

The Effect of Financial Incentives, Organizational Commitment, and Job Satisfaction on Employee Performance

Doddy Firman Rahmadi¹ and Sri Gunani Partiw²

¹Department of Management Technology, Institut Teknologi Sepuluh Nopember, Surabaya

²Department of Industrial and System Engineering, Institut Teknologi Sepuluh Nopember, Surabaya
e-mail: doddyfirman@yahoo.com

Abstract—Organization or business performance always have close relation with its own member or employee performance and productivity. Most of them only focus on raising the wealthy of its member by giving financial incentives hoping it will reflect with significant improvement of member performance. But in some case giving the incentives not always bring significant increase to member productivity. This study was made with the aim to determine the effect of financial incentives, organizational commitment, and job satisfaction on employee performance. This study uses quantitative study. Data collection procedures used in this study are structured data collection. The population used is 10 persons of installation and maintenance employees of PT. KONE Indo Elevator throughout Indonesia that has implement some financial incentive to boots up their employee performance. The result of the study was financial incentives and job satisfaction have positif and significant effect to employee performance while organizational commitment not having significant effect to employee performance.

Keywords—Incentives, Organizational Commitment, Job Satisfaction, Productivity, Performance.

I. INTRODUCTION

EMPLOYEE performance involves behavioral patterns that are directly involved in producing goods or services, or activities that provide indirect support for the organization's core technical processes. With regard to employee performance, human factors are the basic driving force and efficient factors, among the factors of production, because they have unlimited energy and upon which continuous development depends [1] so that the role of human resources is a vital role in achieving organizational goals effective.

Apart from an increase in effective human resources, there are things that need to be considered in triggering good performance. One of them is the provision of financial incentives can result in employee feelings as an integral part of the organization and encourage to work towards the achievement of the organization's vision and mission, and this is achieved through the establishment of a fair reward and incentive system [2]. Economists widely assume that financial incentives represent the dominant stimulators of productive human activities [3] but that's not the only factors that affect employee performance.

Organizational commitment is related to job satisfaction which can more specifically affect employee performance and competitiveness and profitability of the organization. Commitment itself is the overall attitude about work and organization, a number of aspects or dimensions that

influence it, including working conditions, supervision, nature of work, colleagues, salary and benefits as well as personal characteristics [4]. While job satisfaction becomes an important factor related to factors such as employee work conditions, wages, stress levels, colleagues, top managers and workloads.

KONE Indo Elevator (KIE) as a fast growth organization these past 7 years had quiet a lot of experimental company programs regarding incentive and benefits for their field operative personel (installation and maintenance division) aiming for better productivity of their employee performance. Programs like company motor cycle for all maintenance technician, and many incentives for spare parts and add on service selling is created to boots their job satisfaction that lead to better job performance. That makes this company is suitable for this study of understanding the effect of financial Incentives, organizational commitment, and job satisfaction on employee performance.

A. Job Performance

The term job performance refers to the core technical behavior and activities involved in work. Behavior in the domain of job performance is usually recognized as a formal requirement for individual work. Job descriptions often explicitly stipulate that job holders must carry out these activities [5]. Job performance includes one's contribution to organizational performance, referring to actions that are part of the formal reward system, discussing requirements as specified in the job description [6]. Job performance can be defined as the skills (competencies) with which a person performs core work tasks [7]. Other labels sometimes used for job performance are job specific task skills [8-9], technical skills or performance in roles [10-11]. This includes, for example, work quantity, quality of work, and job knowledge [7].

B. Financial Incentives

Financial incentives are another form of direct compensation outside the salary provided by a particular company. This incentive is another form of performance-based compensation. Financial incentives are gifts or replies in financial forms that are given to employees who have a production level that exceeds the specified standard [12]. The provision of incentives can be used as a means to direct the strength and potential of employees to be willing to work hard and enthusiastically in achieving optimal work in realizing specified goals [13].

