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Rector Welcoming Remarks

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Rector Welcoming Remarks



It is our great pleasure to welcome you to International Conference of Innovations on Environment, Technology in Society (ICE-Tech 2018) which will be held during **10-11 August 2018, in Pekanbaru, Indonesia** with the theme ***“The Challenges of Environment and Technology in the Industrial Revolution 4.0”***. This conference is hosted by Universitas Lancang Kuning, Indonesia in collaboration with Dayeh University in Taiwan, University Malaya, Kuala Lumpur, Universiti Teknologi Malaysia and Universiti Kebangsaan Malaysia.

The International Conference ICE-Tech 2018 focusing on all aspects of Environment and Technology that strongly related to all aspects of life. The aims are to bring together researchers, scientists, practitioners and scholar students to exchange and share their experiences, new ideas, and research results about all aspects of Environment and Technology in society

Attending ICIETiS 2017 means you also will experience Pekanbaru, a beautiful city renowned for its international flavor and inspiring diversity. Located on Sumatera island One of the world's You'll find a friendly population, world-famous gastronomy, and an atmosphere of celebration. ICE-Tech 2018 will be an exceptional conference for sharing the latest academic insights as well as experiencing the unique culture of Malay hospitality in Pekanbaru City.

We hope you will join us for a symphony of outstanding social sciences, and take a little extra time to enjoy the spectacular and unique beauty of this region. We thank you for your participation and look forward to seeing you in Pekanbaru, Indonesia.

With best wishes

Assoc. Prof. Dr. Hj. Hasnati, MH



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Editorial Material

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No	First Name	Surname	Institution	Email
1.	Hadinoto	Hadinoto	Universitas Lancang Kuning	hadinoto@unilak.ac.id
2.	Amiruddin	Fisu	Andi Djemma University	amiruddinakbarfisu07@gmail.co
3.	Giarno	Giarno	Gadjah Mada University	giarno@mail.ugm.ac.id
4.	Lusi	Putri	Universitas Lancang Kuning	lusidwiputri@unilak.ac.id
5.	Rindi	Hatika	Universitas Pasir Pengaraian	rindigenesa@gmail.com
6.	Alfian	Saleh	Universitas Lancang Kuning	alfian.saleh@unilak.ac.id
7.	Wan	Syaiyuddin	University of Sumatera Utara	profwsy@gmail.com
8.	David	Setiawan	Universitas Lancang Kuning	dsetia@unilak.ac.id
9.	Zainuri	Zainuri	Universitas Lancang Kuning	zainuri@unilak.ac.id
10.	Febrizal	Syam	Universitas Lancang Kuning	febrizal@unilak.ac.id
11.	Virgo	Haris	Lancang Kuning university	virgotrisepharis@unilak.ac.id
12.	Susy	Srihandayani	Universitas Lancang Kuning	gadisoil79@gmail.com
13.	Tri	Handayani	Sekolah Tinggi Teknologi Dumai	trihandayani.stt@gmail.com
14.	Edfan	Darlis	Universitas Riau	darlis_ee@yahoo.com
15.	Enny	Insusanty	Universitas Lancang Kuning	ennyinsusanty@unilak.ac.id
16.	Fajrizal	Fajrizal	Universitas Lancang Kuning	fajrizal@unilak.ac.id
17.	Titin	Sundari	Universitas Lancang Kuning	titin@unilak.ac.id
18.	Hardi	Hardi	Universitas Lancang Kuning	hardi@unilak.ac.id
19.	Seprita	Lidar	Universitas Lancang Kuning	sepritaldr@unilak.ac.id
20.	Latifa	Siswati	Universitas Lancang Kuning	latifasiswati@unilak.ac.id
21.	Khairil	Anwar	Andalas University	khairrilanwar@gmail.com
22.	Hardi	Hardi	Universitas Riau	hardi.centerr@gmail.com
23.	Wetri	Febrina	Sekolah Tinggi Teknologi Dumai	wetry.febrina@gmail.com
24.	Irwan	Effendi	University of Riau	helpingirwan@gmail.com
25.	Nedi	S	University of Riau	helpingirwan@gmail.com



26.	Fahrial	Fahrial	Universitas Islam Riau	fahrial_me@yahoo.com
27.	Monice	Monice	Universitas Lancang Kuning	monice@unilak.ac.id
28.	Hendri	Silva	Universitas Lancang Kuning	hsilva@unilak.ac.id
29.	Fahmi	Fahmi	Universitas Lancang Kuning	fahmiadvokat12@gmail.com
30.	Dwi	Herlinda	Universitas Lancang Kuning	dwiherlinda@unilak.ac.id
31.	Gusneli	Yanti	Universitas Lancang Kuning	gusneli@unilak.ac.id
32.	Dedi	Wardianto	Muhammadiyah Sumatera Barat University	dediwardianto71@yahoo.com
33.	Liliana	Liliana	UIN Suska Riau Pekanbaru	liliana@uin-suska.ac.id
34.	Ali	Anwar	Institut Agama Islam Negeri Kediri	ali.anwar9999@gmail.com
35.	Hamzah	Eteruddin	Universitas Lancang Kuning	hamzah@unilak.ac.id
36.	Lisnawita	Lisnawita	Universitas Lancang Kuning	lisnawita@unilak.ac.id
37.	Irwan	Effendi	University of Riau	helpingirwan@gmail.com
38.	Loneli	Costaner	Universitas Lancang Kuning	lonelicostaner@gmail.com
39.	Essy	Syam	Universitas Lancang Kuning	essysyam@unilak.ac.id
40.	Raihanatu B	Ruzain	Universitas Islam Riau	raihanatu.binqolbi@psy.uir.ac.id
41.	Indah	Muzdalifah	Universitas Lancang Kuning	indah@unilak.ac.id
42.	Inola	Anwar	Universitas Negeri Padang	anwarinola17@gmail.com
43.	Cica	Openda	Universitas Negeri Padang	cicaopenda94@gmail.com
44.	Nurliana	Nasution	Universitas Lancang Kuning	nurliananst@unilak.ac.id
45.	Indra	Afrita	Universitas Lancang Kuning	indra_afrita@yahoo.com
46.	Vita	Amelia	Universitas Lancang Kuning	vita.amelia@unilak.ac.id
47.	Bambang S	Wijaya	Bakrie University	bswijaya98@yahoo.com
48.	Candra	Kirana	Akademi Kebidanan Helvetia Pekanbaru	ckirana17@gmail.com
49.	Fitridawati	Soehardi	Universitas Lancang Kuning	fitridawati@unilak.ac.id
50.	Masteven	Romus	Universitas Islam Negeri Sultan Syarif Kasim Riau	mrromus@gmail.com
51.	Adi	Rahmat	Universitas Lancang Kuning	adirahmat@unilak.ac.id
52.	Muhammad	Nasution	University of Muhammadiyah Sumatera Utara	muhammadirfan@umsu.ac.id

