, the future of modern Islamic school in Indonesia starts from now. This paper focuses on important and interesting discussion on how a portrait of modern Islamic schools in Indonesia? Who are the responsible in developing today's Indonesia modern Islamic school? The paper was written using qualitative data which is based on literature references and books, news, journal and opinions in the media and other sources that relevant in the study of modern Islamic schools in Indonesia. The results showed that: first, a portrait of Indonesia modern Islamic schools are quite excited. In terms of quantity, of course, the number of modern Islamic school is very much. But in quality, problems still exist, especially in contributing in the global era as in the ASEAN economic community. Second, the responsibility in developing today's Indonesia modern Islamic schools is in "the hand" the state and society based on the regulations that regulated in this country.

Keywords: *Modern Islamic School, State and Society*

Introduction

Schools in the modern era to be able to answer the challenge of global competition. Schools as an educational institution also should be "the bridge" for learners towards global and modern world (Assegaf, 2003: 8-19). In this case, the modernization of schools and education is compatible to the global era, so the schools can exist and contribute to competition in the era of globalization. The development of modern Islamic schools need to know more understanding on modernizing the goals of school services, curriculum, teaching methods, and professional in organizing school as an educational institution.

The purpose of modern Islamic school should seek to answer happiness of the world and the hereafter, besides increasing student capacity in science and information technology. In addition, school curricula should also be designed in unity that systematic and comprehensive based on science, information technology, so it is not just to create the best human resources (output) intellectuality, spirituality, socio-morality, but also in science and information technology. Here, the learning methods should also be more varied and the students-centered. Institutionally, modern Islamic schools also need to be managed in a "professional and modern style".

1 International Symposium for Modern School Development, Social Science and Applied Technologies (ISMOSAT 2016) Grand Sakinah Mayong Jepara, 19 – 20 March 2016

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All of the above statement actually led to the question who is most responsible for the development of modern Islamic schools? The answer is currently on the role of government and supported the community/ society. M. Sirozi in his book "Politics of Education", noted that the roots of various educational problems that arise in a society not only in the classroom and school environment, but there are also in centers of power, such as the parliament and the bureaucracy on education stakeholders. Further, according Sirozi, the problems of education in many developing countries, including Indonesia, could not be understood if we only see from the perspective of education. But, it is necessary to understand the relationship between education and various other issues, including social and political optic (Sirozi, 2007 and Cooper, 2008).

Therefore, educational policy studies, mainly related to Islamic education, today and tomorrow have momentum and significant role in the effort to answer the problems in education. Because, the "colorful" of education was closely linked to the political atmosphere of a country, even the world. In this context, the discussion of education policy (like modern Islamic schools) not only locally, but also globally (Mahfud, 2016: 9-18). In all aspects of this life, globalization has an influence, either directly or indirectly.

In today's discourse on education, it can be said that the influence of globalization on Islamic education was quite significant. Some of the effects and the impacts of globalization can be seen from different optic. Let us suppose that the globalization of information technology make changes to the system, model and media of Islamic learning from simple to become modern. In this case, all the responsibility on education, including Indonesia modern Islamic schools is on "the hand" state and the society, and all stakeholders of Islamic education.

Discussion

Use Images of today's Indonesia modern Islamic schools are quite excited. In terms of quantity, the number of modern Islamic school is very much. But in quality, we see the problems is still exist, especially in contributing in the global era as in the ASEAN economic community (Zamroni, 2000: 118-193).

The future of modern Islamic schools are the responsibility of the state that supported by the society or civil community in the country. In this context, Mochtar Buchori in his book "Education of anticipatory", reminded that education should be done well and be anticipatory (Buchori, 2001: 1-8). It means that anyone held education need to pay attention and prepare learners to anticipate problems or challenges in the future.

By the term anticipatory, Buchori also intends to remind that in carrying out education services, should see far ahead (future-oriented), thinking about what our children and grandchildren will face in the future. Thus, in designing educational change, it is not appropriate if only think to the needs of "now" generation. Not only that, according to Buchori, education should equip young people to be able to cope "narrow-minded" in the life. Therefore, education should help students to think "open-minded" for ennobling life (Buchori, 2001: 5-18).

Here, education is challenged not only to help the students not only to be successful in their life, but also to be meaningful. Besides that, education should be able to give wisdom in facing and solving all daily problems. This wisdom indeed demanded, considering we've switched from the industrial era into the era of information. In this era, it is not enough to prepare students for a living. In this context of technological era that rapid flow of information, they are challenged to be able to choose and to use, which would help them to honor or to destroy their life.

Anita Lie explained that the responsibility and the role of government in education is very significant. If the responsibility from the state in the context of education is not so good and not maximum, it could reinforce the segregation of students based on socio-economic status. Here, Anita Lie give an ex-

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ample, students from poor families who receive government subsidies will not be able to bear the cost disadvantages so that they will be forced to seek and concentrated in schools that minimalist (read: poor), in which the operational cost per child is not (much) exceeding unit cost has been set. Meanwhile, students from middle and upper classes are free to choose schools with adequate facilities and infrastructure (Anita Lie, 2007).

Furthermore, according to Anita Lie, because these schools receive adequate education tuition of students, these schools will have more flexibility to further transform itself and improve the quality of education. For the record, according to Anita Lie, we know that the good budget does not guarantee the good and the quality of education in a school. However, the bad budget is almost certainly dificult in improving the quality of education. In the longer term, the disparity in rich and poor schools and poor children and rich children is widening. In fact, in some areas, many poor schools should be closed because it was no longer able to pay for education services.

We know that education is the right of every citizen. In Indonesia, this is stated at article 31 UUD 1945: "Setiap warga negara berhak mendapat pendidikan" ("Every citizen has the right to education"). Preamble to the Constitution of 1945 stated that the purpose of the Indonesia, to the enlightenment of nation life. In this context, it can be understood that education is the responsibility and obligation of the state to fulfill the rights of its citizens (Tilaar, 2003: 39-79).

In a global context, the government regulations is relevant to the Universal Declaration of Human Rights (1948), clarified by the Convention on the Rights of Child (1989), the World Declaration on Education for All (1990), and the International Convention on Education held in Dakar, Senegal, Africa, the Dakar 2000. The Convention states all states are required to provide quality basic education for free to all its citizens.

From this, we see that the State's commitment to education has also been demonstrated in a number of regulations which states that the government shall manage and organize a national education system, which enhances faith and piety and good character in the context of enlightening life of the nation that regulated. The government also carry out the mandate to advance the science and technology to uphold religious values and national unity for the progress of civilization and prosperity of mankind.

This was in line with the explanations PP 55/ 2007 and the Constitution of the Republic of Indonesia 1945 Article 31 (3): "Pemerintah mengusahakan dan menyelenggarakan satu sistem pendidikan nasional yang meningkatkan keimanan dan ketakwaan serta akhlak mulia dalam rangka mencerdaskan kehidupan bangsa yang diatur dengan undang-undang" ("The Government shall manage and organize a national education system that enhances faith and piety and good character in the context of enlightening life of the nation is governed by laws").

On the basis of the mandate of the Constitution of 1945, Act No. 20/ 2003 on National Education System Article 3 states that the national education aims at developing students' potentials in order to become a man of faith and fear of God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and become citizens of a democratic and accountable. In General Explanation of Law Number 20/2003 on National Education System confirmed that the first strategy in implementing the national education system reform is "the implementation of religious education and noble character".

The regulation on National Education System No.20/2003, article 12 (1) letter "a" mandate that every student at any educational institution entitled to religious education according their religion and taught by educators who co-religionists. This provision has at least three (3) objectives: first, to maintain the integrity and purity of religious teachings; second, the presence of religious teachers of the same religion and be eligible to teach will be able to maintain the harmony of religious life for students of different religions but

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learning at the same educational unit; Third, religious education taught by educators who same in religin showed professionalism in learning process of religious education.

The responsibility from the society in developing Indonesia modern Islamic schools always waited by all Muslims that care Islamic education, besides general education as we know. Here, religious education is generally also held by the private sector as to be a part of Muslim commitment in educational from, by, and for the community/ society in Indonesia. Before Indonesia's independence, religious institutions already growing (Azra, 2002: 7-29). Besides being the nation's cultural roots, religion realized an integral part of education. Religious education is also growing due to the subjects/ courses of religious education that is rated to face various limitations and problems in the life at that time. Some communities cope with the additional religious education at home, house of worship, or in associations, which later developed into a unit or religious education programs formal, non-formal or informal (Saridjo, 2011: 55-99).

Historically, the existence of community-based religious education becomes very important in the development of a learning society, especially because it comes from the community aspirations that reflects the real needs of community about educational services (Fadjar, 1999: 11-39). In fact, there is a huge resource gap among religious education units. As a component of the National Education System, religious education should be given the opportunity to grow, nurtured and improved quality by all components of the nation, including the central and local governments.

In this context, we understand the mandate in Preamble 1945 Constitution is to strive in earnest implementation of the national education system. Exactly, in article 31 (3) confirms that "The government shall manage and organize a national education system that enhances faith and piety and good character in the context of enlightening life of the nation is governed by laws". PP No. 55 of 2007 on Religion Education and Religious Education set of Religious Education in public schools and Religious Education, namely Islam, Protestantism, Catholicism, Hinduism, Buddhism, and Confucianism. In Article 9 (1) states, "Religious Education includes Islamic religious education, Christian, Catholic, Hindu, Buddhist, and Confucian". This chapter is a general article to explain the scope of religious education. Furthermore, in (2) the same article mentioned about who is the manager of both formal religious education, non-formal and informal, namely the Minister of Religious Affairs. From this, it is clear that the responsibility in developing and in modernizing Islamic education (Islamic school) is the responsibility of the minister of religion (State).

In this context, MI, MTs, and MA is no longer Religious Education category, but public education under the authority of the Ministry of Religious Affairs. In the PP stated that Religious Education is education that provides knowledge and forming attitudes, personality, and skills of the students in the practice of their religion were carried out at least through the subjects or lectures on all channels, type, and level of education. While the Religious Education is education that prepares students to be able to carry out a role that requires the mastery of religious knowledge and religious knowledge or be an expert and practice the teachings of his religion.

As we see that one of the functions in teaching learning on Islamic education at all levels are to form the Indonesian people who are faithful to God and morality and is able to maintain peace and harmony and inter relations between religious communities, development of learners in understanding, appreciating and mengamlakan religious values that harmonize the supremacy in science and technology, appreciate and practice of religious values that harmonize their dominance in science, technology and art. Morever, the function of Religious Education to prepare students to be members of the good citizens who understand and practice the values of their religion.

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Conclusion

The development of Indonesia modern Islamic schools is the responsibility of the state and the society need to support all elements. All the challenges and obstacles will be resolved if there is cooperation. The cooperation in dealing with problems in developing modern Islamic schools always need to be prioritized to achieve the ideals and goals of the nation.

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Choirul Mahfud,. Ngawi, 2 February 1982. His Doctoral degree from State Islamic University (UIN) in Surabaya. He also graduated at master degree at Political sciences at Airlangga University (Unair) Surabaya, besides in Islamic education master program in UIN Surabaya. Now, he is lecturer on Islamic studies at Institut Teknologi Sepuluh Nopember (ITS) Surabaya, Indonesia. Before, also teaching Islamic studies at Muhammadiyah University in Surabaya (UM Surabaya), Muhammadiyah University in Sidoarjo (UMSIDA), Sekolah Tinggi Ilmu Dakwah (STID) and Islamic studies in Tarbiyah Faculty, IAIN Sunan Ampel Surabaya. His best-seller book on Multicultural Education (Pustaka Pelajar, Yogyakarta, 2006); Manifesto of Chinese Politics in Indonesia (Pustaka Pelajar, Yogyakarta, 2013); Politics of Islamic Education (Pustaka Pelajar, Yogyakarta, 2016). Several his articles has published at journals, newspapers and other mass media. Ever speaking live in Radio Suara Surabaya, JTV, SBO TV and Metro TV in Surabaya. He may be contacted at choirul.mahfud@its.ac.id

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PERFORMANCES DESIGN OF PHOTOVOLTAIC AND BATTERY PARALELLIZATION USING PI-MPPT PROTOTIPE AUTOTUNED BY FIREFLY OPTIMIZATION[1]

Dwi Ajiatmo
Department of Electrical Engineering, University of Darul Ulum Jombang, Indonesia, ajiatmo@gmail.com. ajiatmo12@mhs.ee.its.ac.id
Imam Robandi
Department of Electrical Engineering Institute of Technology Sepuluh Nopember Surabaya, Indonesia. robandi@ee.its.ac.id.

Abstrac

This paper describes the control system called Maximum Power Point Tracking (MPPT) for photovoltaic (PV) systems in the solar vehicle. The main manifestations of this system is to extract the maximum PV power in charge batteri small losses while keeping the design simple to use converter. The working principle of MPPT based convetional Controller autotuning Firefly Optimization (MPPT-CCFA) is to obtain the desired value of the reference current and voltage. MPPT-CCFA compare them with the values of the actual current and voltage PV to control the duty cycle value. Then the cycle is used to adjust the angle of the ignition switch (MOSFET gate) on the converter and the converter Buck Boost Boost The proposed method is shown through simulations done using MATLAB software. The simulation results show that the system is able to improve the efficiency of the state of charge (SOC%) significantly to approximately 99,98%.

Keyword: *Maximum power point tracking (MPPT), photovoltaic (PV), boost, Firefly*

Introduction

The energy of sunlight as a source of renewable energy has the potential to grow larger. The potential of solar energy in Indonesia is very large: around 4.8 KWh / m2 / day, equivalent to 112,000 GWp, but which have been exploited only about 10 MWp. Solar energy development is also earmarked for transportation. The use of fuel oil (BBM) stem from fossil has caused a lot of pollution and negative impact on air quality. Much research has been done to find new energy sources in Hybrid Electric Vehicle (HEV), among others, is FuelCell and photovoltaic (PV).[1]

PV panels are important elements to produce electric current after converting sunlight through a cell semiconductors due to the effect of photovoltaic, PV panels provide the characteristic curve of non linear, in which the operating point is called maximum power point tracker (MPPT) varies depending on the fluctuations of solar radiation and temperature, then to ensure optimum transfer of energy from the PV generator to the battery, the device adapter is needed to set the maximum power point on the optimal functioning, controlling DC-DC converter by the MPPT algorithm based techniques. [2][3] [4][5][6]

DC-DC boost converter converts the DC output voltage that is higher than the solar

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panels used to charge the battery. Depending on the efficiency of the PV cell fabrication that now does not exceed 15% Increasing the efficiency of PV panels is difficult because of the development of technology and cost. On the other hand, the increase of the MPPT algorithms and strategies can be implemented at the cost of PV systems. [7][8][9]a battery-integrated boost converter utilizing the distributed maximum power point tracking (DMPPT

Photovoltaic Generator

PV power plants convert sunlight into electrical energy. Solar radiation to produce an electrical current proportionally. PV cell voltage increases between 0.5 to 0.8 volts. Because each cell produces little power, so it takes some PV cells connected in parallel or in series in the form of PV panel. The panels are connected in parallel or in series to form a Array. equivalent circuit of PV cells including diodes, Shunt Prisoners, prisoners who represent a range of current flow, and current source depicted in Figure 1.[10]

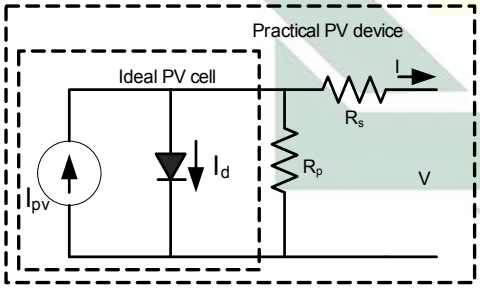

Figure 1. Single diode model photovoltaic

$$I = I_{pv} - I_o\left[exp\left(\frac{V+R_sI}{V_ta}\right) - 1\right] - \frac{V+R_sI}{R_p} \quad \ldots\ldots 1$$

Where I_{pv} and I_o are the photovoltaic ans saturation currents of the array and $V_t = N_skT/q$ is the thermal voltage of the array with N_s cells connected in series. Cells connected in parallel increase the current and cells connected in series provide greater output voltages. If the array composed of Np parallel connections of cell the photovoltaic and saturation currents may be expressed as $I_{pv} = I_{pv,cell}.N_p$, $I_o = I_{o,cell.}N_p$. the caracteristic of PV

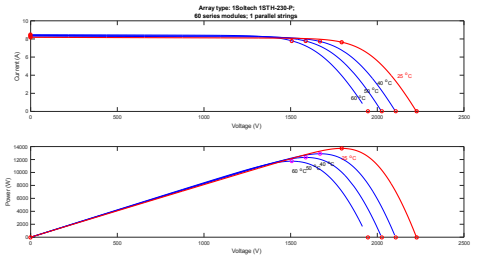

Figure 1. Karakteristik kurva I-V pada PV karena perubahan irradian

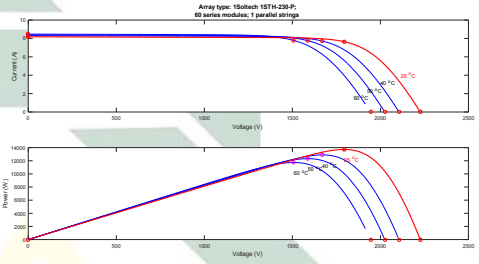

Figure 2. P-V characteristic curve in NPV due to changes in irradiance.

Table 1. Data system Photovoltaic 1 Soltech 1STH-230-P

Pmax	228.735W
Voc	37.1 V
Isc	8,18 A
Vmp	29.9 V
Imp	7.65 A

DC-DC Converter

Boost converter is to convert the DC voltage is not regulated by a regulated DC output voltage. Figure 6 shows the circuit diagram of a boost converter with maximum power point tracker (MPPT). In solar PV systems, solar output voltage of the boost converter is set by the hybrid system to provide constant voltage.

The output power of the PV modules turn to the sun's radiation and the cell temperature. Solar irradiation can not be predicted, which makes the maximum power point of PV module changes continuously. A MPPT technique is required to operate the PV modules at the maximum power point.

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Pertube and Observer (P & O) algorithm is one of the MPPT control algorithm used to generate the gate pulses for the operation of the boost converter. P & O algorithm operates by periodically incrementing or decrementing the PV array operating current and output power compared with the previous PV. If the result is positive, the control system moves the operating point of the PV array in the same direction, if not, the direction changed.[12][13][14][15]

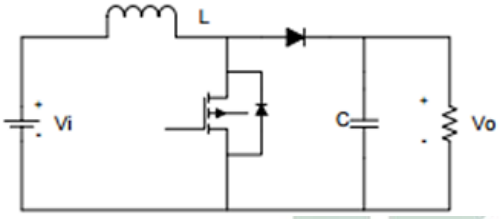

Figure 3. DC-DC Boost Converter

Calculation of duty cycle (D):

$D=1-(V_{in}/V_{out})$ 2

Calculation of output current (I_{out})

$Iout = P/Vout$ 3

Calculation of resistance (R)

$R=V_{out}/I_{out}$ 4

Calculation of inductor's current (IL)

$IL = 0.2 \times Iin = 0.2 \times Iout \times Vout/Vin$ 5

Calculation of inductor (L)

$L=(Vin \times (Vout - Vin)) / (I_l \times f \times Vout)$ 6

Calculation of capacitor (C)

$C = (Vout \times D) / ((\Delta Vout/Vr) \times f \times R)$ 7

Storage Baterry

In many industrial sectors, due to increasing demand for energy hybrid power system that is used. high reliability power supply is indispensable for critical loads. During the pulsating voltage or complete interruption of power, energy must be supplied from local Energy Storage System (ESS). ESS merging conventional to hybrid power system basically relies on the choice of the good battery. There are many disadvantages associated with low density batteries as power and charge / discharge cycles is limited.[7] [16][17]

The battery life is highly dependent on the stability of the use of electrical pulses instead of average power. Variations currents cause voltage transients that can be interpreted by a low voltage detection circuit as the battery is depleted battery suddenly creates stress. high pulsed current has a value Root Mean Square (RMS), which can lead to increased battery loss. a sudden change in the flow also reduces greatly the battery runtime. [9]a battery-integrated boost converter utilizing the distributed maximum power point tracking (DMPPT[7][18]

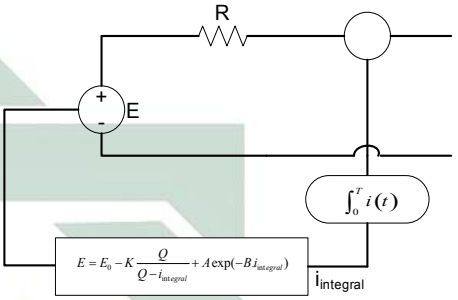

Figure 4 Battery Model

Charging full voltage,

$E_{full} = 108\% \times E_{nom}$ 8

Exponential voltage,

$E_{exp} = 102{,}5\% \times E_{nom}$ 9

The average capacity,

$Q_{nom} = 50\% \times Q_{rated}$ 10

Exponential capacity,

$Q_{exp} = 0.08\% \times Q_{rated}$ 11

Internal prisoners Constants A,

$A = E_{full} - E_{exp}$ 12

constant B,

$B = 3/Q_{exp}$ 11

constant P

$$P = \left[E_{full} - E_{nom} + A\left(exp(-BQ_{nom})\frac{Q_{full}-Q_{nom}}{Q_{nom}}\right)\right]$$ 12

Table 2. Parameter specifications 6V battery / 225Ah

Parameter	Nilai
Jenis baterai	*Lead Acid*
Tipe/Nama Label	Trojan T-105 Plus
Tegangan Rating	6 *Volt*
Rated Capacity	225 Ah
Internal Resistance	0,06 Ohm

Firefly Algorithm

*Firefly Algorithm*is an algorithm meta-

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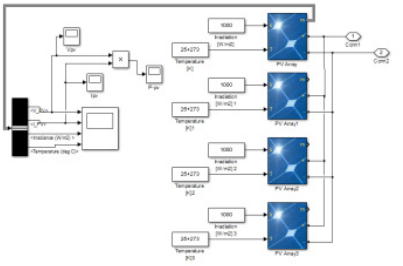
heuristic inspired by the characteristics of fireflies. The algorithm was first discovered by Dr. Xin-She Yang at the University of Cambridge in 2007. Then formulated three basic principles that can be used for solving the optimization problem, there are 3 basic namely, reference.The movement of fireflies i were interst by the appeal of fireflies brighter j is defined as.[19][20]

$$x'_i = x_i + \beta_o e^{-\gamma r_{ij}^2}(x_j - x_i) + \alpha \in_i \qquad 13$$

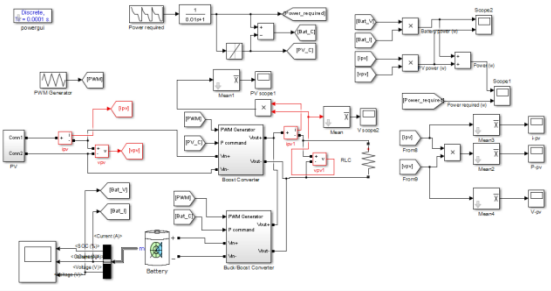
Simulasi Model

The simulation using 4 photovoltaic sources in parallel



Figur 5 PV system structure

Figure 6 Global simulink model PI autotuning Firefly Algorithm



Simulasi results and Discussion

Optimization of simulation results with PI-Firefly acquired for the amount of Kp, Ki, with load R = 20 Ohm, as the table below.

Table 3. Result Ferformance magnitude of the value of Kp, Ki after optimization with PI-Firefly

Magnitude	PI	PI-FF
Kp1	1.5	0.3361
Ki1	1	0.1773
Kp2	1.5	0.9463
Ki2	1	0.6032
Kp3	1.5	0.9882
Ki3	1	0.2148

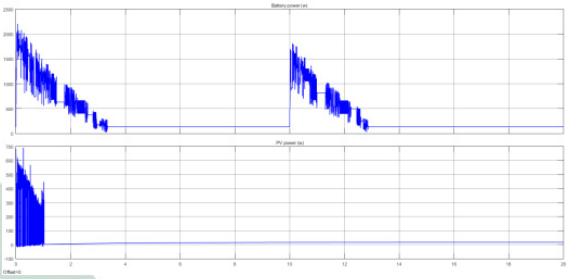


Figure 7 The Battery and PV output autotuningfirefly

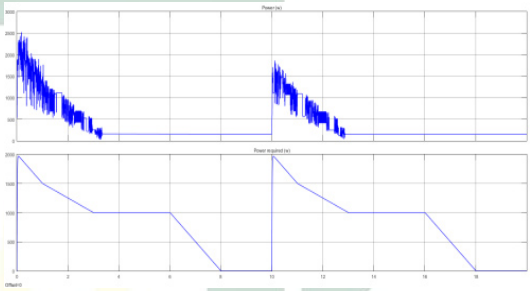


Figure 8 The effects of changes in the total power to dynamic loads

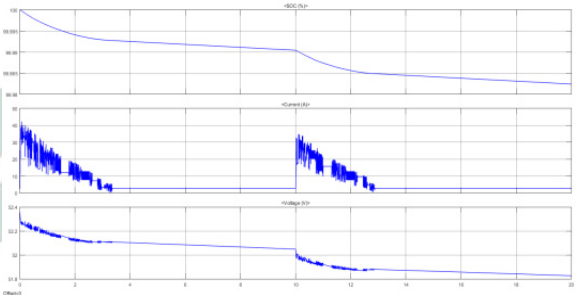


Figure 9 The state of charge of battery, Curent and voltage with optimization firefly control

Conclusion

In this paper, Performance Photovoltaic, Battery parallelization using a basic prototype of the conventional MPPT Controllers Autotuning Firefly proposed. The design and implementation of the proposed method is discussed in detail in this paper. By using load variation, the method proposed MPPT can satisfactorily address changes dynamically load is proportionally PV and Battery

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mutual maintain energy availability. Design procedures are presented and experiments were conducted to validate the effectiveness of the proposed method. Comparing with PI autotuning method fireflies in MPPT, with the proposed method of battery state of charge of about 99.98%, respectively.

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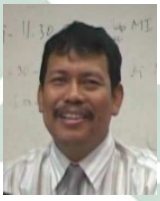
Dwi Ajiatmo, received the ST. degree in electrical engineering from Darul Ulum of University, Jombang, Indonesia in 1996, and MT degree in system electric energy from the Gadjah Mada of University, Yogyakarta, Indonesia in 2004. At this time as a candidate Dr.Eng. in Electrical Engineering at Sepuluh Nopember Institute of Technolgy, Surabaya, Indonesia. The current research focused on Design and Implementationof ControlSystem OptimizationMaximum Power PointTracking(MPPT) UsingHybridFuzzy-Logic Controller-FireflyAlgorithm (FLC-FA) On ASolarPhotovoltaicSystemVehicle.



Imam Robandi, He recived B.Sc. degree in power engineering from Sepuluh Nopember Institute of Technolgy, Surabaya, Indonesia in 1989, and M, Eng., degree in Enginering from the Bandung Institute of Technology, Indonesia in 1994 and Dr.Eng. degree in the Department of Electrical Engineering from Tottori University, Japan, 2002. He is currently Professor and as Chairman of the Laboratory of Power System Operation and Control in the Department of Electrical Engineering, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia. His current reasearch interest includes Stability of power systems, Electric Car, Solar cell and Artificial Iintelegent Control.

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DEVELOPING ISLAMIC EDUCATION MATERIALS ON SOFT SKILLS AND CHARACTER BUILDING IN ISLAMIC SCHOOLS IN INDONESIA[1]

Moch. Tolchah
Lecturer at State Islamic University Sunan Ampel (UINSA) in Surabaya.
He may be contacted via e-mail: mochtolchah@yahoo.com

Abstract

The challenges of Islamic education and Islamic schools in Indonesia from day to day is very complex. In this context, the development of learning materials needs to be done, including in Islamic education on soft skills and character building to address the problem of the graduate Islamic school (out-put) that expected to be a graduate of a successful, faithful and akhlaq noble and competitive in the era of globalization in science and information technology. This paper focuses on interesting issue and important discussion that any material of Islamic education in Islamic schools in Indonesia during this time? How is the development of Islamic education materials on soft skills and character building in Islamic schools in Indonesia? The paper was written using qualitative data which is based on references and books, news, journals and opinions in the media and other sources that are relevant in the study of Islamic education material development. The results showed that: first, the material of Islamic education in Islamic schools in Indonesia focuses on the study of the faith/ aqidah, Islam/ Sharia and worship, and charity/ morals. Second, the development of Islamic education materials on soft skills and character building in Islamic schools in Indonesia includes several religious character, honesty, tolerance, discipline, hard work, creative, independent, democratic, curiosity, the spirit of nationalism, patriotism, respect achievements, friendship/ communicative, love peace, love reading, care for the environment, social responsibility and social caring.

Keywords: *Islamic Education Materials, Soft Skills, Character Building and Islamic School*

Introduction

Schools The issue of soft skill and national character has become the public spotlight. Education is considered as an alternative preventative for all problems. Here, education is to create and to encourage a new generation for a better nation. Islamic education in school is a learning system that is always associated with religious moral values.

When the curriculum as the heart of education, indeed the Islamic education as a part of the educational curriculum into the heart of the character in curriculum. In this context, Islamic education is a subject that the content contains many positive traits in accordance with the educational goals of Islam itself. In fact, it will support the achievement of national education goals. Besides that, Islamic education more emphasis on soft skills as controllers and control of one's hard skills.

As we know that the results of research at Harvard University, United States conducted by Ali Ibrahim Akbar (2000) states

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that it turns out a person's success is not determined solely by knowledge and technical abilities (hard skills), but even more due to the ability to manage themselves and others (soft skills). The study reveals that success is determined only about 20 per cent by the hard skills and the remaining 80 percent by the soft skills. Even the most successful people in the world can succeed because the more widely supported capabilities in soft skills than hard skills. This suggests that the quality of character education for learner is essential to be improved.

Here, characters are the values of human behavior associated with the Almighty God, ourselves, our fellow human beings, the environment, and nationality embodied in thoughts, attitudes, feelings, words, and actions based on religious norms, laws, manners, culture and customs. In this case, the development of Islamic education as a subject needs to be done. Essentially all of the material in Islamic education could contain character values as essential for life and social indivu.

Discussion

The results of this study show that: first, this material during Islamic religious education in Islamic schools in Indonesia focuses on the study of the faith/ faith, Islam/ Sharia and worship, and charity/ morals. Second, the development of Islamic education materials about soft skills and character development in Islamic schools in Indonesia realized that necessary for the development, including several religious character, honesty, tolerance, discipline, hard work, creative, independent, democratic, curiosity, the spirit of nationalism, love homeland, recognize excellence, friendship/ communicative, love peace, love reading, care for the environment, social responsibility and social caring.

Developing Islamic education material in the perspective of philosophical has a sense of essential linkages between Islamic education and character education. Then this study would be more systematic if the discussion beginning of the discussion of Islamic education and education of character ontologically.

According to Ahmad Tafsir, Islamic Education is the guidance given by one person to another so that they grow up in accordance with the teachings of Islam (Tafsir, 2002: 19-32). Zakiah Darajat explained that Islamic Education is an effort to guide and care of children so that one day after the completion of his education, can understand and practice the teachings of Islam and make it as a way of life (Darajat, 1996: 11-19). Islamic Education is education that is carried out based on the teachings of Islam. Islamic education is education through Islamic teachings in the form of guidance and upbringing of children, when the completion of education, he can understand, appreciate and practice all teachings of Islamic religion have believed thoroughly, and make happy life in this world and the hereafter.

In this context, Islamic education as a process for building character to live all Islamic teachings comprehensively. To reach it of course need to as much as requirements as a material that easy to delivering students be a good Muslim. This is called the content of matter, the Islamic education is a concept that contains subjects and teaching activities to achieve educational goals. This material includes four principal basis are: 1. Man's relationship with Allah/ God; 2. Man's relationship with theirself; 3. Man's relationship with all humans; 4. Man's relationship with other beings and the environment.

Four major of Islamic education (PAI) materials are poured in competence; Qur'an, Aqeedah, worship, morality, and history. Viewing the content of material and process, Islamic education contains many universal moral values that are the basis of positive growth in a person's character.

Islamic Education material, Soft Skill and Character Building

Islamic Education (PAI) material is subject cluster developed from the teachings of

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the basic inIslam and it's the basic subjects that can not be separated by the teachings of Islam with the aim of developing moral and personality of the learner.

The purpose PAI is developing all learners in all aspects of faithful and taqwa (devoted) to Allah SWT, virtuous character of the noble, have knowledge about the basic teachings of Islam and practice it in our daily lives, as well as having extensive knowledge and depth of Islam so that adequate well to social life and to continue in the level of higher education.

Islamic Education, as a learning program, aimed at: (1) Maintain aqidah and taqwa of learners, (2) Become a reason for more diligent in studying other sciences taught at the school, (3) encourage all students to be critical thinker, creative and innovative (4) being the basic of behavior in everyday life at the community.

Islamic Education (PAI) learning not only emphasize the cognitive aspects, but also effective and psychomotor aspects. Islamic Education (PAI) content is based and developed on the provisions contained in the two principal sources of the teachings of Islam, namely the Qur'an and the Sunnah of Prophet Muhammad (proposition naqli) and is also enriched with the results istinbath or ijtihad (proposition aqli) the scholars so that more clear and detailed.

In this case, Islamic Education (PAI) is a conscious and deliberate effort to prepare students to believe, to understand, to appreciate and to practice the teachings of Islam through the activities of guidance, instruction, and training. Islamic Education (PAI) is essentially a clump of subjects taught in schools. In the book "Pedoman Pelaksanaan Pendidikan Agama Islam: Di Sekolah Umum" (Guidelines for the Implementation of Islamic Education: In Public Schools) explained that the discussion about Islamic Education (PAI) can be interpreted in two senses: first as a process of teachings of Islam; Second as study which become the material process itself (Departemen Agama RI, 2004: 1-9).

The purpose of Islamic education is to form the Islamic personality. Islam as a religion is a system of beliefs and ritual system which essentially contains various moral content that needs to be applied in the life. So that be a Muslim who practice the teachings of Islam are called Muslims kaffah who already able to practice the teachings of Islam in daily life perfectly. This is what will impact to a noble character.

Characters by Depdiknas Language Center is a "congenital, heart, soul, personality, character, behavior, character, temperament". The character is personality, behavior, temper, and character ". According Tadkiroatun Musfiroh (UNY, 2008), a character refers to a set of attitudes, behaviors, motivations, and skills. Character comes from the Greek word meaning "to mark" or mark and focus on how to apply the value of goodness in the form of action or behavior, so people who are dishonest, cruel, greedy and ugly behavior of other people say bad character. Conversely, people whose behavior in accordance with the moral code called a noble character.

Here, noble character means that individuals have the knowledge of his potential, which is characterized by values such as reflective, self-confident, rational, logical, critical, analytical, creative and innovative, independent, healthy living, responsible, love science, patient, cautious, self-sacrificing, courageous, trustworthy, honest, keeping promises, fair, humble, shy err, forgiving, soft-hearted, loyal, hard working, diligent, tenacious/ persistent, conscientious, initiative, positive thinking, discipline, anticipatory, initiative, visionary, earthy, vibrant, dynamic, economical/ efficient, appreciate the time, dedication, self-control, productive, friendly, love of beauty (aesthetic), sporty, resilient, open, orderly.

In this context, character education is a system of cultivation of character values to the school community, which includes knowledge, awareness or volition, and actions to implement these values. Character education can be defined as "the deliberate use of all dimensions of school life to foster optimal character development". In character educa-

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tion in Islamic schools, all of the components (education stakeholders) should be involved, including the educational components itself, namely the content of curriculum, learning and assessment, treatment or management of subjects, school management, the implementation of activities or co-curricular activities, empowerment infrastructure, finance, and work ethos throughout the school community/ environment. In addition, character education is defined as a behavior that is in the citizen school education must be characterless.

According to David Elkind & Freddy Sweet (2004), character education is defined as follows: "character education is the deliberate effort to help people understand, care about, and act upon core ethical values. When we think about the kind of character we want for our children, it is clear that we want them to be-able to judge what is right, care deeply about what is right, and then do what they believe to be right, even in the face of pressure from without and temptation from within". Further explained that character education is everything that teachers do, which is capable of affecting the character of students. Teachers help shape the character of all students. This includes the example of how the behavior of teacher, the teacher how to speak or submit material, how tolerant teacher, and a variety of other related matters.

According to T. Ramli (2003), Islamic Education and the essence of the characters have the same meaning as moral education and akhlaq education in Islam. The goal is to "establish" a personal Child, so that a good human being, good community residents, and a good citizen. The criteria for good men, good residents, and good citizens for a community or nation, in general are certain social values, which are influenced by the culture of the community and nation. Therefore, the essence of character education in the context of education in Indonesia is education of values as education noble values sourced from Indonesian culture itself, in order to nurture the younger generation's personality.

Character Islamic education rests on the basic character of man that comes from universal moral values (absolute), which comes from religion is also referred to as the golden rule. Character Islamic education have a definite purpose, if it refers to the values of the base character. Meanwhile, according Wibowo in the book "Character Education" defines character education is "education to instill and develop code sublime to the students, so that they have the character of noble applying and practicing in his life both in the family, community, state and country (Wibowo, 2013).

Based on the above understanding, character Islamic education is a system of cultivation of character values to students so that they apply in their lives in their family, school, community, state and country so that it can make a positive contribution to the environment.

