



KEMENTERIAN RISET DAN TEKNOLOGI /  
BADAN RISET DAN INOVASI NASIONAL  
**DEPUTI BIDANG PENGUATAN RISET DAN PENGEMBANGAN**  
Gedung B.J Habibie Lantai 19 – 20, Jalan M.H. Thamrin Nomor 8, Jakarta 10340  
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Nomor : B/112/E3/RA.00/2021 18 Februari 2021  
Lampiran : 3 (Tiga) Berkas  
Hal : Pengumuman Penerima Pendanaan Penelitian di Perguruan Tinggi  
Tahun Anggaran 2021

Yth. 1. Rektor/ Direktur/ Ketua Perguruan Tinggi Negeri dan Swasta  
2. Kepala Lembaga Layanan Pendidikan Tinggi Wilayah I s/d XV

Berdasarkan Keputusan Kuasa Pengguna Anggaran Deputy Bidang Penguatan Riset dan Pengembangan Kementerian Riset dan Teknologi/ Badan Riset dan Inovasi Nasional Nomor 8/E1/KPT/2021 tanggal 01 Februari 2021 tentang Penetapan Pendanaan Penelitian di Perguruan Tinggi Negeri Badan Hukum Tahun Anggaran 2021, Keputusan Kuasa Pengguna Anggaran Deputy Bidang Penguatan Riset dan Pengembangan Kementerian Riset dan Teknologi/ Badan Riset dan Inovasi Nasional Nomor 9/E1/KPT/2021 tanggal 01 Februari 2021 tentang Penerima Pendanaan Penelitian di Perguruan Tinggi Tahun 2021 untuk Penelitian Tahun Jamak Lanjutan Tahun 2019, Keputusan Kuasa Pengguna Anggaran Deputy Bidang Penguatan Riset dan Pengembangan Kementerian Riset dan Teknologi/ Badan Riset dan Inovasi Nasional Nomor 10/E1/KPT/2021 tanggal 01 Februari 2021 tentang Penerima Pendanaan Penelitian di Perguruan Tinggi Tahun 2021 untuk Penelitian Tahun Jamak Lanjutan Tahun 2020, dan Keputusan Kuasa Pengguna Anggaran Deputy Bidang Penguatan Riset dan Pengembangan Kementerian Riset dan Teknologi/ Badan Riset dan Inovasi Nasional Nomor 11/E1/KPT/2021 tanggal 01 Februari 2021 tentang Penetapan Pendanaan Penelitian di Perguruan Tinggi Tahun Anggaran 2021, bersama ini kami sampaikan daftar nama penerima pendanaan Penelitian tahun anggaran 2021 sebagai berikut:

1. Penerima Pendanaan Penelitian di Perguruan Tinggi PTNBH Tahun Anggaran 2021 (**Lampiran I**)
2. Penerima Pendanaan Penelitian di Perguruan Tinggi Non-PTNBH Tahun Anggaran 2021 (**Lampiran II**)

Kami informasikan bahwa penerima pendanaan Penelitian Tahun Anggaran 2021 adalah Peneliti dengan ketentuan sebagai berikut:

1. Pengusul yang proposalnya dinyatakan lolos seleksi, yang bersangkutan atau institusi telah memenuhi kewajiban sebagai berikut:
  - a. Mengunggah laporan kemajuan sampai dengan tahun 2020;
  - b. Mengunggah laporan akhir sampai dengan tahun 2020;
  - c. Melaksanakan seluruh tahapan seleksi sebagaimana disebutkan dalam Panduan Pelaksanaan Penelitian dan Pengabdian Masyarakat Perguruan Tinggi Edisi XIII Tahun 2020 untuk PTNBH dan skema penelitian Desentralisasi bagi Perguruan Tinggi klaster Mandiri, Utama, dan Madya sesuai dengan hasil klasterisasi tahun 2019;
  - d. Melaksanakan monitoring dan evaluasi penelitian secara daring sebagaimana surat Direktur DRPM dengan Nomor B/1223/E3/RA.00/2020
  - e. Tidak sedang dalam status tugas belajar baik untuk ketua maupun anggota, kecuali anggota pada skema Penelitian Pascasarjana;
  - f. Pendanaan penelitian diberikan dengan memperhatikan kuota berdasarkan *h-index* peneliti, kecuali untuk skema Penelitian Pascasarjana yang tidak dihitung sebagai kuota.