53.	Herdi	Herdi	Universitas Lancang Kuning	herdi@unilak.ac.id
54.	Andrew	Utama	Universitas Lancang Kuning	andrew.fh.unilak@gmail.com
55.	Junaidi	Junaidi	Universitas Lancang Kuning	junaidi@unilak.ac.id
56.	Sukma	Erni	Universitas Islam Negeri Sultan Syarif Kasim	sukma.erni@uin-suska.ac.id
57.	Rini	Nizar	Universitas Lancang Kuning	rininizar@unilak.ac.id
58.	Sandra	Dewi	Universitas Lancang Kuning	sandra.fh.unilak@gmail.com
59.	Tantry	Widiyanarti	Universitas Muhammadiyah Tangerang	tantry11@gmail.com
60.	Nora	Adelina	Universitas Negeri Padang.	noraadelina85@gmail.com
61.	Widya	Apriani	Universitas Lancang Kuning	widyaapriani@unilak.ac.id
62.	Muhammad	Yusuf	Universitas Islam Negeri Alauddin Makassar	muh.yusuf1274@gmail.com
63.	Gogor A	Handiwibowo	Institut Teknologi Sepuluh Nopember	gogor@mmt.its.ac.id
64.	Roma A. A.	Loebis	University of Sumatera Utara	romaloebis@gmail.com
65.	Yetti	Yetti	Universitas Lancang Kuning	yetti_arwendi@yahoo.com
66.	Eni	Suhesti	Universitas Lancang Kuning	suhestieni@unilak.ac.id
67.	Hamzah	Eteruddin	Universitas Lancang Kuning	hamzah@unilak.ac.id
68.	Roki	Hardianto	Lancang Kuning University	roki@unilak.ac.id
69.	Robert T	Siregar	Universitas Simalungun	tuasir@gmail.com
70.	Astadi	Pangarso	Telkom University	astadipangarso@telkomuniversity
71.	M. Faisal	Ramadhani	Universitas Indonesia	pbintangpagi@gmail.com
72.	Arianti	Khairina	Universitas Indonesia	pbintangpagi@gmail.com
73.	Munawar	Holil	Universitas Indonesia	kangmumu2016@gmail.com
74.	Bambang	Hernawan	Universitas Indonesia	bambang.hernawan@ui.ac.id
75.	Deby S	Harsena	Universitas Indonesia	deby.steviangga@ui.ac.id
76.	Faizah	Kamilah	Universitas Lancang Kuning	Faizahkamilah76@yahoo.com
77.	Fitri	Eriyanti	Universitas Negeri Padang	fitri.eriyanti@fis.unp.ac.id
78.	Heni	Susanti	Islamic University of Riau	heni@law.uir.ac.id
79.	Elsy	Renie	Brawijaya University	reniebts@gmail.com

80.	Usaha	Situmeang	Lancang Kuning University	usaha@unilak.ac.id
81.	Nyoto	Nyoto	Universitas Diponegoro Semarang	nyotoriau@gmail.com
82.	Khoirunnisa	Kusuma	Universitas Indonesia	khoirunnisakusuma03@gmail.co
83.	Perkasa	Dwiguna	Universitas Indonesia	perkasamega@ui.ac.id
84.	Ida	Erviana	Universitas Indonesia	ida.erviana@ui.ac.id
85.	Asmendri	Asmendri	Institut Agama Islam Negeri (IAIN) Batusangkar	asmendri.25@gmail.com
86.	Haznil	Zainal	Sekolah Tinggi Ilmu Ekonomi Persada Bunda	haznilzainal1@gmail.com
87.	Refika	Andriani	Universitas Lancang Kuning	andriarefi@gmail.com
88.	Muhammad	Daeng	Universitas Lancang Kuning	yusufdm@unilak.ac.id
89.	Abd	Muis	Universitas Hasanuddin	muist82@gmail.com
90.	Akmal	Akmal	Padang State University	akmalmarlis@gmail.com
91.	Yantri	Maputra	Universitas Andalas	yantrimaputra@gmail.com
92.	Evizariza	Evizariza	Universitas Lancang Kuning	evizariza@unilak.ac.id
93.	Bambang	Suroto	Universitas Lancang Kuning	bambanguroto@unilak.ac.id
94.	Surtinah	Surtinah	Universitas Lancang Kuning	Surtinah@Unilak.Ac.Id
95.	Hadiyati	Hadiyati	Universitas Lancang Kuning	hadiyati@unilak.ac.id
96.	Fatkhurahman	Fatkhurahman	Universitas Lancang Kuning	fatkhurahman@unilak.ac.id
97.	Marta	Dinata	Universitas Lancang Kuning	martadinata@unilak.ac.id
98.	Rika	Cheris	Universitas Lancang Kuning	rika.cherish@unilak.ac.id
99.	Idel	Waldelmi	Lancang Kuning University	idelwaldelmi@unilak.ac.id
100.	Ardiansah	Ardiansah	Universitas Lancang Kuning	ardiansyah2000@yahoo.com
101.	Boby	Samra	Universitas Lancang Kuning	boby@unilak.ac.id
102.	Aguswan	Aguswan	Universitas Lancang Kuning	aguswan@unilak.ac.id
103.	Rismayeti	Rismayeti	Universitas Lancang Kuning	rismayeti@gmail.com
104.	Hasnati	Hasnati	Universitas Lancang Kuning	hasnati@unilak.ac.id
105.	Sri	Wahyuni	Universitas Lancang Kuning	sriwahyunifkip@unilak.ac.id
106.	Neneng	Salmiah	Universitas Lancang Kuning	nenengsalmiah@unilak.ac.id