According to psychologists, some basic character values are: love of God and His ciptaann (nature with its contents), responsible, honest, respectful and polite, loving, caring, and cooperation, confidence, creativity, hard work, and unyielding, justice and leadership; kind and humble, tolerant, peaceful, and loving association. Others say that the basic character of a human being consists of: trustworthy, respect and attention, caring, honest, responsible; citizenship, honesty, courage, perseverance, discipline, visionary, fair, and have integrity. Maintenance character education in schools should be based on the values of the basic character, which then developed into values more or higher (which are not absolute or relative) in accordance with the needs, conditions, and the school environment itself.

In an effort to improve the relevance and quality character education, the Ministry of Education in Indonesia to develop a grand design of character education for every channel, level and type of education. Grand design a reference conceptual and operational development, implementation, and evaluation of every stripe and level of education. Configuration characters in the context of the totality of the psychological and social-

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cultural is grouped in: Sports of Heart (Spiritual and emotional development), Sports of Thought (intellectual development), Sports and Kinesthetic (Physical and kinesthetically development), and Sports of Feeling and Doing (Affective and creativity development). Development and implementation of character education should be conducted in accordance with the grand design.

The exposure above shows the similarity between Islamic education with character education. This is evidenced by philofis same basis, namely the characters that formed all sourced from universal values, including the Islamic religion. So the real character education is another implementation of the paradigm of Islamic education.

The development of Soft Skills and Character-based Islamic Education (PAI) Materials

Islamic Education (PAI) material developed from three basic framework of the teachings of Islam, namely the concept of faith, the concept of Islamic Shari'ah, and the character of the concept of ihsan.

The three basic concepts that evolved various Islamic studies, including studies related to science, technology, art and culture.

Out put of Islamic Education (PAI) learning program in schools is the formating/ building of learners who have a noble character which is the main mission of the Message of Muhammad SAW in this world. Moral education (character) is the soul of education in Islam, so that the achievement of noble character (karimah) is a real educational purpose.

Basically Islamic Education (PAI) material developed in the curriculum have been charged soft skills and character, oriented to:

a. The Qur'an, in this matter the child will be made the Qur'an as their guide.
b. Faith, the faith of the true children will grow up thinking the Divine.
c. Morals, with this material the better its relationship with God, each other, ourselves and others.
d. Worship, with this material will always be aware of its obligations as a creature who must serve the one who created it, so that makes worship as a necessity in life.
e. History, through this material more children will emulate the characters of good character.

The values in the material character of Islam in Islamic Education (PAI) that need to be developed are:

1. Al-Qur'an: Religious, Honest, Tolerance, Discipline, Hard sergeant, Creative, independent
2. Faith: Religious, honest, tolerant, disciplined, hard working, creative, independent, democratic, curiosity, nationalism, patriotism, respect for the achievements, friends/ communicative, love peace, love to read, environmental care, social care, responsibility
3. Morality: Religious, honest, tolerance, discipline, hard work, creative, independent, democratic, curiosity, nationalism, patriotism, respect for the achievements, friends/ communicative, love peace, love to read, environmental care, social care, responsibility
4. Jurisprudence: Religious, honesty, tolerance, discipline, hard work, creative, independent, democratic, curiosity, nationalism, patriotism, respect for the achievements, friends/ communicative, love peace, love to read, environmental care, social care, responsibility
5. Islamic History: Religious, honest, tolerant, disciplined, hard working, creative, independent, democratic, curiosity, nationalism, patriotism, respect for the achievements, friends/ communicative, love peace, love to read, environmental care, social care, responsibility.

Conclusion

The development of Islamic education materials based soft skills and character building in Islamic schools in Indonesia is very appropriate for the development and challenges of the times. This certainly could

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be an alternative solution in addressing the problems of the students, school, family, community and nation.

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Moch. Tolchah,. His Doctoral degree from State Islamic University Sunan Ampel (UINSA) in Surabaya. He also graduated at master degree at master of Islamic education program in UIN Surabaya. Now, he is lecturer on Islamic studies at State Islamic University Sunan Ampel (UINSA) in Surabaya and teaching Islamic studies master program at Muhammadiyah University in Surabaya (UM Surabaya) and other university in Sidoarjo. He may be contacted at mochtolchah@yahoo.com

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PENINGKATAN SDM BERKUALITAS MELALUI PENGUATAN PENDIDIKAN KEWARGANEGARAAN SEBAGAI BAGIAN INTI DARI DESAIN PEMBANGUNAN INDONESIA[1]

Amalia Zidatul Ulum
Program Studi Pendidikan Pancasila dan Kewarganegaraan Program Pascasarjana Universitas Negeri Yogyakarta 085601823383 Email: zieziedamalia@gmail.com

Abstrak

Jumlah sumber daya alam yang telah tersebar di seluruh Indonesia merupakan kekayaan dan aset utama yang dimiliki oleh bangsa. Sumber daya alam tersebut merupakan tanggung jawab dari seluruh warga negara. Warga negara menjadi bagian yang paling pokok atau sebagai sumber daya manusia (SDM) yang berperan utama dalam mengelola dan mengembangkan potensi kekayaan sumber daya alam Indonesia. Pemerintah sebagai pemegang kendali semua kewenangan, telah membuat program dalam rangka menyiapkan SDM Indonesia yang berkualitas. Hal yang paling mendasar dalam menyiapkan SDM Indonesia yang berkualitas diawali dari tingkat sekolah. Sekolah menjadi sarana yang paling sentral dalam mencetak SDM yang unggul. Upaya tersebut kemudian dimasukkan dalam bentuk kurikulum pendidikan yang didalamnya memuat semua materi kebutuhan yang harus dicapai oleh peserta didik. Pendidikan kewarganegaraan menjadi salah satu mata pelajaran yang digunakan untuk mempersiapkan pembentukan sikap, karakter, dan perilaku peserta didik. Dengan demikian, pendidikan kewarganegaraan digunakan sebagai dasar untuk melandasi perilaku peserta didik di Indonesia. Pendidikan kewarganegaraan berperan sebagai pembentuk karakter peserta didik pada setiap negara. Karena dengan bekal kepribadian yang berbasis kewarganegaraan, peserta didik menjadi paham dan mengenal sendiri jati dirinya sebagai warga negara. Dengan landasan yang kuat tersebut, maka setiap peserta didik di Indonesia dengan sendirinya akan memiliki tanggung jawab sebagai generasi penerus bangsa untuk melanjutkan pembangunan Indonesia. Hal ini tentunya mempunyai tujuan akhir yang kuat yaitu mewujudkan pembangunan Indonesia di semua aspek kehidupan, mulai dari perekonomian, sosial, dan budaya. Karena keberhasilan pembangunan sebuah negara ditentukan oleh pengelolaan seluruh kekayaan alam oleh SDM yang berkualitas.

***Kata kunci**: sumber daya manusia, pendidikan kewarganegaraan, pembangunan.*

Pendahuluan

Potensi negara Indonesia dalam hal sumber daya alam merupakan salah satu kekayaan yang menjadi kekuatan utama dalam menghadapi perkembangan globalisasi. Sumber daya alam yang dimiliki Indonesia telah tersebar di seluruh bagian wilayah Indonesia. Ketersebaran sumber daya alam tersebut menuntut pengelolaan yang benar oleh seluruh aspek bagian negara yaitu warga negaranya. Warga negara menjadi bagian yang paling pokok atau sebagai sumber daya manusia yang berperan utama dalam men-

1 International Symposium for Modern School Development, Social Science and Applied Technologies (ISMOSAT 2016)Grand Sakinah Mayong Jepara, 19 – 20 March 2016

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gelola dan mengembangkan potensi kekayaan sumber daya alam Indonesia.

Sumber daya manusia (SDM) yang merupakan *icon* penggerak utama kemajuan bangsa Indonesia perlu dipersiapkan sejak dini. Sekolah menjadi bagian dasar yang paling berperan dalam mempersiapkan peserta didik untuk menjadi SDM yang berkualitas. Persiapan SDM yang berkualitas telah tercantum sebagaimana visi misi Kemristekdikti dalam menciptakan arah dan kebijakan pendidikan di Indonesia. Visi yang dirancang oleh Kemristekdikti berupa terwujudnya pendidikan tinggi yang bermutu serta kemampuan IPTEK dan inovasi untuk mendukung daya saing bangsa. Sedangkan misi yang dirancang adalah meningkatkan akses, relevansi, dan mutu pendidikan tinggi untuk menghasilkan SDM yang berkualitas. Serta meningkatkan kemampuan IPTEK dan inovasi untuk menghasilkan nilai tambah produk inovasi (Kemristekdikti, 2015).

Pencapaian SDM yang berkualitas tidak semata-mata dapat langsung terlihat secara cepat. Akan tetapi, dibutuhkan modal dan persiapan yang dilakukan mulai dari dasar. Sejalan dengan visi dan misi yang dicanangkan oleh Kemristekdikti, SDM yang berkualitas dihasilkan dari pendidikan yang bermutu dan didukung kemampuan inovasi dalam bidang IPTEK. Dengan demikian, peran yang paling sentral adalah berasal dari jenjang pendidikan tingkat sekolah. SDM yang berkualitas dan mampu mengikuti arus perkembangan globalisasi dicetak melalui perantara sekolah yang modern. Keberadaan sekolah modern saat ini menjadi bagian utama dalam membentuk kepribadian generasi bangsa. Di Indonesia, setiap sekolah telah dituntut untuk dapat mengikuti kemajuan teknologi sesuai dengan perkembangan globalisasi yang ada di dunia.

Pembangunan sekolah modern harus memuat semua aspek yang dibutuhkan oleh peserta didik dalam membangun karakter dan kepribadiannya. Kemampuan afektif, kognitif, dan psikomotor menjadi tiga acuan utama dalam membangun karakter dan kepribadian peserta didik. Kunci utama yang menjadi penentu keberhasilan kemampuan peserta didik salah satunya berasal dari kurikulum yang dirancang dengan tepat dan sesuai dengan kondisi iklim belajar mengajar di kelas. Dalam hal ini, penulis akan menekankan pada penguatan aspek pendidikan kewarganegaraan yang dipersiapkan untuk menjadi bagian inti dari desain pembangunan Indonesia.

Pendidikan kewarganegaraan menjadi bahan kajian ilmu sosial yang penting untuk menjadi bekal bagi setiap peserta didik. Hal ini telah menjadi salah satu pokok yang tercantum dalam visi misi Presiden RI (Nawa Cita) yaitu meningkatkan mutu hidup manusia Indonesia melalui peningkatan mutu pendidikan dan pelatihan. Serta melakukan revolusi karakter bangsa (revolusi mental) melalui kebijakan penataan kembali kurikulum pendidikan nasional dengan mengedepankan aspek kewarganegaraan (*civic education*).

Pendidikan kewarganegaraan menjadi bagian penting dalam pembentukan sikap dan perilaku peserta didik. Sehingga melalui visi misi yang dicanangkan oleh Presiden RI Joko Widodo pendidikan di Indonesia akan diwujudkan melalui peningkatan mutu pendidikan, kualitas, efektivitas riset dan teknologi yang akan menjadi landasan penting bagi tercapainya peningkatan daya saing bangsa. Penataan kembali kurikulum nasional dengan menomorsatukan pendidikan kewarganegaraan merupakan salah satu langkah tegas yang memang harus diterapkan di Indonesia. Mengingat gelombang perubahan dunia semakin cepat berkembang, yang diiringi dengan tantangan globalisasi yang merambah keseluruh bagian dunia. Dengan demikian, penguatan dalam aspek pendidikan kewarganegaraan digunakan sebagai dasar untuk melandasi perilaku peserta didik di Indonesia. Pendidikan kewarganegaraan berperan sebagai pembentuk karakter anak pada setiap negara. Karena dengan bekal kepribadian yang berbasis kewarganegaraan, anak menjadi paham dan mengenal sendiri jati dirinya sebagai warga negara. Dengan landasan yang kuat tersebut,

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maka setiap anak di Indonesia dengan sendirinya akan memiliki tanggung jawab sebagai generasi penerus bangsa untuk melanjutkan pembangunan Indonesia.

Pembahasan

Peningkatan SDM Indonesia yang berkualitas memang haruslah dilandasi oleh penguatan dalam bidang pendidikan, yaitu lebih khususnya dalam pendidikan kewarganegaraan. Ketika memasuki milenium ketiga saat ini dan mendatang, karakter warga negara memang menjadi salah satu tema penting yang menjadi bahan pembahasan dalam berbagai forum. Tentang bagaimana profil ideal warga negara yang mampu menjadi motor penggerak kehidupan perekonomian, serta bagaimana warga negara yang mampu mewujudkan pembangunan bangsa. Hal ini memunculkan pertanyaan yang sekaligus menyoal alasan misi pembentukan warga negara yang baik yang dikenal dalam setiap diskursus akademik, politik pendidikan, ataupun praktik pedagogik pendidikan kewarganegaraan.

Terminologi warga negara yang baik atau *good citizen* lebih dekat pemaknaannya kepada filsafat moral dari pada politik, namun keputusan-keputusan politik tentang warga negara yang baik cenderung sangat kuat implikasinya. Penulis sepakat bahwa warga negara yang baik tidaklah dilahirkan, tetapi harus dibentuk, dididik dengan desain yang tepat. Untuk hal ini, masing-masing negara memiliki pengalaman berbeda tentang perumusan *good citizen* selaras dengan visi dan cita ideal negara tersebut (Kerr, 2003; Print 2000). Demikian pula dengan pembangunan karakter warga negara pastilah memiliki cara yang berbeda-beda dan pada tiap negara amat kuat pengaruhnya. Hal inilah yang menghubungkan pentingnya antara penguatan pendidikan kewarganegaraan dengan pembentukan *good citizen* yang menghasilkan SDM yang berkualitas.

Berkaitan dengan hal tersebut, penguatan pendidikan kewarganegaraan telah sedemikianrupa disesuaikan dengan arah dan kebijakan dalam tujuan desain pembangunan Indonesia. Pasca pemerintahan orde baru di Indonesia, yang kemudian digantikan oleh era reformasi, terjadi pula masa peralihan dari abad 20 ke abad 21. Indikator perubahan dapat dikenali sesuai dengan bidang atau dimensinya yang meluputi bidang politik, hukum, ekonomi, sosial budaya, dan bidang-bidang lainnya. Dengan kata lain, perubahan sebagai penciri masyarakat yang dinamis dalam berbagai bidang kehidupan tidak terhindarkan lagi. Mengingat perangkat penyebab perubahan masyarakat telah semakin canggih.

Dinamika perubahan dalam bidang politik, hukum, dan ekonomi di Indonesia telah berdampak signifikan terhadap perubahan dalam bidang pendidikan dan salah satuya adalah perubahan kurikulum. Perubahan kurikulum dalam dunia pendidikan dipandang sebagai perubahan yang sangat strategis mengingat "*curriculum is the heart of education*" (Null, 2011:1). Sebagai jantungnya pendidikan, kurikulum disebut pula *the core of education* karena kurikulum terkait dengan apa yang seharusnya dibelajarkan dan merupakan perpaduan dari pikiran, tindakan, dan tujuan. Oleh karena itu, kurikulum memiliki posisi sentral dan strategis bagi dunia pendidikan. Kurikulum tidak dapat terpisahkan dari pendidikan karena dalam praktiknya, kurikulum dapat dipersepsikan secara beragam sesuai sudut pandang yang berbeda-beda. Mengingat kurikulum adalah jantungnya pendidikan, maka kurikulum yang baik tentu akan membawa bangsa menjadi warga negara yang baik *(good citizen).*

Menurut para ahli, praktisi, dan pemerhati pendidikan, kajian pendidikan kewarganegaraan sebagai mata pelajaran di sekolah, telah mengalami perkembangan dari waktu ke waktu sejalan dengan perkembangan kehidupan berbangsa dan bernegara. Namun hakikat pendidikan kewarganegaraan umumnya dimaksudkan sebagai proses pembentukan warga negara yang baik *(good citizen).* Tujuan pendidikan kewarganegaraan ini bahkan sekaligus menjadi tujuan IPS *(social studies)* sehingga dapat dinyata-

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kan bahwa inti dari IPS adalah pendidikan kewarganegaraan itu sendiri (Banks, 1990). Dasar inilah yang menjadi titik tolak dalam menguatkan pembentukan SDM di Indonesia, karena berdasar pada pijakan *social studies* yang mengatur hubungan antar manusia sebagai warga negara.

Dengan demikian, pendidikan kewarganegaraan menjadi bidang kajian atau mata pelajaran sebagai bagian dari sistem pendidikan nasional untuk mencapai tujuan pendidikan nasional. Pendidikan kewarganegaraan yang ada di Indonesia berlandaskan Pancasila sebagai landasan idiil dan UUD 1945 sebagai landasan konstitusional. Pancasila dan UUD 1945 dapat dinyatakan pula bahwa sebagai ciri utama *(core subject atau main ideas)* pendidikan kewarganegaraan di Indonesia. Landasan yuridis-konstitusional dalam pengembangan ontologis pendidikan kewarganegaraan termasuk pengembangan kurikulumnya tetap harus mengacu pada UUD 1945 dengan fokus pada tujuan nasional yang tertera dalam pembukaan UUD 1945, yakni "mencerdaskan kehidupan bangsa...". dalam sistem pemerintahan dan kenegaraan yang demokratis, kehidupan bangsa Indonesia selain baik, tapi juga harus cerdas.

Salah satu proses pencerdasan kehidupan bangsa, setiap warga negara perlu *well informed* dengan isu-isu aktual yang terkait dengan tuntutan, kebutuhan, dan tantangan untuk mencapai tujuan nasional. Untuk memenuhinya, maka tidak dipungkiri apabila pendidikan kewarganegaraan telah menjadi mata pelajaran yang penuh dengan titipan materi yang terkait dengan kebijakan pemerintah. Hal ini pun terdorong oleh kondisi kehidupan bangsa dan negara yang dinamis dan mengarah pada timbulnya permasalahan yang kronis karena tidak kunjung ada penyelesaian. Banyak permasalahan kehidupan berbangsa dan bernegara, seperti masalah korupsi, lemahnya penegakan hukum, narkoba, kekerasan anak, kerusakan lingkungan, dan masih banyak lagi permasalahan yang lainnya. Maka dari itu, tidak terhindarkan lagi bahwa pendidikan kewarganegaraan mendapatkan pesanan untuk memuat materi pelajaran dengan sisipan kajian-kajian yang membahas tentang permasalahan dalam kehidupan berbangsa dan bernegara tersebut.

Kehidupan berbangsa dan bernegara memuat macam-macam etika yang mengatur kehidupan sosial dan budaya, politik dan pemerintahan, ekonomi dan bisnis, penegakan hukum yang berkeadilan, keilmuan dan lingkungan. Macam-macam etika kehidupan berbangsa tersebut telah ditetapkan oleh lembaga tinggi negara (MPR) agar menjadi acuan dasar untuk meningkatkan kualitas manusia beriman, bertakwa dan berakhlak mulia serta berkepribadian Indonesia dalam kehidupan berbangsa (Ketetapan MPR No. VI/MPR/2001). Dokumen etika kehidupan berbangsa itu diperkuat oleh ketetapan MPR berikutnya tentang visi Indonesia masa depan (Ketetapan MPR No. VII/MPR/2001). MPR menyebut ada tiga visi, yaitu ideal, antara dan lima tahunan. Visi Ideal tergambar dalam cita-cita nasional dalam pembukaan UUD 1945. Visi Antara tergambar dalam ketetapan MPR tersebut sebagai Visi Indonesia 2020 yang mewajibkan berlaku sampai 2020. Sedangkan Visi Tahunan tergambar dalam dokumen politik semacam garis-garis besar haluan negara.

Visi Indonesia 2020 memuat idealitas perwujudan masyarakat Indonesia yang memiliki karakter religius, manusiawi, bersatu, demokratis, adil, sejahtera, maju, mandiri, serta baik dan bersih dalam penyelenggaraan negara. berbeda dengan etika kehidupan berbangsa yang implementasinya untuk seluruh warga bangsa, Visi Indonesia 2020 ditekankan implementasinya pada penyelenggaraan negara. Kedua dokumen politik tersebut pada intinya sama-sama mengarahkan Indonesia menuju pembangunan kearah yang lebih baik.

Berbagai rancangan arah dan kebijakan yang telah disusun oleh negara menjadikan sebuah patokan bagi seluruh warga negara untuk dapat mewujudkannya. Dengan mengusung prinsip revolusi mental, pendidikan kewarganegaraan digunakan untuk menguatkan kembali nilai-nilai karakter setiap warga negara, mewujudkan kembali warga

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negara yang bermoral ideologi Pancasila, Berbhinneka Tunggal Ika dan selalu memiliki semangat bela negara. Hal tersebutlah yang kelak akan menjadikan SDM Indonesia menjadi berkualitas dan hasil akhirnya dapat melanjutkan pembangunan Indonesia sesuai cita-cita bangsa.

Penutup

Pada era globalisasi saat ini, tantangan kehidupan berbangsa dan bernegara menjadi semakin kompleks. Maka dibutuhkan sumber daya manusia (SDM) yang berkualitas untuk dapat mewujudkan eksistensi dan peran Indonesia dalam membangun dan mengelola sendiri semua potensi yang menjadi potensi sumber daya alam di Indonesia. Melalui penguatan pendidikan kewarganegaraan yang diajarkan di sekolah, diharapkan dapat membangun serta memperbaiki karakter dan kepribadian setiap warga negara. Tentunya dengan tidak terlepas dari visi misi yang telah dibuat oleh pemerintah. Penguatan pendidikan kewarganegaraan yang ditekankan adalah dalam hal pengajaran pembentukan negara, nilai-nilai patriotisme dan cinta tanah air, serta semangat bela negara dan budi pekerti. Semua upaya yang ada tersebut tentunya harus mendapat semangat dan dorongan dari berbagai pihak, baik dari pemerintah maupun sesama warga negara agar terwujud desain pembangunan Indonesia seperti yang diharapkan seluruh rakyatnya.

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IMITATING THE CHARACTER EDUCATION OF SHEIKH AHMAD RIFA'I IN TEACHING, PREACHING AND FIGHTING AGAINST DUTCH COLONIALISM[1]

Muhammad Fikri Hidayattullah
Program Studi DIII Manajemen Informatika Politeknik Muhammadiyah Pekalongan,Jl. Pahlawan No.10 Kajen 51161Email: muhammadfikri.uad@gmail.com
YustiaHapsari
Program Studi S1 Teknik Informatika STMIK YMI Tegal,Jl. Pendidikan No.1 Pesurungan Lor Tegal 52147 Email: yustia.hapsari@gmail.com

Abstrak

The precise education is not only generating students who are able to memorize kindness value. However, it should be able to implant those kindness values into themselves and then, apply the values in their live. These are the main purpose of character education. The character education may be gained by imitating figure having high integrity. The figure is Sheikh Ahmad Rifa'i. He is one of clerics (ulama) who deserve to be role model. The research try to figure out the method of preach (da'wah), teaching, and struggle of Sheikh Ahmad Rifa'i as the effort of character education learning and the method relevance with modern live. The method used in the research is historical approach. The other purpose of the research is introducing the profile of great cleric from Kendal, Central Java.

Keywords: *character education, Sheikh Ahmad Rifa'i, Dutch, tarajumah*

Introduction

Education is the most valuable thing for human being, particularly Moslem. Through the education, someone may change from without knowledge (*jahil)* to having knowledge (*'alim*)and able to do something according tothe truth he knows(*'amil*). The education is also able to implant kindness values into one self for being a better person. Oxford Dictionary mentioned that definition of education is process of receiving or giving systematic instruction, especially at a school or university [1]. Even though, the education is not only from school or university and in the form of instruction. In the Arabian, there are some terms used in the definition of education, namely *ta'lim* (teaching), *tarbiyah* (care) and *ta'dib* (norm implanting) [2].

On January 2010 14th, the government through National Education Ministry launched "Cultural Education and Nation Character" as the national movement. Character education fever happening everywhere. During this year, almost every scientific meeting, as discussion and seminar, either, regional, national or international seminar takes theme about character education [3].When Muhammad Nuh became the minister of national education conveyed talk in a national seminar on "Nation Character Education" as the series of leader summit event of Post Graduate Program of Educators and Education Workers institution in Indonesia at State Universi-

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ty of Medan (UNIMED) by saying "*character education must be started from primary school as if the character is not be formed early one character will be difficult to change*" [4]. The government through character education program has a great purpose, namely for producing good character generation by implanting kindness values since earlier. Character education is not only generating individual who is only able to memorize good value of honesty, braveness, hard working, keep cleaning and shamed to be dishonest. [5]. However, it is also able to implant the kindness value into his daily lives.

Indonesia has a cleric (*ulama*) and hero who got his national hero title. He was Sheikh Ahmad Rifa'i, a cleric reformer (*mujadid*) in the 19th century birth ofKendal, Central Java. SheikhAhmad Rifa'i has a strong character, brave and persistent not unyielding. In addition to contribute for developing the religious live of Javanese people, he also fought against the Dutch Colonialism who would like to oppressive the small people and moslems. Due to the resistance he have to bear the risk was exiled to Kalisalak to Ambon and Manado. His productivity in work is poured in writing 69 the books in the field of *ushul al-din,fiqh and tasawwuf*[6], 500 *tanbih*and 700 *nadzam* (song) [7]. Particularity his method in teaching is by doing translations Arabic books into Javanese language with *Pegon* script. These books later termed the book of *tarajumah*.

Several researches about the view of Sheikh Ahmad Rifa'ion education hasbeen studied. Lessy [8] research on Islamic education according to the perception of Sheikh Ahmad Rifa'i.The research focusing on the discussion about booksof Sheikh Ahmad Rifa'i talked about education, like *Bayan Songolas, Atlab, Ri'ayah al-Himmah* dan *Husn al-Mithalab*.Rezkyaningrum [9]carried out an analysis study toward the islamic education system according to Sheikh Ahmad Rifa'i. The study discussed two major problems. First, how a education system according to Sheikh Ahmad Rifa'i which includes basic, the purpose,method, curriculum, teachers and students. Second, how contribution thought Sheikh Ahmad Rifa'i in islamic education. In this study will more specifically discuss the character education lesson by imitating of Sheikh Ahmad Rifa'i as an exemplary figure in teaching and preach to *ummah* and the struggle against Dutch colonialism.

Research Questions

1. How method Sheikh Ahmad Rifa'i in teaching, preaching and fighting Dutch so that can be used as an example in learning character education?
2. Do methods used by Sheikh Ahmad Rifa'iis still relevant to the used in the life of modern society like now?

Research Objectives And Benefits

The research objective is to be achieved:

1. Uncover *da'wah* method and Islamic teaching by Sheikh Ahmad Rifa'i to Javanese community (Kalisalak) in the 19th century and his struggle against Dutch colonialism
2. Introduce to the public that Kendal has a great cleric hero as well as an advocate of religion and state
3. Finding out the relevance methods used Sheikh Ahmad Rifa'i in teaching, in this modern life so that can be used as an example in character education

The expected benefits of this research:

1. Being one contribution in writing historical development of Islam in Indonesia
2. Implanting good values on the personal individual by imitating the character and struggle of the clergy

Research Methodology

A method of data collection in this research using methods interviews and literature study. Interview methods used to obtain data directly bycarrying out interviews to *Jama'ahRifa'iyah* that being in the region Paesan, Kedungwuni, Pekalongan. Literature study done by examining the literature primary and secondary relating to research. After all the data obtained then historical approach was done as the process of conclusion

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and interpretation of the symptoms that arise in the past tense to find out a generalization that is useful in an effort to understand history facts [10]. This historical approach method is considered as the best method for revealing the track record of historical figure.

The Purpose And Essence Of Islamic Education

Sheikh Musthafa al-Ghulayani in his book *Izat al-Nashi'in* explaining the definition of education:

التّربيّة هي غرس الأخلاق الفاضلة فى نفوس الناشئين وسقيها بماء الأرشاد والنصيحة حتى تصير ملكة من ملكات النفس ثم تكون ثمراتها الفضيلة والخير وحب العمل لنفع الوطن [11]

> *It means: "Education (tarbiyah) is planting morals noble into the soul of the kids being grow and pour it with steady hints and advice so that it becomes a character inherent in soul, then its fruit that form of primacy, kindness, like almsgiving nation for the sake of expediency".*

From the definition it can be understood that the essenceof education in Islam is not separating between knowledge and deed. However, in it there is a process of habituation planting and good values (knowledge) since childhood so as to produce useful fruit (charity) in later life. While the cause of education in islam is to produce a good man as mentioned al-Attas:"*The aim of education in Islam is therefore to produce a good man*" [12].

Sheikh Ahmad Rifa'i, *Ulama* And Warrior

Sheikh Ahmad Rifa'i was born on thursday 9 Muharam 1200 H who coincides in the year 1786 BCin the village of Tempuran, Kendal Sub District. He was born of the couple ofMuhammad MarhumandSitiRahmah.His father was a priest. At the age of 6 years, small Ahmad Rifa'ihad been left by his father. Two years later, his grandfather also passed away. Then Ahmad Rifa'iwas educated and nurtured by his brother named *Kiai*Asy'ari. *Kiai*Asy'ari was the founder and caretakers of *Pesantren* (boarding school)Kaliwungu.At this *pesantren*, Ahmad Rifa'i started his scientific odyssey for studying religion. Almost his time was used for studying good religion to *Kiai*Asy'ari and other *Kiai* [7].

Spirit of young Ahmad Rifa'i in studying urging him to pursue studies to the holy land Mecca.For eight years he studying in Mecca start in 1225 H until 1232 H [13]. At that point in Mecca, there was tajdid movement (renewal religion) proclaimed by Sheikh al-Imam al-MujadidMuhammad ibnAbd al-Wahhab, which will be called as *Wahabi*movement by their enemies. According to AdabyDarban, Sheikh Ahmad Rifa'i while studying in Mecca, he got teachers with *Wahabi* sect, although not all *Wahabi*sect affect Sheikh Ahmad Rifa'i [13].This may be easily be right looking at similarity the Islamic movement renewal of Sheikh Ahmad Rifa'i with*Wahabi* movement.

Finished studying in the holy land Mecca, Sheikh Ahmad Rifa'i returning home, Kendal.However, his time to settle in Kendal is not long lasting after the Netherland-banned him for disrupting the stability of colonialism governance.He decided to move to Kalisalak, Batang. In Kalisalak, Sheikh Ahmad Rifa'i established*pesantren* on his own land. At this *pesantren*, he taught his students by using the method of Qur'an translation, Hadith and Arabic Books into Javanese language with *Pegon* script. So, the students who learned those translated bookswere given title *santritarajumah*(*tarajumah* students). A method of teaching done by Sheikh Ahmad Rifa'iis easier accepted by people,moreover the writing is in the form of beautiful and interesting *nadzam*(song) in accordance with the Javanese people habit at that time [8]. Moreover, translation method of Arabian book into Javanese language is still taboo [13]. It became opportunities and one of the facilities for facilitating the religion learning to people.

In addition to propagate and teaching the religion to Kalisalak people and surrounding with his special method, Sheikh Ahmad

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Rifa'i also fought against Dutch colonialism. He fought not with physical attack (war), but through social criticism that was poured into-bookslyric of *tarajumah*, his article. A result of social criticism she did to the Netherlands, he have to accept the risks sequestered to Ambon and Manado. The family of Sheikh Ahmad Rifa'ihas warned him to be more flexible and compromising to the colonial in order to survive from danger. However, Sheikh Ahmad Rifa'i is a fighter who is persevering holding the principles of the truth, especially religious truth laid on top of anything. It set out in his book*Sharih al-Iman*:

وأمارة الواصل الى حقيقة الايمان ان يختار ما فيه سلامة الدين ولو تلف ماله او ولده او نفسه او جاهه (شريح الايمان)

> *"And the sign of person who has reached the essence of faith is saving the religion, even it has risks like losing their wealth, position, children and or threatened himself [7].*

Isolation in Ambon and Manado will not decrease his struggles. He still carry out religious proselytizing and writing on isolation land.

Relevance Methods And Struggle Of Sheikh Ahmad Rifa'i With Modern Life

A method of religious teaching done Sheikh Ahmad Rifa'i to the community Kalisalak and surrounding with doing translations Arabic books into Javanese language very help them in understanding lessons. But, that is not enough for individuals who want to learn about religion deeply rely with the text translations.Especially in the life of modern society in easy to access facilities of learning Arabic.DjarnawiHadikusumo warned this:

> *"Nowadays, there are so many religion books in Indonesia language talk about hadith and ilm hadith, interpretation of Qur'an, fiqh and ushulfiqh, falak and hisab and so on. Publishing books of religion in Indonesia langauge really a services large and estimable. And those who does or not understand Arabic can learn science religion, not only monopolized by those who proficient Arabic. But it shall not diminish volition studies Arabic, and he does not. The establishment of madrasah and religious colleges remain activated, where teenagers are educated and taught Arabic language and knowledge in it, taught to think big in order to be able to explore the wisdom and law of the Book of Allah and the Sunnah[14]."*

Resistance is done Sheikh Ahmad Rifa'i against the colonial government is a testament to his commitment to a high level of truth values.He did not just be quiet and doing nothing see various shades damage inflicted by Dutch colonial.This attitude is a reflection of high scientific integrity and courage to act in accordance with the truth and their knowledge.This is an example is needed from time to time. Attitude harmonize between knowledge and charity.

Conclusion

Usage method of religious teaching by translating Qur'an, Hadith, and Arabic books into language comprehensible by the local community very helpful. But, if you want to explore further should study the knowledge instrument, namely Arabic. Sheikh Ahmad Rifa'i had uses the *tarajumah* in order to facilitate the public Kalisalak and its surrounding was notabene they are villagers living in 19th century, where access to education and teaching facilities are not as easy and sophisticated now. His persistence in preaching and fighting deserve high appreciation. Although exiled many times, he does not recede stopped preaching and struggle.In Ambon and Manado he still preaches and send letters to encourage his students for remain committed and continue the mission mandate. This is an example of the integrity of a cleric who earnestly practice the knowledge they have. Cleric very worthy role model and example in form of personal human being, from the past to the present

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Muhammad Fikri Hidayatullah was born in Pekalongan on October 23, 1988. Graduated with a bachelor's in Informatics Engineering Program, Ahmad Dahlan University (UAD), Yogyakarta in 2010. In 2011 get Scholarship Program Masters Degree in Informatics Engineering, University Dian Nuswantoro (UDINUS), Semarang. Activity work as a lecturer Informatics Managementof Muhammadiyah Polytechnic of Pekalongan and also taught at several campuses in city of Tegal. The author is very interested in the field of literacy and history, especially the history of Islam in Nusantara.Is currently started a library in the name of PoestakaKaoemMoeda specifically accommodate and collecting historical archives.

Yustia Hapsari was born in Semarang on 21 August 1987. Activity is currently a lecturer computer in his almamater, STMIK YMI Tegal. In 2011 get Scholarship Program Masters Degree in Informatics Engineering, University Dian Nuswantoro (UDINUS), Semarang. Like the world motivation and capacity building. Current active in an organization authorial Forum Lingkar Pena (FLP) Tegal and administrator the Taman BacaanMasyarakat (TBM) "Pelangi" Tegal city.

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INTERNET OF THINGS EXPERIMENT USING ESP8266 WIFI MODULE, THINGSPEAK CHANNEL AND DELPHI INTERFACE[1]

Fauzy Satrio Wibowo, Adhi Bagus Pribadi
The Authors are with Electrical Department, State University of Malang.
Address: Jl. Semarang no.5 Malang
E-mail: bersamakitaelektro@gmail.com. adhibaguspribadi@gmail.com

Abstract

A IoT is called the third wave of the development of information industry after computer and internet. Mass data will be produced during running of the IoT. Internet of Things (IoT) is the ability of a system which can be connected with many sensor output through the Internet or a local network. The data is sent to a system to be processed so it can connect to other devices to communicate with other and form a system. The system consist of input, unit processing, unit connectivity and cloud/software application. The objective of this research is testing capabilities of ESP8266 on Internet of Things application. This research is using experiment method which has two kind of examination. The first examination is monitoring data using thingspeak channel. Thingspeak channel is cloud computing has powerful and scalable computing ability, which has been applied in processing of the IoT. The second examination is controlling electric device, such as relay using TCP layer with Delphi. Delphi applications intended for use management of the IoT applications centrally. So that the operator can control the sensor nodes on the IoT applications through one centralized place. The future impact of development are smart city and smart industrial system.

Keywords: *Delphi, Internet of Things, Thingspeak Channel.*

1. Introduction

In 2010 the number of internet users in Indonesia was 42 million users, then increases 13 million Internet users in 2011 [1]. Data regarding the quantity of Internet users is proportional to the data obtained Indonesian Internet Service Provider Association stating in the years 2011-2015 the number of internet users in Indonesia reached 446 million Internet users [2]. Based on data from existing Internet users, rapid technological developments make internet facilities developed into one of the facilities that can accommodate the majority of human interests ranging from education to employment interests.

One of many application using internet is Internet of Things. Internet of Things is a system that can connect various types of equipment (equipment) and facilities simultaneously pass through different communication channels. Internet of Things is the third generation of the development of computer science and the Internet, but points to consider in the application of Internet of Things is a very large-sized data that will be created when the system running Internet of Things [3]. An object is said to be the Internet of Things, if contained in an electronic object, or what equipment is connected to a local and global networks through an embedded sensor and is always active. Some researchers predict Internet of Things will connect

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with 50 million devices from every sector of human life in 2020 [4].

Internet of Things is related with embedded system. Embedded System is a computer system designed to perform a specific job. Embedded System is usually a device that consists of hardware and software that is built with an easily recognizable by the user and the machine [5]. Embedded System is the famous microcontroller built with a more complex system, but can be used easily for everyday purposes. Various kinds of embedded systems that have been developed is the Arduino, Beagle Bone, Raspberry etc. The use of embedded systems in the modern era is relatively easier because the factory has made embedded sytem in modular form so it does not require a complex electronic circuit back.