2. Penelitian Kontrak Tahun Jamak 2019-2021 dan Kontrak Tahun Jamak 2020-2022 yang dilanjutkan pendanaannya merupakan penelitian yang telah dinyatakan layak berdasarkan hasil monitoring dan evaluasi pada tahun 2020;
3. Peneliti tahun anggaran 2020 yang ditunda pendanaan penelitiannya ke tahun anggaran 2021, telah mengisi konfirmasi kesediaan Peneliti untuk melaksanakan penelitian 2020 yang ditunda ke tahun anggaran 2021 sesuai dengan surat Direktur DRPM Nomor B/1176/E3/RA.00/2020.

Apabila ada penerima pendanaan penelitian sebagaimana tercantum pada lampiran ternyata tidak memenuhi salah satu dari ketentuan di atas, atau pelanggaran terhadap ketentuan Panduan Penelitian dan Pengabdian kepada Masyarakat Edisi XIII Tahun 2020 maka pendanaannya dapat ditinjau kembali.

Berkenaan dengan hal tersebut, DRPM mengucapkan selamat kepada penerima pendanaan penelitian tahun anggaran 2021. DRPM mengucapkan terimakasih kepada pengusul yang telah berpartisipasi, bagi pengusul yang belum mendapatkan pendanaan tahun ini dapat mengusulkan proposal penelitian untuk pendanaan tahun 2022. Selanjutnya, kami mohon bantuan Bapak/Ibu untuk menyampaikan informasi di atas kepada nama-nama yang tercantum pada lampiran di Perguruan Tinggi masing-masing.

Perlu kami sampaikan bahwa mekanisme penyaluran dana akan dilakukan melalui kontrak. Berkaitan dengan hal ini, perlu kami sampaikan beberapa hal sebagai berikut:

1. Terdapat dua jenis kontrak penelitian yang akan digunakan, yaitu kontrak tahun tunggal dan kontrak tahun jamak. Kontrak tahun tunggal digunakan untuk kontrak penelitian yang pendanaannya hanya 1 (satu) tahun, adapun kontrak tahun jamak digunakan untuk kontrak penelitian yang pendanaannya lebih dari 1 (satu) tahun;
2. Kontrak dilakukan secara berjenjang. Untuk Perguruan Tinggi Negeri (PTN), kontrak dilakukan antara DRPM dengan Ketua LP/LPPM/LPM/Direktur Politeknik, adapun untuk Perguruan Tinggi Swasta kontrak dilakukan melalui Kepala Lembaga Layanan Pendidikan Tinggi (LLDIKTI) masing - masing wilayah;
3. Pencairan dana penelitian dilakukan dengan 2 (dua) cara yaitu secara sekaligus dan secara bertahap;
4. Para penerima pendanaan penelitian akan diminta untuk mengunggah perbaikan proposal dan RAB sesuai dengan dana yang diterima. Informasi lebih rinci terkait pengunggahan perbaikan proposal akan disampaikan kemudian.
5. Hal-hal lain yang terkait dengan penandatanganan kontrak, pencairan dana, dan pelaksanaan penelitian akan diinformasikan lebih lanjut melalui laman: <http://simlibtamamas.ristekdikti.go.id>.

Berkaitan dengan data yang diperlukan untuk penandatanganan kontrak, bersama ini kami kirimkan **Daftar Isian (Lampiran III)**. Kami mohon Daftar Isian tersebut dapat diisi dan segera dikirim melalui laman google form dengan link <http://bit.ly/FormKontrakPenelitian2021> paling lambat tanggal **05 Maret 2021** untuk PTS tidak perlu mengirimkan daftar isian karena Kontrak akan dilakukan dengan LLDIKTI Wilayah masing – masing.

