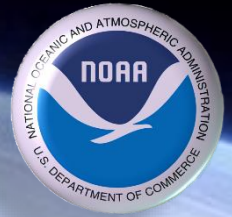


*Remote Sensing Satellite Data,
Machine Learning and
Blockchain's SmartContract:*

*Applied Science for Proactive
Financial Protection Against
Climate Changes*

Dr HSM Widodo, SKom, MEngSc
AAUI 2021

The collage features several key elements: a satellite in orbit at the top; a computer screen displaying data and a 'Machine Learning' icon; a browser window showing the 'AAUI Weather Index Insurance Smart-Contract Platform' with a URL 'soilmoisture.aaui-services.id:8080/contractCustodian/'; a 'AAUI Copernicus 60cm Soil Moisture Interactive Map' of Indonesia with a tooltip showing 'Soil Moisture 46.0 >>114.00000-0.00000'; and a circular diagram illustrating 'SMART CONTRACTS' with icons for 'Autonomous Execution', 'Trustless Execution', 'No middlemen', 'Savings', 'Code Is Law', 'Avoid Manual Error', and 'Default Backups'. Logos for NOAA and Copernicus are also present.





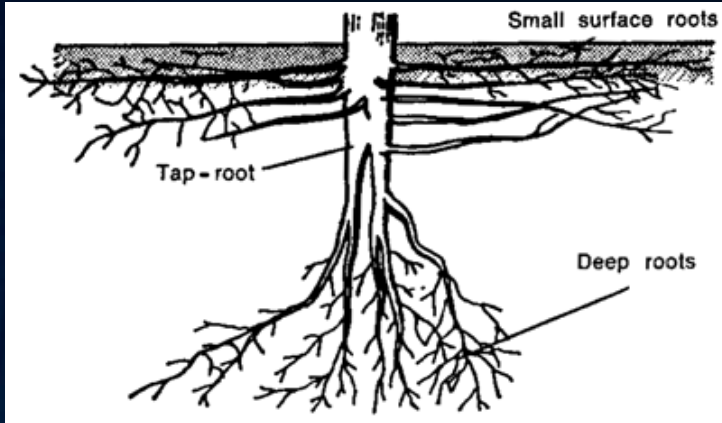
COLLABORATION



MARS



COCOA [*THEOBROMA CACAO* L.]



Cocoa Root (www.fao.org)



Black pod Disease
(<https://agriculture.gov.tt>)

- About 70% of the moisture extracted by the root is obtained in the top half of the root zone (The effective root zone depth*), Copernicus Remote Sensing 60 cm depth (SWI_o60) soil moisture data perfectly correlated with climates affect on cocoa harvest.
- Water Stress affects Canopy expansion, Inhibited flowering, the yellowing of basal leaves, wilting, small leaves and slow trunk growth yielding small pods harvest **
- The most severe Black Pods Disease epidemics coincide with the proliferation of sporangia, In the presence of moisture, sporangia release the infective propagules, zoospores ***

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Main Crop	Development		Harvest						Development			
Mid Crop	Harvest		Development						Harvest			
Rainfall Pattern			Seasonally Highest Rainfall					Seasonally Lowest Rainfall				
El Nino/La Nina Impact						When El Nino, too dry, when La Nina, too wet						

* USDA, *NRCS Irrigation Guide* (210-vi-NEH 652, IG Amend. NJ1, 06/2005), <https://www.nrcs.usda.gov/>

** M. K. V. CARR and G. LOCKWOOD, *THE WATER RELATIONS AND IRRIGATION REQUIREMENTS OF COCOA (THEOBROMA CACAO L.): A REVIEW*, Expl Agric. (2011), volume 47 (4), pp. 653–676 C Cambridge University Press 2011, doi:10.1017/S0014479711000421