Internet of Things has a function that is by utilizing a programming to produces an interaction and communication among the machines are connected with internet. So that in 2014, the study revealed that the science of Wireless Sensor Netwok (WSN), Control System, Automation, and so are the means to build the system the Internet of Things [5]. Knowing the importance of studying and developing the Internet of Things system in the current era of globalization, the research-based Internet of Things trainer is very important to develop the potential of the application of intelligent systems in Indonesia.

2 Delphi-IoT Algoritm System

2.1 Digram System

The working principle of this device is recording the temperature and humidity of the current environment. Monitoring the temperature and humidity can also be done by the Delphi application that has been designed. The Delphi application has the task of monitoring the temperature, humidity and controlling any electric devices which is designed before.

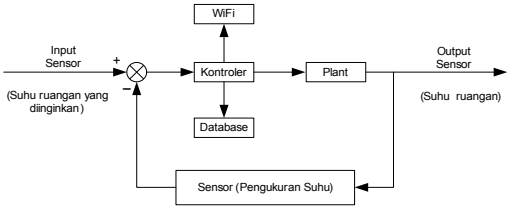

Fig. 1 Delphi-IoT Algoritm System

2.1 Unit Connectivity – ESP8266

ESP8266 is wifi module issued by the company AI Thinker. ESP8266 can work in three modes. The first mode is the Basic Mode. ESP8266 Basic Mode is a mode that allows us to check the condition of ESP8266 whether in good condition or not. The second mode is the Layer Mode WiFi. WiFi ESP8266 Layer mode is a mode that is used when we use in the condition ESP8266 WiFi. The third mode is a TCP Layer. TCP Layer Mode is a mode ESP8266 used when we use an internet connection. ESP8266 also has 2 firmware that can be used to execute commands from the user. Firmware the first and the output of the plant is is AT Command firmware. While the firmware is being developed MCU Node Firmware. Both the firmware type has advantages and disadvantages of each. In the development of this research will be presented on the introduction of the Internet of Things (IOT) using either the AT Command firmware or Node MCU firmware. There is a configuration of ESP8266 consisting of (1) VCC; (2) RST; (3) CH_PD; (4) UTXD; (5) URXD; (6) gp100; (7) GP102; and (8) GND.

2.2 Unit Input – DHT 11 and LM 35

DHT 11 is a digital sensor that can measure the temperature and humidity of the surrounding air. Calibration coefficients stored in the OTP program memory, so when the internal sensor detects something, then this module include the coefficients in the calculations. DHT11 including sensors that have the best quality, judged from the response, fast data reading, and the ability of anti-interference. Its small size, and with the transmission of signals up to 20 meters, making this product suitable for many applications the

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measurement of temperature and humidity.

LM35 is temperature sensor which has principle the sensor will perform during the sensing of temperature change, every 1 ° C rise in temperature will show increase in the voltage of 10 mV. Although the voltage sensor can reach 30 volts but given to the sensor is at 5 volts, so it can be used with a single power supply with the provision that the LM35 only requires a current of 60 uA it meant LM35 has the ability to generate heat (self-heating) of sensors that may cause low readings of less than 0.5 ^{o}C at 25 ^{o}

2.3 Unit Storage – Thingspeak

Thingspeak is an internet network cloud platform that provides a variety of exclusive services to build applications IOT (Internet of Things). Thingspeak features a real-time data collection, visualization of data in graphical form, as well as providing plugins used to collaborate with web services, social network or API. The main feature of Thingspeak is Thingspeak Channel. Thingspeak Channel is a place where we can send the data to Thingspeak to be shown on the channel. Thingspeak Channel has features include (1) 8 columns for universal data; (2) 3 Columns for locations such as latitude, longitude, and elevation; and (3) one column to display the status of what data is displayed on the channel.

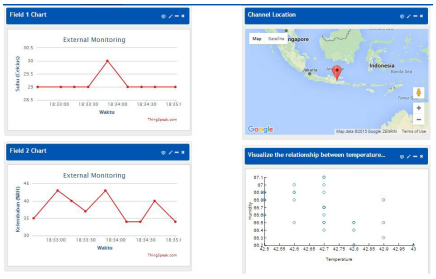

Fig. 2 External Monitoring – Thingspeak

2.4 Unit Execution – Delphi Interface

Delphi is an IDE compiler for the Pascal programming language and software development environment that is used to design an application program. IDE (Integrated Development Environment) is a computer program that has some of the facilities that are required in the software development. The purpose of the IDE is to provide all the utilities needed to build software. In this research, some of components are required, among others: (1) Button; (2) Chart; (3) Label; (4) List Box; (5) Edit Text; (6) Ado Table; (7) comport; (8) groupbox; (9) and RV Project.

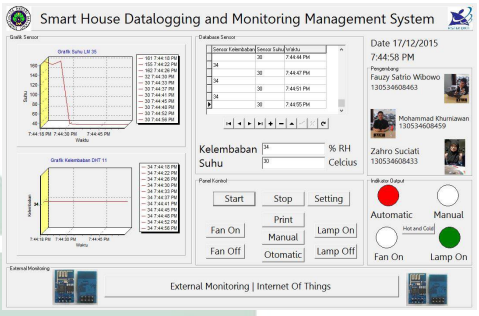

Fig. 3 Delphi Interface

3 Delphi-IoT Performance

3.1 Automatic System Flowchart

Based on fig.4 of the flowchart, the system has an input that can affect the output (lights and fans) is the input temperature sensor LM35 read through, this was the system in automatic mode. As for the humidity does not affect either the lamp or fan output, which is read by the humidity sensor DHT11 only displayed on a monitoring system that uses Delphi. If the temperature (N) is read ≤ 30 then outputs a lamp is lit, and when the value of N ≥ 31, then the light will die. As for turning on the fan output then reads temperature values should be ≥ 33 and to turn off the fan value of N should be ≤ 31.

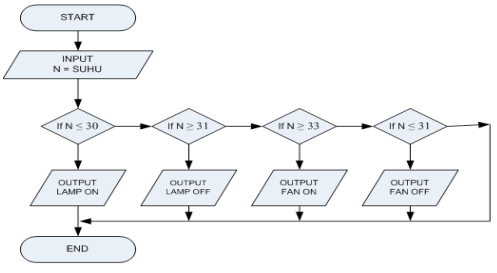

Fig. 4 Automatic System Flowchart

3.2 Manual System Flowchart

Based on fig.5 of flowchart, the system which can be seen that the input provided is

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in accordance with the user input, in these conditions the system is in manual mode. If the user presses the button lamp on the output generated light is on and when the user presses the button lamp off then the light will die. Furthermore, to turn on the fan, the user must press the fan on and vice versa to turn off the fan by pressing the fan off button.

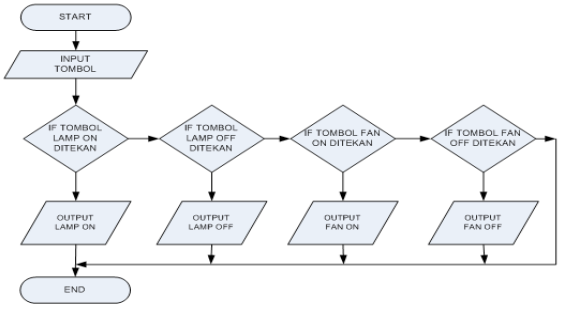

Fig. 5 Manual System Flowchart

3.3 IoT Control System Flowchart

The working principle of the IoT Control system is utilizing the data input provided by an Android device or the web service through the Internet to control any electric device. A system built to control the relay at a time chart which is able to be updated whenever there are changes in the data that goes into the processing unit. Here is the flowchart of IoT control system on Fig. 6.

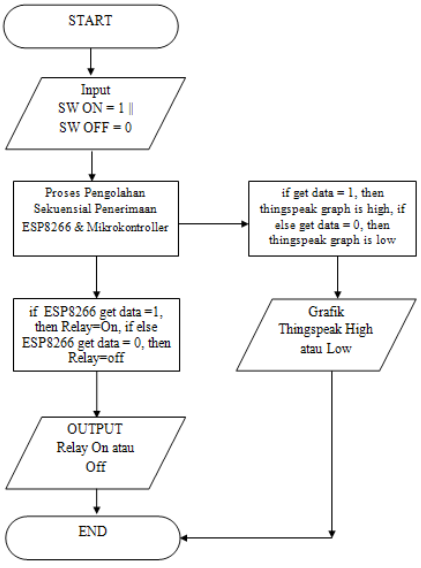

Fig. 6 IoT Control System Flowchart

4. Result

4.1 Delphi Application Performance

The temperature input are read by the sensors will make the lights and the fan changed conditions. If the value N is read ≤ 30, then the light turns on automatically. Conversely, if N ≥ 31, then the light turns off automatically and the indicator lamp will die. Further to the fan output, if N ≥ 33 then the fan will be activated and the indicator is light up. Fans will die if N ≤ 31 (Fig.7). Temperature and humidity are displayed in degrees Celsius (° C) and the percentage of moisture / Humidity (% RH). The data is also represented on a graph for each sensor data and the data sensors will appear also on the block Database Sensor (in the form of a table). The data base is stored on Ms. Access (Fig. 8).

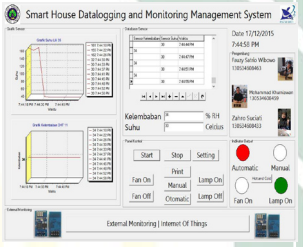

Fig. 7 Indicator on delphi

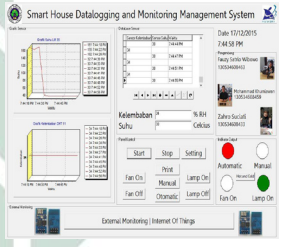

Fig. 8 Database Interface

4.2 Thingspeak Performance

Programs that have been uploaded to the microcontroller will work transmit sensor data to thingspeak channel within a certain time. Programs that have been uploaded into the microcontroller has a time span of 15 seconds to transmit data to the latest sensor readings Thingspeak Channel. Excess which is owned by Thingspeak.com is the result of sensor readings can be known by another user if the feature "public" is enabled. The channel that was created previously been equipped with the "public", enabling the user other than the administrator aware of the results of sensor readings. Here is a link that can be opened by other users https://thingspeak.com/channels/37813. The link is automatically get when users provide features "enable public" on thingspeak channel.

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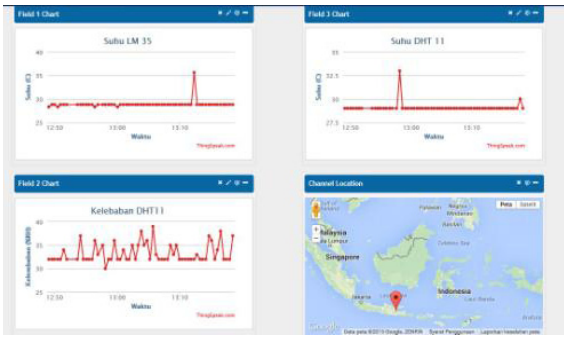

Fig. 9 Thingspeak Channel Performance

4.3 IoT Control System

The work principle of IoT control system is that use the network as an intermediary for the data that is sent through the server (thingspeak channel). In this research, the data sent from the microcontroller to thingspeak channel will trigger commands that allow thingspeak channel to communicate with another device. For example relay module. When thingspeak channel gets the data value is 1 then thingspeak channel will trigger the microcontroller to power on the relay, but if it is 0 then thingspeak channel will trigger the microcontroller to turn off the relay (Fig. 10)

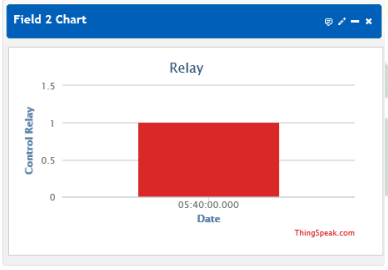

Fig. 10 IoT Control System on Thingspeak Channel

4.4 Overall Result

The overall result of this research will appear on Table 1 below.

Table 1 Result of Delphi-IoT System

No	Parameter	Result
1	Thermal N ≤ 30	Lamp On
2	Thermal N ≥ 31	Lamp Off
3	Thermal N ≥ 33	Fan On
4	Thermal N ≤ 31	Fan Off
5	Delphi Button (Lamp ON) (Local Service)	Lamp On
6	Delphi Button (Lamp Off) (Local Service)	Lamp off
7	Delphi Button (Fan ON) (Local Service)	Fan On
8	Delphi Button (Fan Off) (Local Service)	Fan off
9	Datalogging Sensor on (Local Service)	Stored on Delphi, Access
10	Datalogging Sensor on (Interlocal Service)	Stored on Thingspeak Channel
11	Control Electric Devices (Interlocal Service)	Thingspeak Channel

5 Conclusion

This research has several outcome such as monitoring sensor, datalogging sensor and controlling electric devices. This research can run on two mode, interlocal service and local service. Interlocal service using TCP Connection for data communication, while local service using USART communication. Interlocal service utilize thingspeak channel for data processing through internet, while local service using Delphi application to process human interaction process. This application has classic problem which still relies on internet connection.

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OPTIMIZATION MULTIPLE INTELLIGENCE CHILD TO PRODUCE HUMAN RESOURCES QUALITY[1]

Endah wijayanti
Master health promotion, with reproductive health and HIV/AIDS in Diponegoro University, Central Java

Abstract

Achievement of Indonesian teenagers in 2012 was ranked 64th out of 65 countries in PISA, the field of mathematics, science, and reading. While 90 % of brain growth occurs at the age of five, as well as their nggapan that lower IQ tests confirmed the child is not smart and did not perform well in school.

Given that assumption is now beginning to be pushed by their multiple intelligences that exist in children, and we need to know that all children are smart in the field of the capabilities of each. The development of children's intelligence compounded by 9 aspect according to " Gardner " among others, linguistic, logical-mathematical, spatial space, musical, kinesthetic, interpersonal, intrapersonal, naturalist and eksistensia. Of these, the role of parents and teachers to be able to provide proper guidance according to the type of intelligence of each child

Keywords: *multiple intelligences, adolescent development and health intelligence in the life cycle*

Introduction

Programme for International Student Assesment "PISA" tahun 2012 results show that the achievement of adolescents and Indonesia ranked 64th out of 65 countries participating in the test. It shows that Indonesian children aged 15 years have capabilities that are still very low, especially in the field of mathematics, science, and reading compared to other children in the world.

Seeing the results of the above that a person's intelligence is growing based on the development of the human brain, 90 % of brain growth occurs at the age of five and 85 % Brain Paths develop before children enter elementary school (7 th).

Besides this, many people believe that low IQ children must not be smart and not a child can excel in school, lower grades in school children is not considered intelligent. While we see that the growth and development of children so that each child has a different kind of intelligence, when children learn something that fits the type of intelligence, will be able to achieve good performance. As well as the change of mindset that all the smart kids, so as to optimize the multiple intelligences of children to produce quality human resources.

Basic Concept of Multiple Intelligences

Multiple intelligence theory is proposed by Howard Gardner ' " to show that basically every individual has a lot of intelligence. According to Gardner, intelligence is the ability

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to break -kan and solve problems and produce fashion that is a consequence in an atmosphere of culture or society. " As for the intelligences that:

a. Linguistic intelligence is the ability to use and process the words effectively, both orally and tertutis.
b. Logical-mathematical intelligence is the ability to deal with numbers and calculations, as well as the pattern of logical and scientific thinking.
c. Space-spatial intelligence is the ability to capture the space-spatial world accurately.
d. Musical intelligence is the ability to develop, express and enjoy the musical forms and sounds.
e. Bodily-kinesthetic intelligence is the ability to use the body or gestures to express ideas or feelings.
f. Interpersonal intelligence is the ability to understand and be sensitive to the feelings, intentions, motivations, character, and temperament of others.
g. Intrapersonal intelligence is related to the ability of self-knowledge and the ability to act based on the introduction of self adaptative.
h. The naturalist intelligence is the ability to understand the natural environment well, it can make other consequential distinctions in the natural; the ability to understand and enjoy nature; and to use them productively.
i. Eksistensia intelligence is sensitivity, or the ability to answer the deepest problems of human existence.

Understanding of Multiple Intelligences

a. Help parents and teachers know the advantages and disadvantages of children.
b. Help parents and teachers to be able to provide stimulation in order to optimize multiple intelligences.
c. Helping children to be able to achieve in the areas corresponding to the type of intelligence.
d. Developing children are able to recognize and accept the advantages and disadvantages himself.
e. Develop children who are able to face various problems in life.
f. Developing children who have high confidence

Stimulation of Multiple Intelligences

a. Multiple intelligences need stimulation in order to produce the human resources (HR) quality.
b. Required cooperation between families, educational institutions, health institutions, public and government to develop the potential of multiple intelligences in children.

Factors Affecting Multiple Intelligences

a. Heredity

   Inborn trait that is genetically inherited from the mother and father or influence when a child is in the womb, for example, the influence of nutrition, illness and others.

   Congenital factor determining the outcome of the stimulation provided by the environment.

b. Environmental factors

   Environmental factors are external factors that influence the development of individual self

   1) Mikrosistem
      The immediate environment such as family, friends, school, neighborhood.
   2) Mikrosistem
      The immediate environment such as family, friends, school, neighborhood
   3) Makrosistem
      Environment as not related to the child but under certain conditions can affect children indirectly, for example, the social, political and economic
   4) Kronosistem
      The specificity of the conditions at any period of influence on the development of individuals, for example with the internet make children less

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interested in books.

Health Intellegensia accordance Cycle of Life

a. Pregnant mother
   Brain Booster, a lever brain stimulation and nutrients to the fetus through the pregnant mother.
b. Baby
   Detection and stimulation sensomotorik, a intellegensia development detection and stimulation efforts sensomotorik.
c. Toddler
   Detection and cognitive stimulation, the detection intellegensia development and cognitive stimulation attempts.
d. Children
   Learning modality, is the optimization of learning readiness and effective learning model development.
e. Adolescent
   Multiple intelligences, is the identification and optimization of multiple intelligences in adolescents
f. Adult
   Brain Healthy Lifestyle, is the promotion of a healthy brain lifestyle to stay healthy, independent and productive.
g. Oldest
   Detection and cognitive stimulation elderly, the detection of cognitive disorders, and cognitive stimulation attempts to optimize the quality of life.

Basic Concepts of Adolescent Development

Adolescent phase is a period of transition or transition from late childhood to adulthood, thus mindset and behavior is transition from children to adults.

According to Dorland (2011) Adolescent / Adolescence is the period between the completion of pibertas and physical growth, roughly from the age of 11-19 years.

Early Teen Psychic: feelings and emotional instability situation, the status of early adolescence are confusing, many of the problems faced by teenagers.

Psychic Teens End: start-up and increased stability, self-image and attitude are more realistic point of view, the problem is more mature.

Optimize Multiple Intelligences in Adolescents

a. Linguistic intelligence (Word Smart)
   Learners / adolescents with high intelligence language directed to focus more on activities, such as reading a book every week and create a personal library, writing a diary to write what adadalam mind, practice public speaking, discussion and debate, as well as a play on words such as filling in crossword puzzles (TTS), random words (scrabble) and Others. Moreover, they tend to be easier to learn by listening and verbal.
b. Logical-mathematical intelligence (Smart Logic)
   Students / youth with intelligence suggesting that the ability to think for inductance, and according to the rules of deductive logic and resolve problems with the ability to think. Therefore, given the tendency to analyze and learn cause and effect, such as conducting logical mathematical games, like logic puzzles or brain teasers with friends and family, read books on mathematics and science were well known, visited the science museum, planetarium or science center more
c. Visual Spatial intelligence (Picture Smart)
   Students / youth with this intelligence have the ability to imagine the real form and solve the problem by highlighting the visual-spatial abilities, to be directed by activities such as photography and learn to use the camera for recording visual effects, redecorate the interior room or space, collect favorite pictures from magazines or newspapers, learn skills to determine the direction in the open, making the structure of objects with lego blocks toy or toy material to create three-dimensional building
d. Musical intelligence (Music Smart)

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Learners / teenagers with musical intelligence is more sensitive to noise nonverbal and easier to remember something and express ideas associated with music, the teenager was more focused on activities, such as taking time to sing with your family, your favorite music on a regular basis, joined the chorus of school or college, memperlajari certain musical instruments, such as piano, guitar and so on, listen to the melody or rhythm that naturally arise such as the chirping of birds, the whisper of the waves, the sound of wind, marching and sebagain yes

e. Interpersonal Intelligence (People Smart)
Learners / adolescents with interpersonal intelligence tend to understand and interact with social easier, to optimize adolescents with this intelligence given activities including increases contact with friends, relatives, and others, to practice active listening with a friend or a close friend (communication Effective), start a conversation with a person in a public place, attending a family reunion and school, join a group that aims to help get acquainted with new people,

f. Intrapersonal intelligence (Self Smart)
Learners / adolescents with intrapersonal intelligence tend to be sensitive to the ability of himself and understand the weaknesses and strengths in himself, to optimize the teens of this type of activities that can be given them keep a diary that records the thoughts, feelings and memories, set short-term goals and long-term of the purpose of life, to attend a seminar on self-introduction

g. Naturalist intelligence (Natural Smart)
Learners / adolescents with naturalist intelligence is more sensitive to the natural environment and tend to observe nature, to optimize the teens of this type to be given activities including recognizing beings and natural objects such as insects, birds, plants, rocks, searching for knowledge related to the world nature, ecology, flora and fauna through books or the internet, gardening or raising animals, do activities in the outdoors, such as scouts, mountain climbing, white water rafting, jungle trekking and sea, campers

h. Spiritual intelligence-Existential (Spiritual-existential Smart)
Learners / adolescents with this intelligence is a combination of intelligence itrapersonal and interpersonal skills with a value component as an additional spiritually, to optimize the teen is more geared to activities, such as reading the interpretation of scripture or the books of philosophy that addresses the needs of spiritual-existential self, read the lives of the prophets and apostles, attending religious or philosophical discussion with credible figures.

Conditions and Situations to Develop Multiple Intelligences In Teens

a. Family
Parents are the first educators and foremost, values adopted family, parental expectations, socio-economic circumstances, the bustle of family influence on the attitudes and ways parents develop the potential of children, parents should understand about multiple intelligences, parents should be sensitive in assessing the child's talents, the parents must provide the means as well as provide opportunities for children to participate in education and training in the field appropriate to the type of intelligence.

b. Educational institutions
School is an educator second, most schools applying to teach classical and yet based on the multiple intelligences of each student, most schools do not have the facilities to develop multiple intelligence for students, child's success is strongly influenced by school policies, the competence of teachers and how teachers educate, need to recognize intelligence of each student and provide services in accordance

c. Friends of the same age
Peers are important for teenagers, they are generally more by the peers rather

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than parents for wanting to be accepted by the group, in the peer group, a teenager trying to find her identity, along with peers have the same interest will really help teenagers to develop intelligence, interest and talent

d. Media / Internet
Providing information and knowledge that is very useful to develop intelligence teens, on the other hand, provides an example of negative behavior, especially with regard to interpersonal and intrapersonal intelligence mis. through movies or soap operas are not good quality, values in family and adolescent personality can affect adolescents in selecting information from the mass media.

e. Community
Community influence the formation of values which guide the behavior (good, bad, right, wrong), in the era of globalization into infinite space and time. Thus there will be a shift in cultural values and life, cultural and religious values that are taught inside and outside the home may differ, virtually no role models that show the value of a good and clear

Conclusion

Basically all the children that are born intelligent, so no children are foolish, but the intelligence of each child is different according to their ability and intelligence of each.

Through the concept of multiple intelligences or multiple intelligences is Gardner corrects the limitations of conventional ways of thinking about the intelligence of a single plural.

Intelligence is not limited to the intellectual is measured using several intelligence tests are narrow, or simply look at the achievements displayed a learner through repetition and exams in schools alone, but intelligence also illustrates the ability of students in the fields of art, spatial, sports, communicate, and love of the environment.

With the diversity of human intelligence, makes the role of parents and teachers is very important to provide direction on what is suitable and appropriate for their students.

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All Authors may biographies, my name is endah wijayanti. Kudus, 2 juni 1979. Educational background is master health promotion, with reproductive health and HIV/AIDS in Diponegoro University, Central Java.

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A MODEL OF SCHOOL LEARNING: THE USE OF CARROLL'S MODEL OF FOREIGN LANGUAGE LEARNING[1]

Ratna Rintaningrum
Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia, rintaningrum@yahoo.com.au

Abstract

In modern era, school quality is being questioned. The school is demanded to have good services for its stakeholders, including its students and their achievement. A school as a place to develop education services plays an important role to help its students prepare for learning in order to obtain good achievement. Students are expected to be literate in their achievement in general, technology, and their achievement on foreign language learning. In terms of achievement, however, real life shows that some students are able to obtain good achievement, while other students are not. This indicates that some factors contribute to influence school achievement. Evidence-based research shows that factors such as student characteristics at the student level and school level have effects on student achievement. Thispaper reviews school level factors that operate to influence student achievement, in particular, on English as a foreign language learning.

Key Words: *Factors influencing, School learning, Carroll's model,*

Introduction

Some factors operate to have effects on English language teaching and learning (Nguyen, Warren, Fehring, 2014).The publication of the article 'A Model of School Learning' (Carroll, 1963) elicited much more attention than the author had anticipated when he wrote it. Carroll (1988, p. 26) pointed out that:The model had its roots in work on foreign language learning that showed that persons with low aptitude, as measured by certain tests, generally took much longer to achieve a given criterion of learning than persons with high aptitude.

Carroll's Model of Foreign Language Learning

Carroll (1962; 1963; 1975; 1989) proposed five variables as the basis of his model. These were (a) aptitude, (b) perseverance, (c) opportunity to learn, (d) ability to understand instruction, and (e) quality of instruction. Figure 1.1 illustrates Carroll's model of foreign language learning that is used as the theoretical base of this study.

Carroll (1963) argued that (a) aptitude was measured by the time needed to learn; (b) perseverance was measured by the willingness of the student to engage in active learning; (c) opportunity to learn was measured by the time provided for instruction; (d) ability to understand instruction was measured by the ability of the student to comprehend the task; and (e) quality of instruction was measured by how the learning task was organized, and how the instructor's skills influenced the effectiveness of presentation. It is interesting to note that the first three variables are specified in terms of time.

The Use of Carroll's Model of Foreign Language Learning

In addition to **aptitude**, four other variables namely, **opportunity to learn, perse-**

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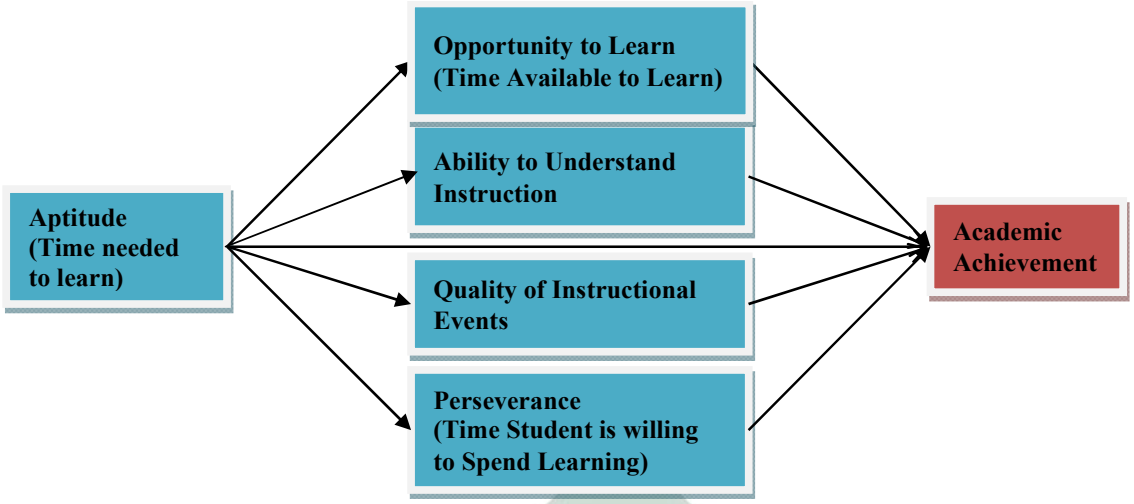

Figure 1.1 Carroll's Model of Foreign Language Learning (1962; 1963; 1975; 1989)

verance, quality of instruction, and **ability to understand instruction**, were initially embodied in a formal, quasi-mathematical model in a technical publication on foreign language learning (Carroll, 1962). These variables were proposed to be the factors that would account for variation in school achievement particularly in the learning of foreign languages.

The model of school learning that was published in 1963 (Carroll, 1963) has taken an important place as a useful guide in conducting research and a variety of aspects of education and teaching. The model has been cited and quoted in a number of investigations on teaching and learning in schools. Consequently, the model of school learning has had an increasing influence in many areas of education, not only in the United States but also in many developed and developing countries.

However, Cool and Keith (1991, p. 28) stated that "most investigators have not included all these variables simultaneously in investigations of school learning, and few have focused on indirect as well as direct effects".

Subsequently, Carroll (1988, p. 26) argued that in addition to the learning of a foreign language

> *It seemed reasonable, however, to generalize the model to apply to the learning of any cognitive skill or subject matter.*

Husén (1975, p. 11) also argued that

> *The comparative study of French as a Foreign Language provided a unique opportunity of testing the Carroll model cross-nationally… The studies that Prof. Carroll has conducted on the role of time are, indeed, fascinating, not least since he is able to assess the potential in terms of student achievement in using a given amount of time. Evidently, it should be of great importance to educational planners and policy makers all over the world to be able to grasp more quantitatively the implications of introducing the study of a foreign language at one age instead of at another.*

Furthermore, Husén(1975, p. 10) stated that

> *This model has, it seems to me, played an important role in modern thinking about the teaching-learning process, for instance, when Professor Benjamin S. Bloom, … developed his theory of mastery learning.*

Bloom (1968) was one of the educators and educational researchers whose thinking was very much influenced by Carroll's model and Bloom used the model as a basis for his concept of mastery learning.

Carroll's model of school learning was expanded and adapted by many educational researchers (Carroll, 1988, p. 27). Acknowl-

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edging that Carroll's model has its origin on work of foreign language learning, it is meaningful to employ this model in a specific learning situation that is in a university that teaches English as a foreign language.

Language Aptitude

A new concept of aptitude was advanced by Carroll (1962, 1973, 1976, and 1981) who proposed foreign language aptitude as a variable that influenced the success of learning other languages. Aptitude was defined in terms of speed in language learning.

Carroll and Sapon(1959, cited in Gardner and Macintyre, 1992, p. 214) designed a formal test of language aptitude that was called the *Modern Language Aptitude Test* (MLAT). This test assessed four subskills believed to be successful predictors of foreign language learning. They were (a) phonetic coding ability, (b) grammatical sensitivity, (c) memory abilities, and (d) inductive language learning ability. Through factor-analytic studies, it was found that these language skills were the basis for aptitude to learn a foreign language (Carroll, 1962). Carroll's study (1973, p. 278) speculated that "aptitude for foreign language is, to some extent, a residue of first language learning ability".

Pimsleur(1966a; 1968) was a further researcher who also studied student's aptitude to learn a foreign language, and developed a foreign language aptitude test, that was called the *Language Aptitude Battery*(Pimsleur, 1966b). This test included native-language skill, for example English vocabulary and meta-linguistic skill. A model of language learning by Spolsky(1989) also considered intact language skills such as phonology, orthography and grammar as necessary skills for the learning of foreign languages.

However, there have been further attempts to reconceptualize and refine the aptitude construct and bring it into the domain of current cognitive theory. McLaughlin (1995) suggested that working memory capacity might contribute to the predictive power of aptitude tests. Yoshimura's study (2001) reported that there was a correlation between aptitude test scores and working memory span. Although Miyake and Friedman (1998) also reported on the role of working memory in aptitude, they claimed that further studies were needed to examine the role of working memory as the central component of aptitude. Working memory was described as the process of memory that was involved in the simultaneous storage and processing of information (Baddeley, 1986, 1990; Harrington and Sawyer, 1992).

Grigorenko, Sternberg, and Ehrman (2000) also developed a new aptitude test known as CANAL-F (*Cognitive Ability for Novelty in Acquisition of Language – Foreign*). This test examined the learners' ability in (a) acquiring vocabulary, (b) comprehending extended text, (c) extracting grammatical rules, and (d) making semantic inferences. When this test was validated, the results were promising. Other scholars who tried to reconceptualize the aptitude construct were Skehan (2002) and Dornyei and Skehan (2003) who argued that the aptitude model needed to add a new component since there was ongoing research into an understanding of the cognitive processes involved in language learning.

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KNOW TECHNOLOGY DEVELOPMENT PRODUCTION, COMMUNICATION AND TRANSPOTATION AND EXPERIENCES USING IT ON LEARNINGSOCIAL STUDIES ININISLAMIC ELEMENTARY SCHOOL[1]

Sukasih
Lecturer of Islamic Elementary School Teacher Education Faculty of Tarbiyah and Teacher Education Islamic State University of walisongo Semarang sukasihfatar@gmail.com

Abstract

The challenge to the social studies on the eve of the twenty-first century is to help students develop reflective attachments to their nation-state and a sense of kinship with citizens in all parts of the world. This research aims to helping students become effective citizens in today's world isa tremendous challenge because of the enormous changes in our global society. This research is the study of description. The data found tested dependability, confirmed, credibility, and transferability. Data analysis the research uses comparative-constant. This research is prove some schools have only one or two computers, while others have at least one for each classroom.Social studieswas learning in Islamic elementary school according to their teacher and infrastructure school.

Keywords: *Social studies, Islamic Elementary school, Learningof experiences*

Introduction

The era global in the 21st century is a challenge Islamic elementary school teachers in learning social studies. Teachers in given the lectures technology development production, communication and transportation and experience use it, it was not all students gain experience in school. School advanced able to provide props and media learning, facilities, while schools in the regions had not yet supported by the learning, props and school of infrastructure.

The teachers at the school who forward with is required to be provided facilities will be able to provide the experience of the use of technology. Generally of teachers who are were required to provide learning experience to the students in fact only do all can to teach. But there is of teachers who have ability to teach social studies going to try to give learning experience student, although available.

Generally students learning in the school forward, most already have experience technology. Students who schools in left needs to obtain the introduction and experience technology development. Experience use technology development production, communication, transportation should be able to students got when learning to social studies in fourth grade the second semester in elementary school in accordance curriculum that is.

Lesson Social Studies

1. Social studies

The social studies are the social sciences simplified pedagogical purposes, (Barr, R. D, Barth, J. L and Shermis,

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1977:1-2). Each view holds that central purpose of social studies education is to develop good citizens, (Shaver, J P 1991:7; Barr,R. D at al 1977:25; Parker, W and Jarolimek, J 1984:6; Woolever,R and Scott, KP 1988:11). The social studies comprised of those aspects of history, economics, political science, sociology, anthropology, psychology, geography, and philosophy which in practice are selected for purposes in schools and colleges.

The reconstruction wishes to transform education into a powerful means for social change to ward word civilization, (Brammeld, Theodore, 1965:39). Social studies a specific field to utilization of social sciences data as a force in the improvement of human welfare, (CSS, 1913:7).Learning social studies provides opportunities to the students to develop knowledge, skills, values and attitudes and action that allows they could be good citizen who actively participate in society democratic.

Social studieswasto help student in developing the potential to be good citizen in the life of democratic society. So social studies served as subject to the students school starting from kindergarten through grade 12. Social studies is basic subject of the K-12 curriculum that is taught in ways that reflect an awareness of the personal, social, and cultural experiences and developmental levels of learners, (NCSS, 1994:251). Teachers Islamic elementary school in developing the subject matter social studies be oriented to student needs by taking into account the science, technology and community.

2. Science, Technology and Community

Teachers Islamic elementary school faced with the learning process social studies in choosing and presenting material according to the development of science, technology and the community. Education to form good citizen as a purpose social studies the complex difficult to achieve due to the advancement of science, technology and the community, (Remy, R C, 1990:77). The concept of science, technology and the community would be a lot affect learning activities social studies, so teachers need to understand science, technology and the community a good.

Citizen to participate decision-making relating to the use of science and technology. The concept of science, technology and the community contributed directly against basic mission social studies, especially in preparing citizens well-informed, (Muroyama and Stever, 1988:78). Modern society who want life democracy as a system need well-informed citizen and understand matters of social studies so complex as a result the advancement of science and technology.

Side positive of technological change especially in the system of production tend to increase and extend the process of production that is delivering on products that are getting better and better,(Sapriya, 2008:78). Good citizen would try to exploit advantage of vehicles and reduce the possibility that can be detrimental to. The learning was process science, technology and the community trying to take advantage of the time to modify information and skills for students. So vehicles as a product technology will truly useful for human survival.

The concept of science, technology and community focused on needs personal students and skills the process which is good for student life. Priority science, technology and community is on the ability of students in the decision-making process responsible, (Yager, Robert E, 1990:84).Learning science, technology and community will bring students to see the science as his world, and will come to know and have the as ever experienced by scientists. Strategy learning social studies started from the real world to the world technology and then the world students links between social stud-

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ies with the world.

3. Global Education

Global education is an effort to inculcate a perspective about the world to the students by focusing that there is mutual relatedness between culture, of mankind and the condition of the planet earth. Global education focus its substance derived from things global an increasingly characterized by pluralism, interdependence and change, (Sapriya, 2008:94). Global education was to improve the orientation of the students in insight international and extending a global understanding in Islamic elementary school.

Technological progress was an image of condition the international community the complex. Evolution in communication system and transportation global combines local economy, regional or national be the global economy. The process of globalization influential also on the process education,(NCSS, 1994:95).Globalization is said to necessitate changes in teaching, such as more attention to diverse and universal human value, global system, global issues, involvement of different kinds of world actors, and global history.