Demikian kami sampaikan, atas perhatian dan kerjasama Bapak/Ibu kami ucapkan terima kasih.



Plt. Direktur Riset dan Pengabdian Masyarakat,

Heri Hermansyah  
NIP 197601181999031002

Tembusan;  
Deputi Bidang Penguatan Riset dan Pengembangan

**PENERIMA PENDANAAN PENELITIAN DI PERGURUAN TINGGI NON BADAN HUKUM  
TAHUN ANGGARAN 2021**

NO	PTN / LLDIKTI	NAMA INSTITUSI	SKEMA	NAMA	NIDN	JUDUL	DURASI PENELITIAN (Tahun)
351	PTN	Politeknik Negeri Semarang	Penelitian Terapan Unggulan Perguruan Tinggi	YUSUF DEWANTORO HERLAMBAANG	0002057801	Model Proton Exchange Membrane Fuel Cell (PEMFC) dengan Variasi Kondisi Operasi untuk Pembangkit Listrik	3
352	PTN	Politeknik Negeri Sriwijaya	Penelitian Terapan Unggulan Perguruan Tinggi	ABU HASAN	0023106402	MODIFIKASI TANAH LIAT UNTUK BAHAN PENGISI KARET ALAM	2
353	PTN	Politeknik Negeri Sriwijaya	Penelitian Terapan Unggulan Perguruan Tinggi	ADE SILVIA HANDAYANI	0030097604	SISTEM MULTI SENSOR NETWORK SEBAGAI PEMANTAUAN UDARA OTOMATIS PADA AREA PARKIRAN DENGAN APLIKASI IoT	3
354	PTN	Politeknik Negeri Sriwijaya	Penelitian Terapan Unggulan Perguruan Tinggi	LEILA KALSUM	0007126209	Rancang Bangun Biodigester Kotoran Sapi yang Dilengkapi dengan Packed Bed Scrubber Untuk Pemurnian Biogas	2
355	PTN	Politeknik Negeri Sriwijaya	Penelitian Dasar Unggulan Perguruan Tinggi	M MIFTAKUL AMIN	0217127901	Pengembangan Model, Algoritma dan Sistem Informasi Group Decision Support System untuk Mewujudkan Manajemen Kolaboratif di Perguruan Tinggi	2
356	PTN	Politeknik Negeri Sriwijaya	Penelitian Terapan	M MIFTAKUL AMIN	0217127901	Multidimensional Database dan Intelligence Decision Support System Sebagai Model Business Intelligence di Perguruan Tinggi	3

https://bima.kemdikbud.go.id/penelitian/laporan-akhir

**BIMA** **OKASI**  
KUALITAS MENUNGGUAKAN INDONESIA

Dashboard Penelitian Pengabdian Kosabangsa Prototipe

### Laporan Akhir

2021

No	Program	Judul	Berkas	Aksi
1	Penelitian Desentralisasi Penelitian Terapan Unggulan Perguruan Tinggi Tahun Ke 1 Dari 2 tahun Tahun Pelaksanaan : 2021 Sudah Unggah ✓	MODIFIKASI TANAH LIAT UNTUK BAHAN PENGISI KARET ALAM		

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Browser tabs: (2) What, klarifikas, Laporan, sinta.ker, Search, Pengum, Lampir, Pengum, Simlita, suratKes, tanggun, Cata x

Address bar: <https://bima.kemdikbud.go.id/penelitian/pelaksanaan-kegiatan/catatan-harian>

Navigation: Dashboard, Penelitian, Pengabdian, Kosabangsa, Prototipe

### Catatan Harian

Filter: 2021

No	Skema	Tahun	Judul	Keterangan	Aksi
1	Penelitian Terapan Unggulan Perguruan Tinggi <b>Penelitian Desentralisasi</b>	2021	MODIFIKASI TANAH LIAT UNTUK BAHAN PENGISI KARET ALAM  Dana Hibah: 248,700,000	Jumlah Catatan : 0 Persentase Capaian: 0	