107.	Bambang	Supeno	Universitas Lancang Kuning	f2bams@gmail.com
108.	Mar'atul	Afidah	Universitas Lancang Kuning	maratul.afidah@yahoo.co.id
109.	Yuslaini	Yuslaini	Universitas Lancang Kuning	f2bams@gmail.com
110.	Nanda	Mela	Universitas Riau	nanda.fito.mela@gmail.com
111.	Iik	Idayanti	Universitas Lancang Kuning	idayanti.iik@gmail.com
112.	Destina	Kasriyati	Universitas Lancang Kuning	destinakasriyati@gmail.com
113.	Melinda	Sariningsih	Universitas Indonesia	melinda.sariningsih@ui.ac.id
114.	Nanny	Lestari	Universitas Indonesia	nanny-sl@ui.ac.id
115.	Nanny	Lestari	Universitas Indonesia	nanny-sl@ui.ac.id
116.	Refika	Andriani	Universitas Lancang Kuning	andriarefi@gmail.com
117.	Achmad	Hidayatullah	University Muhammadiyah of Surabaya	achmad.pendmat@fkip.um-
118.	Noviyanthy	Handayani	Muhammadiyah Palangkaraya University	novisipilump@gmail.com
119.	Abdul	Hidayat	University of Muhammadiyah Surabaya	azizhidayat@um-surabaya.ac.id
120.	Musrifatul	Uliyah	University of Muhammadiyah Surabaya	musrifatul@um-surabaya.ac.id
121.	Kustiawati	Ningsih	Universitas Islam Madura	kustiawatin@gmail.com
122.	Dede	Nasrullah	University Muhammadiyah of Surabaya	dedenasrullah@um-
123.	Dio	Hutama	Universitas Muhammadiyah Surabaya	dioalifhutama@ft.um-
124.	Fatmawati	Fatmawati	Universitas Wiraraja Sumenep	fatmawati.ir@gmail.com
125.	M Rofiqi	M Rofiqi	Universitas Airlangga (Unair) Surabaya	m.rofiqi-2017@fisip.unair.ac.id
126.	Aswin	Rosadi	Universitas Muhammadiyah Surabaya	aswinrosadi@ft.um-
127.	Saiful	Umam	Universitas Airlangga (UNAIR) Surabaya	syaifulumam55@gmail.com
128.	Tining	Haryanti	Universitas Muhammadiyah Surabaya,	ting.haryanti@ft.um-
129.	Khafizh	Rosyidi	Universitas Yudharta Pasuruan	hafizhrosyidi@yudharta.ac.id
130.	Muhsi	Muhsi	Universitas Islam Madura (UIM),	muhsiy@gmail.com
131.	Radius	Setiyawan	Universitas Muhammadiyah Surabaya	radius.setiyawan@gmail.com
132.	Waode	Hamsia	University of Muhammadiyah Surabaya	Hamsiawaode@yahoo.com
133.	Campina	Prihantini	Bakti Bangsa Pamekasan Institute of Economic	campinailla@stieba.ac.id

134.	W Suryaningtyas	Suryaningtyas	Institut Teknologi Sepuluh Nopember, Surabaya	wahyuni.pendmat@fkip.um-
135.	Norseta	Saputra	Muhammadiyah Palangkaraya University	norseta.ajie@gmail.com
136.	Sri	Lestari	Universitas Muhammadiyah Surabaya	spiritsrilestari@gmail.com
137.	Rida	Respati	Muhammadiyah Palangkaraya University	sipilump@yahoo.co.id
138.	Abd	Aziz	Universitas Airlangga (Unair) Surabaya	abdaziz.madura@gmail.com
139.	Hendra	Cahyadi	Muhammadiyah Palangkaraya	irarizqonroyan@gmail.com
140.	Agus	Sujianto	Institut Agama Islam Negeri (IAIN) Tulungagung	agusekosujianto@gmail.com
141.	Hozairi	Hozairi	Islamic University of Madura	dr.hozairi@gmail.com
142.	Sahibudin	Sahibudin	Universitas Islam Madura (UIM) Pamekasan	sahibudin99@gmail.com
143.	Halimatus	Sakdiyah	Islamic University of Madura (UIM) Pamekasan,	Halimatussakdiyah270@gmail.co
144.	Diyah	Hariyani	Universitas PGRI Madiun	dyearth@yahoo.com
145.	Tony	Yulianto	University of Madura (UIM) Pamekasan, Indonesia	toniyulianto65@gmail.com
146.	Ratno	Abidin	Universitas Muhammadiyah Surabaya	ratno.abidin@fkip.um-
147.	Mukhlishi	Mukhlishi	Sekolah Tinggi Keguruan dan Ilmu Pendidikan	lisyi@stkipgrisumenep.ac.id
148.	Bakir	Bakir	Islamic University of Madura, Pamekasan	bakir.madura@gmail.com
149.	Ahmad	Rofiuddin	Universitas Islam Negeri Walisongo	adibudin08@walisongo.ac.id
150.	Ali	Anwar	Institut Agama Islam Negeri Kediri	ali.anwar9999@gmail.com
151.	Ibrahim	Ibrahim	Universitas Muhammadiyah Sorong	ibrahim@gmail.com
152.	Ahmad	Subakir	Institut Agama Islam Negeri Kediri	bakir_kediri@yahoo.co.id
153.	Limas	Dodi	Institut Agama Islam Negeri Kediri	ade_elfa@ymail.com
154.	Nurul	Hanani	Institut Agama Islam Negeri Kediri	nurulhananimhi@yahoo.co.id
155.	Sufirmansyah	Sufirmansyah	Institut Agama Islam Negeri Kediri	mas.imansyah@gmail.com
156.	Andriani	Andriani	Institut Agama Islam Negeri Kediri	andr1an1_73@yahoo.co.id
157.	Malik D	Prakoso	Institut Agama Islam Negeri (IAIN) Kediri	malikdwi521@gmail.com
158.	Syamsul	Huda	Institut Agama Islam Negeri (IAIN) Kediri	syamsul_huda@yahoo.co.id
159.	Iffatin	Nur	State Islamic Institute of Tulungagung	iffaeltinury@gmail.com
160.	Imroatul	Hasanah	Institut Agama Islam Negeri (IAIN) Kediri	imroatulhasna@gmail.com