Table 1.
 Operational definition & variable measurement

X1 - Financial Incentives indicator [15]:		X2 – Organizational Commitment Indicator [26]:	
X11	Sallary	Affective commitment	
X12	Bonus payment	X21.	Have a career in organization.
X14	Long service award	X22.	Treat organizational problem as self. X23.
X16	Housing allowances		Organization like a part family.
	Financial Staff loans	X24.	Emotionally bond to company X25. Sense of belonging
X110	Gratification allowance		
X3 – Job Satisfaction [24]:		Continuance commitment	
X31.	Salary and welfare	X26.	Difficult to leave organization.
X32.	Work itself	X27.	Life will be disrupted if leave organization. X28.
X33.	Leader behavior		Work in organization is need not desire.
X34.	Self-development	X29.	Have more choices.
X35.	Interpersonal relationships	X210.	Alternative scarcity of leaving organization
X36.	Job competence	X211.	Activities affect self evaluation of work.
X37.	Work safety	X212.	Sensitive to self work. X213. Perform important tasks.
X38.	Cleaning facility	X214.	Personal sacrifice to organization
X39.	Inventory tool		
X310.	Cleaning equipment		
X311.	Overall technical performance		
Y – Job Performance [25] (Campbell, 1987)		Normative commitment	
Y1	Detect problems with equipment	X215.	Obligation for organization. X216. Decision of leaving organization.
Y2	Problem Solving	X217.	Feeling guilty of leaving organization. X218.
Y3	Perform routine maintenance		Loyalty of organization.
Y4	Fixing failure	X219.	Sense of obligation to organization. X220. Owe to company
Y5	Using tools		
Y6	Using technical documentation		
Y7	Operating equipment		
Y8	Job planning and organizing		
Y9	Perform administrative tasks		

Financial incentives and rewards are considered to have a positive influence on employee commitment or loyalty. An employee would prefer to remain in an organization that has high incentives than to be involved in other organizations that do not yet have a clear future [14]. Where financial incentives and rewards create a relationship between the company and employees that are harmoniously established because they create a high level of employee commitment and motivation. So, companies must develop strategies that include incentives or employee benefits due to good performance, bonuses, or profit sharing [15].

C. Organizational Commitment

Organizational commitment is the extent to which an employee believes to remain in the organization and the desire to always be with the organization [16]. This is the level of willingness of workers to pursue a future career with the organization. Organizational commitment defines as a reflection of three main characteristics, namely affective commitment, continuance commitment, and normative commitment [17]. In this view, commitment is something that is seen as a reflection of the affective orientation towards the organization. Recognition of the costs associated with leaving the organization, and the moral obligation to remain with the organization.

Organizational commitment is also defined as an individual who has a psychological bond with the organization, including a sense of work involvement, loyalty and trust in organizational values [18]. Organizational commitment from this point of view is marked by the acceptance of employees towards the goals of the organization and their willingness to exert efforts on behalf of the organization [19].

D. Job Satisfaction

Job satisfaction is a feeling of satisfaction or shortcomings in employees related to work, affective and positive attitudes towards one's work and the feelings and emotions that come from work experience [20]. Job satisfaction is an individual's subjective perspective which includes how he feels about his work and the work of his organization. In addition, job satisfaction is also defined as a pleasant emotional state that results from achieving work values [21].

Job satisfaction becomes an important factor related to factors such as employee work conditions, wages, stress levels, colleagues, top managers and workloads [22]. Job satisfaction alone is seen as any form of a combination of psychological environment and physiological conditions that can make a person admit in all honesty that I am grateful for the work I do for leave. On the basis of this definition, the level of job satisfaction is represented by what actually causes feelings of satisfaction [23].

II. METHODOLOGY

This study uses quantitative study with the approach taken is a causal study that examines the causal relationship between two or more variables. The study method consists of four stages of identification, data collection and processing, data analysis and interpretation, then conclusions. The identification stage used in this study consists of 1) identification of the problem, 2) determining the purpose of the study, 3) the study of literature can be sourced from books, journals, or previous study, 4) Field studies conducted at KIE company and establish communication with prospective respondents and which is

Table 2.
 Validity test of organizational commitment variables (N = 104)

