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FOREWORD

In the name of Allah, Most Gracious, Most Merciful
Assalamu'alaikum Wr. Wb.,

Welcome to the Second International Conference on Science Engineering and Technology (ICoSET 2019). The advancement of today's computing technology, science, engineering and industrial revolution 4.0 play a big role in the sustainable development of social, economic, education, and humanity in developing countries. Institute of higher education is one of many parties that need to be involved in the process. Academicians and researchers should promote the concept of sustainable development. The Second International Conference on Science, Engineering and Technology (ICoSET 2019) is organized to gather researchers to disseminate their relevant work on science, engineering and technology. The conference is co-located with The Second International Conference on Social, Economy, Education, and Humanity (ICoSEEH 2019) at SKA Co-EX Pekanbaru Riau.

I would like to express my hearty gratitude to all participants for coming, sharing, and presenting your research at this joint conference. There is a total of 84 manuscripts submitted to ICoSET 2019. However only high-quality selected papers are accepted to be presented in this event, with the acceptance rates of ICoSET 2019 is 70%. We are very grateful to all steering committees and both international and local reviewers for their valuable work. I would like to give a compliment to all co-organizers, publisher, and sponsors for their incredible supports.

Organizing such prestigious conferences was very challenging and it would be impossible to be held without the hard work of the program committee and organizing committee members. I would like to express my sincere gratitude to all committees and volunteers from Singapore Management University, Kyoto University, Kyushu University, University of Tsukuba, Khon Kaen University, Ho Chi Minh City University of Technology, University of Suffolk, Universiti Teknologi Malaysia, Infrastructure University Kuala Lumpur, Universiti Malaya, Universiti Kebangsaan Malaysia, Universiti Utara Malaysia, Universiti Teknologi Mara, and Universiti Pendidikan Indonesia for providing us with so much support, advice, and assistance on all aspects of the conference. We do hope that this event will encourage collaboration among us now and in the future.

We wish you all find the opportunity to get rewarding technical programs, intellectual inspiration, and extended networking.

Pekanbaru, 27th August 2019
Dr. Arbi Haza Nasution, M.IT
Chair of ICoSET 2019

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PAPERS

Full Papers

Biosurvey of Mercury (Hg), Cadmium (Cd), and Lead (Pb) Contamination in Reclamation Island-Jakarta Bay

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Keywords: Biosurvey, Heavy Metals, Jakarta Bay, Reclamation

Abstract: Man-made islands allegedly alter the coastline that slowing pollutants retention time. Green mussels (*Perna viridis*) are one of the organisms known to accumulate heavy metals. Biosurvey needs to be conducted to acquire information on heavy metal content in man-made habitat and biota. The aims of this research are to identify the water quality related to heavy metal presence; to measure heavy metal content in green mussels (*Perna viridis*) around the reclaimed island to determine heavy metal level pollution on reclamation island. Sampling was conducted in August 2017 in reclamation islands C and D. Heavy metal measurement values refer to the SNI method 3554-2015. Data of heavy metal content in water, sediment, and green mussels were analyzed with quantitative descriptive method. The results show biological oxygen demands (BOD), and chemical oxygen demands (COD) has exceeded the water quality standard which indicates a high level of pollution. The results of the examination of the heavy metal in seawater show that mercury (Hg), cadmium (Cd), and lead (Pb) are below the tools detection limit (<0.0002; <0.00011; <0.00086 mg/L) and below seawater pollution standard for biota. Concentrations of heavy metals mercury, cadmium, and lead in sediments around the reclaimed islands and Teluk Naga area are below heavy metal pollution standards for sediments. Mercury (Hg) levels below the tools detection limit (<0.0004 mg/L); cadmium (Cd) ranges from 0.02-0.20 mg/L; lead (Pb) ranges from 0.50 to 5.46 mg/L. Heavy metals examination in green mussels indicate that mercury (Hg), cadmium (Cd), and lead (Pb) are below the tools detection limit (<0.001; <0.00011; <0.00086 mg/L) and below the heavy metal pollution standard on bivalves. Generally, water and sediment around the reclaimed islands and natural habitat in August 2017 are not polluted by heavy metals so there is no harm to biota. Heavy metals quality in water, sediment and mussels are below the pollution standard and based on the USEPA system belong to grade A. The heavy metal index on Reclaimed Island is 18 and considered good. Based on the results obtained, it can be concluded that the reclaimed islands C and D in August 2017 were safe from heavy metal mercury, cadmium, and lead pollutions.

1 INTRODUCTION

One of the purposes of island reclamation in DKI Jakarta Provincial Regulation is to comply with land needs with consideration of the ever-increasing population. Modeling research by (Badriana, 2015; Aprilia and P., 2017)states that

- There is current velocity value decrease after reclamation, the current velocity value change occurs in the gap and around reclamation area
- The increase in sediment may potentially appear around the inland/near coastal reclamation area and in inter-island reclamation gap.

Changes in currents around the reclaimed island will decrease the retention time in washing contaminants from the land. This results from sedimentation rates increase around the estuary, eutrophication and contaminants cumulation including heavy metals. Research on heavy metal pollution in Jakarta Bay has been conducted before and indicating heavy metals detected with varying levels (Cordova, 2011; Putri et al., 2012; Permanawati et al., 2013; Suryono, 2006).

Green mussels have a sedentary lifestyle, attached to the substrate using byssus, and filter feeder that allows heavy metals to enter the body (Cordova et al., 2016). Green mussels are able to bind metals and integrate metal concentration in water over time (Dumalagan et al., 2010) so they can be recommended as heavy metal biofilter (Koropitan and Cordova,

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2017). Currently, there is no information about the content of metals in green mussels that live in reclaimed island C and D habitat. Based on these condition biosurvey of heavy metal content on green mussels and their habitats is necessary. Thus the objective of this research was to identify the water quality related to the heavy metal presence and to measure heavy metal content in green mussels (*Perna viridis*) around the reclaimed island.