161.	Miftahul	Hidayati	Institut Agama Islam Negeri (IAIN) Kediri	miftahulnurilhidayati3935@gmail
162.	Moh. A	Yusuf	Institut Agama Islam Negeri (IAIN) Kediri	asror_y@yahoo.com
163.	Mukhammad	Abdullah	Institut Agama Islam Negeri Kediri	dr_abduhkdrr@yahoo.com
164.	Ririn T	Puspita	Institut Agama Islam Negeri Kediri	ririntripuspitaningrum@gmail.co
165.	Z A	Hakim	IAIN Tulungagung, Indonesia	zunlamteng@yahoo.com
166.	Zuraidah	Ida	Institut Agama Islam Negeri Kediri	Ida_mlg07@yahoo.co.id
167.	Ilmatus	Sa'diyah	Universitas Indonesia	ilmatussadiyah@gmail.com
168.	Turita I	Setyani	Universitas Indonesia	turita.indah@gmail.com
169.	Hernimawati	Hernimawati	Universitas Lancang Kuning	hernimawati@unilak.ac.id
170.	Prihati	Prihati	Universitas Lancang Kuning	prihati@unilak.ac.id
171.	Surya	Dailiati	Universitas Lancang Kuning	suryadailiaty@unilak.ac.id
172.	Sudi	Fahmi	Universitas Lancang Kuning	sudifahmi@unilak.ac.id
173.	Surtinah	Surtinah	Universitas Lancang Kuning	surtinah@unilak.ac.id
174.	Yuhelmi	Yuhelmi	Universitas Lancang Kuning	yuhelmi@unilak.ac.id
175.	Sri	Utami	Universitas Lancang Kuning	uut76solo@gmail.com
176.	Wasiah	Sufi	Universitas Lancang Kuning	wasiah.sufi@unilak.ac.id
177.	Ryan	Pahlawan	Universitas Lancang Kuning	ryanpahlawan@unilak.ac.id
178.	Mohd.	Fauzi	Universitas Lancang Kuning	mohd.fauzi_007@yahoo.co.id
179.	Yuvi	Darmayunata	Universitas Lancang Kuning	yuvidarmayunata@unilak.ac.id
180.	Sri	Wahyuni	Universitas Lancang Kuning	sriwahyuni91@unilak.ac.id
181.	Hajam	Hajam	State of Islamic Religion Institute Syekh Nurjati	hajam_1967@yahoo.co.id
182.	Jeni	Wardi	Universitas Lancang Kuning	budihamuddin@gmail.com
183.	Masnur	Halilintar	Universitas Lancang Kuning	masnur@unilak.ac.id
184.	Lukmanul	Hakim	UIN Imam Bonjol Padang	luqman_az01@yahoo.com.
185.	Heriyanto	Heriyanto	Universitas Islam Riau, Indonesia	heriyanto@agr.uir.ac.id
186.	Elsy	Renie	Brawijaya University	reniebts@gmail.com
187.	Fauzana	Annova	STIT Syekh Burhanuddin, Pariaman	fauzanaannova@gmail.com

188.	Asmendri	Asmendri	Institut Agama Islam Negeri (IAIN) Batusangkar	asmendri.25@gmail.com
189.	Zarfina	Yenti	State Islamic University Sulthan Thaha Saifuddin ,	zarfinayenti1@gmail.com
190.	Rahmatullah	Arsyad	Universitas Muhammadiyah Sorong	rahmatullahbinarsyad@gmail.co
191.	Miftah	Rahmawati	Universitas Muhammadiyah Sorong	miftah.sigit@yahoo.com

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Delegates List

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ICE-Tech 2018

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A. Background

In response to the increasing research and issues on the field of environment and technology in Southeast Asia, Universitas Lancang Kuning, Indonesia in collaboration with Universiti Teknologi Malaysia and Universitas Kebangsaan Malaysia will conducting International Conference on Environment and Technologies (ICE-Tech 2018) focusing on theme “*The Challenges of Environment and Technology in the Industrial Revolution 4.0*”. This Conference provides a chance for academic and industry professionals to discuss recent progress in the area of Environment and Technology. We expect that the conference and its publications will be a trigger for further related research and technology improvements in this important subject.

ICE-Tech 2018 will be the most comprehensive conference focused on the various aspects of advances in Interdisciplinary of Environment and Technologies. The conference will take place in Pekanbaru, Indonesia, on 10-11 August 2018.

B. Scope and Themes

ICE-Tech 2018 will be the most comprehensive conference focused on the various aspects of advances Interdisciplinary on Environment and Technology. It will cover vital issues in Environment and Technology under multiple sub-themes such as Agriculture, Forestry, Computer Sciences and, Engineering

AGRICULTURE: Agribusiness, (off-on farm) , Agricultural Institutional, Agricultural Policy, Sustainable Agriculture, Organic Agricultural, Agricultural Technology, Marketing of Agriculture, Agricultural Extension and Communication, Agro industry

FORESTRY: Forest Management, Forest and Climate Change, Forest Bio-diversity, Ecosystem Service and Conservation, Silviculture and Agroforestry, Forestry and Environmental technology, Forest biotechnology and tree improvement

COMPUTER SCIENCES: Artificial intelligence, Digital Humanities, Computer Vision, Robotic, Mobile Application, Network Security, E-Government, E-Commerce, Data-mining, Geography Information system, Cloud and Grid Computing, Bio Informatics, Decision, Support System

ENGINEERING: Architectural Studies, Sustainable Architecture, Architecture Urban Conservation, Environment-Friendly Construction and Development, Safety Management, Heritage Culture Tourism, Urban Planning, Building and Construction Technologies, Mechanical, Energy and Machine Engineering, Electronics, System and Statistics Engineering,



Renewable Energy Technologies, Electric Drive and Energy Conversion, Information System and Management, Mechatronic, Robotic and Automation

APPLIED MULTIDISCIPLINE: Technology in Education, Applied Technology in Society, Environmental Law, Environmental Literacy, Cultural & Environment, Health and Environment, Public Environment. Environmental Policy.