Code	Indicator	r	1st Step <i>p</i> value	note	r	2nd Step <i>p</i> value	note
X21	Happy have career in the company	0,430	0,000	Valid	0,478	0,000	Valid
X22	vision inline with the company	0,356	0,000	Valid	0,351	0,000	Valid
X23	Feel part of the company	0,450	0,000	Valid	0,451	0,000	Valid
X24	Emotional bond with the company	0,575	0,000	Valid	0,570	0,000	Valid
X25	A sense of belonging	0,601	0,000	Valid	0,601	0,000	Valid
X26	Cannot leave the company	0,486	0,000	Valid	0,558	0,000	Valid
X27	Disrupted if leaving the company	0,546	0,000	Valid	0,581	0,000	Valid
X28	Work is a need not a desire.	0,218	0,026	Valid	0,205	0,037	Valid
X29	Many job choices besides at the company	0,053	0,590	Invalid			
X210	hard to find work outside	0,269	0,006	Valid	0,269	0,006	Valid
X211	High involvement	0,196	0,046	Valid	0,199	0,043	Valid
X212	Ignore coworkers	0,432	0,000	Valid	0,395	0,000	Valid
X213	Cannot do important work	0,418	0,000	Valid	0,384	0,000	Valid
X214	Personal sacrifice	0,114	0,251	Invalid			
X215	There is no obligation for the company	0,323	0,001	Valid	0,328	0,001	Valid
X216	Leaving the company is not the right decision	0,560	0,000	Valid	0,584	0,000	Valid
X217	Feeling guilty left the company	0,512	0,000	Valid	0,551	0,000	Valid
X218	Faithful to the company	0,526	0,000	Valid	0,573	0,000	Valid
X219	Have no plans to leave the company	0,520	0,000	Valid	0,584	0,000	Valid
X220	Owed to the company	0,415	0,000	Valid	0,405	0,000	Valid

Table 3.
 Reliability test result

Code	Variable	Cronbach's alpha	Note
X1	Financial Incentives	0,837	Reliabel
X2	Organizational Commitment	0,760	Reliabel
X3	Job Satisfaction	0,950	Reliabel
Y1	Job Performance	0,899	Reliabel

related to coordination for secondary data that can be used to support the study process.

Data collection procedures used in this study are structured data collection through the submission of a formal questionnaire that presents questions that have been arranged regularly beforehand. The questionnaire compiled included questions related to financial incentives, job performance, and organizational commitment. Where the scale used to provide questionnaire scoring in this study is the Likert scale. In this study the population used was all employees of the installation and maintenance department of PT. KONE Indo Elevators throughout Indonesia with 104 people. The role of the number of respondents is divided into 3 role functions, namely technicians, supervisors and managers.

A. Operational Definition and Variable Measurement

Before data result is analyzed deeper, all of these variables will be verified by validity test ($r < 5\%$) and realibility test ($cronbach's\ alpha > 0,6$) to eliminate invalid variable. After that, valid variable will have descriptive statistics by calculate *mean* and *std.dev* (Table 1).

B. Data Analysis

This study aims to determine the effect of financial incentives, organizational commitment, and job satisfaction on the job performance of PT Kone Indo Elevator employees. Testing the influence of the variables is done using parametric statistics, namely multiple linear regression models. Therefore, it is necessary to test the classical assumptions on the resulting regression model before proceeding with the analysis of the resulting regression model. Because a good regression model must be free of classical assumptions

that have been set, namely that the model must meet the assumptions of normality, free of multicollinearity, and free of heterocedasticity.

This study applies three regression models to examine the effect of financial incentives, organizational commitment, and job satisfaction on the job performance of PT Kone Indo Elevator's employees on the total sample, on the installation staff, and on non-installation staff. Data model will be analyzed with some test:

1) Normality Test

One assumption in the regression model is that the residuals are normally distributed. To see whether the residuals were normally distributed or not the *Kolmogorof-Smirnoff* test was used. The testing hypothesis is: H_0 : residuals are normally distributed, H_1 : residuals are not normally distributed. If the significance value in the *Kolmogorof-Smirnoff* test is greater than 5%, then H_0 is accepted or residuals are normally distributed.