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System tray: 26°C Berawan, Search, 22:22 27/11/2023

Browser tabs: (1) Wh, klarifik, Lapora, sinta.k, Search, Pengu, Lampir, Pengu, Simlita, Lapora

Address bar: <https://simlitabmas.kemdikbud.go.id/vokasi/Main.aspx#>

Navigation: SIMLITABMAS, Online Users: 1; Login: 1; Sesi akan berakhir dalam: 58 menit 36detik

User: **Dr. Ir ABU HASAN M.Si**  
Pengusul - Dosen

Menu Utama: Beranda, Penelitian, Pengabdian, Pelaksanaan Kegiatan, Riwayat Usulan, Pendaftaran Reviewer, Logout

- Tahun: 2022 | Peran: Anggota Pengusul | Sumber Dana: Ristekdikti  
**Penelitian Terapan Unggulan Perguruan Tinggi**
- MODIFIKASI TANAH LIAT UNTUK BAHAN PENGISI KARET ALAM  
Tahun: 2022 | Peran: Ketua Pengusul | Sumber Dana: Ristekdikti  
**Penelitian Terapan Unggulan Perguruan Tinggi**
- Rancang Bangun Biodigester Kotoran Sapi yang Dilengkapi dengan Packed Bed Scrubber Untuk Pemurnian Biogas  
Tahun: 2021 | Peran: Anggota Pengusul | Sumber Dana: Ristekdikti  
**Penelitian Terapan Unggulan Perguruan Tinggi**
- MODIFIKASI TANAH LIAT UNTUK BAHAN PENGISI KARET ALAM  
Tahun: 2021 | Peran: Ketua Pengusul | Sumber Dana: Ristekdikti  
**Penelitian Terapan Unggulan Perguruan Tinggi**
- Produksi Mie Instan Sehat dari Tepung Sukun dengan Variabel Rasa Pedas dan Rasa Kari  
Tahun: 2019 | Peran: Anggota Pengusul | Sumber Dana: Internal Perguruan Tinggi  
**Penelitian Dasar**
- SERAPAN TANAH LIAT AREA PENAMBANGAN BATUBARA PT. BUKIT ASAM (Persero) Tbk. UNTUK KOMPON KARET ALAM  
Tahun: 2019 | Peran: Ketua Pengusul | Sumber Dana: Ristekdikti

System tray: 26°C Berawan, Search, 22:09 27/11/2023



**KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN  
POLITEKNIK NEGERI SRIWIJAYA**

Jalan Sriwijaya Negara, Bukit Besar, Palembang 30139  
Telp. 0711-353414 Fax.0711- 355918  
Laman: <http://polsri.ac.id> email: [penelitian@polsri.ac.id](mailto:penelitian@polsri.ac.id)

**PENELITIAN TERAPAN TAHUN JAMAK TA 2021  
ANTARA  
PUSAT PENELITIAN DAN PENGABDIAN KEPADA MASYARAKAT (P3M)  
DENGAN  
KETUA PENELITI  
Nomor: 034/PL6.2.1/PL/2021**

Pada hari ini Kamis tanggal Delapan Belas bulan Maret tahun Dua Ribu dua puluh satu, kami yang bertandatangan dibawah ini :

- 1. Dr. Rita Martini, S.E., M.Si., Ak., CA.** : Plt. Kepala P3M Politeknik Negeri Sriwijaya, dalam hal ini bertindak untuk dan atas nama Politeknik Negeri Sriwijaya, yang berkedudukan di Jalan Sriwijaya Negara Bukit Besar Palembang, untuk selanjutnya disebut **PIHAK PERTAMA**;
- 2. Dr. Ir. Abu Hasan, M.Si.** : Dosen Jurusan Teknik Kimia Politeknik Negeri Sriwijaya, dalam hal ini bertindak sebagai pengusul dan Ketua Pelaksana Penelitian Tahun Anggaran 2021 untuk selanjutnya disebut **PIHAK KEDUA**.