More information : <http://icetech.unilak.ac.id/Tracks.htm>

C. Important Dates

DESCRIPTIONS	DEADLINES
Abstract Submission Due date:	3 August 2018
Notification of Acceptance:	5 August 2018
Full Paper Submission:	8 August 2018
Conference Day:	10-11 August 2018

D. KEYNOTE SPEAKER

Prof. Dr. Weishen Wu, Ph.D (Dayeh University, Taiwan)

Prof. Dr. Herri, MBA(LL2-Dikti Wil. X)

Prof. Ghamal Zakaria (Universiti Brunei Darussalam)

International Advisory Board

Prof. Dr. Joran (Linkoping University, Swedia)
 Prof. Dr. Amran bin Hamzah (Universitas Teknologi Malaysia, Malaysia)
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 Prof. Dr. Mauridi (Institut Teknologi Sepuluh November, Indonesia)
 Prof. Dr. Adi Soeprijanto (Institut Teknologi Sepuluh November, Indonesia)
 Prof. Dr. Syafrani (Universitas Lancang Kuning, Indonesia)
 Prof. Dr. Hariadi Kartodiharjo (Institut Pertanian Bogor, Indonesia)
 Prof. Dr. Sumbangan Baja (Universitas Hasanuddin, Indonesia)
 Prof. Wiendu Nuryanti Ph.D (Universitas Gajah Mada, Indonesia)
 Prof. Dr. Chairul Saleh (Universitas Islam Indonesia, Indonesia)
 Prof. Dr. Richardus Eko Indrajit (STMIK Perbanas, Indonesia)

-Scientific Committee:

- Assoc. Prof. Dr. Rila Mandala (Institut Teknologi Bogor, Indonesia)
- Assoc. Prof. Dr. Romi Satria Wahono (Universitas Dian Nuswantoro, Indonesia)
- Assoc. Prof. Dr. Phil. Arinafril (Universitas Sriwijaya, Indonesia)
- Assoc. Prof. Dr. Arachchilage Aruna Shanta (Sabaragamuwa University of Sri Lanka)
- Assoc. Prof. Dr. Abdurrahman Radin Haggi (Sultan Sharif Ali Islamic University, Brunei)
- Assoc. Prof. Dr. Dedi Zargustin (Universitas Lancang Kuning, Indonesia)

- Assoc. Prof. Dr. Hamzah (Universitas Lancang Kuning, Indonesia)
- Assoc. Prof. Dr. Sitti Latifah (Universitas Mataram, Indonesia)
- Assoc. Prof. Dr. Marhamah Nadir (Universitas Hasanuddin, Indonesia)
- Assoc. Prof. Dr. Indah Raya (Universitas Hasanuddin, Indonesia)
- Assoc. Prof. Dr. Wasilah Sahabuddin (UIN Alaudin Makassar, Indonesia)
- Assoc. Prof. Dr. Badrussaman (Institut Teknologi Sepuluh November, Indonesia)
- Sofiane Hamrioui, Ph.D (Universite de Haute Alsace, France)
- Amine Brahmia, Ph.D (eXia. CEsi School of Computer and IT, Strasbourg, France)
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3	Giarno	Giarno	Gajah Mada University	giarno@mail.ugm.ac.id	Influence Rainy and Dry Season to Daily Rainfall Interpolation in Complex Terrain of Sulawesi
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5	Rindi	Hatika	Universitas Pasir Pengaraian	rindigenesa@gmail.com	Illegal Gold Mining in Kuantan River: Mercury Contamination Analysis
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The Correlation Between Cone End Resistance (q_c) And California Bearing Ratio (CBR) Of Land In Banjarbaru

Rida Respati¹ & Hendra Cahyadi²

^{1,2}Department of Civil Engineering, Faculty of Engineering, Muhammadiyah Palangkaraya University, Palangka Raya 73111, Indonesia

¹ Email: sipilump@yahoo.co.id

² Email: irarizqonroyan@gmail.com

Abstract: All this time, the score of CBR is calculated according to q_c score. Generally, planner usually refers to graph / nomogram which published on literature book, but the graph / nomogram on the book may not probably able to apply in all areas, including Banjarbaru. In this particular research, it aimed to make the graph or equation between CBR and Cone test in the cone area of 0.5 in². The both tests used the same sample of water contents and density. The samples were taken in four areas in Banjarbaru; Balitra, Jalan Semeru (Semeru Street), Mandiangin Circuit, and Banjarbaru Asri Housing. There took soil samples in three points of every areas. By the test, obtained the correlation between CBR and Cone End Resistance (q_c) on Banjarbaru area: $CBR = 0.0545 q_c + 2.618$ and the q_c score is between 50 kg/cm² to 300 kg/cm².

Keywords: CBR, q_c , compaction, water content.

1. Introduction

The checking of CBR score is usually taking too long time if through the laboratory test. To make the shorten time, the planner usually conducts the CBR test in the field directly. The standard of CBR test type is, by using pistons. Because the large of pistons body, it need a heavy weight to push the piston into the certain depth of soil. Another test of CBR is using Cone Penetrometer. The Cone Penetrometer is easier than pistons test. The pointed of cone end makes the tool easy to push into the ground, so the loading weight is smaller than using a piston. In this checking, it requires the data of cone end resistance and the correlation between cone end resistance and CBR.

Actually, there is an available graph on correlation between cone end resistance and CBR which is produced by the research result of Bakrie Oemar dan Nurly Gofar on 1995. But, the graph was research on unknown area, and the structure and characteristic of soil might certainly different. The graph of the correlation between Cone End Resistance (q_c) and California Bearing Ratio (CBR) of land in Banjarbaru is not available yet. This factor makes the planner usually conducting a CBR test in laboratory or tends to enlarge the safety factor in the design, as the impact, the project cost also increase. Based on the background, the researcher conducted the research on the correlation between Cone End Resistance (q_c) and California Bearing Ratio (CBR) of land in Banjarbaru.

1.1 California Bearing Ratio

CBR test was issued by California Transportation Department on 1992. The test aims to determine the feasibility of subsoil which will use as base course in a highway construction. Since the World War II, U.S Army Corps of Engineers adapts this test in the construction of airfield. The score of CBR is a comparison between the penetration load of a material and the standard material on the same depth and penetration speed. In a formula;

$$CBR = (\text{tension test} / \text{tension standard}) \times 100\% \dots \dots \dots \text{eq. 1}$$

Table of tension standard scores is presented in Table 1.



Table 1. The scores of tension standard on each penetration

Penetration		Unit of tension standard	
mm	Inch	Mpa	Psi
2.5	0.10	6.9	100
5.0	0.20	10.3	1500
7.5	0.30	13.0	1900
10.0	0.40	16.0	2300
12.7	0.50	18.0	2600

Source: Bowles (1992)

The CBR score is used to assess the soil, especially as base course on highway pavement or airfield. The typical rating of CBR score is presented in Table 2.