2) Heteroscedasticity Test

This test aims to test whether in the regression model there is an inequality of variance from the residuals of one observation to another. The test used is the *Glejser Test* conducted by regressing the independent variables to the absolute value of the residuals, if the sig value on the t test for all independent variables is greater than 5%, then the variance of the residuals is the same or homocedasticity.

3) Multicollinearity Test (tolerance > 0,1 dan VIF < 10)

This test aims to test whether the regression model found the correlation of independent variables. A good regression model should not occur correlation of independent

Table 4.
Normality test result

Model	Kolmogorov-Smirnov	ρ value
Model 1: Installation Personel (N= 68)	0,950	0,327
Model 2: Maintenance Personel (N=36)	0,811	0,526
Model 3: All personel (N= 104)	1,268	0,080

Table 5.
Heteroscedasticity and multicollinearity test result

Model	Independent Variables	Heteroscedasticity		Multicollin	earity
		<i>t value</i>	ρ value	Tolerance	VIF
Model 1 (N= 68)	Financial Incentives	-0,912	0,370	0,693	1,443
	Organizational Commitment	1,459	0,156	0,983	1,017
	Job Satisfaction	0,363	0,719	0,701	1,427
Model 2 (N=36)	Financial Incentives	1,242	0,238	0,709	1,410
	Organizational Commitment	-1,781	0,100	0,924	1,083
	Job Satisfaction	1,000	0,337	0,749	1,334
Model 3 (N= 104)	Financial Incentives	0,716	0,478	0,737	1,357
	Organizational Commitment	-0,177	0,861	0,975	1,025
	Job Satisfaction	-1,023	0,313	0,749	1,336

Table 6.
Heteroscedasticity and multicollinearity test result

Model	Independent Variables	B	beta	t value	ρ value	ϵ
Model 1 (N= 68)	Constant	2,671		4,896	0,000	
	Financial Incentives	0,075	0,094	0,699	0,487	0,33363
	Organizational Commitment	0,023	0,027	0,240	0,811	
	Job Satisfaction	0,308	0,390	2,928	0,005	
Model 2 (N=36)	Constant	3,233		4,170	0,000	
	Financial Incentives	0,175	0,395	2,343	0,025	0,25051
	Organizational Commitment	-0,216	-0,241	-1,635	0,112	
	Job Satisfaction	0,263	0,278	1,697	0,099	
Model 3 (N= 104)	Constant	2,749		6,178	0,000	
	Financial Incentives	0,143	0,217	2,133	0,035	0,31776
	Organizational Commitment	-0,068	-0,076	-0,863	0,390	
	Job Satisfaction	0,294	0,342	3,392	0,001	

variables. The detection is done by using Variance Inflation Factor (VIF). If the VIF value <10, then multicollinearity does not occur, on the contrary if the VIF value > 10 then multicollinearity occurs.

4) Multiple Linear Regression Coefficients Analysis

In this study, data processing and analysis was carried out using the Statistical Package for Social Science (SPSS).

20.0 software. specifically, this study uses multiple regression analysis techniques (multiple regression analysis), which is a statistical technique that can be used to analyze the relationship between one single dependent variable and several independent variables.

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + e$$

Where:

- Y = Employee performance
- α = Constant value
- X1 = Financial incentives
- X2 = Organizational commitment
- X3 = Job satisfaction
- β_1 = Regression coefficient X1
- β_2 = Regression coefficient X2
- β_3 = Regression coefficient X3
- e = error

5) Coefficient of Determination Analysis

The coefficient of determination is a coefficient whose

value is intended to find out how much the variation of changes in one independent variable. The stronger the correlation between the observed variables, the greater the coefficient of determination produced. The coefficient of determination is expressed in percent (%) so it must be multiplied by 100%. This means that the percentage of the variation in changes in the Y variable is due to the change in the variable X.

6) Hypotesis Test

Proving the hypothesis is done through the implementation of bootstrapping with a value that must be significant at $p < 0.05$ on the basis of the following decision making: (a) If the probability value of 0.05 is smaller or equal to the probability value of $p \leq 0.05$ then Ho is rejected and Ha is accepted, meaning that it is significant. (b) If the probability value is 0.05 greater or equal to the probability value $p \geq 0.05$ then Ho is accepted and Ha is rejected, meaning that it is not significant.