Indonesia prepare to participate in globalization. Hence obligation of Islamic elementary school students not only as Indonesia citizens, but also as global citizenship. The citizen a viable world need to get sufficient knowledge, attitude and values and the activities of social become incredibly global, so that it can be follow a changing world rapidly, (NursidSumaatmadjadanKuswayaWihardit, 2011:3.1). Global education to prepare teachers and students develop the ability, awareness, and insight global in order to know and understands the environment local, national and environment broader namely the world.

4. Infrastructure Education

Teacher social studies was digging and formulated the subject matter according to the development students. Education facilities to be use in learning social studies in accordance with properties of matter and purpose will be reached. Develop and enrich the subject matter social studies can be obtained from education facilities in the form of a source of learning, props and the media teaching education

The textbook is the most frequently used data source in the social studies classroom. However, abstract materials are not always more difficult than direct experiences, (Banks James A, 1990:236). Informational books can usually be found in the school and public libraries. Teacher will need to help the students acquire the library skills needed to locate and check out informational books.

Visual material, such as pictures, illustration, and charts, are often used in the social studies to introduce concepts, reinforce learning, and extend understanding. Audio materials such as records, tapes, and radio can also be used to enrich the social studies program. Material combining sound and pictures, such as sound filmstrips, can also be used to enrich social studies learning, (Brown, JW at al, 1983: 69-70). Sound films, which combine pictures, sound, and motion, can help students to experience powerful examples of concepts, values dilemmas, and decision-making opportunities.

The use of art in the social studies can add depth, meaning, and interest to social studies units and lessons. Students in the elementary can be taught the visual literacy skills needed to drive social science concepts from works of art, (Bank James A, 1990:248). Works of art such as painting, drawings, sculpture, basketry, pottery, and architecture can help students to derive and test hypotheses about peoples who lived in the past and who live today.

Many educational films on social studies topics are produced each year. Some films designed for other purposes,

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such as television documentaries, are also available for rental or purchase by educational institutions, (Brown, JW at all. 1980:8).Television is a salient part of most students' lives. Teacher should help students become more critical viewers of television.

The computer is increasingly becoming a standard pat of the hardware in elementary schools. Most of the computers in the schools are microcomputers.The computer can be used to tutor students, to reinforce skills and concepts, and for simulations and demonstrations, (Lathrop Ann and Goodson B, 1983:253). Teacher should introduce students to a computer language, teach the concept of programming, and help students develop basic programming skills.

Experience Use Technology

1. **Good citizen**

Teachers as good citizen while giving experience technology development production, communication and transportation not limited only on the books. The provision of experiencewas production his own weaknesses only on book and only several school that will visit to a traditional or modern. The provision of experience technology development tending to shaped the history of technology. Student have called do in a used a good communication. The provision of experience of technology development transportation, not all teachers have can provide a good. Teachers have limited the use of technology transportation water and air.

Students as good citizen was given direction the use of technology development production, community and transportation a good to protecting the environmental. Students who live in city have a lot of experience use technology development, compared his teacher. Students who live in the experience of technological development depends of learning from his teacher, while his teacher also have not yet been widely his experience.

2. **Well informed**

Teachers school modern required to have well-informed. School who was in the area under develop competence his teacher available. The good teacher are also trying to teach for well-informed as lessons learned. Teachers less responsibility just a undertaking the task.

Student on school advanced has the task to seek for information technology development. School on the regions does not grant the to students, having no means support. Students who did not had a means of only received knowledge of teachers.

3. **Globalization**

Teacher Islamic elementary school to follow required to teach social class with the approach global. Teacher donot use education globalization tending to convey the definition and reading book. The importance of know globalization may know the global community. Hence teachers at school that were forward always give tasks to their students to seek for information through the internet may know the world

Student in the left do not have infrastructure and means of the internet, if have still very much limited to a means of communication. Student on school forward using internet to a means of learning. Students can take advantage of the internet can actual herself like in making robot or means of other like CCTV, a computer program, a source of learning. Students who have facilities the internet and able to operate can actual self in competition the science regional-level, national, international.

4. **Education Infrastructure**

Teachers some cannot use an education infrastructure that provided. School that do not providing a means of education. When his teacher have competence so will find a means of learning. Teachers

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who will give experience to students will tried using facilities learning. Schools in the left on general only have the book and one unit of computer for the administration. School advance can provide computer a number of student, have LCD, computer portable, pictures and book to meet the need of teachers in the learning process.

Student schools in region that lacks of learning tools can only know technology development verbally and cannot get experience. Students in that school forward can obtain the introduction and experience of technological development a complete. Students in schools forward likely to use learn facilities in schools and home on compete technology development.

Achievement

Achievement of students was obtained from learning know and experience using technology development production, communication and transportation according to their teachers means provided school. Learning know and experience the development of technology production, communication and transportation, produce students who capable of compete by means of technology on regional level, national, international. Student who it can compete only a particular person, while other students have certain experience but not yet the opportunity or did not yet know and inexperience using technology development production, communication and transportation.

Students was whoable to compete make the robots or program robot regional-level, national, and international inimitable by other students and other teachers. The success of students must did not determined by school principal but supported by the family and students ability. Students who did performance well no mistake school or teacher but the environment different of school and student.

Conclusion

Experience students to the development of technology production, communication and transportation obtained from learning. Students know and experience use technology development they did students different according to their teachers and means provided school. Means provided school determine student ability and experience students. The capability of teacher was to the learning process that gives the introduction and experience students to the development of technology production, communication and transportation.

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REFORMULASI PENDIDIKAN SESUAI ERA DAN TUMBUH KEMBANG ANAK[1]

Muhammad Zaini
Direktur S-PEAM Pasuruan-Indonesia
(Sekolah Pesantren Entrepreneur al-Maun Muhammadiyah),
zaini.muhammad78@gmail.com

Abstract

The educated areas should be placed in the areas of process not "a result" by means of instant and pragmatic. The children for their time will proceed and grow with naturalist intelligence in their each talents. It doesn't mean that learning which are given to them not to be serious, sober and without a target of result, but the seriousness and targets that are given must be based to children in the age of growing, so the result are not paradox. The result will be better if they can grow to be bright at their time with an educated processes.

Keywords: *educate, process, growth, results*

Pendahuluan

Variable mendidik dan mengajar ternyata sangat kaya dan selalu menarik dikaji. Tentu mendidik tidak dapat disamakan dengan mengajar.Pendidikan memerlukan keteladanan, konsistensi, komitmen, integritas dan lain-lain.Inilah alasan mengapa pendidikan di Indonesia harus selalu berbenah untuk beranjak naik menghasilkan tenaga dan "outcome" yang profesional serta berkepribadian.Masih tidak sedikit kita temukan kesenjangan dan bahkan berbanding terbalik antara pendidikan formal yang ditempuh dengan kompetensi dan skill yang dimiliki, apalagi dikaitkan dengan integritas diri dan kepribadian.Begitu juga antara keilmuan dan tingkat pengamalan serta pengalaman seringkali tidak berbanding lurus.

Peristiwa-peristiwa seperti ini dapat dipetik pelajaran, bahwa integrasi ilmu, pengamalan dan pembentukan integritas dirimasih ada jurang pemisahyang sangat serius, sehingga perlu dicari jalan tengah sebagai bentuk solusi.Begitu juga halnya dengan pendidikan formal-akademik, banyak dijumpai kesenjangan yang cukup serius yang berujung pada tidak adanya jaminan pada kualitas dan kompetensi.Tentu ini menjadi *pe-er* kita bersama terutama bagi segenap para pelaku dan pegiat pendidikan, sebab hal semacam ini dapat menjadi potret dan cermin pendidikan di Indonesia. Seringkali disaksikan di lapangan—walaupun ini perlu pembuktian penelitian lebih lanjut—bahwa hasil dari sebuah proses didik di institusi-institusi pendidikan ketika dihadapkan pada dunia empirik dan praktik, cenderung belum siap baik secara mental maupun kompetensi keilmuan.

Dalam batas-batas tertentu harus diakui bahwa pendidikan yang telah dikelola secara profesional pun tidak menutup kemungkinan jugadimungkinkan terjadi "kontra produktif" yang berakibat pada "outcome"

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dari sebuah proses didik yang tidak maksimal. Boleh jadi tingkat keberhasilan yang hendak dicapai tidak sampai pada puncak keberhasilan 100%. Jika hal ini yang terjadi maka dapat dimaklumi karena masih dalam batas kewajaran, tentu di mana pun "trial and error" pasti ada, asalkan tidak terjadi sesuatu yang fatal yang bersifat prinsip dan basic. Seringkali terjadi, walaupun tidak dapat digeneralisir bahwa "outcome" sebuah lembaga pendidikan tidak mencerminkan hasil yang paralel dengan realitas praktik kerja yang sangat jauh dari harapa ideal, baik yang berkaitan dengan integritas diri maupun kemampuandasar. Tentu,banyak faktor yang melatarbelakangi, boleh jadi karena tenaga pendidik yang tidak kompeten, atau konsep kurikulum yang tidak integratif dengan praktik kehidupan di satu sisi dan penegu-han integritas kepribadian di sisi lain.

Landasan Teori

Tulisan ini menggunakan pendekatan penelitian tindakan yang bertujuan untuk mengembangkan keterampilan baru bagi guru atau pendidik dengan berupaya menemukan pendekatan baru yang dapat diterapkan langsung serta hasilnya dapat dikaji dengan mudah. Dalam hal ini hasil dari sebuah proses didik harus nyata dan konkrit yang tidak saja dibuktikan dengan hasil dan capaian yang bersifat kognitif. Pendekatan penelitian tindakan menurut Suryabrata (1983) sangat tepat untuk menemukan variable pengembangan keterampilan guru yang dapat mendorong penemuan sebuah pendekatan baru yang hasilnya dapat berpengaruh pada outcome peserta didik. Tulisan ini barupaya akan menemukan hubuan paralel antara ilmu, perilaku, amal dan tindakan moral dengan analisis deskriptif.

Tantangan Guru

Diakui atau tidak, pendidikan selalu berkembang dan mengikuti irama zaman dan kemajuan.Dari era ke era pendidikan harus selalu menemukan bentuk baru dan pendekatan yang lebih kaya dan kreatif.Tentu, sebuah era memerlukan cara, pendekatan dan bentuk inovasi sendiri-sendiri. Tumbuh kembang anak misalnya, juga mengindikasikan perbedaan siginifikan yang tidak dapat lepas dari konteks era masing-masing. Dalam halini diperlukan cara pandang yang tidak kaku, sehingga dapat melahirkan anak zaman yang sesuai dengan eranya. Jika melihat tingkat keunikan perilaku dan sikap anak sekarang misalnya, tentu sangat jauh berbeda dibandingkan dengan anak yang lahir pada masa silam.

Karena itu, perbedaan era adalah faktor utama yang dapat memengaruhi latar belakang keunikan perilaku dan sikap anak yang harus dipahami dengan baik dan benar.Kultur, interaksi sosial, teknologi, pola asuh, lingkungan dan kondisi ekonomi adalah variable-variable penting yang dapat menjadi faktor utama dalam memengaruhi tumbuh kembang anak. Di sini mutlak adanya sebuah metode dalam memasuki dunia anak yang cocok dengan ruang lingkup kultur, latar belakang sosial, lingkungan dan teknologi.

Guru sebagai penyangga kualitas pendidikan dan penentu kualitas bangsa adalah memiliki peran penting. Di era merebaknya teknologi dan informasi diperlukan guru yang mampu melakukan eksplorasi pembelajaran sampai pada level dapat menginspirasi peserta didik.Di sinilah tantangan guru sesungguhnya yang harus selalu diimbangi dengan updating ilmu pengetahuan dan pengalaman secara berkesinambungan.Upaya untuk menumbuhkan inspirasi memang tidak mudah dan bahkan memerlukan energi besar. Guru sebagai penentu kualitas mempunyai tugas ganda yaitu, di samping melaksanakan tugas mengajar, guru juga harus meningkatkan kualitas diri agar dapat menjadi sumber inspirasi dan referensi peserta didik dalam banyak aspek, baik dalam keilmuan maupun perilaku. Semangat guru untuk tidak sekadar menjalani tugas rutin adalah modal utama untuk melahirkan karya-karya besar dan kreatifitas seba-

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gai media inspirasi bagi peserta didik.

Kualitas diri guru harus selalu mendapatkan ruang recharging secara memadai. Guru yang hebat adalah terletak pada "curiosity" yang tinggi.Setiap moment, pertemuan, kesempatan dan situasi apapun selalu menjadi hal penting bagi guru untuk menemukan dan menggali hal-hal baru yang kemudian dapat ditransfer kepada peserta didik sebagai pengayaan wawasan.Menginginkan peserta didik menjadi seorang penulis misalnya, maka guru harus dapat menjadi teladan dalam memberikan contoh membuat tulisan.Tulisannya pun harus benar-benar berkualitas yang sekali dibaca oleh peserta didik dapat menumbuhkan inspirasi baru dan lain-lain.Demikian pula dalam hal pembentukan kepribadian, guru harus pertama kali yang dapat menjadi pemandu perilaku mereka.Pembelajaran semacam ini adalah buah dari keteladanan dan contoh-contoh konkrit, baik dalam bentuk karyamaupun perilaku yang akan berdampaksangat dahsyat bagi tumbuh kembang aspek kognitif, afektif serta psikomotorik anak.

Dalam banyak hal menjadi guru memang tidak sederhana karena harus mampu menumbuhkan atmosper akademik yang serius bagidiri peserta didik. Hal ini karena beberapa hal yaitu, *pertama,* guru adalah punggung keberhasilan dari sebuah proses pembelajaran. *Kedua,* guru adalah sumber keteladanan yang harus selalu terjaga dengan baik.*Ketiga,* guru adalah miniatur dari sebuah organ rumah tangga yang dapat menjadi sumber inspirasi bagi proses olah bakat anak. Tiga hal itu adalah tanggung jawab moral seorang guru yang harus diwujudkan dalam ranah mendidik.Setidaknya tanggung jawab moral itu dapat melahirkan prinsip-prinsip dasar sebagai titik awal untuk mendesain pendidikan yang mengedapankan kepribadian dan integritas yang secara direvatif dapat meliputi beberapa aspek antara lain, keteraturan, sensitifitas, kepedulian, tanggungjawab dan kemampuan logik.

Implementasi Skala Prioritas

Ada hal yang sangat mendasar yang mungkinmenjadi pertanyaan banyak orang, mengapa "aspek logik" pada statement di atas ditempatkan pada urutan paling akhir? Tentu ini berangkat dari sebuah pemahaman bahwa aspek logik dan intelektualitas—menurut saya—pada era sekarang harus mulai digeser tidak berada pada urutan yang paling utama, karena media "menjadi pintar" sekarang sudah sangat mudah, sehingga bukanlah hal yang utama. Sedangkan, memiliki kepribadian, tanggungjawab, habit hidup teratur, kepekaan dan rasa peduli kini menjadi problem utama dalam kehidupan sehari-hari, sehingga harus lebih diutamakan. Di samping itu, aspek-aspek tersebut tidak dapat dibentuk secara instan, melainkan memerlukan waktu dan proses panjang sampai dapat membentuk sebuah habit yang bersenyawa dengan kehidupan sehari-hari.

Di sini perlu pemahaman ulang tentang apa yang disebut dengan pribadi berkualitas dalam setiap ranah outcome pendidikan. Berhasil mencetak pribadi pintar saja, tetapi tidak diimbangi dengan prinsip-prinsip dan dasar keperibadian yang kuat, maka sesungguhnya pribadi tersebut tidak dapat disebut sebagai pribadi yang berkualitas. Berbeda halnya dengan proses pembelajaran yang mengedapankan aspek integritas dan prinsip-prinsip kepribadian, maka secara otomatik pribadi-pribadi tersebut telah tampil sebagaisosok yang berkualitas karena telah tertanam bekal untuk menjadi sumber kebermanfaatan dengan bekal ilmu yang dimilikinya.

Dalam merancang pembelajaran pun tidak dapat serta merta hanya mengandalkan keleluasaan waktu yang memadai tanpa diimbangi dengan desain dan konsep yang stratejik untuk membentuk kepribadian anak, tanpa mengorbankan target-target akademik sesuai yang diharapkan.Sebenarnya, titik persoalan yang substantif bukan terletak pada alokasi waktu yang leluasa, tetapi lebih kepada keberanian untuk menampilkan bentuk baru yang terekam dalam kerangka

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kurikulum dan seluruh rangkaian kegiatan sehari-hari.*Di sini perlu* kreatifitas "otak-atik" dan perubahan mindset seluruh internal institusi sebagai pelaku pembelajaran di kelas. Jika antara idealisme konsep dan teknis pembagian kurikulum serta *mind-set*internal institusi dapat terbentuk dengan baik dan menyatu menjadi satu visi, maka hal itu dapat menjadi harapan baru untuk melahirkan "outcome" yang unggul dan deferensiatif yang kini sudah mulai diburu oleh masyarakat.

Dalam teknis pembagian jam mata pelajaran harus juga dilihat porsi dan proporsionalitasnya, untuk menentukan skala prioritas yang akan menjadi mata pelajaran unggulan. Prioritas itu ditentukan dengan melihat kondisi waktu yang memungkinkan perserta didik dapat menyerap dengan baik. Misalnya ada program hafalan, maka tidak tepat jika ditempatkan pada jam di siang hari, karena kondisi otak yang sudah tidak kondusif karena sejak pagi telah terjejali oleh sajian mata pelajaran cukup banyak, sehingga juga akan berpengaruh pada daya serap peserta didik. Jika sekolah hendak menanamkan aspek kognitif, afektif, dan psikomotorik maka juga harus ada kondisi waktu yang dialokasikan dalam bentuk program yang konkrit, agar tiga aspek tersebut terbentuk menjadi sebuah habit dalam kehidupan sehari-hari.

Banyak hal yang harus dilakukan, misalnya kalau dalam pembelajaran guru harus mengawali dengan "apersepsi" maka dalam format teknis struktur kurikulum juga harus ada "recharging" untuk menjaga spirit yang akan berpengaruh pada mindset peserta didik. Misalnya, habit membaca, berhitung, dan menulis dapat dijadikan opening awal sebagai recharging otak peserta didik yang dilakukan setiap pagi sebelum memulai mata pelajaran lainnya. Semua itu diakukan secara kontinyu dan terevaluasi secara terukur.Tenaga pendidik benar-benar dikondisikan untuk dapat mendampingi dengan serius dan penuh tanggungjawab agar dapat menuai hasil maksimal.

Pendidikan Berbasis Moral

Setelah pendidikan yang bermuara pada kualitas dapat dijalankan dengan baik yang meliputi aspek kognitif, afektif dan psikomotorik, maka perlu segera beranjak pada upaya peneguhan moral, sehingga pendidikan yang mereka peroleh berbanding lurus dengan perilaku pembentukan integritas diri. Dalam hal ini semangat untuk selalu mengembangkan jihad di bidang pendidikan yang berbasis karakter dan penguatan moral memerlukan kesadaran tinggi dari berbagai pihak.Sebagai pihak penyelenggara tentu selalu ada langkah untuk mengembangkan sayap jihad tiada henti dalam menemukan hal-hal baru guna pengembangan dan inovasi pendidikan.Sedangkan masyarakat sebagai sasaran pendidikanjuga harus selalu dipupuk kesadarannya agar memusatkan perhatian pada pendidikan yang berbasis peneguhan moral, akhlak dan perilaku baik dalam kehidupan sehari-hari.Sebab salah satu keprihatinan bangsa kita adalah semakin melemahnya moral dan amal serta akidah sebagai benteng kehidupan. Ini memerlukan solusi yang konkrit agar kerapuhan moral dapat menemukan jawaban yang tepat, sehingga generasi yang akan datang mampu menjadi pemandu moral bangsa.

Tentu salah satu upaya untuk kembali meneguhkan moral tersebut, tidak lain kecuali barangkat dari pendidikan sebagai fondasinya. Pendidikan yang dapat dijadikan bekal fondasi untuk memperkuat moral adalah pendidikan yang bermuara pada peneguhan penanaman nilai-nilai keagamaan, dengan tetap memerhatikan kemajuan dan perkembangan zaman.Apalagi di sebuah kondisi era generasi digital yang ditandai dengan pesatnya perkembangan teknologi,sehingga kehidupan mereka sangat dekat bahkan tergantung pada produk-prodok teknologi, maka pendidikan yang berbasis pada peneguhan nilai-nilai keagamaan menjadi kebutuhan yang sangat mendesak.Diakui atau tidak, kedekatan generasi kita dengan teknologi cukup memberikan warna baru bagi pola hidup mereka.

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Pengaruh itu tentu boleh jadi positif, dan tidak menutup kemungkinan juga boleh jadi berdampak negatif.Kenyataannya orangtua ketika menghadapi genarasi masuk di era digital ini, banyak di antara mereka yang mengalami kekhawatiran dan bahkan kewalahan untuk dapat menghindarkan mereka dari dampak negatif teknologi.Tanpa disadari banyak pergeseran-pergeseran nilai yang sulit dibendung, baik yang bersifat sosial maupun moral.Secara perlahan para generasi sekarang semakin jauh dari kehidupan sosial, karena media komunikasi mereka tergantikan oleh alat teknologi.Dari segi moral, mereka juga semakin jauh dari amaliyah keagamaan karena tergoda dengan keasyikan penggunaan gadget yang lepas kontrol dan bahkan berlebihan.Pendidikan berbasis pada peneguhan moral melalui penanaman nilai-nilai keagamaan adalah jawaban yang tepat untuk mengembalikan generasi kita ke sebuah atmosphere yang bernuansa religi.

Simpulan

Memang harus disadari wilayah pendidikan sangat berbeda dengan sebuah pabrik yang dapat menghasilkan produk-produk yang bernilai secara kasat mata. Pendidikan adalah wilayah nilai yang berhubungan dengan kualitas dan kepribadian, sehingga memerlukan tolok ukur yang luas sebagai sebuah proses menuju sesuatu yang ideal. Sebuah nilai yang harus terpatri di dalam diri peserta didik adalah sangat relatif panjang yang harus disadari tidak dapat terolah secara instan. Keunikan anak dalam usia yang masih dalam tumbuh kembang memerlukan cara pandang yang luas yang tidak dapat menggunakan pendekatan sebagaimana "kita" yang sudah dewasa. Ada sebagian yang menginginkan kedisiplinan terbentuk sejak dini seperti layaknya "kedisiplinan" orang-orang yang sudah dewasa, dengan cara merampas hak-hak sebagaimana layaknya seorang anak.

Di sini terkadang pendidikan menemukan sebuah dilema. Padahal hasil dari sebuah proses didik *time-life*-nya adalah sangat panjang. Kadang-kadang anak di usia tumbuh kembang sangat unix, merepotkan, hiperaktif dan seterusnya, tetapi tatkala pada titik usia tumbuh kesadarannya, anak tersebut dapat melakukan percepatan dan memiliki tanggung jawab yang cukup dapat dibanggakan. Ini adalah sebuah refleksi bagi kita semua untuk dapat memahami ranah pendidikan secara lebih mendalam.

Nampaknya, harus dihadapi semua itu harus diterima sebagai proses awal untuk menghadapi masa depan dalam jangka panjang. Semua harus saling berintegrasi yang perlu proses berlatih secara terus menerus dan berkesinambungan. Sudah bukan saatnya, orangtua membanggakan hasil pembelajaran dalam bentuk nilai dijit berupa angka-angka. Hasil sebuah proses didik harus juga dapat dibuktikan dengan tampilan-tampilan yang konkrit agar talenta mereka tergali dan terungkap menjadi sebuah mozaik ekspresi yang indah dan nyata.Termasuk juga menyatukan ilmu dan perilaku yang terintegrasi dalam keindahan moral dan kepribadian yang unggul dan utama.

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Muhammad Zaini, lahir di Pamekasan pada 01 Agustus 1978. Latar belakang pendidikan penulis ditempuh mulai dari Madrasah Ibtidaiyah Nurul Falah Pamekasan Madura pada 1987-1993, kemudian malanjutkan jenjang studi di Madrasah Tsanawiyah 1993-1996 hingga Madrasah Aliyah di Pondok Pesantren Modern an-Nuqayah di Guluk-Guluk Sumenep Madura Jawa Timur pada 1996-1999. Penulis memperoleh gelar sarjana dari Universitas Islam Negeri (UIN) Sunan Kalijaga Yogyakarta di 2015, setelah itu penulis menempuh program Magister di Universitas Islam Indonesia Yogyakarta (UII) di bidang Pendidikan Agama Islam dan lulus 2010.

Dalam bidang organisasi, penulis pernah aktif sebagai ketua Tarqiyatul Lughah al-Arabiyah (Pengembangan Bahasa Arab) Pondok Pesantren Modern an-Nuqayah. Pada Jamiyyah Qurro' wa al-Huffadz al-Mizan UIN Sunan Kalijaga Yogyakarta penulis pernah sebagai ketua dan koordinator Devisi Tafsir sejak 2002-2004. Sedangkan di organisasi Himpunan Mahasiswa Islam (HMI-MPO) penulis pernah berperan sebagai koordinator Pengembangan Intelektual UIN Sunan Kalijaga Yogyakarta sejak 2000-2003. Selain itu, penulis pernah menjadi koordinator pada Forum Kajian al-Quran "el-Fikr" (FKQ) Yogyakarta.

Buku yang telah ditulis oleh penulis adalah *Membumikan Tauhid, Persepektif Pendidikan Multikultural,* penerbit Pustaka Ilmu Yogyakarta 2011. *Breakthrough of Muhammadiyah Movement,* dalam buku berjudul; Horizontalization and School's Networking (Prof. Dr. Eng. Imam Robandi, et. al) 2012,*Tauhid dan Cita Menuju Peradaban Profetik* pada Jurnal al-Adabiya vol. 5 No. 1 Januari-Juni 2010 dan buku Magnet of Learning, Penerbit North Beach, Tegal Jawa Tengah 2015.

Pada tahun 2010 sampai 2014 penulis memperolah amanah kepala sekolah di SMP Muhammadiyah 1 Gombong, Ketua Majelis Tarjih Pimpinan Daerah Muhammadiyah Kebumen, dan Ketua Majelis Tabligh di Pimpinan Cabang Muhammadiyah Kecamatan Sempor Kebumen.Tahun 2012 dan 2014 penulis menjadi koordinator international visiting program ke Singapore dan Malaysia dalam rangka teacher exchange dan student exchange.

Sehari-hari penulis bekerja sebagai seorang Muballigh dan direktur di Pondok Pesantren *S*-PEAM (Sekolah Pesantren Entrepreneur al-Maun Muhammadiyah) di Kota Pasuruan, Jawa Timur. Di sela-sela kesibukan, penulis sekarang masih produktif menulis di berbagai majalah dan media di tingkat lokal maupun nasional, dan aktif sebagai pembicara di seminar-seminar, simposium dan workshop. zaini.muhammad78@gmail.com

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ANALISIS PEMBAHARUAN MANAJEMEN PENDIDIKAN PADA SEKOLAH-SEKOLAH MUHAMMADIYAH DI MASA KH. AHMAD DAHLAN SAMPAI PASCA 1 ABAD MUHAMMADIYAH[1]

Akhmad Faozan
Guru Sekolah di SD Muhammadiyah Kriyan Jepara, email: ozanjpr@yahoo.co.id.

Abstract

Muhammadiyah school in developing implementing reforms in management. The renewal is meant to hold a change of management with continuous and systematic. Updates in other words, with tajdid. The term tajdid in Muhammadiyah developed in the early days of the founding association of Muhammadiyah, which is year 1912 KH. Ahmad Dahlan as the founder of Muhammadiyah with great effort against the stagnation of society to adopt a change model developed by Muhammad Abduh and Rashid Ridho.Tajdid in education implemented by KH. Ahmad Dahlan at that time which, in the educational process by using tables, chairs, blackboards and tie, that hehad considered an apostate and infidel religious scholars. Patterns think tajdid such as the emergence of Muhammadiyah Boarding School (MBS) is believed to be very effective in intensifying model of the cadre with learning or educational process more modern and more intensive, At primary school level tend to apply modern management, such as SD Muhammadiyah Sapen, Condong Catur, in Surabaya SD Muhammadiah 4 Pucang Surabaya. Where the schools have become a magnet for Muhammadiyah schools in the area to conduct a comparative study or apprenticeship models of developing a new school in an effort to standardize the level of quality.

Keywords*: Management, Reform, Muhammadiyah*

1. Pendahuluan

Sumber Daya Manusia (SDM) yang unggul dan berkualitas merupakan hasil dari proses pendidikan yang bermutu dan berkemajuan.Pendidikan yang bermutu pun tidak luput dari pengelola yang handal dan berwawasan gobal.Artinya untuk memproduksi sumber daya insani membutuhkan polesan tenaga yang berkualitas.Di sinilah letak pentingnya SDM.

Karena SDM merupakan salah satu komponen terpenting dalam dunia pendidikan, maka focus pengembangan pendidikan mengarah kepada manajemen berbasis SDM. Namun sampai sekarang ini dunia pendidikan berkembang belum mengarah kepada proses pembentukan SDM berkualitas Padahal dunia sudah berkembang dengan pesat. Bila dilihat perkembangan dunia dalam bidang sains dan teknologi. Indonesia sangat jauh tertinggal, di Asia Tenggara saja Indonesia kalah jauh dengan Vietnam dan Thailand.

Inilah persoalan mendasar yang dialami oleh Indonesia.Hal ini disinyalir adanya kesalahan dalampengelolaanpendidikannya. Salah satu faktor terpenting adalah bagaimana upaya strategis dalam menyusun rencana pengelolaan dan pengembangannya.

Sebagaimana perkembangan pendidikan yang ada di Indonesia, bahwa lembaga pen-

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didikan yang dikelola oleh masyarakat salah satunya adalah lembaga pendidikan Muhammadiyah yang dikenal dengan Amal Usaha Muhammadiyah bidang pendidikan,dari kurun waktu sejak berdirinya pada tahun 1912 dan sampai sekarang pasca milad satu abad keberadaannya terus berkembang.

Tabel1.Data Amal Usaha Muhammadiyah pada jenjang pendidikan dasar dan menengah.

No	Jenis Amal Usaha	Jumlah
1	TK/TPQ	4.623
2	Sekolah Dasar (SD)/MI	2.604
3	Sekolah Menengah Pertama (SMP)/MTs	1.772
4	Sekolah Menengah Atas (SMA)/SMK/MA	1.143
5	Pondok Pesantren	67

Secara kuantiti jumlah Amal Usaha bidang pendidikan sebanyak belasan ribu, dari jenjang PAUD sampai dengan Perguruan Tinggi dan sudah menghasilkan output dan out come.

Terdapat ciri khas dan model pendidikan yang dikembangkan oleh Muhammadiyah dibandingkan dengan sekolah-sekolah Islam yang berkembang. Muhammadiyah dalam mengembangkan sekolah-sekolah dari masa ke masa mengalami perubahan. Seiring dengan ide dasar Muhammadiyah sebagai gerakan tajdid (pembaharuan) yang dikembangkan oleh KH.Ahmad Dahlan pada masa-masa awal adalah dengan memadukan pola barat (Belanda) dengan pola Islam.Yang pada saat itu beliau disebut oleh sebagian masyarakat disebut kyai murtad. Karena mengadopsi pola barat.Inilah yang menjadi pokok bahasan pada tulisan ini.

Pembaharuan

Pembaharuan dalam istilah lain disebut dengan tajdid. Istilah tajdid sangat melekat pada organisasi Muhammadiyah berkembang pada masa awal didirikannya perkumpulan Muhammadiyah, dimana pada tahun 1912 KH.Ahmad Dahlan sebagai pendiri Muhammadiyah dengan usaha keras melawan kejumudan masyarakat dengan mengadopsi model pembaharuan yang dikembangkan oleh Rasyid Ridha dan Muhammad Abduh.

Pembaharuan sebagai gerakan telah merubah pola pikir masyarakat yang sempit dan kolot menjadi masyarakat yang berpikir maju.Diantaranya dengan berkembangnya amal-amal usaha Muhammadiyah dalam bidang dakwah tabligh, kesehatan, ekonomi, social dan khususnya dalam bidang pendidikan.

Pembaharuan dalam bidang pendidikan yang dilaksanakan oleh KH. Ahmad Dahlan pada waktu itu diantaranya adalah pada proses pendidikan dengan menggunakan meja, kursi, papan tulis dan berdasi, yang kemudian ia dianggap murtad dan kyai kafir.Dan ini menjadi konsekwensi dalam mengembangkan model dakwah yang dianggap baru dan aneh di tengah-tengah kejumudan social.

Konsep pengembangannya pun tidak terhenti sampai pada saat itu atau pada tahun-tahun berdirinya sekolah-sekolah muhammadiyah tetapi terus berlanjut dan sampai saat ini pasca milad satu abad kelahiran Muhammadiyah pun spirit pengembangan sekolah-sekolah muhammadiyah itu terus eksis menghiasi wajah pendidikan di Indonesia.

Maka bila ditilik dari perkembangan sejarahnya dari masa ke masa, pada awalnya dipengaruhi oleh system pendidikan Belanda.Yang kemudian KHA.Dahlan memadukan system pendidikan Islam kala itudengan tanpa dikotomi.Yang mana pada saat itu urusan agama dan ilmu dibedakan menjadi dikotomi.

Manajemen

Kepemimpinan KHA. Dahlan yang sangat kooperatif dan progresif menjadikan lembaga pendidikan Muhammadiyahnya berjalan dan eksis sampai sekarang ini.

Seiring dengan berjalannya waktu, perkembangan pola pengembangan lembaga pendidikan muhammadiyah yangdulu hanya sebatas meniru pola atau system pendidi-

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kan yang diterapkan kolonial Belanda dan sekarang di zaman modern dan bersamaan dengan berkembangnya teknologi pengembangan pengelolaan sekolah-sekolah Muhammadiyah lebih mengarah kepada mutu dan berkeunggulan.Hal ini sangat relevan dengan misi organisasi yang beorientasi kepada kemajuan. Dan yang terkait dengan hal ini manajemen sekolah-sekolah Muhammadiyah sudah menekankan pada upaya-uaya perencanaan strategis, sampai percepatan dalam pengembangannya. Sehingga sekarang ini banyak bermunculan sekolah-sekolah Muhammadiyah yang sangat maju, unggulan berprestasi. Yang sangat sederhana dalam mengukurnya adalah bila sekolah muhammadiyah tersebut siswanya semakin tahun makin meningkat grafik pertambahannya, program sekolahnya semakin beragam dan variatif serta inovatif, out put dan outcomenya punya daya saing tinggi. Sehingga dalam hal ini Sekolah Muhammadiyah sudah menyumbang dari segi sumber daya manusia kepada bangsa Indonesia.

Metode

Kajian analitis tentang Pembaharuan manajemen pendidikan pada sekolah-sekolah di muhammadiyah ini merupakan kajian analitis dengan pendekatan kualitatif, dimana peneliti perlu mengumpulkan data dalam situasi yang berkembang. Dalam hal ini penulis membutuhkan akurasi data dari berbagai sumber diantaranya majalah suara Muhammadiyah, buku-buku tentang pendidikan Muhammadiyah, dan jurnal pendidikan.

Untuk menilai keabsahan datasangat diperlukan pemeriksaan secara mendalam (*Thrustworthiness)* dengan kriteria diantaranya Kredibilitas *Credidibility,* dapat ditransfer dan termanfaatkan pada masa-masa dan konteks kekinian (*Transferability*) dan terciptanya konfirmabilitas.

2. Diskusi

Di dalam pengelolaan suatu lembaga sangat dibutuhkan pembaharuan dalam pengelolaannya agar tetap eksis.Demikian juga dalam pengelolaan pendidikan Muhammadiyah.Unsur pengelolaannya diantaranya siswa, Sumber Daya Manusianya yaitu tenaga pendidik dan kepegawaiannya, serta program-program yang ditawarkan.

Dalam hal tenaga pendidik, sebagaimana dalam Undang-undang Guru dan Dosen, menjadi tantangan tersendiri bagi para pemangku amanah dalam mengelola sebuah lembaga pendidikan.Karena tugasnya yang mulia tidak hanya mencerdaskan dari segi mindset peserta didik tetapi lebih dari itu yaitu berkarakter positif.

Sebagai pemangku amanah dalam menjalankan pengelolaannya maupun dalam proses pendidikannya, tenaga pendidik harus berorientasi jelas yaitu untuk menghasilkan output yang unggul dan berkualitas, berkeyakinan mantap, serta terlihat dalam kesehariannya nampak ketaatan dalam beribadah.

Apalagi dengan semakin meningkatnya perkembangan dalam dunia sains dan teknologi, menuntut bagi guru dan pengelola agar mampu menyesuaikan diri mengikuti perkembangan social yang ada.

Dalam hal ini akanmenjadi persoalan tersendiri manakala tidak ada upaya strategis dalam mengelola suatu lembaga pendidikan, karena tujuan dari pendidikan nasional tidak hanya mencerdaskan peserta didik tetapi juga meningkatnya karakter positif peserta didik.

3. Pembahasan

Arah pengembangan pendidikan ala Muhammadiyah sebagai bagian dari gerak langkah dakwah Muhammadiyah sejak awal berdirinya merupakan langkah reformasi dan revolusi cara pandang beragama. Wujud pembaharuan pada waktu itu dalam bidang garap organisasi, tabligh dan pendidikan.

Jadi pendidikan merupakan bagian dari bidang garap yang penting yang menjadi bagian dari gerakan berbasis system (*System based movement*). Pola gerakan yang berlangsung terus menerus berjalan dan teratur, ser-

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ta sistematis dan menghasilkan Amal Usaha Muhammadiyah (AUM) pendidikan yang selalu eksis, walaupun para pendirinya telah wafat.