2 MATERIAL AND METHODS

2.1 Research Location, Time, and Design

The research was conducted from July to December 2017. Sampling station determined purposively based on green mussels presence at the point of biota monitoring attached in Environmental Management Plan and Environmental Monitoring Plan (RKL-RPL) of C and D reclamation islands (A, B, C, and D) and Teluk Naga (figure 1). There are three observation points at each station, positioned by Global Positioning System (GPS). Sampling was conducted in August 2017 and expected to provide an overview of water conditions in the dry season. Descriptive method research was used to determine levels of heavy metals in green mussels. Mussels were collected by hand-sorting techniques (Abdulgani and Aunurohim, 2010).

Figure 1: Sampling Station

2.2 Tools and Materials

Tools used in this research include water sampler model JT-1 made in the USA, sediment sampler, 250 ml and 500 ml polyethylene plastic bottle, Global Positioning System (GPS) Garmin GPSMAP64s, coolbox, plastic clip bag, beaker glass, pipettes, meter, FiveGo pH meter, Atago refractometer made in Japan, turbidimeter, oven, funnel, vernier caliper, adhesive label paper, analytical balance, Mettler Toledo Seven2Go dissolved oxygen (DO) meter, action camera for underwater photo and videography, Fujifilm Finepix s4800 camera, stage sieve, 700 series inductive coupled plasma optical emission spectrometry (ICP-OES) device year 2013 made in Australia. Materials used include green mussels (*Perna viridis*), water samples, sediment samples, distilled water, preservative samples (86% H_2SO_4, 70% HNO_3).

2.3 Sample Storage, Preservation, and Handling

Sampling and handling of the sample refer to Puget Sound Water Quality Action (PSWQA) (PSWQA., 1997) and Standar Nasional Indonesia (SNI) 06-2412-1991 (SNI, 2008). The data taken include the measurement of several physical and chemical parameters of water quality. Measurements were performed either in-situ or ex-situ through laboratory analysis and were done three times at each observation point. In-situ measurements included depth, temperature, pH, salinity and dissolved oxygen (DO). Ek-situ measurements for grain size analysis was done at the Ecology Laboratory of School of Life Science and Technology Institut Teknologi Bandung (SITH ITB) and for Total Suspended Solid (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and heavy metals samples were sent to Saraswanti Indo Genetech (SIG) Bogor laboratory. Sediment texture was determined based on (K., 1922) by filtering sediment using a stratified filter. The sediment type is determined using Miller's triangle (Miller and White, 1998). TSS, sediment grain and green mussels samples are stored at 4°C. Biological Oxygen Demand (BOD) samples are stored in dark bottles at 4°C. Chemical Oxygen Demand (COD) samples were preserved with H_2SO_4. Water samples are preserved with HNO_3.

3 RESULT AND DISCUSSION

3.1 Heavy Metals in Seawater and Sediment

Analysis result of heavy metals cadmium (Cd), mercury (Hg) and lead (Pb) in the water and sediment of Reclamation Island and Teluk Naga provided in

Table 1. All metals values were below seawater quality standards (Decree Ministry of Environment and Development No. 51, 2004) so they are relatively safe for biota. This result was similar to (Putri et al., 2012) that reported the concentration of mercury, cadmium, and lead in the waters of Muara Kamal is below the standard of seawater so it is suitable for mussels and other biota growth. The concentration of heavy metals in the aquatic ecosystem due to the presence of natural heavy metals and heavy metal waste. The concentrations of heavy metals are higher with the input of waste into the waters and accumulate in the ecosystem. Heavy metals in an aquatic ecosystem experiencing various processes such as precipitation, dilution, dispersion, and absorption by living organisms in aquatic habitat (Warner and Preston, 1974; HP., 1984).

Mercury (Hg) concentrations in sediments around Reclamation Island and Teluk Naga are not hazardous to the environment and living organisms. Mercury (Hg) concentration in the research area probably low that it is undetectable. Cadmium (Cd) concentration in sediments range from 0.07 to 0.15 mg/L. The concentration value was below the standard of IADC (International Association of Drilling Contractors)/CEDA (Central Dredging Association) (1997). Cadmium (Cd) at that concentration has no potential hazard to the living organism. The results of Cd analysis showed higher concentrations in sediment than water column in each research site. This happens due to heavy metals have a tendency to settle because of the large mass. Lead concentrations in sediments range from 2.10 to 4.62 mg/L. The concentration values were below the standard of IADC/CEDA (1997). Presence of Pb metal allegedly due to the concentration of Pb in the waters and the amount of organic and inorganic particles in the waters (CC et al., 2007; Begum et al., 2009; S and MH., 2010).

Metals content in sediment is influenced by several factors, among others; organic matter content, grain size, and mineralogy. High concentrations of heavy metals are generally associated with grain size texture (SE., 2001). Sediment textures on Reclamation Island are mainly sand which may be one of the reasons for the low metal content. Cadmium and lead content in sediment is greater than in seawater but below the pollution standard of sediment. The levels of heavy metal sediment at each station can be said not to endanger marine organisms. It is accord to (Permanawati et al., 2013) which states that heavy metal content (copper (CU), lead (Pb), zinc (Zn), cadmium (Cd), and chromium (Cr)) in water and sediments in Jakarta bay waters below pollution standard.