III. RESULT

A. Validity and Reliability Test

After all that 78 variables are having validity test, 76 variables are valid. Only two variables of Commitment Organization are not valid that is Many job choices besides at the company & Needed Personal sacrifice (Table 2) as not meet r and ρ value requirement to be valid. All 4 main

Table 7.
Analysis coefficient of determination analysis

Independent Variables	Model	Adjusted R ²	F value	ρ value
Financial Incentives	Model 1 (N= 68)	0,165	5,407	0,002
Organizational Commitment	Model 2 (N=36)	0,295	5,891	0,003
Job Satisfaction	Model 3 (N= 104)	0,217	10,510	0,000

Table 8.
Hypothesis test

Model	Independent Variables	beta	t value	ρ value	Conclusion
Model 1 (N= 68)	Financial Incentives	0,094	0,699	0,487	Not significant
	Organizational Commitment	0,027	0,240	0,811	Not significant
	Job Satisfaction	0,390	2,928	0,005	significant
Model 2 (N=36)	Financial Incentives	0,395	2,343	0,025	significant
	Organizational Commitment	-0,241	-1,635	0,112	Not significant
	Job Satisfaction	0,278	1,697	0,099	Not significant
Model 3 (N= 104)	Financial Incentives	0,217	2,133	0,035	significant
	Organizational Commitment	-0,076	-0,863	0,390	Not significant
	Job Satisfaction	0,342	3,392	0,001	significant

variable is reliable as the Cronbach's alpha value is more than 0.6 (Table 3).

B. Normality Test

Analysist model is split based on the respondent's work characteristics related to the installation personel for 68 persons (model 1), and Maintenance Section Personnel for 36 persons (Model 2) that make the total respondent of 104 (Model 3). The test results show that all three models have normal, because the resulting kolmogorov-smirnov value has a significant value above 0.05. Thus, the three models produced are worthy of further analysis (Table 4).

C. Heteroscedasticity and Multicollinearity Test

Shows on Table 5 that the *t* value of the independent variable in each model has a significance level of > 5%. Thus, the model analyzed in this study is free from heterokedasticity problems. Table 4 also shows that the three independent variables in each model have *tolerance values* > 0.1 and *VIF* < 10. Thus, it can be concluded that the three variables are independent of all multicollinearity-free models.

D. Multiple Linear Regression Coefficients

Table 6 shows the magnitude of the regression coefficients generated in testing the study model. Based on the Table 6, the equation model in this study is as follows. Model 1: Installation personel (N = 68) ($Job\ Performance = 2.671 + 0.075 IK + 0.023 KO + 0.308 KK + 0.33363$). Model 2: Maintenance personel (N = 36) ($Job\ Performance = 3,233 + 0,175 IK - 0,216 KO + 0,263 KK + 0,25051$). Model 3: All Personel (N = 104) ($Job\ Performance = 2.749 + 0.143 IK - 0.068 KO + 0.294 KK + 0.31776$).

Above equation model shows that if there is no influence of financial incentives, organizational commitment, and job satisfaction, the performance of the installation staff is lower than that of the Maintenance Personnel (2,671 < 3,233). Meanwhile, when there is an influence of financial incentives, organizational commitment, and job satisfaction, the performance of the installation department's

tasks has a greater tendency to increase when compared to the performance of the employee's maintenance personnel (Table 6).

E. Analysis Coefficient of Determination Analysis

The coefficient of multiple determination (adjusted R²) shows the magnitude of the ability to predict financial incentives, organizational commitment, and job satisfaction on improving employee job performance. Table 7 shows that the predictive ability of financial incentives, organizational commitment, and job satisfaction towards improving the performance of the installation department's employee duties is 0.165 (Model 1). This means that the predictive ability of financial incentives, organizational commitment, and job satisfaction towards improving the performance of the employees of the installation department is 16.5%. This means that 83.5% of the performance of the installation part of the task is influenced by other variables not observed in this study (Table 7).