Sehingga dengan gerakan berbasis system itulah Muhammadiyah berkembang sampai sekarang.Muhammadiyah tidak mengkhususkan bidang garap tertentu namun menjadi satu kesatuan langkah.

Disadari bahwa bidang pendidikan adalah bidang yang sangat urgent dalam keberlangsungan dan jalannya organisasi.Dari bidang pendidikan lahir kader penerus dan penggerak Amal Usaha Muhammadiyah. Sumber Daya Manusia yang mengemban amanah sebagai pengelola amal Usaha Muhammadiyah lahir dari proses pendidikan Muhammadiyah dengan bercirikhas mata pelajaran Al Islam dan Kemuhammadiyahan.

Cirikhas pendidikan Muhammadiyah terwadahi dalam bentuk sekolah.Yaitu jenjang pendidikan dari mulai PAUD, SD, SMP/MTs, SMA/MA/SMK dan Perguruan Tinggi.Sejak awal berdirinya Muhammadiyah hanya berkonsentrasi dalam jenjang pendidikan formal.Lalu dengan berkembangnya pemahaman dan mindset dengan kolaboratif dan intensif pendidikan muhammadiah mengadakan pembaharuan dari sisi intensifikasi pendidikannya yang berbentuk pesantren modern yang berorientasi untuk menghasilkan kader atau out put handal.Pada awalnya konsep pendidikan berbentuk pesantren ini Seperti muncunya sekolah Muallimin dan muallimat di Jogyakarta. Kemudian berkembang pola piker dengan tajdidnya Muhammadiyah mengembangkan sekolah menginap (Boarding School) munculllah di beberapa daerah sekitar Yogyakarta Muhammadiyah Boarding School Yogyakarta, Klaten, kemudian muncul dengan konsep yang sama di berbagai daerah seperti di Kudus yang kopi paste konsepnya.

Pola berpikir tajdid seperti munculnya Muhammadiyah Boarding School (MBS) diyakini sangat efektif dalam mengintensifkan model pengkaderan dengan pembelajaran atau proses pendidikan yang lebih modern dan lebih intensif karena lebih lama pertemuan antara santri dengan pengasuhnya. Sebagaimana konsep MBS yang berkembang saat ini lebih mengintensifkan dalam penguasaan ilmu-ilmu agama yang terangkum dalam materi al Islam dan Kemuhammadiyahan, lebih menonjolkan pada hafalan al Quran dan penguasaan dalam bidang non akademis seperti penguasaan dari segi bahasa Arab maupun Inggris.

Bila dilihat dari animo masyarakat yang ingin menyekolahkan ke MBS Yogyakarta mereka umumnya berasal dari luar daerah bahkan dari luar Jawa.Sangat jelas basis inputnya, mereka umumnya berasal dari kalangan intern warga Muhammadiyah.Karena daya tampung yang terbatas sehingga sekolah menerapkan pendaftaran berdurasi singkat dan itupun sudah jauh-jauh hari. Dengan kuota yang terbatas itu akhirnya memperluas dakwahnya dengan membuka cabang baru seperti di Klaten. Denan konsep dan manajemen yang sama.

Tidak jauh berbeda dengan jenjang sekolah dasar yang cenderung menerapkan manajemen modern.Pada jenjang ini pun berkembang sangat pesat dengan mengembangkan prinsip berkemajuan dan berkeunggulan.Di awali dengan lahirnya sekolah-sekolah unggul dan berprestasi seperti SD Muhammadiyah Sapen, Condong Catur, di Surabaya ada SD Muhammadiah 4 Pucang Surabaya. Dimana sekolah-sekolah ini menjadi magnet bagi sekolah-sekolah Muhammadiyah di daerah untuk mengadakan study banding dan magang dari sekolah yang baru berkembang. Model yang berkembang seperti saat sekarang ini adalah model magang satu bulan, atau beberapa minggu mengadopsi proses pembelajaran sekolah-sekolah yang sudah lebih jauh melangkah dalam pengembangan sekolah dari sisi pembaharuan manajemennya. Cara ini dianggap sangat efektif untuk mengembangkan sayap dakwah dalam bidang pendidikan dan dalam menstandarisasi kualitas dan mutu.

Dari model ini muncullah Sekolah unggul di beberapa kota di Jawa Tengah seperti SD Muhammadiyah Plus Salatiga, SD

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Mutual Magelang. Di Solo juga berkembang pesat model sekolah Muhammadiyah yang mengembangkan keunggulan dari sisi akademis maupun non akademis yang berlabel Program Khusus seperti SD Muhammadiyah Program Khusus (PK) Kota Barat Surakarta yang kemudian berkembang di sekitar Solo Raya (Sukoharjo, Boyolali).

Sekolah-sekolah Muhammadiyah di daerah-daerah cenderung berkembang dan sangat nampak perkembangannya dengan mengukur dari segi jumlah siswanya berkembang secara signifikan dari tahun ke tahun, program sekolahnya yang lebih inovatif dan kreatif serta beragam.Kemudian dari segi SDM guru dan karyawannya semaki terbangun semangat dalam mengembangkannya, mereka para tenaga guru siap menerima tugas magang di sekolah-sekolah unggul dan maju.

Model pengembangan sekolah unggul berikutnya adalah dengan membangun jaringan, yaitu dengan menerapkan konsep student exchange ke beberapa Negara yang sudah mengadakan nota kesepahaman.

Pembaharuan manajemen sekolah-sekolah muhammadiyah terlaksana dengan pelan tapi pasti dengan perbaikan yang sedikit tetapi terus menerus yang dalam pengembangan dunia pendidikan di Jepang dinamakan konsep kaizen. Dalam Islam pun konsep ini sudah dipesankan lewat hadits, barang siapa hari ini lebih baik dari kemarin maka ia termasuk orang yang beruntung (al Hadits).

4. Penutup

Sekolah-sekolah Muhammadiyah yang sekarang ini berkembang menerapkan model pengembangan berbasis pembaharuan manajemen.Sejak awal berdirinya Muhammadiah yang mengembangkan sekolah berorientasi modern dengan menerapkan model pembelajaran maupun sarana-prasarana yang digunakan menggunakan sarana modern.

Berkembangnya sekolah-sekolah Muhammadiyah tidak lepas dari semangat atau spirit para pendiri yang menerapkan system yang berkelanjutan.Sebagaimana Muhammadiyah adalah gerakan untuk mewujudkan masyarakat yang unggul dan berkemajuan.

Sebagaimana perkembangan sekolah muhammadiyah unggul dan maju yang menjadi magnet bagi sekolah-sekolah yang baru taraf pengembangannya dengan menerapkan model magang, sehingga melahirkan sekolah-sekolah unggul lain di luar daerah.

Percepatan perkembangan sekolah sesuai dengan perkembangan dunia global dengan mengadakan muhibah atau student exchange ke beberapa Negara yang sudah menjalin komunikasi dan jaringan.

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MOOD LAMP BERBASIS MICROCONTROLLER[1]

Tamaji, Arief Budijanto
Universitas Widya Kartika Surabaya, e-mail: tamajikayadi@gmail.com, arief232@yahoo.com

Abstract

Mood lamp is made of LED lights RGB (red, green, blue) which can be programmed by the color through the remote control, so that the flame color of light can be determined solely by the user for his mood. These lights are designed using 89C2051 microcontroller with low-power technologies (low power) and RGB LED that can be programmed into some color via remote control. Remote control signal in this study using a standard remote code NEC. The results of the experiment led lights can be programmed to 7 colors, namely red, blue, cyan, yellow, magenta, white, green. The purpose of this research to the next in order to be used as a business opportunity in the field of creative industries, because of the mood lamp can be used as garden lights, patio lights home, restaurant and cafe.

Keywords: *LED Lights, Led RGB, microcontroller, Remote Control*

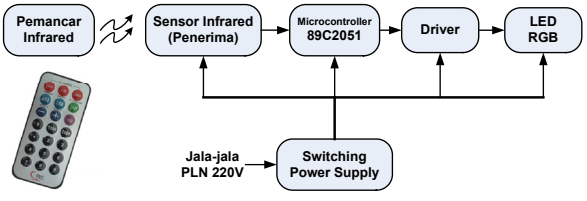
I. Pendahuluan

Lampu LED merupakan lampu yang lebih hemat energi jika dibandingkan dengan lampu pijar dan neon. Lampu Led ini merupakan jenis *solid-state lighting* (SSL)[7], artinya lampu yang menggunakan kumpulan LED sebagai sumber pencahayaannya. Kumpulan LED diletakkan dengan jarak yang rapat untuk menambah terang cahaya. Satu buah lampu ini dapat bertahan lebih dari 30 ribu jam bahkan mencapai 100 ribu jam.

Lampu yang terbuat dari LED RGB (*Red,Green, Blue*) yang mana lampu led tersebut nyala lampu lednya dapat deprogram berdasarkan warnanya melalui *remote control* (pengendali jarak jauh) yang akan diolah oleh komponen microcontroller sehinnga warna lampu LED dapat diatur sesuai keinginnan suasana hati. Lampu ini pembuatan sangat sederhana dan biayanya murah tapi mempunyai nilai komersil yang tinggi, sehingga dapat dijadikan sebagai peluang usaha bagi industri skala rumahan dibidang industry kreatif. Penerapan Lampu LED RGB dapat digunakan sebagai lampu kamar tidur, lampu teras, lampu-lampu yang dipasang pada restoran-restorn, café dan lain sebagainya. Dengan latar belakang diatas, kami bermaksud membuat Lampu LED RGB Hemat Energi yang dapat dikendalikan via *remote control*

II. Metodologi Penelitian

Metodologi penelitian dalam penelitian ini dibagi menjadi dua bagian, yaitu perancangan sistem perangkat keras dan sistem perangkat lunak. Diagram blok perangkat keras diperlihatkan pada gambar 1.



Gambar 1. Diagram Blok Perangkat Keras

1 International Symposium for Modern School Development, Social Science and Applied Technologies (ISMOSAT 2016), Grand Sakinah Mayong Jepara, 19 – 20 March 2016

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Prinsip kerja dari lampu LED warna ini adalah memancarkan cahaya lampu LED sesuai dengan warna yang dikehendaki dengan cara mengirimkan kode dari hasil penekanan tombol pada pemancar infra merah. Pertama kali tombol remote ditekan sesuai dengan warna yang diinginkan, kemudian *remote control* akan mengirimkan data itu lewat pancaran cahaya infra merah, selanjutnya kode yang dipancarkan dari *remote control* akan diterima oleh sensor infra merah, kemudian sensor infra merah akan didistribusikan ke mikrokontroler untuk diproses sesuai dengan data kode yang dikirimkan, setelah diproses oleh mikrokontroler selanjutnya data control yang dikeluarkan oleh mikrokontroler akan menjalankan transistor driver sesuai dengan LED warna yang akan dinyalakan. LED akan memancarkan warna cahaya sesuai dengan keinginan pengguna. Warna dasar LED yang digunakan adalah 3 buah warna yaitu Merah (R), Hijau (G), dan Biru (B). Tiga warna dasar ini akan digunakan untuk membangkitkan beberapa warna yang diinginkan.

Remote Control

Remote control NEC menggunakan format data 32 bit yang terdiri dari 8 bit address, 8 bit komplemen dari *address* itu, 8 bit command dan 8 bit komplemen dari command itu. Jika sebuah tombol remote ditekan, maka sebuah *start bit* dikirimkan. Lalu dikirimkan 8 bit *address* dengan bit LSB dikirimkan terlebih dahulu disusul dikirimkannya 8 bit komplemen dari address itu, setelah itu dikirimkan 8 bit *command* dengan bit LSB dikirimkan terlebih dahulu dan terakhir dikirimkan 8 bit komplemen dari *address* itu.

Gambar 2. Format Data Remote Control NEC[6]

Data tersebut dikirimkan oleh *remote control* dan diterima oleh infrared reciever yang outputnya terhubung ke pin RXD dari AT89C2051, kemudian AT89C2051 memeriksa apakah ada penekanan pada tombol *remote control* dengan program sebagai berikut:

```
CekStartBitNec:
    Jb      rxd,$
    setb    tr0
    jnb     rxd,$
    mov     a,th0
    cjne    a,#8,$+3
    jnc     CekStartBitNecSelesai
    clr     tr0
    mov     th0,#0
    mov     tl0,#0
    sjmp    ambilnec
CekStartBitNecSelesai:
    clr     tr0
    mov     th0,#0
    mov     tl0,#0
```

Pertama kali yang dilakukan adalah proses pengecekan sinyal *start bit* yang dipancarkan oleh *remote control* NEC. Selanjutnya adalah mengambil 8 *bit address* yang dilakukan dengan mengambil bit demi bit. Berikut adalah potongan program untuk mengambil 1 bit data dari *remote control* NEC:

```
AmbilBitNec:
    jnb     rxd,$
    setb    tr0
    jb      rxd,$
    clr     tr0
    mov     a,th0
    cjne    a,#3,$+3
    jnc     Bit1Nec
    clr     c
    mov     th0,#0
    mov     tl0,#0
    ret
Bit1Nec:
    setb    c
    mov     th0,#0
    mov     tl0,#0
    ret
```

Pengambilan data 1 bit dari remote control NEC mirip dengan remote control pada umumnya, perbedaannya hanya terletak pada baris 1 dan 3 potongan program di atas. Berikut adalah potongan program untuk mengambil 8 *bit address* dari remote control NEC:

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```
    mov   r7,8
addr:
    push  acc
    acall ambilbitnec
    pop   acc
    rrc   a
    djnz  r7,addr
    clr   tr0
    mov   address,a
```

Pengambilan 8 bit address ini sama dengan pengambilan data 8 bit dari remote pada umumnya. Pada baris terakhir potongan program di atas data disimpan di variabel address. Setelah pengambilan 8 *bit address* dari *remote control*, dilanjutkan dengan pengambilan 8 *bit* komplemen dari *address* itu untuk verifikasi.

```
     mov       r7,#8
addrcpl:
    Push       Acc
    Acall      AmbilBitNec
    Pop        Acc
    Rrc        A
    Djnz       R7,addrcpl
    Clr        TR0
    cpl        a
    cjne       a,address,ambilNec
```

Setelah instruksi 'Clr TR0' 8 bit komplemen dari address tersimpan di akumulator, lalu 8 bit ini dikomplemen nilainya dengan instruksi 'Cpl a' setelah itu dilanjutkan dengan instruksi berikutnya yang membandingkan nilai akumulator dengan nilai yang ada di variabel *address*, jika hasilnya tidak sama maka terjadi kesalahan dan program akan kembali mengulangi pengambilan data *remote control* dengan melompat ke alamat yang diberi nama dengan variabel 'ambil Nec'. Jika setelah instruksi 'cjne a,address,ambilNec' nilai akumulator sama dengan nilai *address* maka program akan melanjutkan instruksi di bawahnya yaitu pengambilan 8 *bit command* dari remote kontrol.

```
        mov   r7,#8
cmd:
        Push  Acc
        Acall AmbilBitNec
        Pop   Acc
        Rrc   A
        Djnz  R7,cmd
        Clr   TR0
        mov   command,a
```

Proses pengambilan 8 *bit command* ini tidak berbeda dengan sebelumnya. Hasilnya disimpan di memori yang alamatnya diberi nama dengan variabel '*command*'. Setelah itu dilanjutkan dengan mengambil 8 bit komplemen dari *command* untuk verifikasi terakhir.