3.2 Heavy Metals in Green Mussels

Table 1 shows the concentration of heavy metals mercury (Hg), cadmium (Cd), and lead (Pb) in the green mussels are not detected and below heavy metal pollution standards for bivalves according to Badan Standarisasi Nasional (BSN) 7387 (SNI, 2009). Mercury, cadmium, and lead contained in water and sediments have not exceeded the specified standard threshold. This shows that heavy metal concentration does not pollute the environment even though Jakarta bay has the potential to be highly polluted. Bioaccumulation of heavy metals in green mussels can occur because heavy metal enters into the body of the living organism easily and quickly (de Astudillo L. R. et al., 2005). But this research did not show the accumulation of mercury (Hg), cadmium (Cd), and lead (Pb) on the green mussels. This is probably due to low of mercury (Hg), cadmium (Cd), and lead (Pb) content in water and sediment. Heavy metal accumulation in aquatic organism according to (SE., 2001) are influenced by many factors, among others:

- The concentration of heavy metals in water
- The concentration of heavy metals in sediment
- Acidity of the water and sediment
- Chemical oxygen demand (COD) level in water
- Sulfur content in water and sediment
- Types of aquatic organism
- Organism age and body weight and
- Organism life phases (eggs, larvae)

If concentrations of heavy metals in water are high then there is a tendency for heavy metals concentrations to be high in sediments, and the accumulation of heavy metals in the demersal organism occur (K. et al., 2004; IDL and SM., 1996).

- Seawater Standard Quality for Marine Biota, standard criterion set by Indonesia Government Decree Ministry of Environment and Development (DMED) No. 51/2004. Tool detection limit for mercury (Hg) 0.0002 mg/L; cadmium (Cd) 0.00011 mg/L; lead (Pb) 0.00086 mg/L.
- Sediments pollution standard in Indonesia has not been established. IADC (International Association of Drilling Contractors)/ CEDA (Central Dredging Association) (1997) has been used as standard. Tool detection limit for mercury (Hg) 0.0004 mg/L.

Table 1: Water quality and heavy metal content in water, sediment and green mussels.

No.	Parameter	A	B	C	D	TN	Standard Quality
Water							
Physical							
1	Bright(m)	0,9	1,8	1,4	0,9	1,7	Coral: >5; mangrove: -; seagrass: >3; natural >0,5
2	Turbidity (NTU)	10,5*	7,0*	4,5	8,3*	5,5*	<5
3	Total suspended solid (mg/L)	9,3	7,3	8,3	13,0	3,6	20
4	Waste	-	-	3	5	-	Nihil
5	Temperature (0C)	28,9	28,7	29,0	29,1	30,2	Natural (20-30)
Chemical							
	pH	8,4	8,6	8,6	8,9*	8,6	7-8,5
1	Salinity (%)	29,3*	30,0	30,1	30,2	30,8	Natural (30-40)
2	Disolved oxygen (mg/L)	3,89*	4,70*	4,67*	4,55*	5,16	>5
3	COD (mg/L)	70,0*	85,1*	71,2*	79,6*	81,7*	20
4	BOD (mg/L)	265,3*	474,8*	373,8*	593,2*	418,2*	20
5	Mercury (mg/L)	nd**	nd**	nd**	nd**	nd**	0.001
6	Cadmium (mg/L)	nd**	nd**	nd**	nd**	nd**	0.001
7	Lead (mg/L)	nd**	nd**	nd**	nd**	nd**	0.008
Sediment							
1	Mercury (mg/L)	nd**	nd**	nd**	nd**	nd**	0.03
2	Cadmium (mg/L)	0.14	0.07	0.08	0.15	0.09	0.8
3	Lead (mg/L)	3.19	2.29	2.1	4.62	2.5	85
Green mussels							
1	Mercury (mg/l)	nd**	nd**	nd**	nd**	nd**	1
2	Cadmium (mg/l)	nd**	nd**	nd**	nd**	nd**	1
3	Lead (mg/l)	nd**	nd**	nd**	nd**	nd**	1.5

*value higher than pollution standard, ** nd=not detected

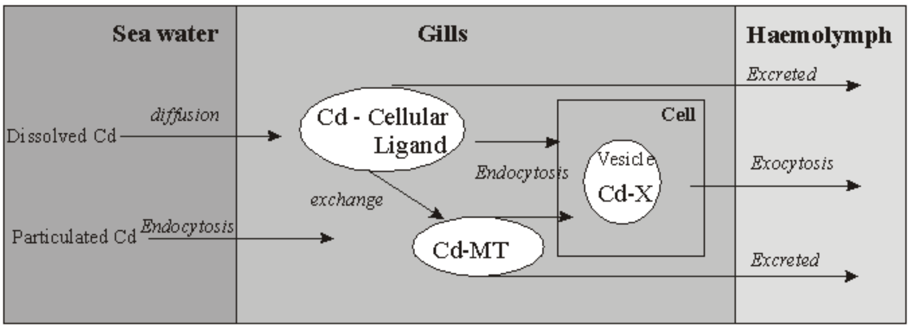

Figure 2: Mechanism of accumulation and detoxification of heavy metals by bivalves (Soto et al., 2003)

- Green mussels pollution standard based on Standar Nasional Indonesia (SNI) 7387: 2009 [17] as the maximum limit of heavy metal contamination in food. Tool detection limit for mercury (Hg) 0.009 mg/L; cadmiun (Cd) 0.00011 mg/L; lead (Pb) 0.00086 mg/L.

The heavy metals entering cells through the lipid layer of the membrane by endocytosis, through a pumping and organic chelating system. Non-essential metals that enter the cells will compete with essential metal to bind to ligands. Binding mechanism of metal and proteins generally damages sulfide bonds (N. et al., 2004). Metals binding to biomolecules then will accumulate in hepatopancreas or be detoxify. The mechanism of accumulation and detoxification of heavy metals in bivalve can be seen in Figure 2. Heavy metals modify existing enzyme processes by interfering with and replace calcium (Ca) ions that affect oxidation. In this research-heavy metal mercury (Hg), cadmium (Cd), and lead (Pb) of green mussels samples are inert within the acceptable limit for green mussels and other predators. This can be observed from the absence of heavy metals accumulation in mussels indicating that cadmium (Cd) and lead (Pb) in sediments that enter mussels body has been detoxified.