Table 2. Soil Classification according to CBR score

CBR No	Common Levels	Function	Classification	
			Unified	AASHTO
0-3	Very poor	Sub grade	OH,CH,MH,OL	A5,A6,A7
3-7	Poor to fair	Sub grade	OH,CH,MH,OL	A4,A5,A6,A7
7-20	Fair	Sub base	OL,CL,ML,SC,SM,SP	A2,A4,A6,A7
20-50	Good	Base or sub base	GM,GC,SW,SM,SP,GP	Ab,A2-5,A3,A2-6
>50	Excellent	Base		A1a,A2-4,A3

Source: Bowles (1992)

1.2 Laboratory CBR Test

This test use Penetrometer tools with minimum capacity of 4.45 ton and the speed of penetration of 1.25 mm per minutes. Laboratory CBR test requires compaction test. The common sample on Laboratory CBR test is soil in optimum water contents. But, the checking of CBR can be conducted to varieties of water contents and dry content weights. The disadvantages of this test are:

- Taking too long time compare to direct field test, because it through testing procedures, such as filtering, Atterberg limit test, and compaction.
- Taking more cost on taking the samples and carrying the samples to laboratory.

1.3 Field CBR Test

If compare to laboratory test, Field CBR test has advantages on time (data may take at that time) and no need to take the soil sample. The first common of field CBR test is pistons test. The pistons test use a mechanical CBR jack with a capacity of 10 tons, and requires a truck or other heavy vehicle loaded, then under the vehicle is set a mechanical jack. The disadvantage of this test is the use of trucks or heavy vehicles that make this test not efficient.

The second of field CBR test is cone test or Cone Penetrometer. Cone Penetrometer is developed by U.S Army Corps of Engineers to test the cohesive soil capacity which will be passed the combat vehicle. The cone penetrometer has two models; military and commercial, consisting of handle, proving ring, and dial gauge. The cone is made by material of stainless steel with height of 1.5 inch and width of 0.5 inch².

The advantages of the Cone Penetrometer are:

- Very fast, especially by electronic device supporting to record the end resistance.
- Possibility to record continuity on the soil resistance on the layers that will be tested.
- No requires any loading due to the pointed of cone end makes the tool easy to penetrate into the ground.

2. Methodology

The research procedures is presented in Figure 1:

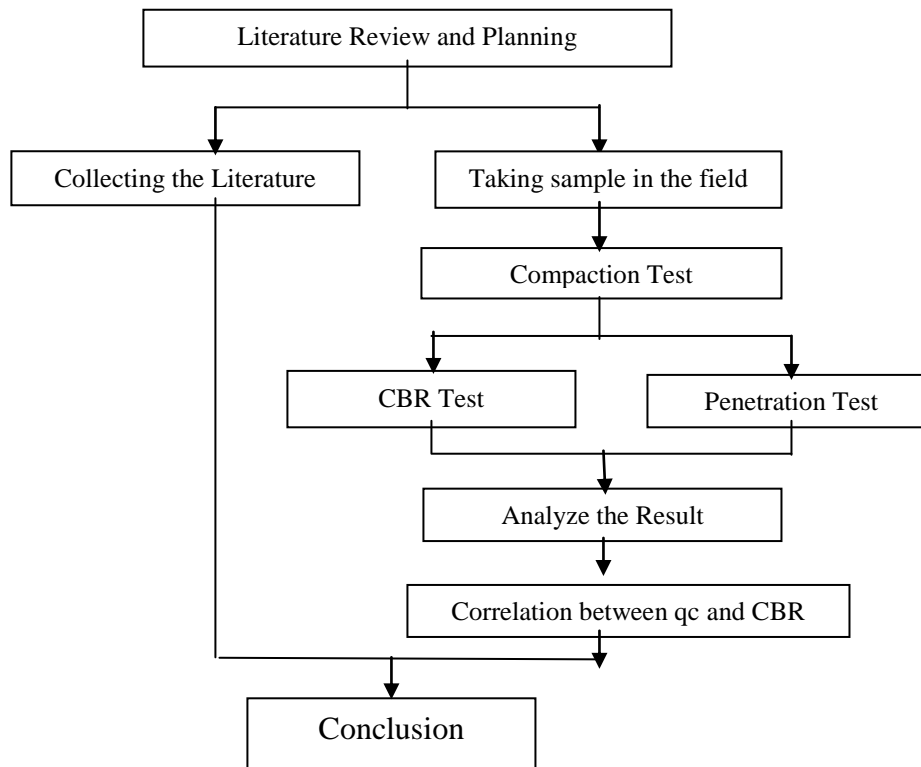


Figure 1. Flow Chart of the Research

2.1 Field Work

The samples were taken in; Balitra, Jalan Semeru (Semeru Street), Mandiangin Circuit, and Banjarbaru Asri Housing. There took soil samples in three points of every areas.

2.2 Laboratory Work: Soil Physical Characteristic Test

In the test, it aims to know the liquid limit (LL), plastic limit (PL), and specific gravity (Gs). The standard of ASTM D-4318 is used to measure the plastic limit and liquid limit, and the standard of ASTM D-854 is used to measure the specific gravity.

2.3 Compaction Test

The steps of compaction are:

- 1) Checking the initial water content before the compaction test
- 2) Obtained the score of optimum water content based on the test of plastic limit and liquid limit.
- 3) The test subjects is divided into five; one subject on optimum water contents, two subjects on lower than optimum water contents, and two subjects on higher than optimum water contents. Adding water aiming to reach the standard water content, must consider the score of natural water contents.
- 4) The score of zero air voids is based on the score of soil specific gravity (Gs).
- 5) Mixing time. The longer of soil mixing time, it will obtain higher the maximum density, because by the longer of mixing time, the clay structure will be more dispersed.

The compaction procedures are according to standard of ASTM D 698-78.

2.3 CBR Test and Cone Penetration Test

The soil sample with the same soil density will be tested through 2 kinds of tests, which are CBR test and penetration test. On CBR test, the soil samples will be checked on a penetration where the penetration speed standard is 1.25 mm/det. The CBR score is based on the penetration score of 2.5 mm. If the score of 5 mm penetration is higher, then the test must retake. And, if the CBR score of 5 mm penetration in the retake test is higher than the penetration score of 2.5 mm, then the CBR score of 5 mm penetration will be used. The CBR test procedures are based on the standard of ASTM 1883-87. Moreover, on penetration test, the cone will be put on penetrometer tools to replace the pistons. Then, the cone is pushed into the soil where the depth of penetration and density is same with the CBR test.