```
        mov   r7,#8
cmdcpl:
        Push  Acc
        Acall AmbilBitNec
        Pop   Acc
        Rrc   A
        Djnz  R7,cmdcpl
        Clr   TR0
        cpl   a
        cjne  a,command,ambilNec
        setb  p3.5
        mov   p1,a
        acall tunda
        mov   p1,#0ffh
        acall tunda
        clr   p3.5
        Sjmp  AmbilNec
```

Setelah instruksi 'Clr TR0' data 8 bit komplemen dari command disimpan di akumulator lalu dibalik nilainya dengan instruksi 'Cpl a' untuk dibandingkan dengan data 8 bit command sebelumnya. Jika hasilnya tidak sama maka program akan mengulangi lagi dari awal dengan melompat ke alamat yang diberi nama dengan variabel 'ambilNec'.

Sensor Penerima Infra Merah

Kode-kode yang dipancarkan oleh pemancar remote control diterima oleh sensor infra merah. Kemudian sensor infra merah ini akan meneruskan ke kaki mikrokontroler untuk diolah menjadi sebuah perintah yang akan digunakan untuk menyalakan lampu LED.

Bentuk sensor infra merah dengan model TSOP ditunjukan pada gambar 3 dan gambar 4. dibawah ini.

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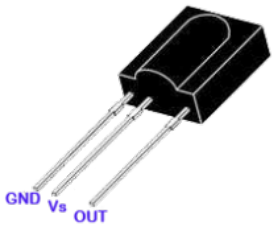
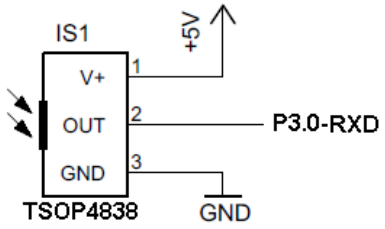


Gb3. Sensor Infra Merah TSOP



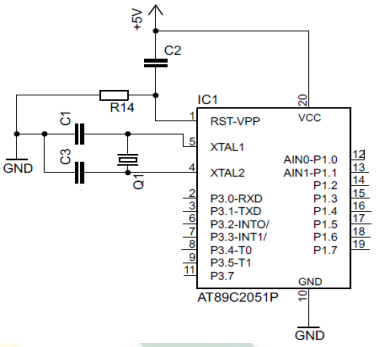
Gb 4. Rangkaian Penerima Infra Merah

Kaki nomor satu (1) dari sensor dihubungkan dengan ground dari Vcc kemudian kaki yang kedua (2) atau yang ditengah dihubungkan dengan Vcc dalam hal ini besarnya 5 Volt. Sedangkan data yang diterima oleh infra merah akan dikeluarkan melalui pin nomor tiga (3) yang langsung diumpankan ke kaki mikrokontroler. Kaki output dari sensor dapat langsung dihubungkan dengan mikrokontroler tanpa menggunakan rangkaian pengkondisi sinyal.

Pada prakteknya sinyal infra merah yang diterima intensitasnya sangat kecil sehingga perlu dikuatkan. Kekuatan sinar dan sudut datang merupakan faktor penting dalam keberhasilan transmisi data melalui infra merah selain filter dan penguatan pada bagian penerimanya. Selain itu agar tidak terganggu oleh sinyal cahaya lain maka sinyal listrik yang dihasilkan oleh sensor infra merah harus difilter pada frekuensi sinyal *carrier* yaitu pada 30KHz sampai 40KHz. Selanjutnya baik photodioda maupun *phototransistor* disebut sebagai *photodetector*. Dalam penerimaan infra merah, sinyal ini merupakan sinyal infra merah yang termodulasi. Pemodulasian sinyal data dengan sinyal carrier dengan frekuensi tertentu akan dapat memperjauh transmisi data sinyal infra merah. Semakin besar area penerimaan maka sudut penerimaannya juga semakin besar. Kelemahan area penerimaan yang semakin besar ini adalah *noise* yang dihasilkan juga semakin besar pula.

Minimum Sistem AT89C2051

Mikrokontroler akan mengolah data dari sensor infra merah berupa kode-kode untuk menyalakan lampu LED. Sebuah port yang digunakan untuk sensor infra merah dan tiga port digunakan untuk mengendalikan transistor driver lampu LED. Rangkaian Minimum Sistem AT89C2051 diperlihatkan pada gambar 5.



Gambar 5. Rangkaian Penerima Infra Merah

Input sensor infra merah dihubungkan dengan port 3.0 (lihat gambar 4.) dengan format pengiriman data menggunakan i^2C namun tidak menutup kemungkinan dapat dipasang pada port yang lain. Sedangkan output digunakan port 1.5 sampai dengan port 1.7 untuk menggerakkan basis dari transistor yang akan menyalakan lampu LED. Susunan lampu LED diurutkan sebagai berikut, lampu LED merah dipasang pada port 1.5, lampu LED hijau dipasang pada port 1.6, dan untuk lampu LED biru dipasang pada port 1.7

Rangkaian Driver LED

Padai gambar 6. dapat dilihat rangkaian driver LED yang dihubungkan pada port1.5 (merah), port1.6 dan port 1.7.

Nilai resistor yang menghubung LED dengan microcontroller adalah 150 Ω. Nilai resistor tersebut dapat dihitung nilainya dengan rumus sebagai berikut:

$$R = (VCC - V_{Led})/I_{Led} \quad \text{.....(1)}$$

Diketahui dari *data sheet* (dari parik pem-

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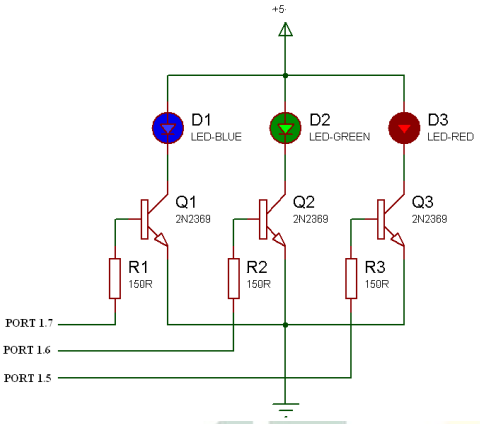
buat) LED membutuhkan arus maksimum ≅ 20 mA dan tegangannya 3 V. Sehingga nilai resistor dapat dihitung

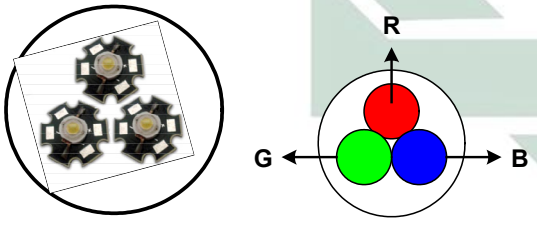
R = (5V – 3V)/20mA = 2V/20mA =100 Ω. …...(2)

Nilai minmum resistor yang dapat digunakan adalah 100 Ω, tetapi dalam praktek untuk menghindari kelebihan arus yang dapat merusakkan LED maka dipilih resistor dengan nilai yang agak lebih besar sedikit yaitu 150 Ω.



Gambar 6. Rangkaian Driver Lampu LED

Konstruksi susunan LED dapat dilihat pada gambar 7, yaitu LED disusun berdekatan yang diletakkan dalam satu papan PCB dan diberi tutup kaca putih sebagai reflektor agar warna dari nyala lampu LED dapat terpadu.



Gambar 7. konstruksi susunan LED

Jenis-jenis warna dari perpaduan warna dari nyala LED diperlihatkan dalam tabel 1.

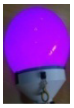
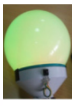
III. Hasil Eksperimen

Hasil eksperimen lampu LED RGB (*mood lamp*) yang dapat dikendalikan nyala lampu LED berdasarkan warnanya lewat remote control NEC diperlihatkan pada table 2.

Tabel 1. Perpaduan warna nyala LED

Parpaduan Warna			Hasil Warna
Merah	Biru	-	Magenta
Merah	Hijau	-	Kuning
Biru	Hijau		Cyan
Merah	Hijau	Biru	Putih

Tabel 2. Hasil Ekperimen Mood Lamp

Tombol Remote power	Kondisi Lampu RGB	
	Padam	
1	Nyala Merah	
2	Nyala Hijau	
3	Nyala Biru	
4	Nyala Cyan	
5	Nyala Magenta	
6	Nyala Kuning	
7	Nyala Putih	

Dalam eksperimen hasil yang masih kurang sesuai adalah nyala lampu warna kuning yang masih kelihatan unsur warna hijaunya.

IV. Kesimpulan

Mood lamp sudah bekerja sesuai fungsinya, yaitu dapat dikendalikan melalui remote control NEC untuk penyalaan lampu LED berdasarka warnanya. Warna nyala Lampu LED yang dapat dikendaliakan ada 7 warna, yaitu merah hijau, biru,cyan, magenta, kuning dan putih.

V. Saran

Warna dari *Mood Lamp* dapat dikembangkan menjadi lebih dari 7 warna, yaitu dengan menggunakan metoda PWM untuk menggerakkan tiap-tiap LED nya. Sehingga dengan kombinasi PWM yang berbeda-beda akan membangakitkan tegangan DC yang

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diberikan pada tiap-tiap LED berbeda-beda pula.

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SHORT-TERM LOAD FORECASTING FOR NATIONAL HOLIDAYS USING FUZZY LINEAR REGRESSION AT JAVA-BALI SYSTEM IN INDONESIA[1]

Andi Imran, I Made Yulistya Negara, Imam Robandi
[1]*Department of Electrical Engineering Institut Teknologi Sepuluh Nopember Surabaya, Indonesia, andi.imran13@mhs.ee.its.ac.id, yulistya@ee.its.ac.id, robandi@ee.its.ac.id*

Abstract

This paper discusses the application of Fuzzy Linear Regression (FLR) for the short-term load forecasting.The proposed method considers the peakload data during national holidays along year of 2007 until 2008 with 13 national holidays are used. Later, research is focused on peakload data from 4 days before the holiday (h-4) andon holidays (h). The result by utilizing the absolute error indicate that FLR method gives reasonable forecasting. FLR method has an average absolute error of about 3 % in year 2008.

Keywords: *Short-Term Forecasting, Fuzzy Linear Regression, Absolute Error.*

Introduction

Peak load during the holidays is completely different from a normal working day. Non-linearity of them come with the dynamic behavior of the customers and they are affected by environmental conditions, such as windspeed, precipitation, air pressure, temperature and humidity. These two characteristics pushing the load profile under conditions of uncertainty, so the solution by using probabilistic statistical assumption may result in inaccurate forecasting. The main problem of probabilistic methods such as linear regression, auto-regress moving average (ARMA) and auto-regress integrated moving average (ARIMA) its limitation capability to work in any condition that may be because of their high dependence on a single historical data and complex mathematical equations[1]. Advantages intelligent method over conventional methods are essentially simple computational techniques and algorithms, simple structural and high accuracy performance without any requirement to solve the non-linear mathematical equations. For instance, fuzzy linear regression can solve the non-probabilistic information anduncertainty to manipulate data through the parameters of symmetrical triangular fuzzy[2].

Therefore, this method issuitable for solving and model complex systems with characteristics of non-linear and non-appropriate [3]. However, the weather approaches and the implications are lessnecessary because the actual data peak a few days before the estimated time basically did not change significantly and they already represent the demand for electricity collect affect not only by the weather conditions. Day by day the load forecasting method is growing rapidly. However, Fuzzy Linear Regression method that will be used in this research to load forecasting Java-Bali, especially on national holidays. Model Fuzzy Linear Regression (FLR) proposed is based on Tanaka using fuzzy arithmetic operations [2]. In the proposed method, environmental factors is neglected.

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The method was trialed only with the actual load data from special days/holidays using peakload before the holidays and during the-holidays.

The Model Of Fuzzy Linear Regression[3]

Linear regression is a statistical method to model the relationship between two variables by using linear equations to the observed data. One of the variables considered explanatory variables, and the other is considered as the dependent variable. Linear regression method can be used to estimate based on the assumption of continuing correlation between the variables in the future. A linear regression model is as follows:

$$y_i = \mathrm{a} + \mathrm{b}x_i \qquad (1)$$

where a and b are coefficients.

The coefficient of (1) can be obtained from a given (x_i, y_i). Fuzzy linear regression model can be seen as below

$$\mathrm{g}_i = A_o \oplus (A_I \otimes X_i) \qquad (2)$$

where y_i, x_i, A_0, and A_1 are fuzzy numbers

$\oplus$ is fuzzy number addition.

$\otimes$ is fuzzy number multiplication.

Fuzzy number is convex subset of the real line R with the membership function normalized. A number of fuzzy triangle symbolized $(a, \mathrm{a}, \mathrm{b})$ is expressed as

$$\tilde{A}(t) = \begin{pmatrix} 1 - \dfrac{a-t}{\mathrm{a}}, if\ a - \mathrm{a} \le t \le a \\ 1 - \dfrac{a-t}{\mathrm{b}}, if\ a \le t \le a + \mathrm{b} \\ 0 \qquad otherwise \end{pmatrix} \qquad (3)$$

where $a \in R$ is the center.

$\mathrm{a} > 0$ is the left spread.

$\mathrm{b} > 0$ is the right spread of $\tilde{A}$.

If a tantamount b, then the triangular fuzzy number is called a symmetric triangular fuzzy number symbolized by $(a, \mathrm{a},)$. Equation (3) is represented by figure 1.

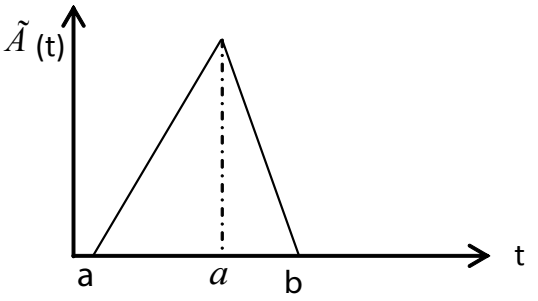

Figure1. fuzzy number $\tilde{A}$. [3]

Load Forecasting Using Fuzzy Linear Regression

Ina linear regression model according to equation 1 can be expressed as follows

$$Y = A_o + A_I X \qquad (4)$$

$A_0$is characterized by (a_0, a_0) with $a_0=c_0$, $a_0=p_0$ and $A_1$is characterized by (a_1, a_1) $a_1=c_1$,$a_1=p_1$ is a triangular fuzzy numbers symmetrical with a_i is the center of A_i and a_1 are scattered from A_i. Central point and spread figures symmetrical triangular fuzzy, X_i and Y_i, is a row(x_i, γ_i) and (y_i, e_i). There, x_i and y_i is the average, and γ_i and e_i is the standard deviation. For simplification, it is assumed that the coefficients and variables are symmetric fuzzy numbers. A_0:(a_0, a_0) and A_1:(a_1, a_1) is estimated by using X_i:(x_i, Y_i) and Y_i(y_i, e_i). Examples of symmetry triangular fuzzy numbers, *Xi* and *Yi* for the past year. The year-to-i are shown in table 1

Table 1. Input Data Fuzzy

	X_i (x_i,γ_i)	γ_i (y_i, e_i)
1	(x_1,γ_1)	(y_1, e_1)
2	(x_2,γ_2)	(y_2, e_2)
:	:	:
i	(x_i,γ_i)	(y_i, e_i)

X_i: (x_i, γ_i) became a member of the average and standard deviation of the daily peak load for four days before the holiday. Suppose the daily peak load for four days before the holiday is m1, m2, m3 and m4.Suppose M is a burden that is the largest among the four values of the daily peak loads. The average daily peak loads were normalized to four days before a holiday is as follows:

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$$x_i = \frac{m_1 + m_2 + m_3 + m_4}{4M} \quad (5)$$

And the standard deviation of daily peak load for four days before holiday is given by equation 3.

$$\gamma_i = \frac{(m_1/M - x_i)^2 + (m_2/M - x_i)^2 + (m_3/M - x_i)^2 + (m_4/M - x_i)^2}{4} \quad (6)$$

Y_i: (y_i, e_i)contains information when holidays, stated the average and standard deviation of the peak load during the holidays.If m_1, m_2, m_3, andm_4, became peak load for four working days before the holiday, then m_5, can be expressed peak load of the holiday as follows:

$$\gamma_i = \frac{m_5}{M} \quad dan \quad e_i = \sqrt{\left(\frac{m_5}{M} - y_i\right)^2} \quad (7)$$

ei value of *Yi* is 0. fuzzy data input can be obtained from the peak load fouryears earlier using equations 5 and 6.

Fuzzy linear regression model was determined by solving linear programming problems mixture to form the equation

$$\begin{aligned} \gamma_i &= A_o \oplus (A_1 \otimes X_i) \\ &= \left(a_o \otimes a_1 x_i, \max\left(a_o, |a_1| \gamma_i, a_1 |x_i|\right)\right) \end{aligned} \quad (8)$$

If X_4 become fuzzy data input to maximum load of four days before the holiday, Y_4 can be calculated using equation 8, the maximum load of a holiday in the prediction by the equation:

$$P^*_{Max} = Y_4 x P^{WD}{}_{Max} \quad (9)$$

With P^*_{Max} is the maximum load forecasting holidays, Y4 is approximate values normalized on holidays and $P^{WD}{}_{Max}$ is a maximum load of four days before the holidays.

Error of forecasting is calculated by equation 10.

$$error(\%) = \frac{|P^{forecast}(t) - P^{actual}(t)|}{P^{actual}(t)} x100 \quad (10)$$

Work Steps Fuzzy Linear Regression

The first, enter the data daily peak load (MW) respectively for the holidays and 4 days before the holiday in 4 years ago. The second, Finding the averagenormalized peakloads for four days before holidays (x_i) with equation 5 and standard deviation (γ_i) with equation 6 in the form X_i: (x_i, γ_i), M is the largest peak load than others. The third search Y_i: (y_i, e_i) which contains information on the holiday with initial value 0,γ_i and e_i with equations 7 to obtain the optimal value of A_0: (a_0, a_0) and A_1: (a_1, a_1) is based on the linear programming method. The fourth, If X_4 become data input of fuzzy for maximum load off our days before holidays, Y_4 can be calculated by equation 8. Then the maximum load prediction of holidays calculated byequation 9. The latter, calculate the error by using the equation 10.

The work steps can be seen on fuzzy linear regression flowchart in Figure 2.

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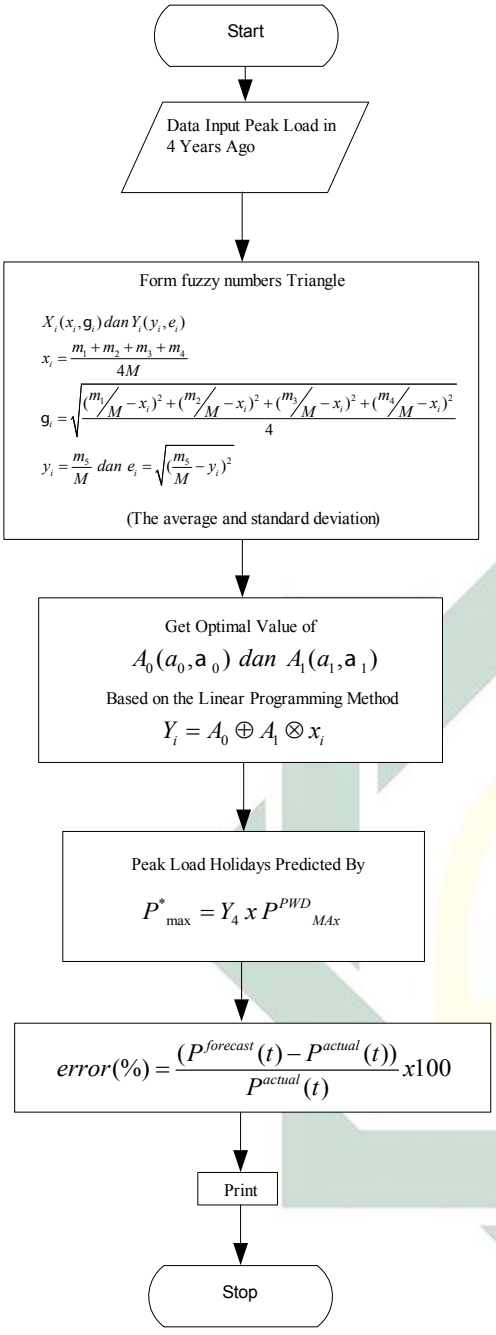

Figure2. Load Forecasting Algorithm Using Fuzzy Linear Regression

Results and Analysis

Java-Bali electricity system of 500 kV consists of 23 bus that connects the island of Java, Madura and Bali in Indonesia. To optimize the performance of the system several studies were conducted.Oneof themis short-term load forecasting of national holiday. In Indonesia has 13 national holidays. In this study fuzzy linear regression method is applied for load forecasting of the Java-Bali system. Load forecasting of the Java-Bali system is determined using the data input 4 days of earlier (h-4) and holidays h, start of 2007 until 2008.

Table 2 shows peak load data from h-4 to h for idulfitri holiday in 2007-2008.

Table2.Peak Load of Idul FitriIn 2007-2008

Beban Puncak Idul Fitri (MW)					
Tahun	h-4	h-3	h-2	h-1	h
2007	13793	12420	11463	10841	11162
2008	13085	12519	11769	10940	11147
2009	15328	14015	12388	11543	11676
2008	14882	13254	12051	11494	11700

Data from Table 2 were processed using fuzzy linear regression algorithm in accordance with Figure 2. The result of peak load forecasting national holidays using fuzzy linear regression can be seen in Table 3.

Table3. Results of calculation of load forecasting

load forecasting for national holidays in 2008using Fuzzy Linear Regression

No	Days	Actual Data	FLR	Error
1	Masehi's New Year	12442	13114	0,054010609
2	Imlek	13906	13600	0,02200489
3	Maulid	13482	13768	0,02121347
4	Nyepi	13457	13781	0,024076689
5	Wafat Yesus Kristus	13358	13739	0,028522234
6	Waisak	14745	14145	0,04069176
7	Kenaikan Yesus Kristus	14279	14659	0,026612508
8	Isra Miraj	14771	14158	0,041500237
9	Independence Days	13416	13683	0,01990161
10	Idul Fitri	10940	10193	0,068281536
11	Idul Adha	12778	13039	0,020425732
12	Islamic New Year	12729	12816	0,006834787
13	Natal	13312	13292	0,001502404
Average				0,028891

For more details, then the table 2 made a graph that can be seen in Figure 3.

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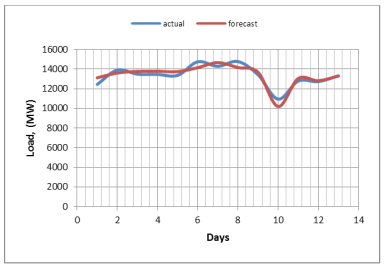

Figure 3. Comparison of actual data with results of load forecasting usingFLR

From simulation result in table 3 and figure 3 show that average error 2.8891%. The biggest error was show that 6.8281536% on Eid holidays and the smallest error one is about 0.1502404% on Christmas holidays.

CONCLUSION

Fuzzy Linear Regression method proposed in this study can be used to forecast the peak load during some holiday in java-bali system 500 kv. with very reasonable accuracy. The algorithm result proposed in average error of about 3% for holiday along year 2008.

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OPTIMAL DESIGN STABILITY CONTROL SPEED BRUSHLESS DIRECT CURRENT (BLDC) AT THE ELECTRIC VEHICLE USING PARTICLE SWARM OPTIMIZATION (PSO)[1]

Izza Anshory[a,b] Imam Robandi[a] Wirawan[a]

a) Department Electrical Engineering Institute TeknologiSepuluhNopember (ITS)Surabaya 60111, Indonesia, izza.anshory15@mhs.ee.its.ac.idrobandi@ee.its.ac.idwirawan@ee.its.ac.id

b) Department of Electrical Engineering University of MuhammadiyahSidoarjoSidoarjo, 601271

Abstract

This research presents optimal design stability control speed and the influence of load changes that are implemented on the electric motor type Motor Brushless Direct Current (BLDC). BLDC is one among the constituent components of electric cars such as battery, DC-DC converter and the inverter, which can be controlled with tuning stability Proportional Integral Derivative (PID) parameters. Brushless Direct Current (BLDC) optimized controller PID parameter with particle swarm optimization (PSO). The results show that the addition of the load will affect the speed in achieving stability. Beside that obtained value PID parameters after tuning with PSO algorithm, has a value Kp_pso=14.6420, Ki_pso=1.1340e+03, Kd_pso=1.1126 and Fitness global best is1.409e+11.

Keywords: *Modeling, Electric Vehicle, PID;PSO algorithm.*

I. Introduction

Electric vehicle in terms of driving energy sources are generally classified into three, namely pure electric vehicle (PEV), a hybrid electric vehicle (HEV), and fuel electric vehicle (FEV). PEV or it could be called Battery Electric Vehicle (BEV) that use batteries as equipment for storing electrical energy. PEV can travel as far as 120 km on one battery incision, with long battery charging time of 5 to 8 hours for the specification of 110-240 volts, 13-40 A and 2-4 kW.[1] The main component constituent comprises electric vehicle electric motor, system control, power converters, and battery. Batteries store electrical energy as the place has a weakness in terms of capacity and the duration of use (lifetime) for supplying electrical energy.

Model power flow in the system of electric cars is required to determine the capacity of the battery is required. [2] The capacity of the energy stored in the batteries is also determined by the process of acceleration, braking, surface conditions and changes in the load on the electric car. [3] Modeling and simulation of the influence of load changes which is implemented with the electric motor type Brushless Direct Current (BLDC) optimized controller Derivative Proportional Integral (PID) algorithm with particle swarm optimization (PSO) is proposed research.

II. Theoretical Background

A. Electric Vehicle

The structure ofthe electriccardrive systemconsistsof abattery, power inverter, electric motor, anda collection ofsome of the

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controller. Batteryas aplace to store theenergy source used topower electric cars. The electric motor can be used as a driver ofa motor type variable resistance magnetic motors, induction motors, and motors Direct Current (DC), because it is easy to maintainand reliable. Speed and torque controlis used inverter accordingly. ADC-DC converteris usedto adjust the voltage on the battery and motor drive system. Feedback and speed profile of the motor is taken as a reference for the inverter control pulse generator. Chargedstate of the battery at the time considered to control the converter. DC voltage converter to bring the needs of the inverter. [2]

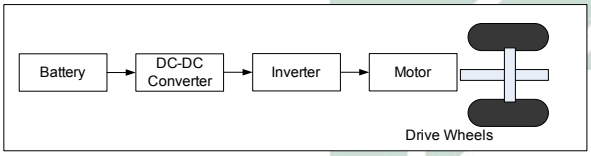

Figure 1. Electric vehicle architecture

The force delivered to the electric vehicle called the tractive power. Tractive power can be used to address the following matters: rolling resistance, gravitational force, aerodynamic drag force, and an accelerating force. Rolling resistance is generated due to hysteresis when the wheel contacts the road surface. [2]

$$F_{Roll} = Co * m * g \quad (1)$$

The aerodynamic dragforce is generated due to the resistance of the air against the movement ofthe vehicle.

$$F_{aero} = 0.5 * V^2 * C_D * \gamma * A_V \quad (2)$$

Gravitational force isdepending on thegravityof theslope of the road. Positive forcewhenthe path ofa hikeanda negativeforcewhenthe path ofdecline.

$$F_{grad} = m * g * sin\beta \quad (3)$$

Acceleration forceson the electric caris influencedby the mass ofthe vehicle.

$$F_{acc} = m * a \quad (4)$$

B.Mathematical Model of BLDC Motor

Brush less DC motors (BLDC motor) which is known as an electronic commutated motors have many advantages such as simple structure, reliable operation, low maintenance, high dynamicspeed, better control performance and good mechanical properties.A Brushless DC motors have arotor with permanent magnets and astator with the windings connected to the electronic control. Electronic controls replace the function of the commutate dan denergize the proper winding. Eachturn of the sequence has oneroll of electrical energy to the positive (current into the windings), the second winding negative (when exiting the turns) and the third isin a state of non-energy. The torque generated due to the interaction between the magnetic field generated by the stator coils and permanent magnets. [3]

The circuit diagram for the stator windingis as shown in figure.2.

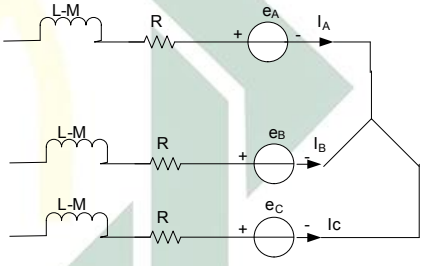

Figure 2. Circuit diagram stator winding

BLDC motor circuite quations can be described by the equation (1-3).[4]

$$V_a = I_a R + L\frac{di_a}{dt} + E_a \quad (1)$$

$$V_b = I_b R + L\frac{di_b}{dt} + E_b \quad (2)$$

$$V_c = I_c R + L\frac{di_c}{dt} + E_c \quad (3)$$

Where, L_a=L_b= L_c = L : self-inductance [H]
R_a=R_b= R_c = R : phase resistance [Ω]
V_a=V_b= V_c= V : phase voltages [V]
I_a= I_b = I_c = I : phase current[A]
E_a= E_b =E_c = E : back EMF [V]

The transfer function is therefore obtained as follows using the ratio of and the angular velocity, ω_m to source voltage, V_s.[5]

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That is,

$$G(s) = \frac{\omega_m}{V_s} = \frac{\frac{1}{K_e}}{\tau_m \tau_e s^2 + \tau_m . s + 1} \quad (4)$$

Where the mechanical (time constant) is

$$\tau_m = \frac{RJ}{K_e K_t} \quad (5)$$

The electrical (time constant),

$$\tau_e = \frac{L}{R} (6)$$

$$K_e = \frac{3R_\emptyset}{K_t \tau_m} \quad 7)$$

where, $R=R_\phi$ is terminal resistance phase to phase, T_e is the input torque of the winding, Jis the inertia of the system, Lis the inductance armature, $k_T$is the torque constant, P is the number of poles. The coefficient B is calculated from the moment of inertia J

C. Proportional Integral Derivative (PID)

Proportional Integral Derivative control system is a feedback control technology that is widely used as an automatic controller in industrial control systems. The PID control system has an important role to carry out energy saving system on any closed loop control system.[6]

The rapid development of science and technology, demand accuracy, speed of response and stability control system becomes higher. For this process, the classic PID control has been widely used because of its simple construction and good durability. The PID control principle is to establish control withproportional, integration and differentiation, then choose a linear combination of the right to control the target. [7] As shown in Figure 2

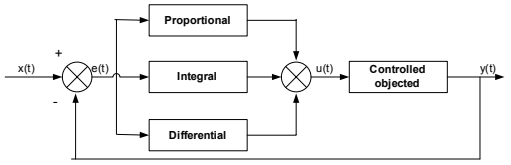

Figure 2. Schematic of a PID controller

The PID control equation is

e(t)=x(t)-y(t) (4)

$$u(t) = k_p e(t) + k_i \int_0^t e(t)dt + k_d \frac{de(t)}{dt} \quad (5)$$

Where KP is a proportional gain coefficient, k_i is an integrated time coefficient, the kid is a differential time coefficient.

D. Particle Swarm Optimization (PSO)

Particle Swarm Optimization is one of the optimization calculation method which is inspired by the movement of herd behavior such as fish, herbivorous animals, and birds were then each objectis simplified to a particle animals. Aparticlein space has a position that is encode das vector coordinates.This position vector can be regarded as a state that is being occupied by aparticlein the search space. Each position in the search spaceis an alternative solution that can be evaluated using the objective function. Each particle moves with velocityv[8]

PSO is one of evolutionary computation methods used to solve optimization problems. This method can be applied to solve the problem of non-linear optimization which includes By the limits defined objectives. The procedure PSO is to iterate the following equation is [6]

$$V_{ij}^{(k+1)} = w\, x\, v_{ij}^{(k)} + c_1 x\, rand(\quad) x \left(pbest_{ij} - x_{ij}^{(k)}\right) + c_2 x rand(\quad) x (gbest_j - x_{ij}^{(k)}) (6)$$

$$x_{ij}^{(k+1)} = x_{ij}^{(k)} + v_{ij}^{(k+1)} \quad (7)$$

Where:
i: Current velocity of agent i at iteration.
J: The PID parameter specie number
k: an iteration number
v: a moving vector
pbest: a personal best of particle i
gbest: a global best of all particles

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w,c1and c2:weight parameters

rand(): a uniform random number 0 to 1

ω : weight function for the velocity of agent i,

c1, c2 : positive constants; [c1+ c2< 4].

III. Design and Result Simulation of Effect Varying Load On Stability Control Speed Electric Vehicle optimized by Particle Swarm Optimization (PSO)

Design andsimulation ofthe effect ofload changestothe speed controlBLDCmotorsusingthe transfer function obtained the ratio of and angular velocity is

$$=\frac{13.11}{2.66e-6s^2+0.0171s+1}$$

A. *Open Loop System*

After that we can model BLDC motor in an open loop system with simulink.[5]

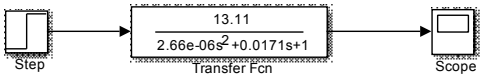

Figure 3. Block Simulink open loop system

The result of simulation with Matlab is

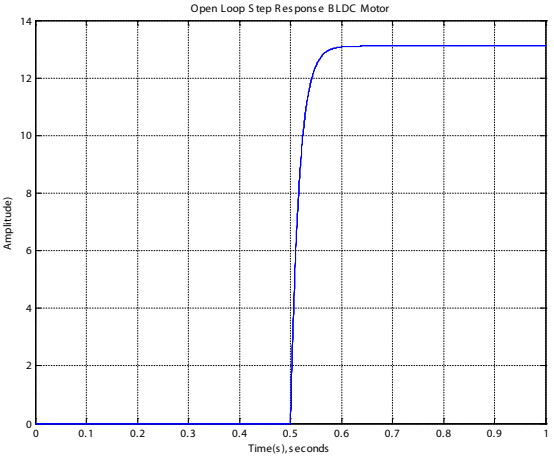

Figure 4. Open Loop Step Response BLDC Motor

B. PID Controller Tuning Parameter

Controller tuning PID parameter using Zeigler-Nicholas method can write in block diagram Simulink.

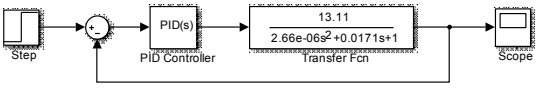

Figure 5. PID Schematic for BLDC Motor

Byusing an assumed sample rate of 1000 was used in the Matlab for plotting the coordinate, we can find Kp=11.327, Ki=1381.34 and Kd=0.0232.

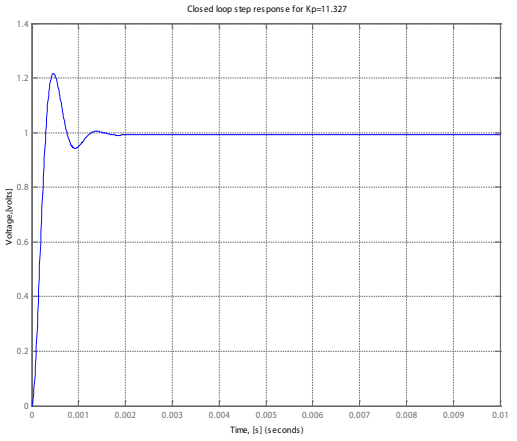

Figure 6 Closed loop response for Kp=11.327

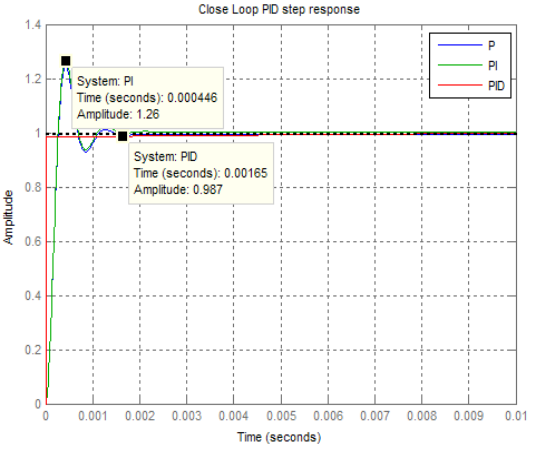

Figure 7. Diagram Close Loop PID step response

Figure 6 and 7: explain close loop PID response with amplitude 1.26 for Proportional,

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Integral, and PID response shows value amplitude 0.987. This picture shows that using a PID controller can find a stable system at 0.00165 seconds.

C. Optimal Design Stability Control Speed Brushless Direct Current (BLDC)Using PSO

Stability control BLDC motor speed can be improved by determining the PID parameters through the PSO algorithm. The addition of the load on the motor is made to see its effect on the stability of the BLDC motor performance.

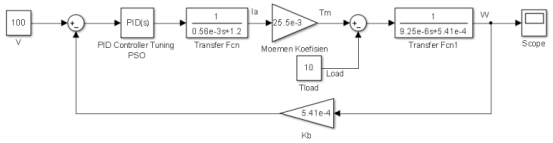

Figure 8. Optimal Design Stability Control Speed Using PSO

By modeling the particle number 5, a maximum of 5 iterations, the number of variables 3, and given the load 10, the results obtained for the value Kp_pso=14.6420, Ki_pso=1.1340e+03, Kd_pso=1.1126 and Fitness-global best is 1.409e+11

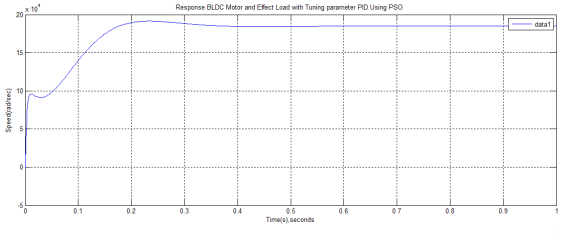

Figure 9. Grafik Response BLDC Motor and Effect Load

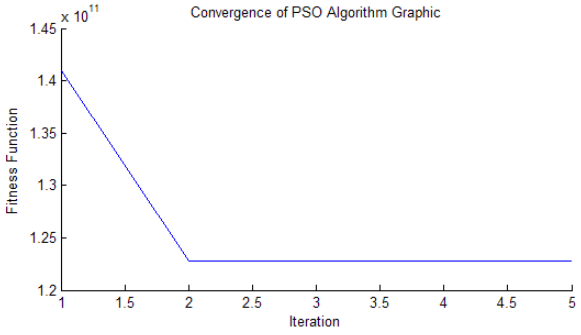

Figure 10. Convergence of PSO Algorithm Graphic

Figure 10 shows the current two iterations has reached convergence.

IV. Conclusion

Motor Brushless Direct Current (BLDC) is one among the constituent components of electric cars such as battery, DC-DC converter and the inverter, which can be controlled with tuning stability PID parameters. Tuned PID parametersby using PSO algorithm that takes the number of particles of 5 and maximum iterations 5. Also in the modeling of the BLDC motor has also seenits influence after the given load. The results show that PID parameters after tuning with PSO algorithm, has a value Kp_pso=14.6420, Ki_pso=1.1340e+03, Kd_pso=1.1126 and Fitness global best is 1.409e+11

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PARTICLE SWARM OPTIMIZATION (PSO)USING LINEAR DECREASING INERTIA WEIGHT (LDIW) ON THE PID CONTROL FOR TEMPERATURE REGULATION[1]

Fachrudin Hunaini[a], Resa Dian Pradikta[b], Imam Robandi[c]
[a,c]*Electrical Engineering Dept., Institut of Technology Sepuluh Nopember (ITS), Indonesia,*
[a,b] *Electrical Engineering Dept., Widyagama University, Malang, Indonesia*
[a]*fachrudin_h@widyagama.ac.id,* [b]*robandi@ee.its.ac.id,*[c]*resa.dp@gmail.com*

Abstract

Performance of a system invariably expected to produce an output in accordance with the required the reference, in order that there is no difference between the output against the reference, the system should have aclosed loop control system. Proportional, Integral and Derivative (PID) controlis one of thereliable control methods for controlling the output of the system to fit with there quisite, butto get the PID parameters need to be assisted by optimization methods in order to obtain optimum control performance. In this paper developed a PID optimal control system based Particle Swarm Optimization (PSO) which applied to the temperature control system. PSO selected as the method of optimization for its simplicity and speed in the computing process and to obtain accuracy of the convergence process was added strategies Linear Decreasing Inertia Weight (LDIW). Temperature control system built into two parts: hardware consists of a temperature sensor and aheater, and the software consists of PID control system and PSO. Tests conducted by the Hardware in the Loop Simulation (HILS) with the results of optimization iteration storeach convergence on 11 with again of PID constants are obtained;:KP=8.0152, KI=4.662 and KD=1.0376. The response system reaches the set point with Risetime 7.18, settle time15.76 and error12:18%.

Keywords: *PID Controller; PSO; LDIW; Temperature Regulation*

1. Introduction

High degree of accuracy needed in a process control to achieve perfect results, but the use of automatic temperature control system to achieve the required set point depends heavily on the expertise and experience of the operator in a process control system. Many researches of control systems on the temperature regulation been widely applied in industry, using either conventional control system such as the Proportional, Integral and Differential (PID) [1], [2] and artificial intelligence such as the Fuzzy Logic Control (FLC) [3], but the performance of the control system still determined by the control parameters gained by trial and error so that the process control system doesn't necessarily workoptimally. PID controller is the most popular and reliable controller because of its ability is very high, simple implementation, and the application is very comprehensive [4], [5]. In an effort to get the performance of the optimal PID control system required the proper parameters to obtain a perfect output system. Therefore, it is necessary an optimization

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method for determining the parameters of the PID control system. Particle Swarm Optimization (PSO) is an optimization method that has some advantages, namely a simple algorithm, its implementation easier, faster convergence and effective in computing[6], [7], [8].

In this paper, the optimization PID control system using PSO applied to the temperature control system. To increase the effectiveness of PSO used a strategy LDIW(Linear Decreasing Inertia Weight) which is the best method currently in the process of optimization PSO[9] which was presented in the application program Matlab Simulink for controlling the prototype of temperature control system that consists of aheater and sensor as an actual device of the control system. Optimization of the PID parameter by PSO is repeated until convergence is reached so that the parameters obtained is the optimal parameters of the control system. The results of optimization are used as a parameter in PID control system for optimal control system simulation process on the temperature control system.

2. Proportional, Integral and Derivative (PID) Controller

Proportional control serves to amplify the signal of activator errors (error signal) which will accelerate the output of the system reaches a point of reference. Integral control in principle aims to eliminate errors during state conditions (offset) which is usually generated by proportional control. Derivative control can be called as controlling the pace, because the output of control proportional to the rate of change of the error signal. The combination of the three controllers becomes Proportional Integral Differential (PID) controller[4], [10]. Block diagram of the PID controlis shown in Figure1.

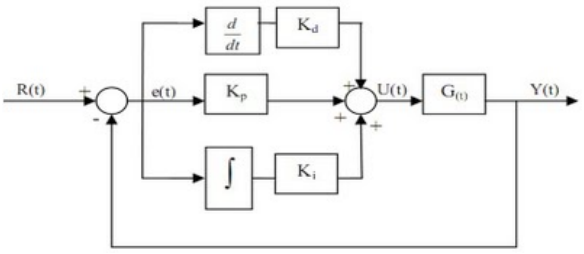

Figure1.Diagram block of the PID control

The equation for PID control (Proportional Integral Differential) [4]:

$$u(t) = K_p e(t) + K_i \int_0^t e(t)dt + K_d \frac{de(t)}{dt} \qquad (1)$$

where:

u(t) = PID controller output signal
Kp = Proportional coefficient
Ti = Integral time
Td = Derivative time
Ki = Integral coefficient (Kp/Ti)
Kd = Derivatif coefficient (Kp.Td)
e(t) = *signal Error*

3. Particle Swarm Optimization (PSO)

PSO is one of optimization techniques based on evolutionary computing techniques. This method has a good robust to solve problems that have nonlinear characteristic sand non differentiability, multiple optimal and large dimension through adaptation derived from social-psychology of the theory[11], [12]. This method inspired by the dynamic motion of a flock of birds or fish in search of food. They move together in a group and not individuals. They use the concept of partnership, where each of information disseminated within the group. Suppose there are flock of fish that randomly search for foodin a region and there is only one meal there. All birds do not know where the location of these foods, but they know how far they are from the food in each iteration. So the most effective strategyis to follow the fish closest to the food. PSO initialized with a population of random solutions and find the most optimal solution store new the members of the population. Each particle is called a random solution. Each particle moves in space prob-

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lems and has already achieved the best value, this value is called p best. Value of the "best" others is the best value achieved by any particle in the population, this value is called g best. PSO has avelocity that would change the position of particles on each iteration. At each iteration the value of the velocity and position of renewed[12].