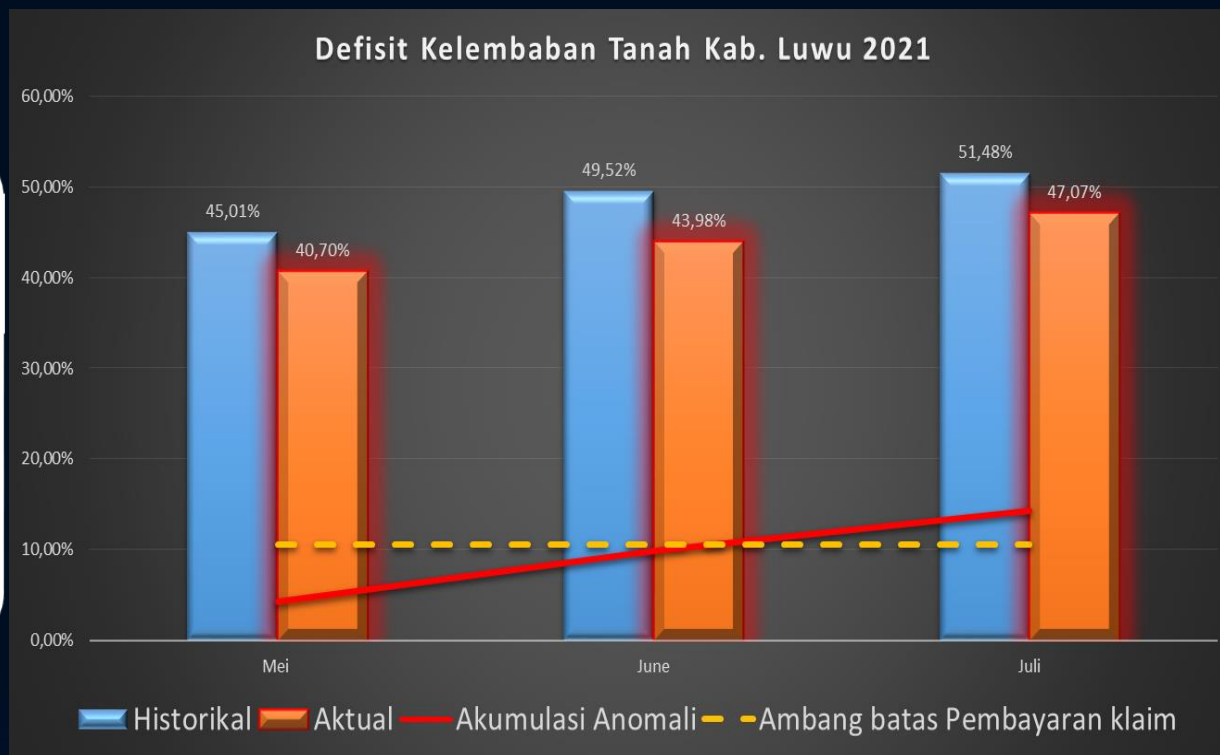
*** David Guest, *Black Pod: Diverse Pathogens with a Global Impact on Cocoa Yield*, Phytopathology® 2007 97:12, 1650-1653

LUWU Long:Lat >>120.000000:-2.600000
47.26% intersection

Asuransi Tanaman Berbasis Index: Kakao - Kab. Luwu

A retrospective soil Moisture Deficit protection simulation For May, June & July 2021 in Kab. Luwu, South Sulawesi.

For as low as IDR 25K premium for 3 month deficit protection for month of May, June & July with maximum IDR 1 Mio Sum Insured.

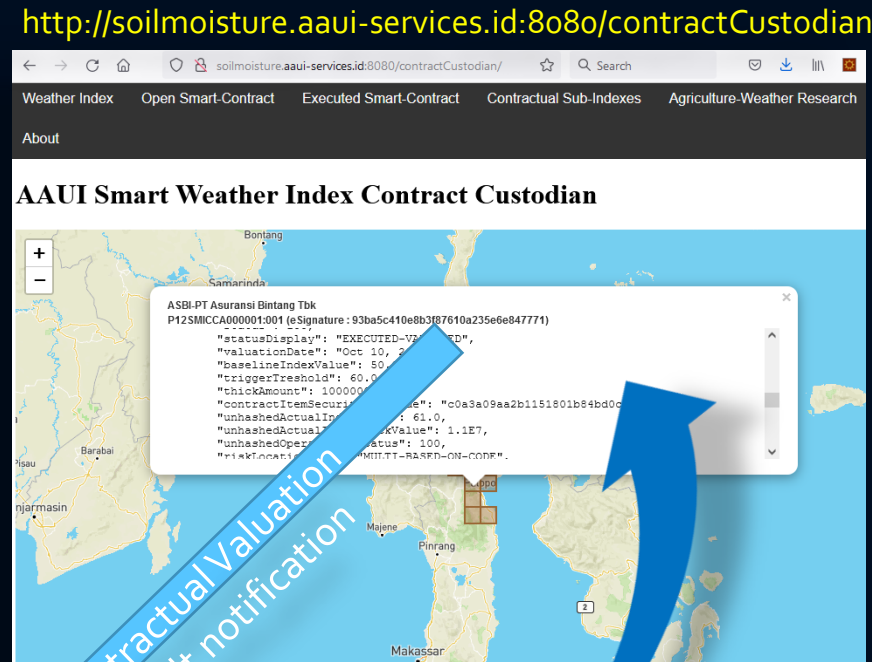


Luwu's slightly lower than normal 3 months Soil moisture triggers an automatic proportionate claim payment in amount of IDR Rp 31.563,- in the valuation month of Agustus 2021.