3.3 Heavy Metal Pollution Level on Reclamation Island

Pollution level of heavy metal on water, sediments, and biota are determining using STORET method (US-EPA/United States Environmental Protection Agency) based on scores (Decree of the Minister of Environment (DMED) no. 115/2003 about Guidelines for Determining Status of Water Quality) (DMED No.115, 2003). Results show that heavy metal mercury, cadmium, and lead in water, sediments, and green mussels around reclamation island are below standard quality so that it is included in class A. This is probably due to the intensity of waste disposal consist of low heavy metals.

Although in this research there was no heavy metal pollution, it does not indicate the condition around the reclaimed island is good. Physical and chemical analysis of water shows that turbidity, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and dissolved oxygen (DO) parameters do not comply with water quality standards in Decree Ministry of Environment and Development No. 51/2004. Biological Oxygen Demand (BOD) concentrations in water range from 265,3 to 593,2 mg/L, it is much higher than the standard quality which is 20 mg/L. Chemical Oxygen Demand (COD) concentrations in water range from 70,0 to 85,1 mg/L that higher than the standard quality which is 20 mg/L. dissolved oxygen (DO) concentrations in water range from 3,89 to 5,16 mg/L that below than the standard quality which is 5 mg/L except for Teluk Naga station. These parameters illustrated the high pollution around the reclaimed island.

4 CONCLUSIONS

Based on the results it can be concluded that :

- Mercury (Hg), cadmium (Cd) and lead (Pb) content in the water below the water quality standard for biota. Mercury (Hg), cadmium (Cd) and lead (Pb) content in sediments below the standard set by IADC/CEDA. The content of heavy metal in water and sediment of reclamation islands are safe for biota. High Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) content showed high organic pollution around reclaimed islands C and D
- There is no accumulation of heavy metal mercury (Hg), cadmium (Cd) and lead (Pb) occur in green mussels.
- Heavy metal pollution level in the water, sediment, and green mussel organs based on the STORET (US-EPA) method included in class A which is classified as not contaminated by heavy metals mercury (Hg), cadmium (Cd), and lead (Pb). Mercury (Hg), cadmium (Cd), and lead (Pb) quality index in reclamation island C and D amounts to 18 so that it is classified as good.

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Expert System to Detect Early Depression in Adolescents using DASS 42

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Keywords: Case Based Reasoning, DASS 42, Expert System

Abstract: Around 5% adolescents in Indonesia suffer from depression at the certain time. To identify the level of depression, direct consultation with an expert like alienist or psychologist is needed. However, the problem is the number of experts in hospital and culture social environment is limited, also the society is not used to do consultation to alienist or psychologist. Therefore, a system that can help the medical to detect early depression disorder is needed, before the adolescents do the next consultation to the medical. The system called as expert system with web based which built by Case Based Reasoning (CBR) and using Simple Matching Coefficient (SMC) method also DASS 42 as the research instrument. Based on the 200 data testing on 500 and 700 case base, this expert system can detect the early disorder with an precision rate more than 90%. So that, with this expert system the early disorder can be done accurately and fast.

1 INTRODUCTION

Depression is a mood disorder characterized by loss of feelings of control and subjective experience of severe suffering. Depression will cause feelings of depression (sadness, disappointment, futility), loss of energy and interest, feelings of guilt, loss or difficulty concentrating, loss of appetite to suicidal desires and sometimes self-degrading behaviour (Faia et al., 2017; Shen et al., 2017). Depression that is not detected early in adolescents can eventually lead to serious difficulties in school, work, and personal adjustment which often continues in adulthood. To be able to correctly identify the level of depression experienced by a adolescents, parents or teachers must consult directly with experts, both psychiatrists and psychologists. However, the obstacle is the limited number of psychiatric experts who are not available in all hospitals and the sociocultural environment in the community that is not accustomed to consulting a psychiatrist and psychologist (Haryanto et al., 2016; Syafitri and Apdian, 2016; Syafitri and Saputra, 2017).

Expert system is a computer program designed to solve problems like an expert, by transferring expertise so that other people (non-experts) can solve problems that are usually carried out by an expert (Gu et al., 2017; Rahman et al., 2018). The representation of knowledge representation using Case Based Reasoning (CBR) is a collection case-based that has never happened before. CBR uses solutions from previous cases that are similar to new cases to solve problems. Various methods can be used to measure the level of similarity of old cases with new cases. One of similarity methods used is Simple Matching Coefficient (SMC).

Some studies in the domain of expert systems with CBR used as a reference are research conducted by Faizal, E (2014) applying CBR to build a system that has the ability to diagnose cardiovascular disease based on similarity in previous cases using method SMC. The test results show that the system built has a sensitivity value of 97.06%, specificity of 64.29%, positive predictive value (PPV) of 86.84%, negative predictive value (NPV) of 90.00%, accuracy of 87.50% with level error (error rate) of 12.50% (Faizal, 2014; Syafitri and Sari, 2017; Syafitri et al., 2018).

2 RESEARCH METHOD

Research method is the stages passed by the researcher to get description of the research. The stages passed in the research method are follows:

2.1 Data Collection

The data collection techniques needed in making this system are as follows:

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- Interviews conducted directly with Psychology experts.
- Distribution of online questionnaires to 700 adolescents aged 17 to 21 through Google Forms to obtain case base data and test data.
- Literature studies through scientific references from various sources related to the problem under study, both from books, scientific journals and from other readings that can be justified.