Berdasarkan keputusan Kuasa Pengguna Anggaran Nomor 10/E1/KPT/2021 Tentang Penetapan Pendanaan Penelitian Skema Terapan di Perguruan Tinggi Tahun 2021 **PIHAK PERTAMA** dan **PIHAK KEDUA**, secara bersama-sama sepakat mengikatkan diri dalam suatu Kontrak PENELITIAN TERAPAN UNGGULAN PERGURUAN TINGGI Tahun Anggaran 2021 dengan ketentuan dan syarat-syarat sebagai berikut:

**Pasal 1  
Ruang Lingkup Kontrak**

**PIHAK PERTAMA** memberi pekerjaan kepada **PIHAK KEDUA** dan **PIHAK KEDUA** menerima pekerjaan tersebut dari **PIHAK PERTAMA**, untuk melaksanakan dan menyelesaikan PENELITIAN TERAPAN UNGGULAN PERGURUAN TINGGI Tahun Anggaran 2021 dengan judul **“Modifikasi Tanah Liat untuk Bahan Pengisi Karet Alam”**.

**Pasal 2  
Dana Penelitian**

- (1) Besarnya dana untuk melaksanakan penelitian dengan judul sebagaimana dimaksud pada Pasal 1 adalah sebesar Rp 248.700.000 (**Dua ratus empat puluh delapan juta tujuh ratus ribu rupiah**) sudah termasuk pajak.
- (2) Dana Penelitian sebagaimana dimaksud pada ayat (1) dibebankan pada Daftar Isian Pelaksanaan Anggaran (DIPA) Direktorat Jenderal Penguatan Riset dan Pengembangan, Kementerian Riset, Teknologi dan Pendidikan Tinggi Nomor SP DIPA-042.06.1.401516/2021, tanggal 23 November 2020.

**Pasal 3**  
**Tata Cara Pembayaran Dana Penelitian**

- (1) **PIHAK PERTAMA** akan membayarkan Dana Penelitian kepada **PIHAK KEDUA** secara bertahap dengan ketentuan sebagai berikut:
  - a. Pembayaran dilakukan sekaligus 100% dari seluruh total dana penelitian yaitu Rp 248.700.000 (*Dua ratus empat puluh delapan juta tujuh ratus ribu rupiah*), yang akan dibayarkan oleh **PIHAK PERTAMA** kepada **PIHAK KEDUA** setelah **PARA PIHAK** membuat dan melengkapi rancangan pelaksanaan penelitian yang memuat judul penelitian, pendekatan dan metode penelitian yang digunakan, data yang akan diperoleh, anggaran yang akan digunakan, dan tujuan penelitian berupa luaran yang akan dicapai.
  - b. Biaya tambahan dibayarkan kepada **PIHAK KEDUA** bersamaan dengan pembayaran Tahap Kedua dengan melampirkan Daftar luaran penelitian yang sudah di validasi oleh **PIHAK PERTAMA**
- (2) Dana Penelitian sebagaimana dimaksud pada ayat (1) akan disalurkan oleh **PIHAK PERTAMA** kepada **PIHAK KEDUA** ke rekening sebagai berikut:

<b>Nama</b>	<b>: Dr. Ir. Abu Hasan, M.Si.</b>
<b>Nomor Rekening</b>	<b>: 1130007412574</b>
<b>Nama Bank</b>	<b>: Bank Mandiri</b>

- (3) **PIHAK PERTAMA** tidak bertanggung jawab atas keterlambatan dan/atau tidak terbayarnya sejumlah dana sebagaimana dimaksud pada ayat (1) yang disebabkan karena kesalahan **PIHAK KEDUA** dalam menyampaikan data peneliti, nama bank, nomor rekening, dan persyaratan lainnya yang tidak sesuai dengan ketentuan.