The ability to predict financial incentives, organizational commitment, and job satisfaction to improve the performance of employees' tasks in the Maintenance Section is 0.295 (Model 2). This means that the predictive ability of financial incentives, organizational commitment, and job satisfaction on improving the performance of employee duties that are Maintenance Personnel is 29.5%. This means that 71.5% of the job performance of the Maintenance Department Personnel is influenced by other variables not observed in this study.

The ability to predict financial incentives, organizational commitment, and job satisfaction towards improving employee job performance is 0.217 (Model 3). This means that the predictive ability of financial incentives, organizational commitment, and job satisfaction to improve employee job performance is 21.7%. This means that 79.3% of employee job performance is influenced by other variables not observed in this study. The amount of adjusted R² shows that the predictive ability of financial incentives,

organizational commitment, and job satisfaction towards improving the performance of the installation staff's work is lower than the financial incentives, organizational commitment, and job satisfaction towards improving the performance of the employee's tasks. Maintenance Personnel (16.5% <29.5%).

F. Hypothesis Test

Hypothesis Testing 1 (Table 8): (1) In Model 1 (installation personnel), the value of ρ value is greater than 5% so that it can be explained that in Model 1, Hypothesis 1 is rejected. Thus, it can be concluded that "financial incentives have no effect on the performance of the employees of the PT Kone Indo Elevator installation". (2) In Model 2 (the Maintenance Personnel), the value of ρ value is less than 5% so it can be explained that in Model 2, Hypothesis 1 is accepted. Thus, it can be concluded that "financial incentives have a positive and significant effect on the performance of the employees of PT Kone Indo Elevator's Maintenance Personnel". (3) In Model 3 (all personnel), the ρ value is less than 5% so it can be explained that in Model 3, Hypothesis 1 is accepted. Thus, it can be concluded that "financial incentives have a positive and significant effect on the job performance of PT Kone Indo Elevator employees".

Hypothesis Testing 2: (1) In Model 1 (installation personnel), the value of ρ value is greater than 5%, so it can be explained that in Model 1, Hypothesis 2 is rejected. Thus, it can be concluded that "organizational commitment does not affect the job performance of PT Kone Indo Elevator installation employees". (2) In Model 2 (the Maintenance Personnel), the value of ρ value is greater than 5%, so it can be explained that in Model 2, Hypothesis 2 is rejected. Thus, it can be concluded that "organizational commitment does not affect the job performance of PT Kone Indo Elevator's Maintenance Personnel personnel". (3) In Model 3 (all personnel), the value of ρ value is greater than 5%, so it can be explained that in Model 3, Hypothesis 2 is rejected. Thus, it can be concluded that "organizational commitment has no effect on the job performance of PT Kone Indo Elevator employees".

Hypothesis 3 Testing: (1) In Model 1 (installation personnel), the value of ρ value is less than 5%, so it can be explained that in Model 1, Hypothesis 3 is accepted. Thus, it can be concluded that "job satisfaction has a positive and significant effect on the performance of the employees of the PT Kone Indo Elevator installation". (2) In Model 2 (Maintenance Personnel), the value of ρ value is greater than 5%, so it can be explained that in Model 2, Hypothesis 3 is rejected. Thus, it can be concluded that "job satisfaction has no effect on the job performance of PT Kone Indo Elevator's Maintenance Personnel personnel". (3) In Model 3 (all personnel), the ρ value is less than 5%, so it can be explained that in Model 3, Hypothesis 3 is accepted. Thus, it can be concluded that "job satisfaction has a positive and significant effect on the job performance of PT Kone Indo Elevator employees".

IV. CONCLUSION

The conclusions of this study are: (1) Financial incentives

have a positive and significant effect on maintenance section employees (ρ value 0,025) and the total sample (ρ value 0,035), but do not have a significant effect on the performance of the installation department employees (ρ value 0,487). (2) Organizational commitment has no effect on the job performance of PT Kone Indo Elevator employees (ρ value 0,487 - 0,112 - 0,390). (3) Job satisfaction has a positive and significant effect on the employees of the installation section (ρ value 0,005) and the total sample (ρ value 0,001), but does not affect the performance of the maintenance department employees (ρ value 0,099).

ACKNOWLEDGMENT

I would like to thank to the management and employees of PT. KONE Indo Elevator because of their support for completing questionnaires.