All Insurance Weather Index Contract registered and Automatically Valuated on the stipulated date by AAUI ContractCustodian Platform

Asuransi Tanaman Berbasis Index : Kakao

The Real Technology Driven Cost effective InsureTech



A Participative & Collaborative Product Development Methodolgy.



Applicable to other commodities & industry

Perlindungan Kekurangan Kelembaban: Kakao

Lokasi	Periode	Ambang Batas*	Faktor per poin anomali	Tarif Premi
Sulawesi Selatan	Mei - Juli	31,50	0,281%	2.5%
Sulawesi Tengah	Mei - Juli	31,19	0,380%	2.5%
Sulawesi Tenggara	Mei - Juli	23,27	0,320%	2.5%



Perlindungan Kelembaban Berlebih: Kakao

Lokasi	Periode	Ambang Batas*	Faktor per poin anomali	Tarif Premi
Sulawesi Selatan	Aug - Okt	89,59	0.16%	2.5%
Sulawesi Tengah	Jul - Sept	45,62	0,43%	2.5%
Sulawesi Tenggara	Jul - Okt	62,91	0.29%	2.5%

* Metode decadal data

BlockChain's SmartContract adopted mechanism automating a Fair and Transparent Contract Valuation



```

    "id" : 9,
    "LogMessage" : "Total Anomaly : 42.73268817204302 GREATER THAN (>) Trigger : 31.5 CLAIM-INCURRED",
    "LogType" : "RULE ENGINE"
  },
  "id" : 10,
  "LogMessage" : "Index Jaminan (Total Anomaly - Trigger) value is : 11.23268817204302",
  "LogType" : "RULE ENGINE"
  },
  "id" : 11,
  "LogMessage" : "Claim Unit Amount for Each 1.000.000 of Sum Insured is Rp 31563.853763440882",
  "LogType" : "RULE ENGINE"
  },
  
```


AAUI smartContract Custodian Platform

[Electronically Secured Contract Custodian Ecosystem with Auditable JSmart-Contract Java Execution Engine for Transparent, Automated Future Contract Valuation and Fulfilment]



Multiple 128-Bit Hash Secured-Transparent-Immutable Future Contract Public Registrar .

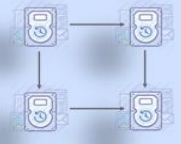
Integrated Contractual Sub-Index Generation from Copernicus/NOAA Baseline Weather Index

Autonomous Transparent Auditable smartContract Valuation mechanism

```
//Rule Script for Valuating Defisit Soil Moisture Contract
ResultSet rs= toolbox.getAggregatedIndexOverThanValuationDate(policy.getIndexCode(), coverage.getMultiRiskLocation(), coverage.getValuationDate());
tls.logsTransactionMessage("RULE ENGINE", "calling >> toolbox.getAggregatedIndexOverThanValuationDate");
if (rs.next()){
  tls.logsTransactionMessage("RULE ENGINE", "Year Month:"+rs.getString("year_month")+ ", index : "+rs.getString("subindex_average")+ ", s
  coverage.setUnhashedActualIndexValue(rs.getDouble("monthly_subindex_average"));
  if(rs.getDouble("monthly_subindex_average")<coverage.getTriggerThreshold()){
    coverage.setUnhashedOperationalRemark("VALUATED-CLAIM-INCURRED");
    coverage.setUnhashedOperationalStatus(200);
    tls.logsTransactionMessage("RULE ENGINE", "CLAIM INCURRED "+rs.getString("monthly_subindex_average")+ " < "+String.valueOf( coverage.getTrig
  }else{
    coverage.setUnhashedOperationalRemark("VALUATED-CLAIM-NOT-INCURRED");
    coverage.setUnhashedOperationalStatus(100);
    tls.logsTransactionMessage("RULE ENGINE", "CLAIM NOT INCURRED "+rs.getString("monthly_subindex_average")+ " >= "+String.valueOf( coverage.g
  }
} else {
  tls.logsTransactionMessage("RULE ENGINE", "getAggregatedIndexOverThanValuationDate("+policy.getIndexCode()+","+ coverage.getMultiRiskLocat
```