2.2 Adolescents

In English adolescents are called adolescent, derived from the word adolescent which means growing toward maturity. Adolescents is a period of transition between childhood and adulthood. At this time, adolescents experience the development of achieving physical, mental, social and emotional maturity and the emotional state of adolescents is still unstable because it is closely related to hormonal conditions. Hurlock (1980), divides adolescents into two parts, namely early adolescents and late adolescents. Early adolescents lasts approximately from the age of 13-16 years and the late adolescents starts from the age of 17-21 year(Holmbeck, 2018; Weis, 2017).

Adolescents is a period of developmental transition between childhood and adulthood which includes biological, cognitive and social emotional changes. In English teenagers are called adolescent, derived from the word adolescent which means growing toward maturity. Adolescence is a period of transition between childhood and adulthood. At this time, adolescents experience the development of achieving physical, mental, social and emotional maturity and the emotional state of adolescents is still unstable because it is closely related to hormonal conditions. Emotional emotions dominate and control themselves from a realistic mind (Rosenberg, 2015; Coleman, 2006).

2.3 Depression

Depression is a period of disruption of human function related to natural feelings of sadness and accompanying symptoms, including changes in sleep patterns and appetite, psychomotor, concentration, anhedonia, fatigue, hopelessness and helplessness, and suicide. Depression is likened to flu, because depression can occur in all circles, including adolescents (Kaplan et al., 2010; Amelia et al., 2018). There are 3 levels of depression :

- Mild Depression
  At this level, the symptoms usually affect the daily activities of people who experience it such as being less interested in doing things that are usually done, easily angry, the motivation to work becomes less. This depression is not too disturbing, but must be treated to prevent the condition from getting worse.

- Middle Depression (Moderate Depression)
  At this level, this depression causes a person to experience difficulties in terms of social, work and domestic activities. In moderate depression, usually a person becomes less confident so he or she is less motivated to do something. Often a person starts to worry about things that are unnecessary, more sensitive, and vulnerable to feelings of hurt or offense in personal relationships.

- Severe Depression
  At this level, this depression causes a person to experience severe suffering such as feeling a loss of self-esteem or feeling useless and guilty, and wanting to commit suicide. A person who is severely depressed cannot manage his emotions so that he easily experiences feelings of despair. People with severe depression may also suffer from delusions, hallucinations or stupor depressive.

Anxiety can be divided according to the source of reason, namely: Anxiety that comes from the environment, called objective anxiety that is anxiety caused by the environment and does not need treatment, because it is one of the factors "self-care". Anxiety in the body is called vital anxiety, namely anxiety that originates in the body and functions as a definition mechanism that protects the individual. Awareness of consciousness is called conscience anxiety, that is, individuals have an awareness of morality that will protect individuals against acts that are immoral (Lovibond and Lovibond, 1995).

Problems experienced by adolescents in fulfilling the tasks of adolescent development, namely:

- Personal problems, namely problems related to situations and conditions in the home, school, physical condition, appearance, emotions, social adjustment, duties, and values.

- Typical teen problems, namely problems that arise due to unclear status in adolescents, such as the problem of achieving independence, misunderstanding, the existence of greater rights and fewer obligations imposed by parents.

2.4 Expert

Systems Knowledge-based systems, also known as expert systems, are one branch of artificial intelligence, which in the commercial world is called a system that can effectively and efficiently carry out tasks that do not really require experts. Expert systems are also known as advisory systems, knowledge systems, intelligent work assistance systems or operational systems (Aronson et al., 2005).

2.5 Case Based Reasoning (CBR)

Case Based Reasoning (CBR) is a system that aims to resolve a new case by adapting the solutions found in the previous case that are similar to the new case. The basic idea of CBR is to imitate human abilities, namely solving new problems using answers or experiences from old problems. Representation of knowledge is made in the form of cases. Each case contains problems and answers, so the case is more like a certain pattern. The way CBR works is to compare new cases with old cases. If the new case bears a resemblance to the old case, the CBR will provide an answer to the old case for the new case. If there is no match, the CBR will adapt, by inserting the new case into a case base, so that indirectly CBR knowledge will increase (Li et al., 2018).

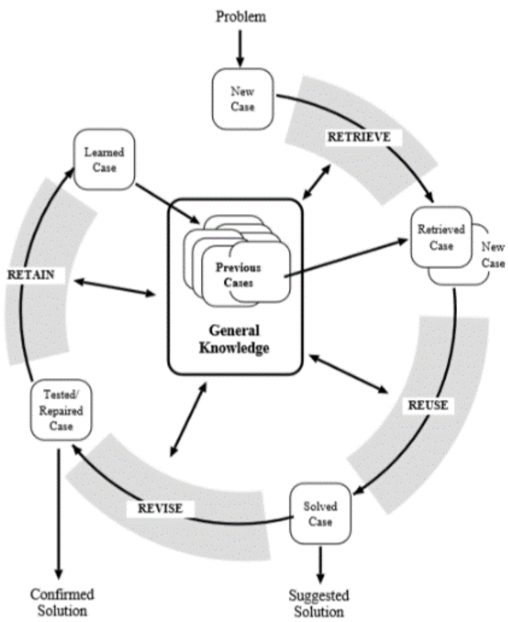

Figure 1: System Architecture CBR.