**Pasal 4**  
**Jangka Waktu**

Jangka waktu pelaksanaan penelitian sebagaimana dimaksud dalam Pasal 1 sampai selesai 100%, adalah terhitung sejak **Tanggal 13 April 2021** dan berakhir pada **Tanggal 31 Oktober 2021**

**Pasal 5**  
**Target Luaran**

- (1) **PIHAK KEDUA** berkewajiban untuk mencapai target luaran wajib penelitian berupa Seminar Internasional
- (2) **PIHAK KEDUA** diharapkan dapat mencapai target luaran tambahan penelitian berupa Prototype
- (3) **PIHAK KEDUA** berkewajiban untuk melaporkan perkembangan pencapaian target luaran sebagaimana dimaksud pada ayat (1) kepada **PIHAK PERTAMA**.

**Pasal 6**  
**Hak dan Kewajiban Para Pihak**

- (1) Hak dan Kewajiban **PIHAK PERTAMA**:
- a. **PIHAK PERTAMA** berhak untuk mendapatkan dari **PIHAK KEDUA** luaran penelitian sebagaimana dimaksud dalam Pasal 7;
  - b. **PIHAK PERTAMA** berkewajiban untuk memberikan dana penelitian kepada **PIHAK KEDUA** dengan jumlah sebagaimana dimaksud dalam Pasal 2 ayat (1) dan dengan tata cara pembayaran sebagaimana dimaksud dalam Pasal 3.
  - c. **PIHAK KEDUA** menyerahkan hasil penelitian kepada **PIHAK PERTAMA** melalui Berita Acara Serah Terima (BAST).
- (2) Hak dan Kewajiban **PIHAK KEDUA**:
- a. **PIHAK KEDUA** berhak menerima dana penelitian dari **PIHAK PERTAMA** dengan jumlah sebagaimana dimaksud dalam Pasal 2 ayat (1);
  - b. **PIHAK KEDUA** berkewajiban menyerahkan kepada **PIHAK PERTAMA** luaran wajib dan luaran tambahan **dan catatan harian pelaksanaan penelitian**;
  - c. **PIHAK KEDUA** berkewajiban untuk bertanggungjawab dalam penggunaan dana penelitian yang diterimanya sesuai dengan proposal kegiatan yang telah disetujui;
  - d. **PIHAK KEDUA** berkewajiban untuk menyampaikan kepada **PIHAK PERTAMA** laporan penggunaan dana sebagaimana dimaksud dalam Pasal 7.

**Pasal 7**  
**Laporan Pelaksanaan Penelitian**

- (1) **PIHAK KEDUA** berkewajiban untuk menyampaikan kepada **PIHAK PERTAMA** berupa laporan kemajuan dan laporan akhir mengenai luaran penelitian dan rekapitulasi penggunaan anggaran sesuai dengan jumlah dana yang diberikan oleh **PIHAK PERTAMA** yang tersusun secara sistematis sesuai pedoman yang ditentukan oleh **PIHAK PERTAMA**.
- (2) **PIHAK KEDUA** berkewajiban mengunggah Laporan Kemajuan dan Catatan harian penelitian yang telah dilaksanakan ke SIMLITABMAS paling lambat **30 Agustus 2021**.
- (3) **PIHAK KEDUA** berkewajiban menyerahkan *Hardcopy* Laporan Kemajuan dan Rekapitulasi Penggunaan Anggaran 70% kepada **PIHAK PERTAMA**, paling lambat **8 September 2021**.
- (4) **PIHAK KEDUA** berkewajiban mengunggah Laporan Akhir, capaian hasil, Poster, artikel ilmiah dan profil pada SIMLITABMAS paling lambat **31 Oktober 2021** (bagi penelitian tahun terakhir).
- (5) Laporan hasil Penelitian sebagaimana tersebut pada ayat (4) harus memenuhi ketentuan sebagai berikut:
  - a. Bentuk/ukuran kertas A4;
  - b. Di bawah bagian cover ditulis:

Dibiayai oleh:  
Direktorat Riset dan Pengabdian Masyarakat  
Kementerian Riset dan Teknologi/Badan Riset dan Inovasi Nasional  
Sesuai dengan Kontrak Penelitian Tahun Jamak Penelitian Terapan dengan  
Nomor Kontrak : 260/SP2H/LT/DRPM/2021  
Tanggal 18 Maret 2021

## **Pasal 8** **Monitoring dan Evaluasi**

**PIHAK PERTAMA** dalam rangka pengawasan akan melakukan Monitoring dan Evaluasi internal terhadap kemajuan pelaksanaan Penelitian Tahun Anggaran 2021 ini sebelum pelaksanaan Monitoring dan Evaluasi eksternal oleh Direktorat Riset dan Pengabdian Masyarakat, Direktorat Jenderal Penguatan Riset dan Pengembangan, Kementerian Riset, Teknologi, dan Pendidikan Tinggi.