Index Insurance Smart-Contract

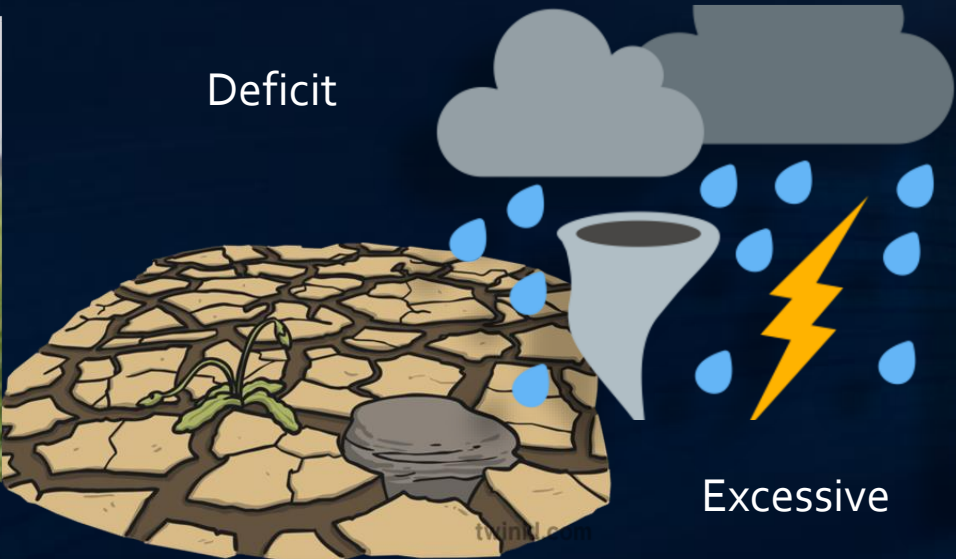


Valuation result & Claim Notification



Smart-contract Realm

Financially Empowering Farmers to Pro-Actively Mitigates Climate Changes



Capex	Amount	%
sewa lahan	3.260.000	46%
pompa air	2.512.000	36%
bibit bawang merah	450.000	6%
golok	80.000	1%
cangkul	211.500	3%
wadah	82.000	1%
gerobak dorong	172.500	2%
sabit	70.500	1%
timba	82.000	1%
Peralatan tambahan yang lainnya	112.500	2%
Total	7.033.000	

<http://www.agrowindo.com/>

Asuransi Tanaman Berbasis Index: Shallot, Monthly Protection before harvest against Deficit

Automatic Claim Payout on the following month on the event of Soil Water anomaly, enabling farmer to finance additional water pumping operation.

Our Future

Rain/Soil Moisture Index

Agriculture

- Bawang Merah
- Kelapa Sawit
- Tembakau
- Cengkeh
- Vanilli
- Minyak Nilam

Mining

- Coal Mining
- Fero Nickle

Sea Temperature Index

- Sea weed Farming
- Pearl
- Corral Reef Insurance

Sea Level Index

Rob Flooding

Transportation

- Vessel Port Entry
- Vessel Load Factor

soilmoisture.aau-services.id:8080/contractCustodian/

μTorrent Web TerraScope How to Create an A...

AAUI Weather Index Insurance Smart-Contract Platform

Weather Index Open Smart-Contract Executed Smart-Contract Contractual Sub-Indexes Agriculture-Weather Research About ATBI

About smart-Contract Sea Temp (Coral Prototype)

Agriculture-Weather Index Insurance Funded Research

Maipark-IFC-Mars
Cocoa Farmer Index Insurance Pricing & Model for Sulawesi Selatan, Sulawesi Tengah and Sulawesi Tenggara

AAUI-Maipark Research Grant: Master Research
Universitas Jendral Soedirman
Agung Prabowo SSI,MSi
Pengaruh Perubahan Pola Curah Hujan Pada Produksi Bawang Merah di Kabupaten Brebes

AAUI-Maipark Research Grant: Master Research
Universitas Technology Sepuluh Noverber
Yan Aditya Pramana SPD, MSI
Analisa Pengaruh Cuaca untuk Estimasi Produksi Bawang Merah dengan Hidden Markov Model Sebagai Antisipasi Dampak Perubahan Iklim

Thank You

hsmwidodo@yahoo.com