2.6 Simple Matching Coefficient (SMC)

There are a variety of techniques that can be used to measure the similarity of a case with an old case on a case base. One of methods similarity that can be used is Simple Matching Coefficient (SMC) with equation (1) (Faizal, 2014).

$$SMC(X,Y) = \frac{M_{11}+M_{00}}{M_{01}+M_{10}+M_{11}++M_{00}} \qquad (1)$$

Description:
X = Old case
Y = New case
M11 = Number of attributes where X = 1 and Y = 1
M00 = Number of attributes where X = 0 and Y = 0
M01 = Number of attributes where X = 0 and Y = 1
M10 = Number of attributes where X = 1 and Y = 0

2.7 Feasibility System

Feasibility system is obtained by finding the value of precision and recall systems based on comparison of the results of detection by experts using the DASS 42 calculation with the results of detection by the system. Before getting precision and recall values, need the True Positive (TP), True negative (TN), False Positive (FP) and False Negative (FN). These values are measured using information retrieval (Huibers et al., 1996). Precision and recall can go through the formulas in equations (2) and (3).

$$Precision(P) = \left| \frac{TP}{TP+FT} \right| * 100\% \qquad (2)$$

$$Recall(R) = \left| \frac{TP}{TP+FN} \right| * 100\% \qquad (3)$$

2.8 DASS 42

The severity of depression, anxiety, and stress what a person experiences can be measured on many scales including using the Depression Anxiety Stress Scale 42 or abbreviated with DASS 42 developed by Lovibond & Lovibond (1995). DASS is a 42-item questionnaire that includes three scales to measure negative emotional states of depression, anxiety and stress. Each of the three scales contains 14 items. Scores for each respondent during each sub-scale, then evaluated according to their severity (Lovibond and Lovibond, 1995).

Table 1: Score DASS 42 (Lovibond & Lovibond 1995).

Level of	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Medium	14-20	10-14	19-25
Severe	21-27	15 - 19	26 - 33
Extremely severe	>28	>20	>34

3 RESULT AND DISCUSSION

3.1 Testing on 500 Case Bases

There are 100 test data with an equal number of detection rates of 20: 20: 20: 20: 20 in anxiety detection, 20: 20: 20: 20: 20 in stress detection and 20: 20: 20: 20: 20 in depression detection . The comparison sample of detection results is shown in table 2.

Based on table 2, the number of detection levels in the test data is shown in table 3.

Testing on Detection of Depression

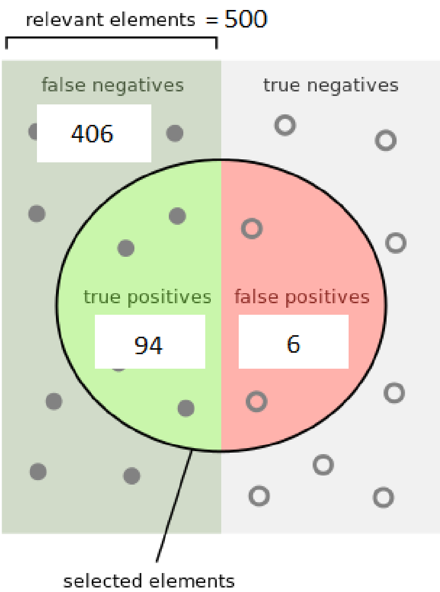

Figure 2: Information Retrieval on Comparison of Detection Results of Depression (Based on Table 3).

Based on figure 2, the precision and recall values of depression detection can be found as follows:

$$\begin{aligned} Precision(P) &= \left[\frac{TP}{TP+FT}\right] * 100\% \\ &= \left[\frac{94}{94+6}\right] * 100\% \\ &= \left[\frac{94}{100}\right] * 100\% \\ &= 94\%\,. \end{aligned} \quad (4)$$

$$\begin{aligned} Recall(R) &= \left[\frac{TP}{TP+FN}\right] * 100\% \\ &= \left[\frac{94}{94+406}\right] * 500\% \\ &= \left[\frac{94}{500}\right] * 100\% \\ &= 18,80\%\,. \end{aligned} \quad (5)$$

Testing the Amount of Random Detection Rate.

There are 100 test data with a number of random detection rates of 14: 15: 30: 25: 16 in anxiety detection, 11: 22: 41: 17: 9 in stress detection and 8: 13: 35: 35: 9 in depression detection. The comparison sample of detection results is shown in table 4.

Based on table 4, the number of detection levels obtained in the test data is shown in table 5.

Testing on Detection of Depression

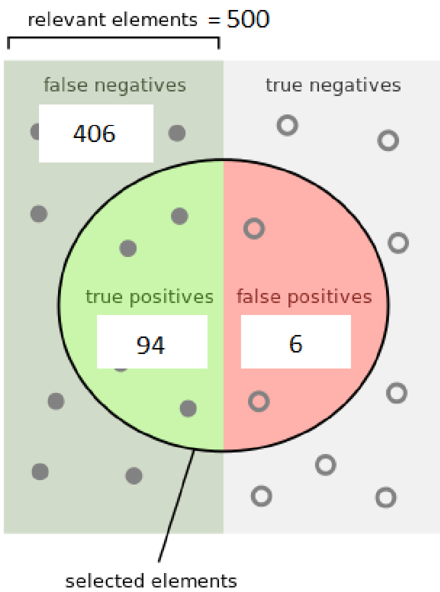

Figure 3: Retrieval of Information on Comparative Results Detection of Depression (Based on Table 5).

Based on Figure 3, the precision and recall values of depression detection can be found as follows:

$$\begin{aligned} Precision(P) &= \left[\frac{TP}{TP+FT}\right] * 100\% \\ &= \left[\frac{97}{97+3}\right] * 100\% \\ &= \left[\frac{97}{100}\right] * 100\% \\ &= 97\%\,. \end{aligned} \quad (6)$$

$$\begin{aligned} Recall(R) &= \left[\frac{TP}{TP+FN}\right] * 100\% \\ &= \left[\frac{97}{97+403}\right] * 100\% \\ &= \left[\frac{97}{500}\right] * 100\% \\ &= 19,40\%\,. \end{aligned} \quad (7)$$

Table 2: Comparison of Test Data Detection Results by Experts with a System with an Equal Alignment Detection Level.