REFERENCES

- [1] Industrial enzymes market. "Industrial enzyme market by type (carbohydrases, proteases, non-starch polysaccharides & nucleases, others types), source, application (food & beverage, feed, bioethanol, detergents, pulp & paper, textiles & leather, wastewater, treatment, other applications), form, and region- global forecast to 2026. <https://www.marketsandmarkets.com/Market-Reports/industrial-enzymes-market-237327836.html>. Accessed on 6 July 2020
- [2] A. Tanriseven and S. Dogan. "Immobilization of Pectinex Ultra SP- L to Produce Fructooligosaccharides". *Enzyme Microb. Technol.*, Vol .36, pp. 550-554, 2001.
- [3] S.R. Juliastuti, T. Widjaja, A. Altway, V.A. Sari, D. Arista, and T. Iswanto. "The effect of microorganism on coffee pulp pretreatment as a source of biogas production". *MATEC Web of Conferences* 156, 03010, 2018. <https://doi.org/10.1051/mateconf/201815603010>.
- [4] N. K. Blinova, M. Sirotiak, A. Bastosova and M. Soldan. Review: "Utilization of waste from coffee production". *Research paper*, Vol .25, no. 40, 2017.
- [5] T. Selvankumar., M. Govarthan., M. Govindaraju. "Production of Extracellular α -amylase enzyme by *Bacillus amyloliquefaciens* using coffee pulp waste as substrate". *An Indian Journal*, Vol. 4, no.3, pp. 156-159, 2010.
- [6] S. Ubaidillah and K. Muzakhar. "produced under solid state fermentation by *Pestalotiosis* sp. VM9 and *Aspergillus* sp. VTM5, and its efficiency as medium for single cel protein *Saccharomyces cerevisiae*". *IOP Conf. Series*, Vol. 546, 2019.
- [7] F. J. Contesini., J. D. A. Figuera., H. Y. Kawaguti., P. C. B. Fernandes., P. D. O. Carvalho., M. D. G. Nascimento., H. H. Sato." Potential Applications of Carbohydrases Immobilization in the Food Industry". *Review. International Journal of Molecular Science*, Vol. 14. pp. 1335-1369, 2013.
- [8] Azizah. "Skrening bakteri selulolitik dari sistem pencernaan *Hypothenemus hampei* Ferr dan purifikasi enzim yang dihasilkan". *Thesis*. Jember: Jember University Graduate Program, 2019.
- [9] D. M. Sirisena, and T. P. Manamendra. "Isolation and characterization of cellulolytic bacteria from decomposing rice straw". *Journal of the National Science Foundation of Sri Lanka*, Vol. 2, no.1, pp. 25-30, 1995.
- [10] K. Muzakhar., Masruroh., Siswoyo., R. Winarsa., and Sutoyo. "Sugar-rich hydrolysates of palm oil empty fruit bunch production through two step solid state fermentation and its confersion to ethanol". *Advanced Science Letters*, Vol. 23, no. 3, pp. 2533-2535, 2017.
- [11] N. Nelson. "A photometric adaptation of the somogy method for the determination of glucose". *The Journal of Biological Chemistry*, no. 153, pp. 375- 380, 1994.
- [12] R. M. Mairer. "Environmental Microbiology". Academic Press. Inc. All rights of Reproduction in any form reserved, 2009.
- [13] V. Renge., S. Khedkar., and N. R. Nandurkar. "Enzyme synthesis by fermentation method: a review" *Sci Rev Chem Comm*, Vol. 2, no.4, 2012.
- [14] F. J. Baker and R. E. Silverton." Introduction of medical laboratory technology". Butterworth-Heinemann, United Kingdom, 1976.