Equation of PSO algorithm consists of velocity and position, the most fundamental of which is as follows, velocity:

$$v_i(k+1) = w * v_i(k) + L_{1i} * R_{1i} * \left(p_i - x_i(k)\right) + L_{2i} * R_{2i} * \left(G - x_i(k)\right) \quad (2)$$

and position:

$$x_i(k+1) = x_i(k) + v_i(k+1) \quad (3)$$

where:

i	= particle index
k	= iteration
v	= velocity of particle
x	= positionof particle
p	= the best position of the particle (pbest)
G	= the best position of the swarm (gbest)
$L_{1,2}$	= learning rates
$R_{1,2}$	= random numbers with interval [0 – 1]
W	= inertia

In the method of standard PSO implementation, it was found that the velocity of particles in PSO updated too fast and the minimum value of the objective function is often over looked. There fore, there is a revision or improvement of the standard PSO algorithm. Improvements in the form of the addition of an inertia θ to reduce speed. Usually the value of θ is made such that increasing iterations passed, the smaller the particle velocity. This value varies linearly within the range of0.9to0.4. This inertia weights used to dampen the paceduring the iterations, which allows birds to the target point more accurately and efficiently than the original algorithm [9]. High inertia weight values increase the portion of the global search (global exploration), whilea low value emphasizes local search (local search). For not very focused on one part and keep looking for new search area in particular dimensional space, it is necessary tobe sought inertia weight value (θ) which draw maintaining global and local search and to reach it and accelerate convergence, aweight of inertia that decreases in value with increasing iterations used by the formula [9]:

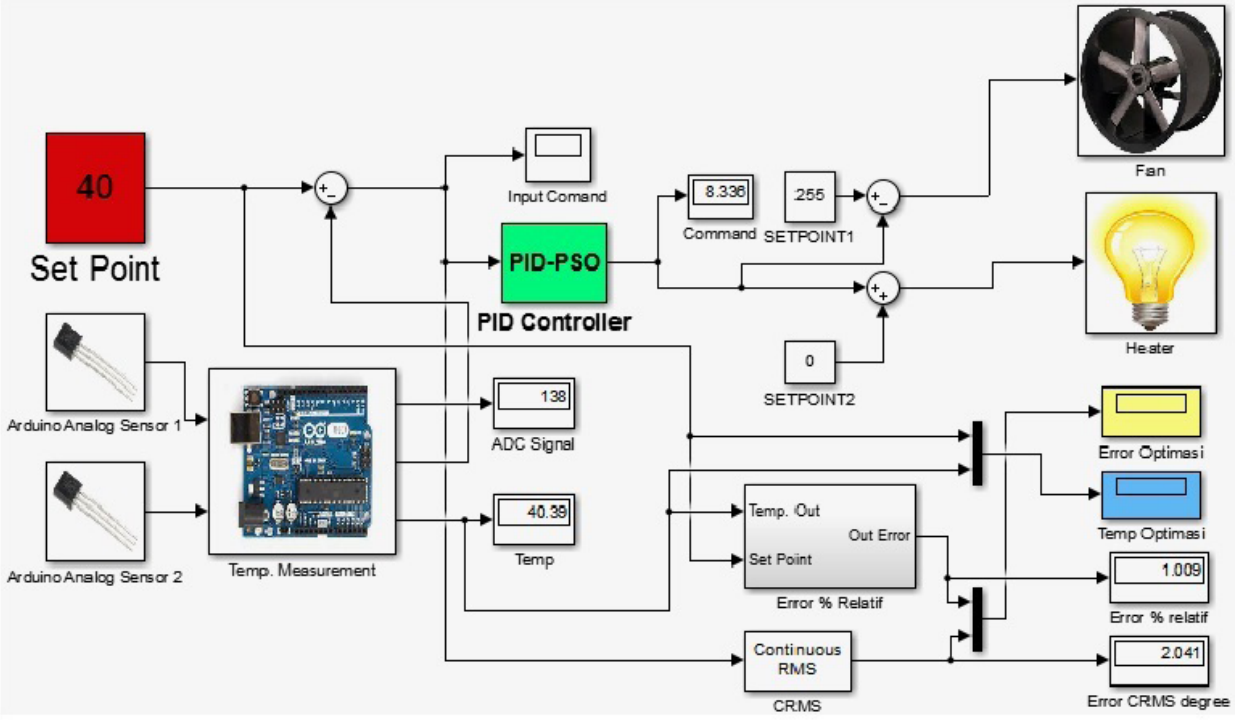

Figure2. Model of the optimal control system on temperature regulation

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$$W = W_{max} - \left(\frac{W_{max} - W_{min}}{It_{max}}\right) \cdot It \quad (4)$$

where:

W_{max} : Value of the initial weight
W_{min} : Value of the final weight
It : Iteration running
It_{max} : Maximum iterations

In this paper, the variables are optimized as much as 3 variables to determine the parameters of PID control parameters in the form constants Kp, Kd and Ki.

4. Temperature Control System

The structure of the optimal control system on temperature regulation built in Simulink matlab application program, as figure 2.

PID controlis packaged in a subsystem PID-PSO with the input set point and feedback ADC. Data from the temperature sensor in the form of a voltage serially connected to arduino with baudrate 115200 through comport 1 and then converted into scale ADC to be used as a comparative calculation so that it can display temperature reading sin unitso C. PSO sub system contains the model PID combined with 3 gain to be optimized. Gain PID constants contained in the Error and Δ Error input and PWM output. On Error given scope with the data stored in the work space as the reference data at the time of optimization by PSO.

5. Simulation of Temperature Control System

The design of the electronic device includes a temperature sensor, heater blower and Arduino Rev.3. Sensors using LM35 with output voltage of 10 mV per 1°C. To further improve the accuracy and precision on temperature measurements, carried out set-up voltage reference 8-bit ADC with a range of 0-255 represent the minimum and maximum temperature can be measured by the circuit. Sensor output connected into non-inverting amplifier circuit to improve the precision of measurement. Actuator circuit using a MOSFET IRFZ44 N-type MOSFETs supplied with 12 VDC according to the needs of the blower and DC Lamp that will be controlled. MOSFET is controlled by the PWM signal from arduino to determine the value of the incoming voltage to the circuit. Blower connected in series with a MOSFET as electronic switches. Figure 3 is a 3D model of the hardware used in the simulation process.

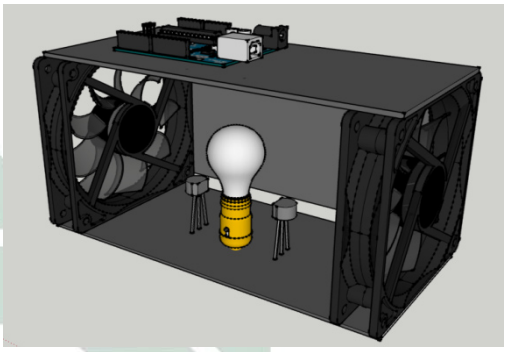

Figure 3. 3D model of the hardware simulator

Optimization process is then performed using PSO with LDIW methods to obtain parameters optimal control system, optimization results achieved convergence on the 11th iteration.

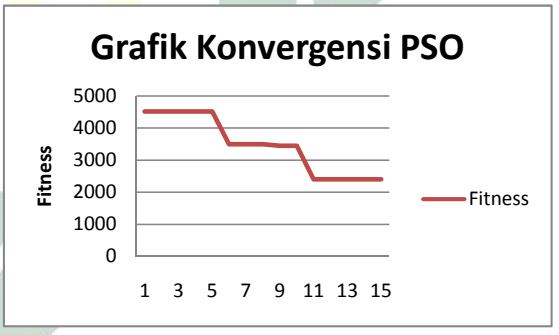

Figure 4. fitness convergence of iterations PSO with LDIW.

Figure 4 shows that the convergence of particles occurred on the 11th iteration. The resulting constant value of PSO with LDIW method is stored in the workspace, where the optimal parameter values produced are: KP = 9.5401, KI = 4,666 and KD = 0.9504 with a value ITAE (Integrated Time absulute Error) = 6506.4971. Furthermore, the PID control simulation using the optimal parameters with sampling time 150 and the setpoint temperature 40 ° C, following the curve of simulation results.

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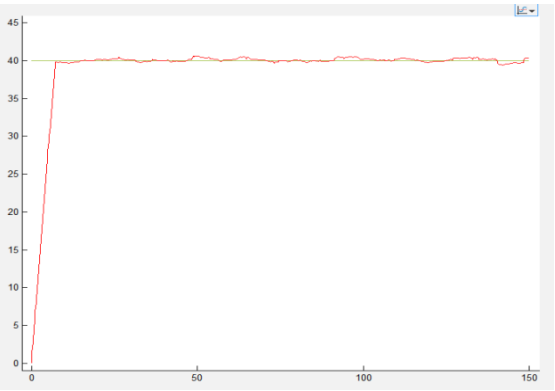

Figure 5. Rise time and Settle time of the simulation results PID-PSO with LDIW.

The simulation results show that the control system response curves corresponding to the set point (40°). Rise time is reached at the 7:18 time simulation and settle time at 15.76 time simulation, as in Figure 5, where the X axis is time simulation and the Y axis is in units of temperature °C.When the setpoint is reached and the control system running, Error generated 0:18%. Overshoot does not occur when raise the target because the PSO with LDIW better methods for changing the value of the gain Error, ΔError and output so PWM value given is not too high. The following comparison table PSO simulation results without and with LDIW.

Table 1. Comparison of the simulation results PSO

Setpoint	PSO fixed (W = 0.4)			PSO with LDIW (0.4<W<0.9)		
	Rise time	Settle time	Error	Rise ime	Settle time	Error
40	7.63	27.74	0.26%	7.18	15.76	0.18%

6. Conclusion

PID controller based on PSO can be applied to a prototype plant temperature control with LM35 temperature sensor as a feedback control system through a port connected arduino serial ADC integrated with Matlab-Simulink. Optimization results expelled through PWM port arduino to control the heater and blower, so that the defined set point temperature can be achieved steady state.

On set point temperature of 40 °C, the average value obtained error 0.18%, compared with manual PID tuning is 0.78% and the PID-PSO fixed inertia 12.26%.

The use of PID controller based on PSO with LDIW method shows faster performance, with rise time 7.18 ms, settle time 15.76 ms compared with the results of the PID control - PSO fixed Inertia, rise time is reached at 7.63 ms, settle time 27.74 ms.

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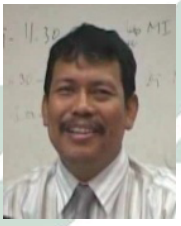
Fachrudin Hunaini received the B.Sc. degree in Electrical Engineering from the University of Widyagama, Malang, Indonesia, in 1991 and M, Eng., degree in Electrical Engineering from Sepuluh Nopember Institute of Technolgy, Surabaya, Indonesia in 1999. At this time as a candidate Dr.Eng. in Electrical Engineering at Sepuluh Nopember Institute of Technolgy, Surabaya, Indonesia. The current research focused on optimal control system-based on behavior on the steering of vehicles using Steer-by-wire system.

Resa Dian Pradikta received the B.Sc. degree in Electrical Engineering from the University of Widyagama, Malang, Indonesia, in 2016 and The current research focused on optimal control system-based on behavior on Temperature optimal control system.



Imam Robandi, He recived B.Sc. degree in power engineering from Sepuluh Nopember Institute of Technolgy, Surabaya, Indonesia in 1989, and M, Eng., degree in Electrical Enginering from the Bandung Institute of Technology, Indonesia in 1994 and Dr.Eng. degree in the Department of Electrical Engineering from Tottori University, Japan, 2002. He is currently Professor and as Chairman of the Laboratory of Power System Operation and Control in the Department of Electrical Engineering, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia. His current reasearch interest includes Stability of power systems, Electric Car, Solar cell and Artificial Iintelegent Control.

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SPEED CONTROL OF BRUSHLESS DC MOTOR FOR ELECTRIC VEHICLES APPLICATION

Darmansyah[*], Imam Robandi[**],

** The Author is with the Department of Electrical Engineering, Institut Teknologi Sepuluh November, Surabaya.*

E-mail: darmansyah15@mhs.ee.its.ac.id.

*** The Author is with the Department of Electrical Engineering, Institut Teknologi Sepuluh November, Surabaya.*

E-mails: robandi@ee.its.ac.id

Abstract

Speed Control is one of the system in Brush Less Direct Current (BLDC) motors used on Electric Vehicles (EV). The BLDC motor speed controlled by using Proportional Integral (PI) controller. BLDC motor speed controlled using PI controller have a better performance in the realization time and reliability. Analysis of the simulation results by analyzing battery charging condition indicator, stator current, electromagnetic torque and rotor speed.

Keywords: *Speed Control, Brush Less Direct Current (BLDC) motor, Proportional Integral (PI) controller, Electric Vehicle (EV)*

I. Introduction

In recent years, Indonesia has experienced energy shortages of fuel due to the consumption of fuel oil in the country by motor vehicles and other needs far greater than domestic production so that Indonesia becomes importer of oil. As an alternative to vehicles with the fuel, then the last few years developed an electric vehicle. One part of the development of electric vehicles is the speed control.

BLDC motor is a rotating synchronous machine. The stator and rotor magnetic fields are rotating at same frequency. The stator is made up of laminated steel stacked to carry the stator windings and the rotor has permanent magnets. Te number of poles on the rotor depends upon the application. In BLDC motors, the brushes and commutator arrangement is replaced by a Power Electronic converter.

II. Motor Drive and Control

This motor uses a three-phase bidirectional bridge, made with transistors and diodes parallel to each, in the last transits the back current when speed control occurs. In order to optimize the output torque, it is applied a conduction angle control 120^0 technique to the BLDC motor [2].

Controlling the current (trapezoidal shape) that goes through the motor's terminals, exciting just two of them simultaneously and the third is maintained free during 120^0 of the transistors conduction [3]. This strategy requires the knowledge of the rotor position, commonly acquired by using an encoder sensor. It was identified that the system consumes energy in each part of the process, due to the BLDC is operating as a motor, and it is continuously connected to the energy source [5]. Considering that issue the proposed architecture will isolate the unidirectional source during each deceleration,

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with the aim to let the generator to redirect the current recovered. As the motor is a permanent magnet one, when it is disconnected from the voltage source and the rotor is still in movement, it generates enough flux at the windings to behaves as a generator [1].

The BLDC is a kind of permanent magnet synchronous motor. It is powered by three waves 120 degrees out of phase with a rectangular shape. Also since it has three phases located in the stator armature coils and a magnetic rotor in motion, it presents a large advantage over others [7]. Electric motors are the core technology for EV and to be incorporated into them certain characteristics must be met, such as: high torque and power density, high efficiency over wide speed and torque ranges, must have wide constant power operation capability and robustness for vehicular environment. Studies have led to permanent magnet brushless motors to become the most attractive to meet these requirements [6].

In Power Electronic Converter as shown in Figure 2, two switches are conducting at any instant of time. One switch is from upper side and one from lower side of the bridge. For a star connected system, only two phases are connected to the input and the third phase is lef free. Each phase is conducting for a period of 120^{o} electrical during fat portion of back EMF. For a period of 60^{o} electrical commutation event occurs between phases. The details pertaining to rotor position are needed for proper commutation. By using Hall efect sensors, the position of rotor can be directly detected by observing back EMF of open phase 3 [2].

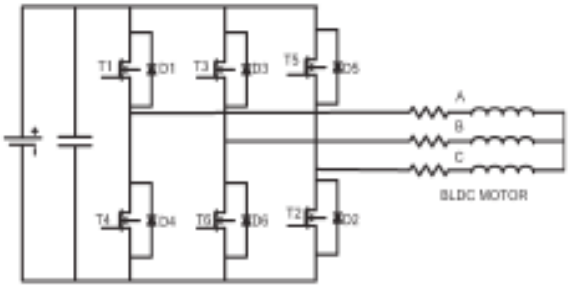

Figure 2. Typical Inverter Drive system for a BLDC motor

BLDC motors are electronically commutated. The stator windings of a BLDC motors should be energized in a cycle. The knowledge of rotor position is required to track the proper energizing cycle. The Hall effect sensors detect the position of rotor. The Hall effect sensors are mounted on the stator 4. From the observation of Hall Effect sensors, we can get a 3-b code with values ranging from one to six. The present location of rotor in a sector can be identified by this code. Appropriate exciting sequence for rotor rotation is obtained by each code value. In Hall Effect sensors, the invalid states are state "0" and state "7". The logic levels of sensors are such that sensor C represents the Most Significant Bit (MSB) and sensor A gives the Least Significant Bit (LSB). Te state table gives the details of inputs to the sensors and the equivalent drive state necessary for commutation. In a BLDC speed control can be done by changing the applied motor phase voltages 5,6 [3]. To change the motor phase voltages, Pulse Width Modulation (PWM), or hysteresis control 7,8 can be employed. A new fixed frequency digital pulse width modulation controller has been implemented, simulated and experimentally verified for BLDC motor [4]. The introduction of digital controller in BLDC digital system, the speed can be regulated by two levels of operation such as low duty level and high duty level. The digitals controller does not require any state observer [3]. Figure 1 shows the simulation blocks of controller for BLDC motor using MATLAB.

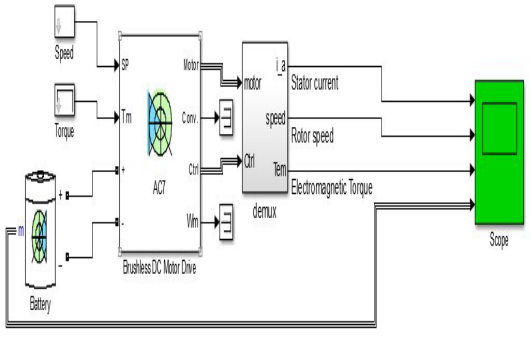

Figure 1. Simulation block for speed control of BLDC motor using MATLAB

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III. Simulation &Analysis

Results of simulation using MATLAB:

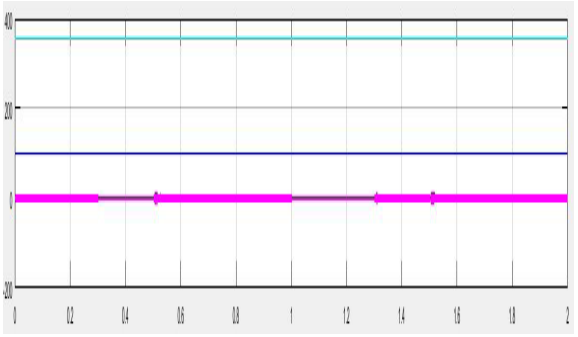

Figure 3. Simulation results of voltage, current and state of charging battery

DC bus voltage 300 V constant, dc bus current 100 A constant and speed control of BLDC motor correspond with battery State of Charging (SOC).

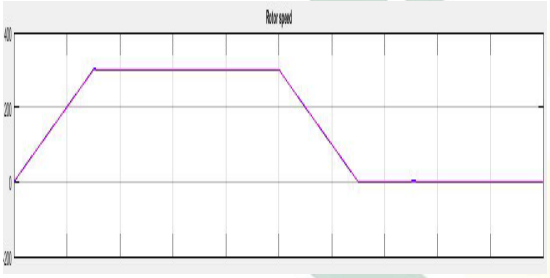

Figure 4. Simulation result of rotor speed

BLDC rotor speed controlled: speed increase until 350 rpm

from 0 second to 0.3 second, constant 350 rpm from 0.3 second to 1 second, speed decrease to 350 rpm to 0 from 1 second to 1.3 second and speed 0 for more than 1.3 second.

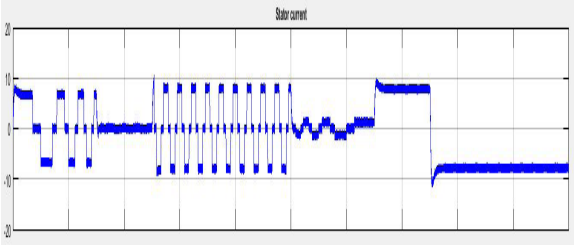

Figure 5. Simulation result of stator current

Stator current fluctuated from 0 second until 1.3 second 10 A to -10 A and constant -10 A after more than1.3 second.

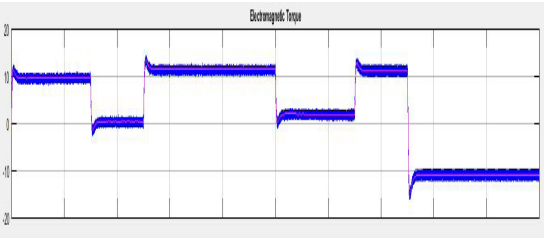

Figure 6. Simulation result of Electromagnetic Torque

Electromagnetic Torque fluctuated from 0 second until 1.3 second 10 N.m to -10 N.m and constant -10 N.m after more than1.3 second.

IV. Conclusions

This research has presented the BLDC motors speed can controlled base on *Proportional Integral (PI)* controller with speed range 0 to 350 rpm, electromagnetic torque -10 N.m to 10 N.m and dc bus voltage 300 V, dc bus current 10 A.

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SHORT TERM LOAD FORECASTING USING *INTERVAL TYPE – 2 FUZZY INFERENCE SYSTEM*

Jamaaluddin
Dept. Of Electrical Engineering, Institute of Technology, Sepuluh Nopember (ITS), Surabaya 60111, Indonesia.
Dept. Of Electrical Engineering, University of Muhammadiyah Sidoarjo, Sidoarjo 61271, Indonesia. jamaaluddin15@mhs.ee.its.ac.id
Imam Robandi
Dept. Of Electrical Engineering Institute of Technology, Sepuluh Nopember (ITS), Surabaya 60111, Indonesia. robandi@ee.its.ac.id

Abstract

Accurate Short Term Load Forecasting (STLF) is essential for a variety of decision making processes. Forecasting of load is related with generation power systems, the power delivery schedule (dispatch scheduling), maintenance planning for the generating unit (maintenance units) and evaluation regarding the reliability of the electric power system stability (stability). This paper proposes the application of Interval Type-2 Fuzzy Inference System (IT-2 FIS). By analyzing the peak load on the day and 4 days before day in the previous year continued analysis by using IT-2 FIS will be obtained at the peak load forecasting a day in the coming year. IT-2 FIS, with extra degrees of freedom, are an excelent tool for handling prevailing uncertainties and improving the prediction accuracy. Experiments conducted withreal datasets show that IT2-FIS models approximate future load demans with an acceptable accuracy.

Keywords: *Short Term Load forecasting, Interval Type-2 Fuzzy Inference System.*

Introduction

Since the Industrial Revolution, the need for electrical energy has increased. Most of the energy required by modern society is supplied in the form of electrical energy [1]. Therefore, electrical energy is a basic necessity today, aside from other major needs (such as eating, clothing and housing). Without electricity in one minute, modern society cannot perform activities [2][3]. Electric power is used in various sectors, among others: the industrial sector, public services, hospitality, research centers, education and household.

Operators of electricity require accurate estimation of electricity needs. To obtain a high level of power generation efficiency. Load prediction is very closely related to the operation of power systems, for example, the power delivery schedule (dispatch scheduling), maintenance planning for the unit generating unit (maintenance units) and evaluation regarding the reliability of the electric power system stability (stability) [4][5].

Over the past two decades, there has been atremendous growth in the use of fuzzy logic controllers in power systems applications [6]. One method that can be used to make short-term load forecasting is: *Interval Type – 2 Fuzzy Logic System (IT-2 FLS)*. This method is an extension of previous methods, ie: *Type –1 Fuzzy Inference System (T-1 FIS)*. By using the method of *IT-2 FIS*, load demand can be predicted in the upcoming. By doing So, the schedule of power delivery (dispatch scheduling), maintenance planning for the unit generating unit (maintenance units) and employee working hours arrangements can be planned early, with an expectation to increase the efficiency of power generation [7].

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Methods

1. *Structure of Interval Type- 2 Fuzzy Logic System (IT-2 FLS)*

An *IT-2 FLS* contains five interrelated components, ie: ***fuzzifier, rules base, inference engine, type-reducer*** and ***defuzzifier*** shown in Figure 1. Process mapping of crisp value input x to output crisp value can be expressed quantitatively in equation $Y = f(x)$.

Figure 1. below indicates that the value a good crisp of defuzzification input into type 0 (known as single fuzzification), *Type-1* or *Interval Type – 2 Fuzzy Sets* (*IT-2 FS*$_S$), then the inference engine to produce an output of rule base *IT-2 FS*$_S$. IT-2 FSS is then processed by the type-reducer (combining of set output and then calculating the centroid), leading to T-1 FIS called a type of reduced set. A Defuzzifier and then get it defuzzification type-reduced set to produce a crisp output. Formulation process mapping from input to output using *Interval Type-2 fuzzy logic* called *IT-2 FIS*. *IT-2 FIS* structure is in MATHLAB objects that contain all of the information *IT-2 FIS*. This structure is kept in any GUI tool [4].

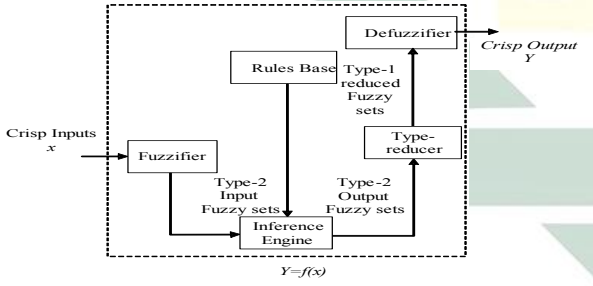

Fig. 1. *Type-2 Fuzzy Logic System (T2FLS)* **[8]**

2. *Membership functions and fuzzy rules*

The advantage of the fuzzy inference is easy to formulate the experience and knowledge of experts and highly flexible in forecasting by changing the rules. Fuzzy IF-THEN rules are used in this method for a maximum load is expressed by Equation 1. As follows:

$$IF\ X\ is\ A_i\ AND\ Y\ is\ B_i\ THEN\ Z\ is\ C_i \quad (1)$$

Input of variable values Y obtained from the adjacent holiday in one year. Fuzzy sets A_i, B_i, C_i makes eleven sets, where each set consists fuzzy, fuzzy type-1 top and bottom, then restricted as *FOU* and called *interval type-2 fuzzy sets (IT2FSs)* [7].

3. *Operation on Membership Function Type-2*

The following operations on the set of fuzzy, membership function of type-2. As shown Fig.2:

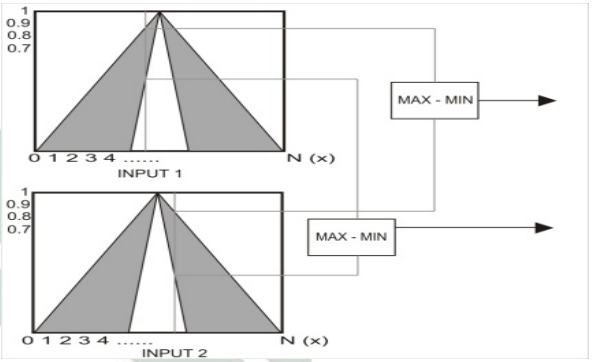

Fig. 2. Operations on Membership Function *Type-2*

Operations on fuzzy set *Interval Type-2 Fuzzy Set* is almost the same as type-1, only the *fuzzy logic system Interval Type-2*, the operation is performed on the two intervals, the top (upper function) and bottom (lower membership function) at once.

4. *Type-2 Fuzzy Inference System (FIS)*

FIS in type-2 is almost the same as the *FIS* in type-1, using the same stage. *FIS* operation of type-2 can be seen in Figure 3 for completion "tips" meals together as follows [9].

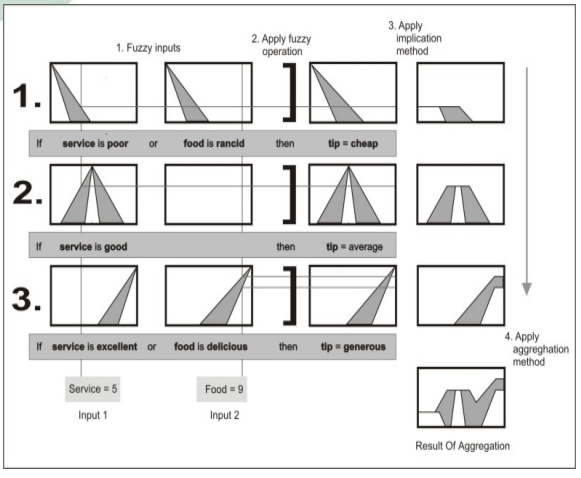

Fig. 3. Mamdani *FIS* **on** *Type-2*

Figure. 3. It seen that the columns are three grades of service criteria: poor services,

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good, excellent. While the taste of the food groups is valued criteria, Not tasty and delicious. Both of the above group becomes the input of Fuzzy. In the group of tips that are the result of the acquisition value of the input earlier, has three criteria: cheep, average and generseus. With process analysis, then showed aggregation as in Figure 3.

5. Defuzzification

Defuzzification is the process of mapping the fuzzy, logic control through type-reducer with an iterative method for calculating the centroid IE Karnik Mendel algorithm to control the actions nonfuzzy (crisp). This is possible because the central area of a *IT-2 FSs* is the *Type-1 Fuzzy*, *sets* (*T-1 FSs*) and the set is really marked by the end point on the left and right then, calculating the centroid of *Interval Type-2 Fuzzy*, sets simply requires computing two end points. Using a centroid defuzzification process in *IT-2 FLS* been proposed by Karnik and Mendel [10].

STEP of process

A. Preprocessing

In the preprocessing stage is a grouping of data national religious holidays. Then calculate the peak load 4 days before Forecasting days [11].

$$MaxWD_{(i)} = \frac{WD_{(i)h-4} + WD_{(i)h-3} + WD_{(i)h-2} + WD_{(i)h-1}}{4} \quad (2)$$

The next step is calculating the difference in peak load (Load Difference) days will be predictable.

$$LD_{MAX}(i) = \frac{MaxSD(i) - MaxWD(i)}{MaxWD(i)} x100 \quad (3)$$

Then look for a Peak Load Variation (Variation Load Reference) on a day that would be predictable.

$$VLD_{\max}(i) = LD_{\max}(i) - TLD_{\max}(i) \quad (4)$$

B. Processing

The next process at this stage is to enter STLF models into IT-2 FIS and Neural Network with the following steps:

1. Creating a membership function input *interval type-2 fuzzy logic system* that inputs *X* and *Y*, and *Z* that Output membership function for a religious national holiday to be predictable. With the following conditions:
   X: VLD_{max} *(i)* the same public holidays in the year before forecasting.
   Y: VLD_{max} *(i)* previous holidays (adjacent) in the same type of holiday in forecasting
   Z: Forecast VID_{max} (on) a holiday that will forecast

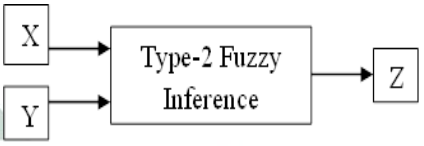

Fig. 4. Input and Output for Data Processing

2. Create a fuzzy rules (fuzzy, rules) *Interval Type-2 Fuzzy, Inference System (IT-2FIS*) as follows[11]:

IF X is A_i AND *Y* is B_i THEN *Z* is C_i

3. Applying operation on the (*IT-2 FIS*).
4. Applying the *MIN* function on fuzzy, implications.
5. Applying the composition *MAX* on each fuzzy, implication results.
6. Calculating firm output (non fuzzy, values) with the assertion method Centroid through reducer type using Kernik Mendel algorithm so as to get the value Forecast VLD_{max}

C. Flowchart of Forecasting by Using IT-2

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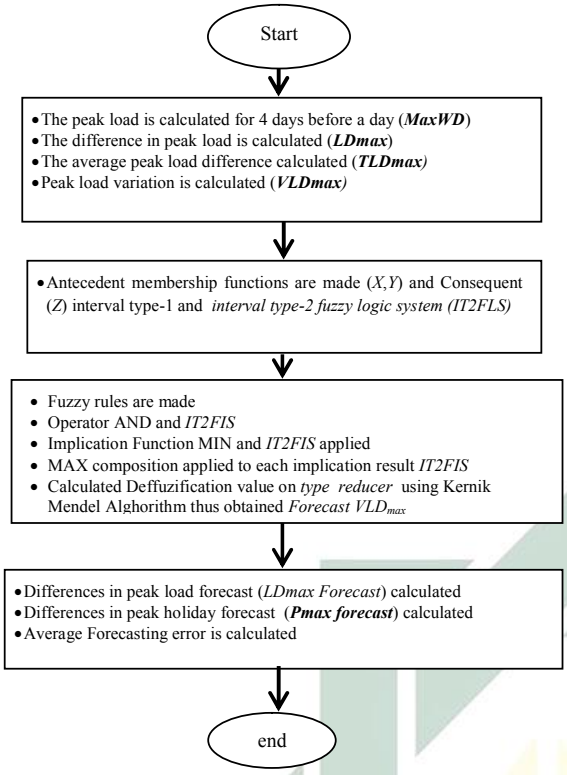

Fig. 5. Diagram of Forecasting for *IT-2 Fuzzy*

D. Post processing

In the post-processing stage of the calculation results of short-term load forecasting, the following:

1. Calculate the difference peak load forecast (load forecast reference) for a day of forecast:

$$Forecast\ LD_{MAX}(\mathrm{I}) = ForecastVLD_{MAX}(\mathrm{I}) - TLD_{MAX} \quad (5)$$

Calculate the difference of the day peak load forecast:

$$P'_{MAX}(i) = MaxWD(i) + \frac{(ForecastLD_{MAX} x MaxWD(i))}{100} \quad (6)$$

2. Calculating error forecasting results:

$$Error\% = \frac{P_{forecast} - P_{actual}}{P_{actual}} x100$$

$$Error\% = \frac{P'_{MAX}(i) - MaxSD(i)}{MaxSD(i)} x100 \quad (7)$$

Peak Load Forecasting Using *IT-2 FIS*

E. Membership Function for Input and Output Variable

The set of *Interval Type-2 Fuzzy*, fuzzy sets similar to the type-1. *Interval Type-2 Fuzzy*, done twice a *fuzzy*, membership function type-1. Input variables (*X, Y*) and output variables (*Z*) consists of 11 *fuzzy* sets are described as follows:

Negative Very Big (NVB) range of values -12 s/d -8
Negative Big (NB) range of values -10 s/d -6
Negative Medium (NM) range of values -8 s/d -4
Negative Small (NS) range of values -6 s/d -2
Negative Very Small (NVS) range of values -4 s/d 0
Zero (ZE) range of values -2 s/d 2
Positive Very Small (PVS) range of values 0 s/d 4
Positive Small (PS) range of values 2 s/d 6
Positive Medium (PM) range of values 4 s/d 8
Positive Big (PB) range of values 6 s/d 10
Positive Very Big (PVB) range of values 8 s/d 12

The figure of the antecedent (*X, Y*) and consequent (*Z*) *IT-2 FIS* as follows:

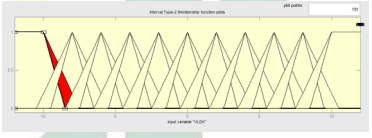

Fig. 6. Membership Function Input Variable *X (IT-2 FIS)*

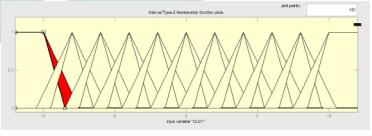

Fig. 7. Membership Function Input Variable *Y (IT-2 FIS)*

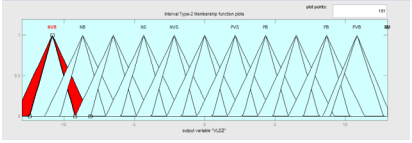

Fig. 7. Membership Function Input Variable *Z (IT-2 FIS)*

Translation of antecedent membership functions (*X, Y*) and consequent (*Z*) is used for the manufacture of the *Rules Base Fuzzy Inference System*. Making the basic rules of Fuzzy *(Fuzzy Rule Base)* short-term load fore-

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casting.

F. Implementation forecasting of Short Term Load for a day using Method Interval Type-2 Fuzzy Inference System (IT2FIS).

Short-term load forecasting using the *Interval Type-2 Fuzzy Inference System* executed through m.file program in Matlab using the given function in the Toolbox *IT-2FLT*, to obtain the value of forecasting *VLDmax. Value of VLDmax forecasting* results continued (post processing) using software MS.Excell to get the peak load forecasting and forecasting error value.

CONCLUSION

This paper presented Short Term Load Forecasting *a* day by using *Interval Type-2 Fuzzy Inference System (IT-2 FIS)*. Load forecasting is done is to predict the maximum load. Input analysis in the form of daily peak load value and calendar information. Input this analysis is the value of daily peak load and calendar information.

With the above results, the *IT-2 FIS* can be proposed as one of the methods used to conduct short-term load forecasting. To increase the accuracy of the model, it can be done expand the membership function of the current forecast model. When do expansion membership function, then the data will have a smaller range and will obtain more accurate forecasting results [12].

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PROSEDUR PEMBERIAN PINJAMAN YANG TEPAT DAN SYSTEM YANG EFEKTIF UNTUK MEMINIMALISIR KREDIT MACET (STUDI PADA USAHA SIMPAN PINJAM TANI JAYA MOJOKERTO)[1]

Henny Dwijayani[a,b], Gigih Yuliadi[a]

[a] *Program Studi Manajemen, Fakultas Ekonomi, Universitas Darul'Ulum Jombang, Indonesia.*

[b] *Program Doktor Ilmu Manajemen, Fakultas Ekonomi dan Bisnis, Universitas Brawijaya Malang Indonesia.*

hennydwija@gmail.com, gigihyuliadi@ymail.com

Abstract

Sistem manajemen yang efektif memberi dampak positif pada sisi pendapatan karena resiko yang terjadi pada penyaluran kredit dapat diantisipasi lebih awal. Setiap usaha terdapat resiko sehingga diperlukan penerapan prinsip kehati-hatian (prudensial) dalam menyalurkan kredit atau pinjaman dan diperlukan manajemen yang baik. Permasalahannya adalah Prosedur apakah yang tepat untuk pemberian pinjaman dan Sistem apakah yang efektif untuk pemberian pinjaman agar dapat meminimalisir kredit. Analisis data yang digunakan adalah dengan menggunakan model Miles Dan Huberman. Ditemukan model prosedur dan sistem pemberian pinjaman bahwa prosedur dan sistem yang diterapkan yaitu mulai pinjaman diberikan sampai dengan pinjaman lunas meliputi, permohonan pinjaman, persyaratan pinjaman, pemeriksaan berkas, survey calon peminjam, taksasi (penilaian) agunan, analisa pinjaman, kontrak pinjaman, pencairan pinjaman dan pengawasan pinjaman. Sedangkan Penyelesaian kredit bermasalah menggunakan cara yang arif, karena koperasi dalam melayani pinjaman terhadap anggotanya bersifat pembinaan bukan semata-mata hanya mencari keuntungan.

Keywords: *Prosedur Pinjaman, Analisis Pinjaman, Kredit Macet. Model Miles Dan Huberman*

1. Pendahuluan

Perkreditan tidak dapat dipisahkan dari bidang usaha apapun karena perkreditan sangat berperan dalam memberikan bantuan fasilitas pembiayaan atau investasi terhadap pengembangan maupun pendirian suatu usaha. Seiring dengan tingkat peradaban manusia, maka akan berpengaruh terhadap tingkat kebutuhan barang dan jasa. Dari alasan inilah sehingga setiap produsen berusaha untuk saling berebut konsumen dengan cara meningkatkan baik kualitas dan kuantitas produk-produk yang dihasilkan maupun mutu pelayanannya.

Sistem manajemen yang efektif memberi dampak positif pada sisi pendapatan karena resiko yang terjadi pada penyaluran kredit dapat diantisipasi lebih awal. Bila dalam usaha simpan pinjam banyak terjadi kredit bermasalah maka pendapatan yang merupakan tujuan akhir dari koperasi akan mengalami penurunan dan tidak sesuai dengan yang direncanakan. Kredit bermasalah

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sebenarnya bersifat kasuasitas, yang artinya masalah yang ada pada satu debitur akan berbeda dengang debitur lainnya [1].

Untuk mencegah terjadinya penggunaan dana yang tidak proporsional, maka koperasi perlu menerapkan sistem manajemen anggaran sehingga dana yang dikelola dapat efektif dan efisien sesuai dengan peruntukannya. Karena Koperasi Jasa Keuangan (KJK) bergerak dalam bidang menerima dana anggota sebagai simpanan dan menyalurkannya kepada anggota, maka perlu meningkatkan sistem manajemen perkreditan untuk menghindari terjadinya kerugian, karena usaha apapun bentuknya selelu mengandung resiko. Kredit macet adalah suatu keadaan dimana nasabah sudah tidak sanggup membayar sebagian atau seluruh kewajibannya kepada bank seperti yang telah diperjanjikan dalam perjanjian kredit [2].

Setiap usaha terdapat resiko sehingga koperasi menerapkan prinsip kehati-hatian (prudensial) dalam menyalurkan kredit/ pinjaman dan diperlukan manajemen yang memadai. Meskipun demikian tidak jarang Seorang analis kredit tidak dapat memprediksi bahwa kredit yang telah diberikan akan selalu berjalan dengan baik, banyak faktor penyebabnya diantaranya kesalahan dalam melakukan analisa atas penggunaan kredit karena kurangnya informasi, manajemen yang kurang baik, dan kondisi perekonomian mempunyai pengaruh yang besar terhadap kesehatan keuangan debitur.

Berdasar pendahuluan dan latar belakang dapat dirumuskan permasalahan sebagai berikut:

a. Prosedur apakah yang tepat untuk pemberian pinjaman pada usaha Simpan Pinjam Tani Jaya Mojokerto
b. Sistem apakah yang efektif untuk pemberian pinjaman agar dapat meminimalisir kredit macet di Usaha Simpan Pinjam Tani Jaya Mojokerto

2. Tinjauan Pustaka

Koperasi simpan pinjam adalah koperasi yang kegiatannya hanya usaha simpan pinjam. Sedangkan Unit Simpan Pinjam adalah unit koperasi yang bergerak di bidang usaha simpan pinjam, sebagai bagian dari kegiatan usaha Koperasi yang bersangkutan. Kegiatan usaha simpan pinjam adalah kegiatan yang dilakukan untuk menghimpun dana dan menyalurkannya melalui kegiatan usaha simpan pinjam dari dan untuk anggota koperasi yang bersangkutan, calon anggota koperasi yang bersangkutan, koperasi lain dan atau anggotanya. [3]

Kredit adalah uang atau tagihan yang dapat dipersamakan dengan itu, berdasarkan persetujuan atau kesepakatan pinjam meminjam antara bank dengan pihak lain yang mewajibkan pihak peminjam melunasi utangnya setelah jangka waktu tertentu dengan penberian bunga. Kredit merupakan kesepakatan antara bank (Kreditur) dengan nasabah penerima kredit (Debitur), dengan perjanjian yang telah dibuat mencakup hak dan kewajiban masing masing termasuk jangka waktu kredit dan bunga [4]

Batas Maksimal Pemberian Kredit (BMPK)

Penempatan dana yang tidak didukung oleh kemampuan dalam mengelola konsentrasi penempatan dana secara efektif akan memperbesar resiko atau kegagalan. Untuk mengurangi potensi kegagalan usaha bank sebagai akibat dari konsentrasi penyediaan dana tersebut maka perlu menerapkan prinsip kehati-hatian, antara lain dengan melakukan penyebaran dan diversifikasi portofolio penyediaan dana terutama melalui pembatasan penyediaan dana, baik kepada pihak terkait maupun kepada pihak bukan terkait sebesar persentase tertentu dari modal bank atau yang dikenal dengan Batas Maksimum Pemberian Kredit (BMPK) [1]

Prosedur dalam pemberian Kredit

a. Permohonan Kredit (pengajuan berkas), Dalam hal ini permohonan kredit yang dituangkan dalam suatu proposal, yang dilampiri berkas-berkas yang dibutuhkan
b. Penyelidikan berkas pinjaman, Bertujuan

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untuk mengetahui apakah berkas yang diajukan sudah lengkap sesuai persyaratan dan sudah benar.

c. Wawancara I, Wawancara dengan calon peminjam, untuk meyakinkan apakah berkas-berkas tersebut sesuai dan lengkap seperti dengan yang dibutuhkan.
d. On the spot, Merupakan kegiatan pemeriksaan kelapangan dengan meninjau berbagai objek yang akan dijadikan usaha atau jaminan.
e. Wawancara II, Merupakan kegiatan perbaikan berkas, jika mungkin ada kekurangan-kekurangan pada saat setelah dilakukan on the spot di lapangan. Catatan yang ada pada permohonan dan pada saat wawancara I dicocokkan dengan pada saat on the spot apakah ada kesesuaian dan mengandung suatu kebenaran.
f. Keputusan kredit, Keputusan kredit dalam hal ini adalah menentukan apakah kredit akan diberikan atau ditolak, jika diterima, maka dipersiapkan adaministrasinya, biasanya keputusan kredit yang akan mencakup; jumlah uang yang diterima, jangka waktu dan biaya yang harus dibayar. Keputusan kredit biasanya merupakan keputusan team, begitu pula bagi kredit yang ditolak.
g. Penandatanganan akad kredit/perjanjian lainnya, Kegiatan ini merupakan kelanjutan dari diputuskannya kredit, maka sebelum kredit dicairkan maka terlebih dahulu calon nasabah menandatangani akad kredit, mengikat jaminan dengan hipotek dan surat perjanjian atau pernyataan yang dianggap perlu.
h. Realisasi kredit, Realisasi kredit diberikan setelah penandatangan surat-surat yang diperlukan.
i. Penyaluran/penarikan dana, Adalah pencairan atau pengambilan uang dari rekening sebagai realisasi dari pemberian kredit dan dapat diambil sesuai ketentuan dan tujuan kredit.

Unsur yang terkandung dalam fasilitas kredit menurut [4] terdiri dari 5 (lima) yaitu:

a. Kepercayaan (trust), Yaitu suatu keyakinan pemberi kredit bahwa kredit yang diberikan (berupa uang, barang atau jasa) akan benar-benar diterima kembali dimasa tertentu dimasa datang.
b. Kesepakatan, Disamping unsur percaya didalam kredit juga mengandung unsur kesepakatan antara pemberi kredit dengan penerima kredit. Kesepakatan ini dituangkan dalam suatu perjanjian dimana masing-masing pihak menandatangani hak dan kewajibannya masing-masing.