No	Anxiety Detection Results		Stress Detection Results		Depression Detection Results	
	Expert Results	**Expert Results**	**Expert Results**	**Expert Results**	**Expert Results**	**Expert Results**
1	Normal	Normal	Normal	Normal	Normal	Normal
2	Normal	Normal	Normal	Normal	Normal	Normal
3	Normal	Normal	Normal	Normal	Normal	Normal
4	Normal	Normal	Normal	Normal	Normal	Normal
5	Normal	Normal	Normal	Normal	Normal	Normal
6	Normal	Normal	Normal	Normal	Normal	Normal
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
97	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe
98	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe
99	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe
100	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe

Table 3: Number of Detection Levels on Test Data (Based on Expert Results).

No	Anxiety Detection Results		Stress Detection Results		Depression Detection Results	
	Detection rate	**Total**	**Detection rate**	**Total**	**Detection rate**	**Total**
1	Normal	20	Normal	20	Normal	20
2	Mild	20	Mild	20	Mild	20
3	Medum	20	Medum	20	Medum	20
4	Severe	20	Severe	20	Severe	20
5	Extremely severe	20	Extremely severe	20	Extremely severe	20
	Total	**100**	**Total**	**100**	**Total**	**100**

Table 4: Comparison of Test Data Detection Results by Experts with a System with an Equal Alignment Detection Level.

No	Anxiety Detection Results		Stress Detection Results		Depression Detection Results	
	Detection rate	**Total**	**Detection rate**	**Total**	**Detection rate**	**Total**
1	Normal	14	Normal	11	Normal	8
2	Mild	15	Mild	22	Mild	13
3	Medum	30	Medum	41	Medum	35
4	Severe	25	Severe	17	Severe	35
5	Extremely severe	16	Extremely severe	9	Extremely severe	9
	Total	**100**	**Total**	**100**	**Total**	**100**

3.2 Testing on 700 Case Bases

Testing is focused on similarity testing, where the data to be tested consists of 200 depression data test that are tested on 500 case base and on 700 case base. 200 data test on the detection of depression are subdivided into 2 which 100 data test with an equal number of detection levels with 20:20:20:20:20 data and 100 data test with a random number of detection levels with 8:13:35:35:9 data. Experts will look for detection results in the data test on each test using the DASS 42 calculation.

Based on table 6, obtained the number of detection levels in the test data shown in table 7.

Testing on Detection of Depression

Based on figure 2, the precision and recall values of depression detection can be found as follows:

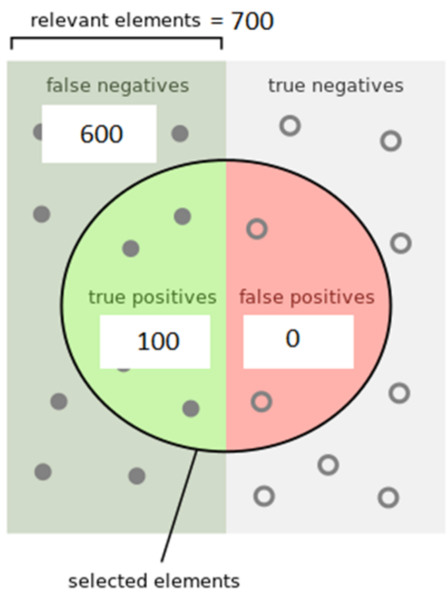

Figure 4: Information Retrieval on Comparison of Detection Results of Depression (Based on Table 3).

$$\begin{aligned} Precision(P) &= \left[\frac{TP}{TP+FT}\right] * 100\% \\ &= \left[\frac{100}{100+0}\right] * 100\% \\ &= \left[\frac{100}{100}\right] * 100\% \\ &= 100\%\,. \end{aligned} \quad (8)$$

$$\begin{aligned} Recall(R) &= \left[\frac{TP}{TP+FN}\right] * 100\% \\ &= \left[\frac{100}{100+600}\right] * 100\% \\ &= \left[\frac{100}{700}\right] * 100\% \\ &= 14,29\%\,. \end{aligned} \quad (9)$$

Testing the Amount of Random Detection Rate

Table 5: Number of Detection Levels on Test Data (Based on Expert Results).

No	Anxiety Detection Results		Stress Detection Results		Depression Detection Results	
	Expert Results	**Expert Results**	**Expert Results**	**Expert Results**	**Expert Results**	**Expert Results**
1	Mild	Mild	Extremely severe	Extremely severe	Extremely severe	Extremely severe
2	Mild	Mild	Severe	Severe	Extremely severe	Extremely severe
3	Mild	Medium	Severe	Severe	Mild	Medium
4	Normal	Normal	Severe	Severe	Severe	Severe
5	Mild	Mild	Severe	Severe	Medium	Medium
6	Mild	Mild	Severe	Severe	Severe	Severe
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
97	Extremely severe	Extremely severe	Mild	Mild	Medium	Medium
98	Extremely severe	Extremely severe	Medium	Medium	Medium	Medium
99	Severe	Severe	Mild	Mild	Severe	Severe
100	Severe	Medium	Medium	Medium	Medium	Medium

Table 6: Comparison of Test Data Detection Results by Experts with Systems with Amount of Equal Level Detection.

No	Anxiety Detection Results		Stress Detection Results		Depression Detection Results	
	Detection rate	**Total**	**Detection rate**	**Total**	**Detection rate**	**Total**
1	Normal	20	Normal	20	Normal	20
2	Mild	20	Mild	20	Mild	20
3	Medum	20	Medum	20	Medum	20
4	Severe	20	Severe	20	Severe	20
5	Extremely severe	20	Extremely severe	20	Extremely severe	20
	Total	**100**	**Total**	**100**	**Total**	**100**

There are 100 test data with a number of random detection rates of 14: 15: 30: 25: 16 in anxiety detection, 11: 22: 41: 17: 9 in stress detection and 8: 13: 35: 35: 9 in depression detection. The comparison sample of detection results is shown in table 8.

Based on table 8, the number of detection levels in the test data is shown in table 9.