The factors must consider in CBR test and Cone test are:

- 1) Reach the touch field perfectly between the pistons and cone and the soil surface. The soil surface must be flat.
- 2) Give the same treatment to soil sample through the CBR test and cone penetration test, such as colliding energy, adding water, mixing time, and others. This is to ensure the same density on the soil samples and the correlation between the CBR score and the result of cone end resistance is accountable.

3. Findings

3.1 Soil Attribute

The result of soil physical characteristic test is presented in table 3:

Table 3. Soil Classification in Banjarbaru

Location	Point/ Location	Symbol of Soil Classification	Gs
Balitra	1	CL	2.73
Balitra	2	CL	2.70
Balitra	3	CL	2.77
Sirkuit Mandiangin	1	ML	2.68
Sirkuit Mandiangin	2	ML	2.67
Sirkuit Mandiangin	3	ML	2.70
Jalan Semeru	1	CL	2.78
Jalan Semeru	2	CL	2.72
Jalan Semeru	3	CL	2.70
Komp. Banjarbaru Asri	1	CL	2.73
Komp. Banjarbaru Asri	2	CL	2.77
Komp. Banjarbaru Asri	3	CL	2.71

3.2 CBR Test and Cone Test

Based on the laboratory test, the CBR score in Balitra is 5.2% - 15.9% and the cone end resistance is 49.947 kg/cm² – 215.813 kg/cm². The graph on the correlation between the CBR score and cone end resistance in Balitra is presented in Figure 2.

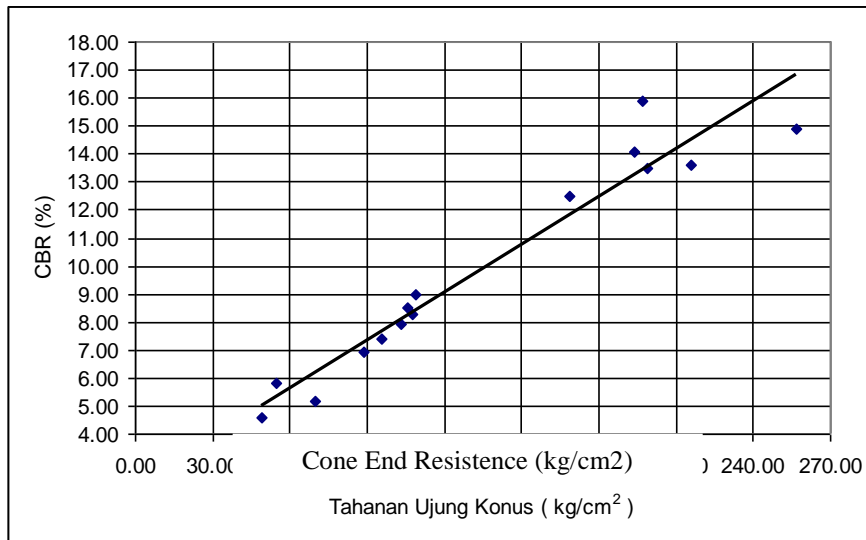


Figure 2. The Graph On The Correlation Between The CBR Score And Cone End Resistance

Figure 2 show the inclination the higher of q_c score, then the CBR score is also high. The dispersed points make positive linier line with the equation of $CBR = 0.0565 q_c + 2.289$ and the linier correlation between the score of CBR and q_c is very good and high. By the score of $R^2 = 0.9323$, 93.23% the variety of CBR score can be explained by the linear correlation with score of q_c .

On Mandiangin circuit, the CBR score is 11.6% - 17.2%, and the cone score is 109.905 kg/cm^2 - 299.740 kg/cm^2 . The graph on correlation between CBR and cone end resistance in Mandiangin circuit is presented in Figure 3.

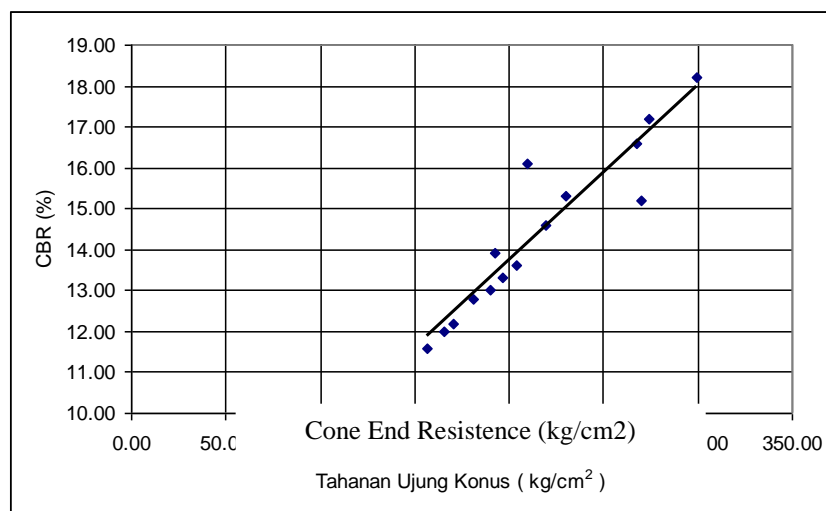


Figure 3. The Graph On The Correlation Between The CBR Score And Cone End Resistance

Figure 3 show the inclination the higher of q_c score, then the CBR score is also high. The dispersed points make positive linier line with the equation of $CBR = 0.0427 q_c + 5.1809$ and the linier correlation between the score of CBR and q_c is very good and high. By the score of $R^2 = 0.8825$, 88.25% the variety of CBR score can be explained by the linear correlation with score of q_c .

On Semeru Street, the CBR score is 6.1% - 17.9% and the cone score is 88.923 kg/cm^2 - 270.765 kg/cm^2 . The graph on correlation between CBR and cone end resistance in Semeru Street is presented in Figure 4.