- [15] R. Subramaniam and R. Vimala. "Solid State and Submerged Fermentation for The Production and Bioactive Substances: a Comparative Study". International Journal of Science and Nature, Vol. 3, no. 3, pp. 480-486, 2012.
- [16] S. Mampreet, S. Sawraj, D. Sachin, S. Pankai and U.C. Baneerjee. "Influence of Process Parameters on the Production of Metabolites in Solid State Fermentation". Review Article. Malaysian Journal of Microbiology, Vol. 1, no. 2, 2005.
- [17] H. D. L. Bentubo and O. F. Gompertz. "Effects of Temperature and Incubation Time on The in Vitro expression of Proteases, Phospholipases, Lipases and DNases by different species of *Trichosporon*". SpringerPlus, Vol. 3, pp 377, 2014.
- [18] K. M. Sharma., R. Kumar., S. Panwar and A. Kumar. "Microbial alkaline proteases: optimization of production parameters and their properties". Journal of Genetic Engineering & Biotechnology, Vol. 15, no. 1, pp. 115-126, Jun. 2017.
- [19] H.H. Murad and H.H. Azzaz. "Microbial Pectinases and Ruminant Nutrition". Research Journal of Microbiology, Vol. 6, no. 3, pp. 246-269, 2011.
- [20] D. Asem., V. V. Leo., A. K. Passari., M. V. Tonsing., J. B. Joshi., S. Uthandi., A. Hashem., E. F. Abd allah., and B. P. Singh. "Evaluation of Gastrointestinal Bacterial Population for The Production of Holocellulose Enzymes for Biomass Deconstruction". Plos One, Vol. 12, no. 10, pp 17, Oct. 2017.
- [21] E. N. N. Raju and G. Divakar. 2013. Screening and isolation of pectinase producing bacteria from various regions in Bangalore. International Journal of Research in Pharmaceutical and Biomedical Science, Vol. 4, pp. 151-154.
- [22] A. C. Soria., M. Brokt., M. L. Sanz., I. Martinez-Castro. "Comprehensive Sampling and sampler preparation". Reference Modul in Chemistry, Molecular Sciences and Chemical Engineering, Vol. 4, pp. 213-243, 2012.
- [23] G. Grogan. "Practical Biotransformation". Postgraduate Chemistry Series. Chichester: Jhon Willey & Sons Ltd, 2009.
- [24] A. Kumar and N. Garg. "Enzymology: Enzyme Purification". Devi Ahilya University, India, 2006.
- [25] E. Navasivayam., D. John Ravindar., K. Mariappan., A. Jiji., M. Kumar., R. L. Jayaraj." Production of extracellular pectinase by *Bacillus cereus* isolated from market solid waste". Journal of Bioanalysis & Biomedicine, Vol. 3, no. 3, pp. 70-75, 2011.
- [26] L. Ho and L. Heng. "Xylanase Production by *Bacillus subtilis* in Cost-Effective Using Soybean Hull as Part of Medium Composition Under Submerged Fermentation (SmF) and Solid State Fermentation (SsF)". Journal of Biodiversity, Bioprospecting and Development, Vol. 2 no. 1, 2015.
- [27] W. Yang., F. Meng., J. Peng., P. Han., F. Fang., L. Ma., and B. Cao. "Isolation and Identification of cellulolytic bacterium from the Tibetan pig's intestine and investigation of its cellulase production". Electronic Journal of Biotechnology, Vol. 17, pp. 262-267, 2014.
- [28] M. Vatanparast., V. Hosseiniinaveh., M. Ghadamyari., and S. Minoosajadian. "Plant Cell Wall Degrading Enzymes, Pectinase and Cellulase, in the Digestive System of The Red Palm Weevil, *Rhychophorus ferrugineus* (Coleoptera Curculionidae)". Plant Protect, Vol. 50, no. 4. Pp. 190- 198, 2014.
- [29] P. K. Robinson." Enzymes: principle and biotechnological applications". Essays in Biochemistry, Vol. 59, pp.1-40.
- [30] J. K. Seo., T. S. Park., I. H. Kwon., M. Y. Piao., C. H. Lee and J. K. Ha. "Characterization of cellulolytic and xylanolytic enzymes of *Bacillus licheniformis* JK7 isolated from the rumen of a native Korean goat". Asian-Aust J Anim Sci, Vol. 26, pp. 50-58, 2013.
- [31] K. Muzakhar. "A consortium of three enzymes: xylanase, arabinofuranosidase, and cellulase from *Aspergillus* sp. which liquified coffee pulp wastes". IOP Conf. Seris, Vol. 546, 2019.