Testing on Detection of Depression

Based on figure 5, we can find the value of precision and recall value of depression detection as follows:

$$\begin{aligned} Precision(P) &= \left[\frac{TP}{TP+FT}\right] * 100\% \\ &= \left[\frac{100}{100+0}\right] * 100\% \\ &= \left[\frac{100}{100}\right] * 100\% \\ &= 100\%\,. \end{aligned} \tag{10}$$

$$\begin{aligned} Recall(R) &= \left[\frac{TP}{TP+FN}\right] * 100\% \\ &= \left[\frac{100}{100+600}\right] * 100\% \\ &= \left[\frac{100}{700}\right] * 100\% \\ &= 14,29\%\,. \end{aligned} \tag{11}$$

Based on Table 10, the first with 100 test data with the equal number of detection with 20:20:20:20:20 data which tested at 500 case base explained that percentage of precision is 94% and percentage of recall is 18.80%. The second test with 100 data test with the random number of detection with 8:13:35:35:9 data which tested at 500 case base explained that percentage of precision is 97% and percentage of recall is 19.40%.

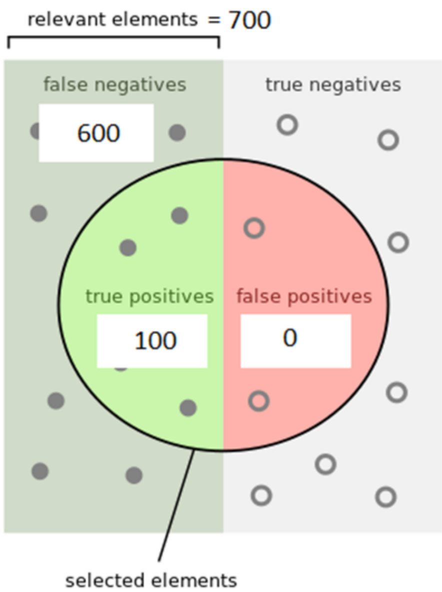

Figure 5: Information Retrieval on Comparison of Detection Results of Depression (Based on Table 9).

Based on table 11, both the third test with 100 with the equal number of detection with 20:20:20:20:20 data and the fourth test with 100 test data with the random number of detection with 8:13:35:35:9 data which was tested at 700 case base explained that all percentages of precision is 100

Based on the testing, the percentage of precision is 100% at 700 case base and are ¿ 90% at 500 case base so it can be concluded that the number of case base affects the percentage of precision in the system.

Table 7: Number of Detection Levels on Test Data (Based on Expert Results).

No	Anxiety Detection Results		Stress Detection Results		Depression Detection Results	
	Expert Results	Expert Results	Expert Results	Expert Results	Expert Results	Expert Results
1	Normal	Normal	Normal	Normal	Normal	Normal
2	Normal	Normal	Normal	Normal	Normal	Normal
3	Normal	Normal	Normal	Normal	Normal	Normal
4	Normal	Normal	Normal	Normal	Normal	Normal
5	Normal	Normal	Normal	Normal	Normal	Normal
6	Normal	Normal	Normal	Normal	Normal	Normal
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
97	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe
98	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe
99	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe
100	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe	Extremely severe

Table 8: NumberComparison of Detection Results of Test Data by Experts with Systems with Amount of Random Detection Rate.

No	Anxiety Detection Results		Stress Detection Results		Depression Detection Results	
	Expert Results	Expert Results	Expert Results	Expert Results	Expert Results	Expert Results
1	Mild	Mild	Extremely Severe	Extremely Severe	Extremely Severe	Extremely Severe
2	Mild	Mild	Severe	Severe	Extremely Severe	Extremely Severe
3	Mild	Mild	Severe	Severe	Mild	Mild
4	Normal	Normal	Severe	Severe	Severe	Severe
5	Mild	Mild	Severe	Severe	Medium	Medium
6	Mild	Mild	Severe	Severe	Severe	Severe
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
97	Extremely Severe	Extremely Severe	Mild	Mild	Medium	Medium
98	Extremely Severe	Extremely Severe	Medium	Medium	Medium	Medium
99	Severe	Severe	Mild	Mild	Severe	Severe
100	Severe	Severe	Medium	Medium	Medium	Medium

Table 9: Number of Detection Levels on Test Data (Based on Expert Results).

No	Anxiety Detection Results		Stress Detection Results		Depression Detection Results	
	Detection rate	Total	Detection rate	Total	Detection rate	Total
1	Normal	14	Normal	11	Normal	8
2	Mild	15	Mild	22	Mild	13
3	Medum	30	Medum	41	Medum	35
4	Severe	25	Severe	17	Severe	35
5	Extremely severe	16	Extremely severe	9	Extremely severe	9
	Total	**100**	**Total**	**100**	**Total**	**100**

Table 10: Testing Conclusions on 500 Case Base.

Detection	Tested on 500 Case Base			
	100 Equal Data Test		100 Random Data Test	
	Precision	Recall	Precision	Recall
Depression	94%	18,80%	97%	19,40%
Average	95,33%	19,07%	95,67%	19,13%

Table 11: Test Conclusions on 700 Case Base.

Detection	Tested on 700 Case Base			
	100 Equal Data Test		100 Random Data Test	
	Precision	Recall	Precision	Recall
Depression	100%	14,29%	100%	14,29%
Average	100%	14,29%	100%	14,29%

4 CONCLUSIONS

Testing is focused on similarity testing, where the data to be tested consists of 200 depression data test that are tested on 500 case base and on 700 case based. 200 data test on the detection of depression are subdivided into 2 which 100 data test with an equal number of detection levels with 20:20:20:20:20 data and 100 data test with a random number of detection levels with 8:13:35:35:9 data. Experts will look for detection results in the data test on each test using the DASS 42 calculation.

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