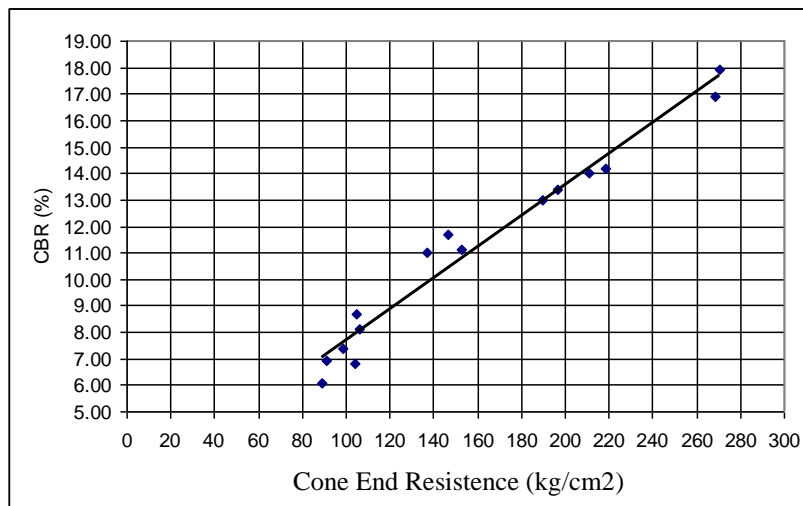


Figure 4. The Graph On The Correlation Between The CBR Score And Cone End Resistance

Figure 4 show the inclination the higher of q_c score, then the CBR score is also high. The dispersed points make positive linier line with the equation of $CBR = 0.0584 q_c + 1.8747$ and the linier correlation between the score of CBR and q_c is very good and high. By the score of $R^2 = 0.9642$, 96.42% the variety of CBR score can be explained by the linear correlation with score of q_c .

The last on Banjarbaru Asri housing, the CBR score is 12.5% - 16.3% and the cone score is $173.849 \text{ kg/cm}^2 - 268.767 \text{ kg/cm}^2$. The graph on correlation between CBR and cone end resistance in Banjarbaru Asri housing is presented in Figure 5.

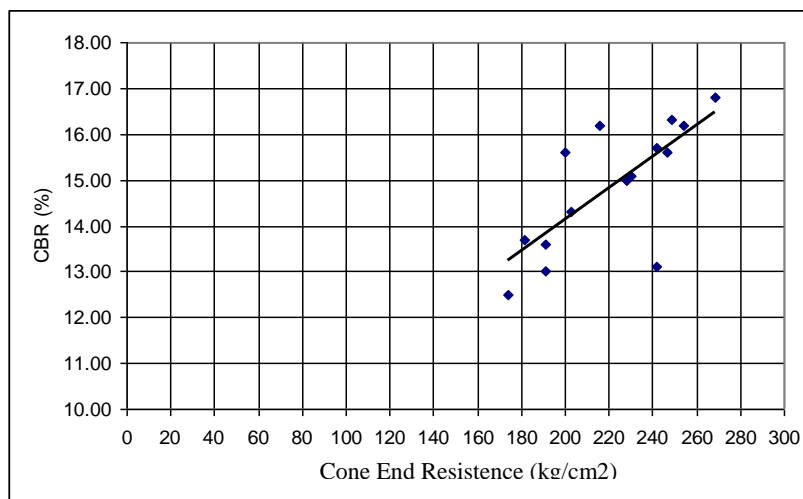


Figure 5. The Graph On The Correlation Between The CBR Score And Cone End Resistance

Figure 5 show the inclination the higher of q_c score, then the CBR score is also high. The dispersed points make positive linier line with the equation of $CBR = 0.0344 q_c + 7.2514$ and the linier correlation between the score of CBR and q_c is very good and high. By the score of $R^2 = 0.5331$, 53.31% the variety of CBR score can be explained by the linear correlation with score of q_c .

4. Discussion: *The Correlation Between CBR and q_c in Banjarbaru*

After obtained the correlation between CBR and Cone End Resistance on each area, the next step is making graph which explain on correlation between CBR and Cone End Resistance in Banjarbaru. Figure 6 show the inclination the higher of q_c score, then the CBR score is also high. The dispersed points make positive linier line with the equation of $CBR = 0.0545 q_c + 2.618$ and the linier correlation between the score of CBR and q_c is very good and high. By the score of $R^2 = 0.9325$, 93.25% the variety of CBR score can be explained by the linear correlation with score of q_c .

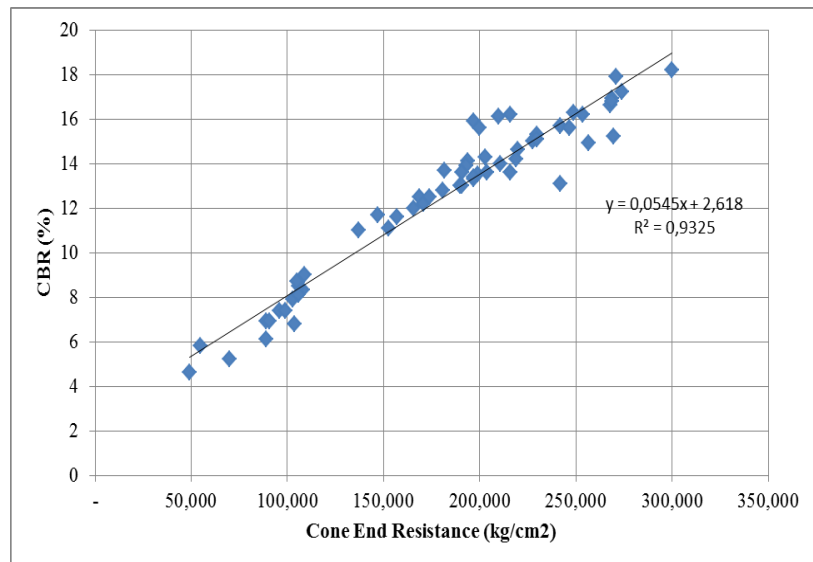


Figure 6. The Graph on The Correlation Between The CBR Score And Cone End Resistance In Banjarbaru

5. Conclusion

The calculation of CBR score using cone Penetrometer is the easier ways.

- 1) There are some researches on the correlation between CBR and q_c , such Bakrie Oemar and Nurly Gofar (1995), but the research result may not probably able to apply in all areas.
- 2) In Banjarbaru, the correlation between CBR and q_c is formulated by the formula of $CBR = 0.0545 q_c + 2.618$

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