c. Jangka waktu, Setiap kredit yang diberikan memiliki jangka waktu tertentu, jangka waktu ini mencakup masa mengembalian kredit yang telah disepakati.
d. Risiko, Adanya suatu tenggang waktu pengembalian akan menyebabkan suatu risiko tidak tertagihnya /macet pemberian kredit. Semakin panjang suatu kredit semakin besar risikonya dan sebaliknya.
e. Balas jasa, Merupakan keuntungan atas pemberian kredit atau jasa tersebut yang kita kenal dengan bunga. Balas jasa dalam bentuk bunga dan biaya administrasi kredit ini merupkan keuntungan bank.

3. Metode Penelitian

Jenis penelitian kualitatif didefinisikan sebagai prosedur penelitian yang menghasilkan data deskriptif berupa kata-kata tertulis atau lisan dari orang – orang dan perilaku yang dapat diamati. Penelitian kualitatif adalah penelitian yang bermaksud untuk memahami fenomena tentang apa yang dialami oleh subjek penelitian misalnya perilaku, persepsi, motivasi, tindakan, dan lain lain. Secara holistik dan dengan cara deskripsi dalam bentuk kata-kata dan bahasa, pada suatu konteks khusus yang alamiah dan dengan memanfatkan berbagai metode ilmiah [5]

Data yang digunakan dalam penelitian ini adalah data primer yaitu semua data, informasi yang diperoleh langsung dari perusahaan dengan teknik wawancara digunakan untuk menggali informasi. Wawancara adalah merupakan pertemuan dua orang untuk bertukar informasi dan ide melalui tanya jawab, sehingga dapat dikonstruksikan mak-

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na dalam suatu topik tertentu [6]

4. Analisis Data

Analisis data kualitatif dilakukan secra interaktif dan berlangsung secara terus menerus sampai tuntas, hingga datanya sudah jenuh[6]. Penelitian ini disajikan juga dalam bentuk deskriptif yang membahas tentang bagaimana mekanisme penanganan prosedur dan sistem pemberian pinjaman guna meminimalisir pinjaman macet pada Unit Simpan Pinjam Tani Jaya Mojokerto.

Analisis data dilakukan melalui 3 tahap, yaitu:

Tahap pertama, Data Reduction (Reduksi Data) yaitu merangkum memilih hal yang pokok, memfokuskan pada hal yang penting, dicari pola dan temanya. Misal pada bidang prosedur dan sistem pemberian pinjaman, setelah peneliti memasuki perusahaan tempat penelitian, maka dalam mereduksi data, peneliti akan memfokuskan pada prosedur dan sistem pemberian pinjaman, dengan mengkatagorikan pada aspek tahap permohonan, syarat pengajuan pinjaman, analisa kelayakan pinjaman dan pengawasan setelah pinjaman diberikan.

Tahap kedua, Data Display (penyajian data) yaitu mendisplay data artinya menyajikan data dalam bentuk uraian singkat, bagan, hubungan antar katagori, dan sebagainya. Menyajikan data yang sering digunakan dalam penelitian kualitatif adalah bersifat naratif. Ini dimaksudkan untuk memahami apa yang terjadi, merencanakan kerja selanjutnya berdasarkan apa yang dipahami.

Tahap ketiga Conclusion Drawing / Verification, Langkah terakhir dari model ini artinya penarikan kesimpulan dan verifikasi. Kesimpulan dalam penelitian mungkin dapat menjawab rumusan masalah yang dirumuskan sejak awal namun juga tidak, karena masalah dan rumusan masalah dalam penelitian kualitatif masih bersifat sementara dan berkembang setelah peneliti ada di lapangan.

Berdasarkan pendapat tersebut diatas maka langkah-langkah dalam menganalisis data dalam penelitian ini menggunakan model Miles dan Huberman yaitu menggunakan analisis interaktif. Pengumpulan data yang diperoleh dilapangan disajikan dalam bentuk narasi, hasil dari pengumpulan data direduksi, dirangkum sehingga menemukan tema-tema dan pola pokok yang relevan dengan penelitian.

Hasil wawancara dan pengolahan data dapat diuraikan sebagai berikut:

Analisa Pinjaman

Meminimalisir terjadinya pinjaman bermasalah, pihak koperasi akan melakukan analisa terhadap permohonan pinjaman sebelum pinjaman diberikan dengan menggunakan pertimbangan 5C (Character, Capacity, capital, condition, collateral). Dengan dukungan data-data hasil wawancara dengan calon peminjam, pencocokan atas kebenaran data-data yang dilampirkan, survey terhadap lokasi usaha dan kediaman calon peminjam. Hasil pencocokan data tersebut dibuatlah sebuah proposal kelayakan pinjaman oleh bagian pinjaman (acount officer). Proposal yang telah diselesaikan diajukan pada komite pinjaman untuk mendapatkan opini yang direkomendasi oleh Kepala Bagian Pinjaman kemudian diajukan kepada manajer untuk mendapatkan sebuah persetujuan. Usaha Simpan Pinjam Tani Jaya juga perlu melakukan monitoring terhadap kolektibilitas pinjaman agar dapat diketahui sewaktu-waktu sejauh mana perkembangan pinjaman yang diberikan mengalami permasalahan.

Kontrak Pinjaman

Untuk memberi kepastian atas pinjaman yang akan diberikan maka dilakukan kontrak pinjaman yang didalamnya berisi tentang; data pemberi pinjaman dan peminjam, fasilitas pinjaman, plafon, agunan, jangka waktu, kewajiban dan hak masing-masing pihak, sangsi-sangsi dan penyelesaian perkara. Kontrak pinjaman merupakan surat perjanjian kesepakatan bersama antara pemberi pinjaman dan peminjam, agar masing-masing pihak dapat memahami hak dan kewajibannya. Sebelum calon peminjam menanda tangani surat perjanjian pinjaman ini terlebih dahulu bagian administrasi pinja-

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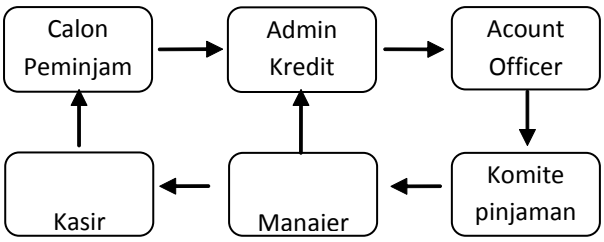
man membacakan isi dari perjanjian tersebut agar dipahami dan tidak terjadi salah persepsi. Selesai pembacaan isi kontak pinjaman jika kalau dirasa sudah cukup, maka calon peminjam harus menanda tangani surat perjanjian pinjaman, bersama suami atau istri yang selanjutnya dilakukan proses pencairan pinjaman melalui teller. Apabila pinjaman sudah dicairkan secara otomatis calon peminjam menjadi peminjam yang namanya telah masuk dalam file pinjaman. Antisipasi kinerja keuangan agar tetap terjaga, dibentuklah penyisihan aktiva produktif (cadangan penghapusan piutang) yang disisihkan dari planfon pinjaman sebesar 0,50% setiap kali terjadi pencairan pinjaman.

Meminimalisir Terjadinya Kredit Bermasalah

Untuk meminimalisir terjadinya kredit bermasalah Unit Simpan Pinjam Tani Jaya selalu menerapkan menajemen kredit dan melakukan prinsip prinsip pemberian pinjaman. Oleh karena kegiatan simpan pinjam merupakan sebuah usaha yang penuh dengan menanggung resiko, maka koperasi menerapkan sifat kehati hatian (prudensial). Untuk itu dalam menangani permohonan pinjam yang baru diterima dari calon peminjam sesuai yang diatas, maka dalam rangka untuk meminimalisir pinjaman bermasalah koperasi terlebih dahulu melakukan analisa terhadap calon peminjam, baik dengan wawancara, kunjungan kerumah dan meneliti berkas permohonan, jaminan dan lain lain, dan selalu tidak lepas dari prinsip pemberian pinjam yaitu 5C (Characte, Capacity, capital, condition, collateral). Selesai kredit tersebut dicairkan atau direalisasi kepada peminjam Unit Simpan Pinjam Tani Jaya dilakukan memantauan dan pengawasan penggunaan pinjaman oleh peminjam. Pengawasan diperlukan untuk langkah pencegahan dini terhadap pinjaman bermasalah.

Prosedur dan sistem pemberian pinjaman yang dilaksanakan oleh Unit Simpan Pinjam Tani Jaya sehingga proses pemberian pinjaman dapat digambarkan sebagai berikut:



Gambar 1. Prosedur Dan Sistem Pemberian Pinjaman

Dalam menyelesaikan kredit bermasalah Unit Simpan Pinjam Tani Jaya menggunakan cara yang arif, karena koperasi dalam melayani pinjaman terhadap anggotanya bersifat pembinaan bukan semata-mata hanya mencari keuntungan, cara yang ditempuh adalah:

a. Melakukan pendekatan secara kekeluargaan.
b. Melakukan penjadwalan ulang terhadap pinjaman yang bermasalah
c. Melakukan perubahan struktur atas pinjaman bermasalah
d. Mengkondisikan terhadap pinjaman bermasalah
e. Melakukan eksekusi terhadap jaminan, ini merupakan jalan terakhir bila memang ke empat cara tersebut sudah menemua jalan buntu.

5. Kesimpulan

Penerapan manajemen pinjaman oleh Unit Simpan Pinjam Tani Jaya Mojokerto sudah cukup baik. Prosedur dan sistem yang telah diterapkan yaitu mulai pinjaman tersebut diberikan sampai dengan pinjaman tersebut lunas meliputi, permohonan pinjaman, persyaratan pinjaman, pemeriksaan berkas, survey calon peminjam, taksasi (penilaian) agunan, analisa pinjaman, kontrak pinjaman, pencairan pinjaman dan pengawasan pinjaman. melaksanakan prinsip-prinsip pemberian pinjaman 5C yakni, character, capacity, capital, collateral dan condition of economic agar pinjaman bermasalah dapat ditekan seminimal mungkin.

Sistem pengawasan dan pemantauan pinjaman yang tepat dan efektif untuk

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mengantisipasi pinjaman macet dengan melakukan pembinaan terhadap peminjam, melakukan pemantauan pinjaman dengan menggunakan sistem komputerisasi, melakukan penggolongan terhadap pinjaman bermasalah (kolektibilitas pinjaman) dan melakukan penyelesaian melalui cara-cara pendekatan kekeluargaan, penjadwalan ulang, struturisasi, mengkondisikan dan sebagai jalan terakhir yang harus ditempuh dalam penyelesaian pinjaman bermasalah adalah dengan melakukan eksekusi jaminan.

6. Saran

Aktivitas penagihan perlu ditingkatkan, meskipun secara umum NPL semakin menurun, tetapi apabila tidak dilakukan penagihan yang lebih efektif maka aktiva produktif atau pinjaman yang seharusnya dapat ditarik kembali masih mengendap khususnya pada pinjaman kurang lancar dan pinjaman diragukan yang nantinya akan naik menjadi kolektibilitas 4 (empat) atau kredit macet sehingga akan berpengaruh pada kinerja keuangan.

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OPTIMAL DESIGN CONTROLLER MOTOR DC USING PID-NOVEL BAT ALGORITHM (NBA)

Irna Tri Yuniahastuti
Student of Power System Engineering
Institut Teknologi Sepuluh Nopember
Surabaya, Indonesia (031) 5947302
Email: irna14@mhs.ee.its.ac.id
Imam Robandi
Institut Teknologi Sepuluh Nopember
Surabaya, Indonesia (031) 5947302
Email: robandi@ee.its.ac.id

Abstract

Using of PID controller requires setting proper parameters to obtain optimal performance of the motor. Generally, controller use trial-error method, but the results are less than optimal. This research use method based on intelligent Novel Bat Algorithm (NBA) to optimize parameters of the PID. This study will compare methods without PID controller, PID trial-and-error and PID NBA. From the results obtained that NBA method can tune PID parameters appropriately, so it can decrease overshoot and settling time.

***Keywords**: Motor DC, PID, Trial-Error, NBA, Overshoot, Settling time*

INTRODUCTION

The use of DC motors in the industrial world are very widely used because of its structure is simple and has a very good stability [1]. In addition DC motors can provide high starting torque, easy in setting the pace so prevalent in some industries [2]. The major problem often discussed in the PID control parameters are control. One technique that often used is the conventional control trial- error, but for this method is difficult to adjust the parameters, so it takes a long time to find the right parameters [1] as well as the accuracy of control is not good

Researchers have many uses intelligent methods (Artificial Intelligent) for the determination of PID parameters DC motor. The researchers began studying the intelligent behavior of animals to be applied to solve optimization problems. The animals include bees, ants, wasps and find an algorithm of behavior of a habit or behavior of the animal.

In 2009, a researcher She Xin Yang found a clever method called intelligence bats and make a settlement algorithm inspired by the behavior of bats in search of food. Several methods of optimization-based methods of conventional and intelligent methods have been widely used to optimize PID parameters of DC motors, including PID control algorithm [4], Particle Swarm Optimization [5], Tabu Search [6], Bacterial Foraging [7], Fuzzy Logic [8], Genetic Algorithm [9], and Neural Network.

This research will be used a clever method (Artificial Intelligent) for tuning PID parameters of DC motor is by Bat Algorithm (BA) method and will be analyzed and compared the response speed of a DC motor with a conventional method (trial-and-error) PID and DC motor without a controller.

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BAT ALGORITHM (ba) [4]

Bat Algorithm (BA) is a new type of algorithm metaheuristic. It introduced by Xin Yang at 2010. This algorithm is inspired by the behavior of bats. Bats are animals that are very amazing because the animal is the only type of mammals that have wings to fly and have advanced capabilities in echolocation. Bats use a type of sonar called echolocation to detect the food, avoid obstacles and find the nest in the dark. Bats emit pulses with high-frequency sounds and listening to the echoes that bounce back from surrounding objects. Pulses emitted varies and can be connected with the animal hunting strategies depending on the species.

Objective function $f(x)$, $x = (x_1, ..., x_d)^T$
Initialize the bat population xi (i = 1, 2,..., n) and v_i
Define pulse frequency f_i *at* x_i
Initialize pulse rates r_i *and the loudness* A_i
while (*t* <*Max number of iterations*)
Generate new solutions by adjusting frequency, and updating velocities and locations/solutions
  if (*rand* > r_i)
Select a solution among the best solutions
Generate a local solution around the selected best solution
  end if
Generate a new solution by flying randomly
  if (*rand* < A_i & $f(x_i) < f(x_*)$)
Accept the new solutions
Increase r_i *and reduce* A_i
  end if
Rank the bats and find the current best x_*
end while
Postprocess results and visualization

Fig 1. Pseudo Code Bat Algorithm

Most bats use a frequency modulated signal is shortened to about one octave, while others are more frequently using a constant frequency signals for echolocation. Band width / wide-band signal may vary depending on the species and can often be improved harmonics. With the ability of echolocation, bats can fly into the night in search of food without bumping into anything.

DESIGN OF PID CONTROLLER based on Novel bat algorithm

A. *Modeling on DC Motor* [1]

Modelling a DC motor used is based on a paper that is where using a transfer function modeling. DC motor that is used of permanent magnet DC motors, rated speed of 1400 rpm to 1250 rpm speed during measurement. By entering a DC motor speed, then the transfer function of DC motors is,

$$G(s) = \frac{K_m}{T_m s + 1} \qquad (1)$$

Where, K_m is mechanic gain and T_m is time constant mechanics.

$$G(s) = \frac{2.75}{0.18s + 1} \qquad (2)$$

Fig 2. Modelling motor DC at Simulink

B. *Designing of the PID controller* [1]

PID control is one of controller used of large in industrial and has simple structure. PID controller control deviation e(t) according the given value r(t) and actual value y(t). Control law is as follows:

$$u(t) = k_p[e(t) + \frac{1}{T_i}\int_0^t e(t)dt + T_d\frac{de_t}{dt}] \qquad (3)$$

Where, u(t) is control value calculated by PID controller. K_p is the proportional coefficient, T_i is integral time constant and T_d is differential time constant. It describe as follows:

1) Proportional element: it reflects the deviation signal e(t) of control system proportionally. Once e(t) produced, PID controller generates contol effect immediately to reduce the deviation.
2) Integral element: it is mainly used to eliminate static error and inprove the stability of system
3) Diferensial element: it reflect the change the deviation signal, introduces a correction signal before the deviation signal value becomes bigger and accelerates the response of the system in order to reduce the setting.

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Thus, designing PID controller mainly means obtaining 3 parameter and configurating the three parameter of PID (K_p, K_i, K_d). In this paper, the NBA algorithm is proposed to search the optimal parameter.

Block diagram of the control system is shown in Fig 3.

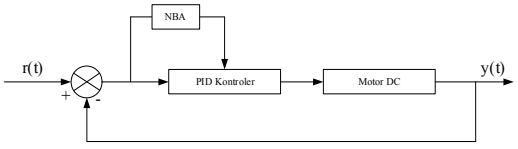

Fig 3. Controller PID-NBA system at Simulink

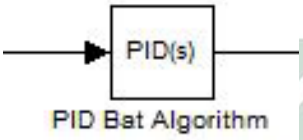

Fig 4. Modeling of PID at Simulink

SIMULATION AND ANALYSIS

Response speed DC Motor without controller

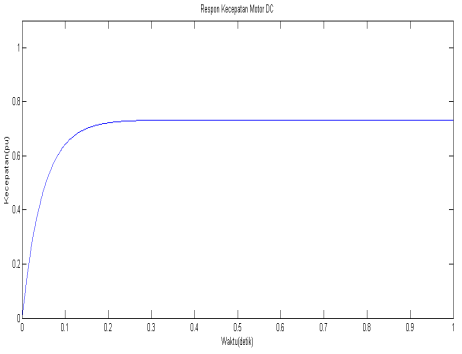

Fig 5. DC Motor speed response without controller, t=1s

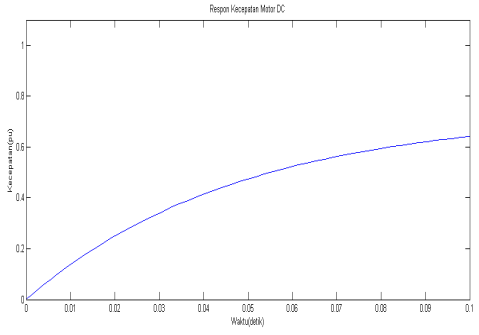

Fig 6. DC Motor speed response without controller, t=0.1s.

1. DC Motor speed response with PID Trial-Error

Secondly, result of simulation DC Motor with trial error method shown in Fig 7 and 8.

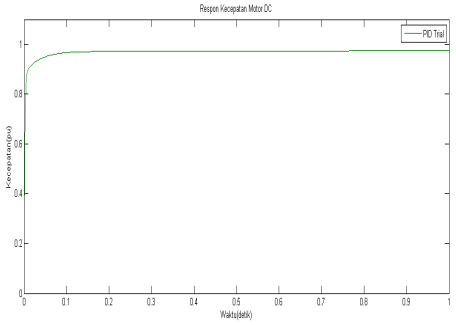

Fig 7. DC Motor speed response with PID-trial error, t=1s

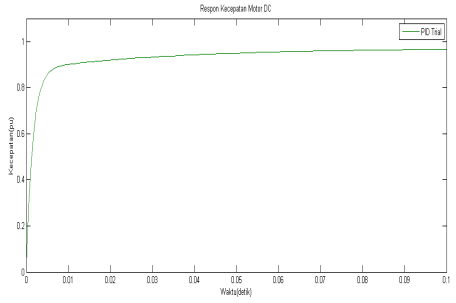

Fig 8. DC Motor speed response with PID-trial error, t=0.1s

Fig 7 and 8 shows settling time is very long, but is still better than Fig 5 and 6. The system can be stabilized in seconds more than 10s. It means that this control is not desire by the system because the system response long time would interfere with the performance of the plan are controlled.

2. Response speed control DC motor with PID-NBA

In the third method is DC Motor controller with PID-NBA.

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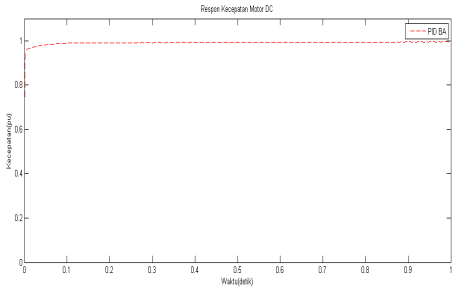

Fig 9. DC Motor speed response with PID-

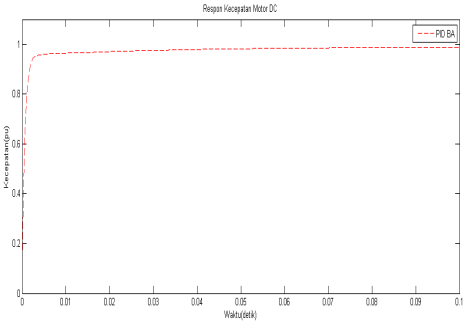

Fig 10. DC Motor speed response with PID-NBA, t=0.1s

Fig 9 and Fig 10 shows frequency response of DC motors with PID-NBA and response obtained very fast settling time compared with the others method. In which the system can be steady state in 0.2s. It can be concluded that intelligent methods to optimize PID parameters, the results obtained for the performance of PID is very good because it shows a fast response for DC motor control.

4.1 Motor DC response speed of all method

The comparison of value parameter of PID are shown in Table 1.

Table 1. Result of tunning PID parameters

Parameter	Trial-Error	NBA
Kp	12.0888	32.8323
Ki	1.4906	24.7934
Kd	0.2585	0.7482

Fig 11 and Fig 12 shows a comparison of all method to design DC motor has been simulated.

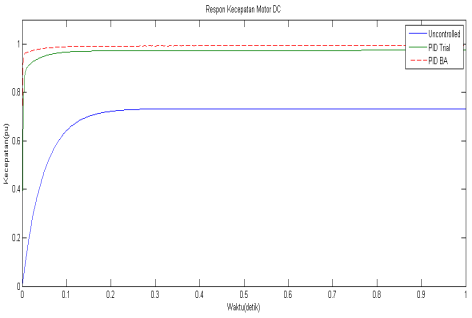

Fig 11. The Comparison of speed response DC motor with the other, t=1s

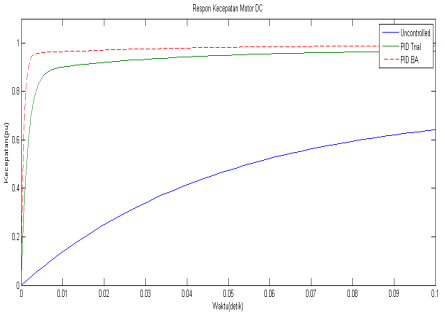

Fig 12. The Comparison of speed response DC motor with the other, t=0.1s

In Fig 11 and 12 show that Controller with PID-NBA find optimal solution quickly and efficiently and the optimal solution.

CONCLUSIONS

By using artificial intelligent BA (Bat Algorithm) as tunning PID controller, the result parameter tuning optimal PID where K_p= 32.8323, K_i= 24.7934, K_d= 0.7482.

Simulation shows that response of speed motor DC with PID-NBA, settling time more faster than trial-error method. PID-NBA system can be steady at time 0.5s.Thus using PID-NBA obtain response more faster than trial error method.

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DAYLIGHT DISTRIBUTION ESTIMATION FOR APARTEMENT BEDROOM DESIGN

Yose Rizal[1)2)], Imam Robandi[1], Eko Mulyanto[1]
yose15@mhs.ee.its.ac.id, robandi@ee.its.ac.id, ekomulyanto@ee.its.ac.id
[1]Department of Electrical Engineering, Sepuluh Nopember Institute of Technology Surabaya, Indonesia
[2)] Dept. Of Achitecture, University of Lancang Kuning, Pekanbaru, Indonesia.

Abstract

The design of natural lighting or also called daylight lighting (daylight) lighting design requires careful on achieving a good distribution and quality of natural lighting. Many of the architectural design which incorporates natural light through the window design based on assumptions and empirical review that is not measurable. The entry of natural light into the space affects the level of energy efficiency to the use of artificial lighting. The large number of lumens from the light source that will fall on the surface of the room on every Square foot (sq ft) would affect the value of illumination in the room. This study was conducted to determine the size of the lighting distribution of sunlight on occupant comfort. The method used is the direct measurement in the study area, collecting measurement data and map the numbers into a formula the density distribution of incoming light to further simulate the density distribution of daylight (daylight) that enters the room apartment at 8:00, 12:00 and 15:00 pm. Simulation of light distribution daytime (daylight) Yag used a simple method to help excel microsoft office programs where results can show the distribution of light from the highest intensity to the lowest intensity. The results showed that the value of the existing distribution are useful to conduct a study follow-up study on the distribution of light in the room. Illumination distribution is expected to be useful for the design of spatial structure for architects designing.

Keywords: natural lighting, daylight, light distribution.

Introduction

Natural lighting or Daylighting is a source of light for the full spectrum of human vision adaptation. Recent studies have shown that the adjustment of the daylighting of a building that can improve productivity in space. More importantly, daylight provides tremendous psychological benefits to building occupants, this should be the main point of daylight than modest reduction of artificial lighting requirements.

The extent and distribution of natural light in a room depends on three factors: Geometry of space, placement and orientation of windows and other openings and the characteristics of the internal surface. Design in form factor to accommodate daylight illumination requirements for activities in space and aims aesthetics of lighting

With the integration of the appropriate building and lighting control, daylight can significantly reduce the need for mock lighting. The integration of daylight strategy with electrical control can provide an automatic

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adjustment to provide minimum lighting levels with minimum use of electricity.

LITERATURE

1. Daylighting

Natural lighting is the lighting that comes from nature, which naturally exist in nature. For example: sunlight, moonlight, stars. Areas of natural lighting during the day is a comparison of the level of lighting at a point of a particular field in a space on a flat field illumination level in the open field, which is a measure of the performance of the room skylight.

Light is defined as a part of the electromagnetic spectrum that are sensitive to the human eye sight. 1 The wavelength of visible light is between 380-750 nm. Sunlight into the building can be divided into three (Szokolay et al, 2001), namely:

a. Direct sunlight;
b. The diffuse light of a bright sky;
c. The diffuse light reflected from the ground or a building.

2. The factors Daylighting

Areas of natural lighting during the day is a comparison of the level of lighting at a point of a particular field in a space on a flat field illumination level in an open field which is a measure of the performance of the room skylight.

Areas of natural lighting during the day consists of three components include:

1. Sky Component (SC), the lighting components directly from the sky light;
2. Externally Reflected component (ERC), which is a component of lighting coming from the reflection of objects that are in the vicinity of the building concerned;
3. Internally Reflected Component (IRC), which is a component of lighting coming from the reflection surfaces in the room.

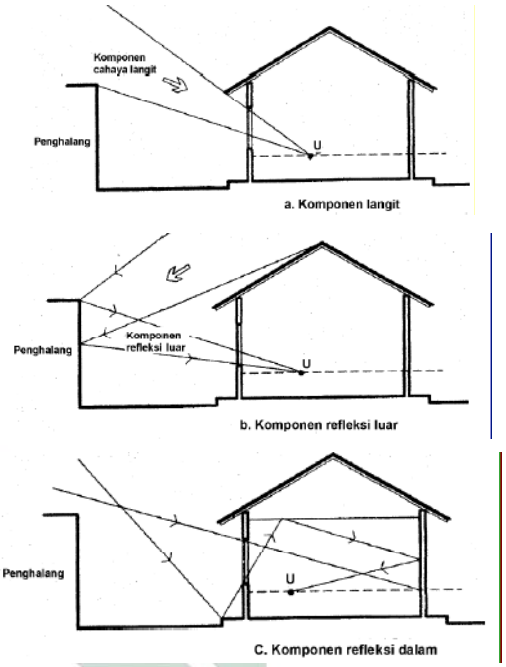

Figure 1. Three Components Light sky until at point A on Work

(Source: SNI 03-2001, Procedures Daylighting Systems in Buildings)

3. Natural Lighting Systems in Buildings

In general, natural light is distributed into the room through openings in addition to (side lighting), opening at the top (top lighting), or a combination of both. Building types, heights, building and planning mass ratio, and the presence of other buildings around an electoral considerations lighting strategy (Kroelinger, 2005).

The lighting system side (side lighting) is a natural lighting system most widely used in buildings. In addition to entering light, also provide flexibility to view, orientation, connectivity outside and inside, and the air vents. The position of the window in the wall can be divided into three: high, medium, low, whose application is based on the needs of the distribution of light and wall systems. Side lighting design strategies that are commonly used include:

1. Single side lighting, openings on one side with a strong unidirectional light intensity, the greater the distance from the window intensity fizzle.
2. Bilateral lighting, openings on two sides

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of the building to improve the distribution of light distribution, depending on the width and height of the room, and the location of lighting openings.

3. Multilateral lighting, openings in some of the more than two sides of the building, can reduce glare and contrast, improve equitable distribution of light on horizontal and vertical surfaces, and provide more than one main zone of natural lighting.
4. Clerestories, the top window with a height of 210 cm above the floor, is a good strategy for local lighting on horizontal or vertical surfaces. Placement openings high on the wall of light can provide a deeper penetration of light into the building.
5. Light shelves, providing imagery to the position of the window being, separate glass to view and glass for lighting. Can be an external element, internal, or a combination of both.
6. Borrowed light, lighting concepts shared between two adjacent rooms, such as corridor lighting obtained from the transparent partition space next to it.

To find out how much light coming into the room as a reference qualified or not, and how to measure it can use Luxmeter tool in every corner of the room in a test.

Diagram provides information on the solar azimuth and height mataharipada any time throughout the year. The slope of the Earth's axis fixed, the northern hemisphere will be facing the sun in June and the southern hemisphere would be facing the sun in December.

Extreme conditions will occur on June 21 when the north pole is closest to the direction of the sun and on 21 December where the north pole is at its farthest from the sun. On September 21 and March 21 the sun was right above the equator (Lechner, 2007). So that the most effective time to conduct test measurements sunlight is three (3) hours prior to 12.00, 12.00 and after 12.00.

4. Standard Distribution Lighting

Based on SNI 03.6575.2001, minimum lighting levels on its recommendation to the various functions of space shown in the table:

Fungsi ruangan	Tingkat Pencahayaan (lux)
Rumah Tinggal :	
Teras	60
Ruang tamu	120 ~ 250
Ruang makan	120 ~ 250
Ruang kerja	120 ~ 250
Kamar tidur	120 ~ 250
Kamar mandi	250
Dapur	250
Garasi	60
Perkantoran :	

Methods

This study evaluates the lighting distribution process through the data retrieval with the aid of a luxmeter on the object of study. The data can be analyzed to see the distribution of illumination in the room. This method is useful to estimate the MS Excel program is to create a mathematical equation "Intensity-Based Distribution Squared Distance".

1. Lux meter digital HS 6612 Dekko

Lux Digital Meter HS 6612 dekko is one tool type gauges the intensity of light or lighting levels used in this study. The lighting requirements of each room is sometimes different. All depends and adapted to the activities undertaken. To measure the light levels needed an instrument that could work automatically capable of measuring light intensity and adjusts the light required. This tool can display the measurement results using a digital format. Different types of light entering the luxmeter either natural or artificial light will have a different response from the sensor. Various colors are measured will produce different color temperatures and different wavelengths, the value generated by luxmeter of the numbers called illumination. Measurement unit of study done at 08:00, 12:00 and 15:00 by using natural lighting where the sun shines bright light conditions.

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3.1. Objects Study

Study data collection that are in one of the rooms, studios, apartment buildings Puncak Kertajaya Surabaya, located on the 8th floor, orientation longest building on the north and south. The room was on the field in a tower with a view to the south. Height of the rooms from floor is 21 meters from the ground floor (where height is 3 m per floor, on the floor of the apartment no 4 was removed, then the actual position of the object of study are at the 7th floor).

Figure 2. Typical apartment building mass

Characteristic studio type rooms on the study object has an area of 18 m², ceiling height of 3 m, has two windows with clear glass on the south field with an orientation toward the inside of the inner court of the building mass (tower). The rooms have white color made standard on the ceilings, floors and walls. In this studio-type unit has one bathroom and a small kitchen that is located between the entrance. This unit also has a small balcony the size of 1:25 m x 0.85 m. The size of the two windows on the type, measuring 0.60 m x 1:50 m (window position 0.5 m from the floor) on the side wall of the balcony section and measuring 0.75 m x 0.80 m (window position 1m from the floor) on the side wall next to it.

3.3. Partitioning Grid and Point Study Sample

To define and facilitate decision-sampling point in the room, indicated by per 1 m² coordinates and the coordinates of each point within 1m. Giving the name of the measurement point will make it easier to determine the test point by using the symbol T1 - T13. Recording the value of strong light (lux) luxmeter premises was conducted in March. Because in the months of March, June, September, December, this is the maximum of sunlight is shining, and done after the simulation will be visible results which parts of which get maximum light and which part is not getting light to the maximum.

Large Lux in each coordinates will differ from each other because of the incoming light will be very different because of the future then the light will be brighter, if more and more into the light that may be on the wane. It is influenced also by the exposure time and the weather.

Lighting distribution on the study was also influenced by the position and typical windows. For more details can be seen in the image below:

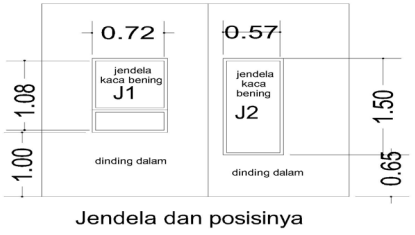

Figure 3. Typical of windows

Discussion and results

To make an estimation of the distribution of light in the room to do some stage;

1. Stage of data collection lux values

At this stage dilakukkan light force measurements with luxmeter instrument in the

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grids that have been planned, ie per 1 m² of field space. Measurements carried out at 8:00, 12:00 and 15:00 pm degan bright sun conditions. At this stage there are several things that affect pegukuran ie if suddenly the brightness of daylight conditions tertututup cloud thus affecting the power level of light.

There are 13 large measurement point of the bedroom space 18 m². Furthermore, in the image data processing plan, 13 of the grid, divided into a grid with a grid size of 0.25 m², it aims to make an estimate of the density distribution of daylight coming into the room.

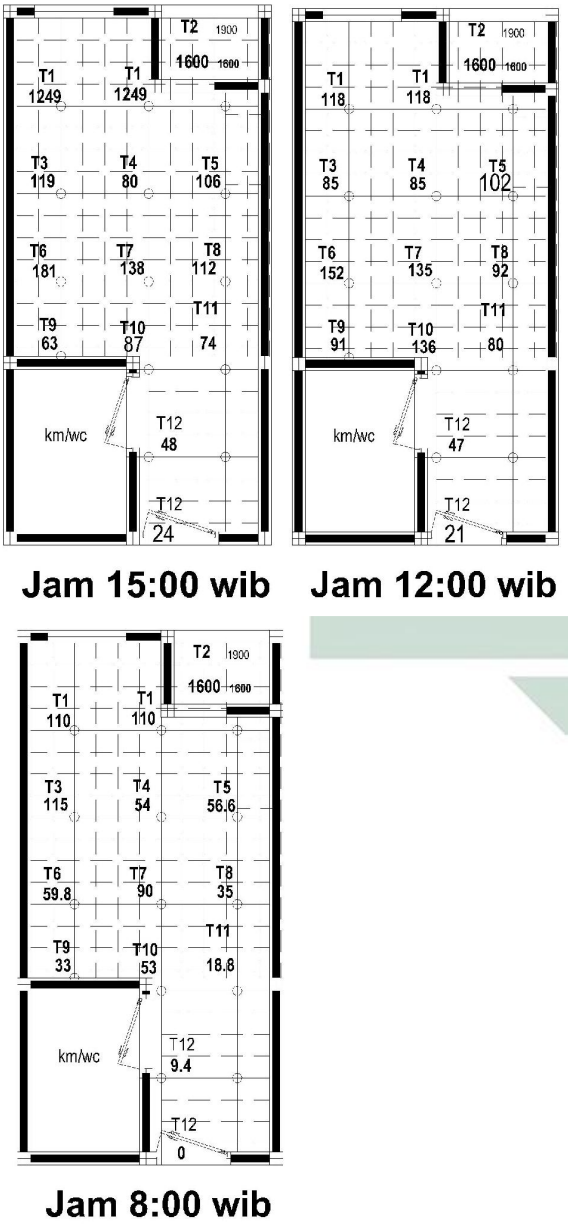
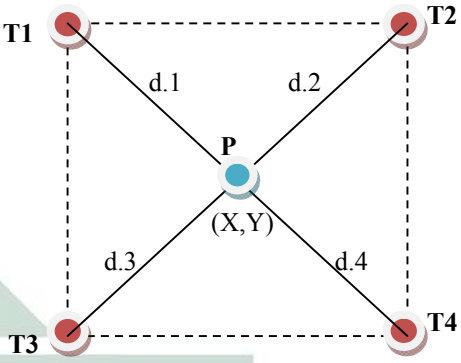


Figure 4. Grid system on the object of study

2. Phase measuring data processing

At this stage is to process the measurement data by plotting the distance between one point of the sample with dots estimates have been reduced.



3. Stage to formulate a mathematical equation

At this stage to make a mathematical equation to find the distance daylight distribution point on the object of study by the method Quadratic Equation-Based Intensity Distribution Distance.

$$I = \frac{\sum_{i=1}^{4} Ii. \quad \frac{1}{di^2}}{\sum_{i=1}^{4} \quad \cdot \frac{1}{di^2}}$$

Dimana :

$$di = \sqrt{(X_1^{'} - X)^2 + (Y_1^{'} - Y)^2}$$

4. Phase entering data into MS Excel program

Through the above formula data is entered into the formula Ms excel at each sample point coordinates. The importance of the figures based on the coordinates that exist on the object of study. The following data is entered into the program excel.

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Data at 8:00 Am

110	110	108	106	107	110					
111	111	107	103	103	103					
113	113	104	97	90	82					
114	114	106	92	74	61					
110	115	106	83	62	54	55	56	56	56	54
103	108	98	82	67	57	58	57	55	53	52
87	87	83	80	76	68	65	59	53	46	46
71	66	70	77	83	83	75	60	46	38	39
57	59	60	69	83	90	81	58	40	35	34
54	56	59	66	77	82	73	55	41	33	32
46	46	53	59	64	64	59	49	39	27	27
38	36	43	52	56	54	52	43	30	20	22
35	33	38	48	53	53	46	31	21	18	17
					46	39	28	21	17	16
					28	26	22	19	14	14
					14	16	17	14	10	11
					9,4	8,6	7,8	8,6	9,4	8,6
					8,2	7,5	6,8	7,5	8,2	7,5
					4,7	4,7	4,7	4,7	4,7	4,7
					1,2	1,9	2,6	1,9	1,2	1,9
					0	0,8	1,6	0,8	0	0,8

Data at 12:00 Am

115	118	115	113	115	118					
111	114	111	109	111	114					
102	102	102	102	102	103					
92	89	92	94	92	90					
90	85	90	95	90	85	89	97	101	102	101
99	93	98	101	97	91	94	99	101	101	100
119	119	116	114	112	108	106	104	101	97	97
138	144	136	127	127	127	120	108	99	93	94
147	152	147	139	135	135	129	113	97	92	91
139	144	141	135	134	131	125	112	99	91	90
122	122	125	129	132	127	122	111	100	86	86
104	99	108	122	131	132	125	110	93	81	82
96	91	100	119	132	136	124	98	82	80	77
					122	110	91	81	76	73
					87	84	78	71	64	64
					56	61	64	58	51	54
					47	45	43	45	47	45
					44	42	40	42	44	42
					34	34	34	34	34	34
					24	26	28	26	24	26
					21	23	25	23	21	23

Data at 15:00 Am

1157	1249	1155	1057	1155	80	86,27				
1016	1108	1013	929,7	1011	87,6	93,47				
684	684	679	674,3	670	109	109				
352	260,1	346	418,8	326	130	124,5				
124	119	119	109,5	89,7	80,0	86,3				
132	126,7	123	116,2	100	87,6	93,5	101,9	105,7	106,7	107
150	150	139	129,5	120	109,0	109,0	109,0	109,0	109,0	109
168	173,3	160	142,8	135	130,4	124,5	116,1	112,3	111,3	111
171	181	168	145,4	137	138,0	131,0	117,6	111,7	112,0	112
157	166,3	153	136	131	130	123,1	112,6	108,57	107	104
122	122	119	117,3	115	109	107,1	102,8	98,417	93	93
87,3	77,74	87,3	98,47	97,5	91,9	93,87	92,86	85,456	78,7	82
72,6	63	73,4	89,08	90,4	87	83,48	77,25	74,334	74	77
					82,4	79,16	75,08	73,809	70,8	69
					68,6	69,31	70,75	72,194	61	61
					53,7	58,51	66,42	71,515	51,2	53
					48	46,04	44	46,04	48	50
					45	43,06	41,33	43,059	45	43
					36	36	36	36	36	36
					27	28,94	30,67	28,941	27	29
					24	25,96	28	25,96	24	26

5. Final Stage

the last stage is the estimation of lighting intensity based on field data by estimating the distance between one point to another point in the predetermined coordinates. the color on those coordinates using the program Axcel Ms.

Data at 8:00 Am

110	110	108	106	107	110					
111	111	107	103	103	103					
113	113	104	97	90	82					
114	114	106	92	74	61					
110	115	106	83	62	54	55	56	56	56	54
103	108	98	82	67	57	58	57	55	53	52
87	87	83	80	76	68	65	59	53	46	46
71	66	70	77	83	83	75	60	46	38	39
57	59	60	69	83	90	81	58	40	35	34
54	56	59	66	77	82	73	55	41	33	32
46	46	53	59	64	64	59	49	39	27	27
38	36	43	52	56	54	52	43	30	20	22
35	33	38	48	53	53	46	31	21	18	17
					46	39	28	21	17	16
					28	26	22	19	14	14
					14	16	17	14	10	11
					9,4	8,6	7,8	8,6	9,4	8,6
					8,2	7,5	6,8	7,5	8,2	7,5
					4,7	4,7	4,7	4,7	4,7	4,7
					1,2	1,9	2,6	1,9	1,2	1,9
					0	0,8	1,6	0,8	0	0,8

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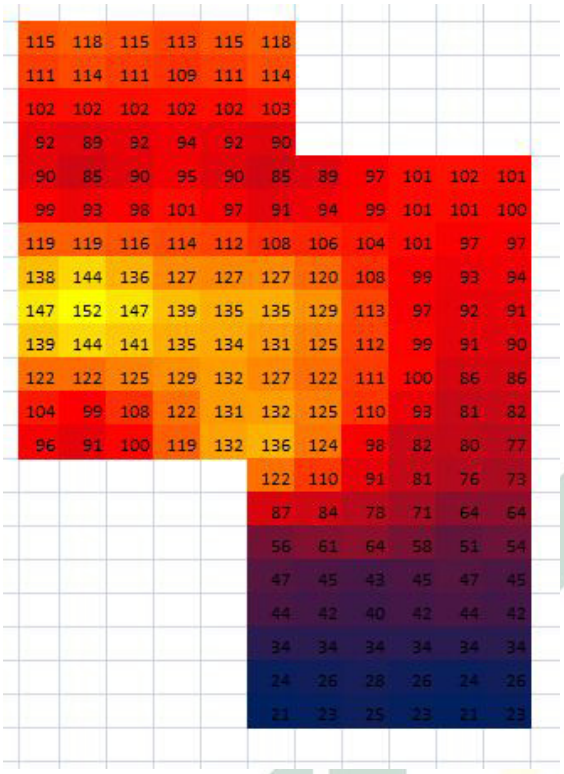
Data at 12:00 Am



Data at 15:00 Am

CONCLUSION

Based on the final results can be seen in daylight distribution estimated by using an equation based on data within the study in the field. If we look at the distribution end estimates reflect changes color gradations of light and dark. The yellow color shows the bright light and dark tends to shift toward the inside. Distribution with a simple program is a preliminary study to show a pattern that occurs in lighting.

In this preliminary study is felt there are still some shortcomings of data whether caused by external factors which initially sunny sky conditions suddenly became cloudy, whereas internal factors influenced by the limitations of the calibration of measuring instruments.

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