## **Pasal 9** **Penilaian Luaran**

1. Penilaian luaran penelitian dilakukan oleh Komite Penilai/*Reviewer* Luaran sesuai dengan ketentuan yang berlaku.
2. Apabila dalam penilaian luaran terdapat luaran tambahan yang tidak tercapai maka dana tambahan yang sudah diterima oleh peneliti harus disetorkan kembali ke kas negara.

## **Pasal 10** **Perubahan Susunan Tim Pelaksana dan Substansi Pelaksanaan**

Perubahan terhadap susunan tim pelaksana dan substansi pelaksanaan Penelitian ini dapat dibenarkan apa bila telah mendapat persetujuan tertulis dari Direktur Riset dan Pengabdian Masyarakat, Direktorat Jenderal Penguatan Riset dan Pengembangan, Kementerian Riset, Teknologi, dan Pendidikan Tinggi.

## **Pasal 11** **Penggantian Ketua Pelaksana**

- (1) Apabila **PIHAK KEDUA** selaku ketua pelaksana tidak dapat melaksanakan Penelitian ini, maka **PIHAK KEDUA** wajib mengusulkan pengganti ketua pelaksana yang merupakan salah satu anggota tim kepada **PIHAK PERTAMA**.
- (2) Apabila **PIHAK KEDUA** tidak dapat melaksanakan tugas dan tidak ada pengganti ketua sebagaimana dimaksud pada ayat(1), maka **PIHAK KEDUA** harus mengembalikan dana penelitian kepada **PIHAK PERTAMA** yang selanjutnya disetor ke Kas Negara.
- (3) Bukti setor sebagaimana dimaksud pada ayat (2) disimpan oleh **PIHAK PERTAMA**.

## **Pasal 12** **Sanksi**

- (1) Apabila sampai dengan batas waktu yang telah ditetapkan untuk melaksanakan Penelitian ini telah berakhir, namun **PIHAK KEDUA** belum menyelesaikan tugasnya, terlambat mengirim laporan Kemajuan, dan/atau terlambat mengirim laporan akhir, maka **PIHAK KEDUA** dikenakan sanksi administratif berupa penghentian pembayaran dan tidak dapat mengajukan proposal penelitian dalam kurun waktu dua tahun berturut-turut.
- (2) Apabila **PIHAK KEDUA** tidak dapat mencapai target luaran sebagaimana dimaksud dalam Pasal 5, maka kekurangan capaian target luaran tersebut akan dicatat sebagai hutang **PIHAK KEDUA** kepada **PIHAK PERTAMA** yang apabila tidak dapat dilunasi oleh **PIHAK KEDUA**, akan berdampak pada kesempatan **PIHAK KEDUA** untuk mendapatkan pendanaan penelitian atau hibah lainnya yang dikelola oleh **PIHAK PERTAMA**.



**Pasal 13**  
**Pembatalan Perjanjian**

- (1) Apabila dikemudian hari terhadap judul Penelitian “**Modifikasi Tanah Liat untuk Bahan Pengisi Karet Alam**” sebagaimana dimaksud dalam Pasal 1 ditemukan adanya duplikasi dengan Penelitian lain dan/atau ditemukan adanya ketidakjujuran, itikad tidak baik, dan/atau perbuatan yang tidak sesuai dengan kaidah ilmiah dari atau dilakukan oleh **PIHAK KEDUA**, maka perjanjian Penelitian ini dinyatakan batal dan **PIHAK KEDUA** wajib mengembalikan dana penelitian yang telah diterima kepada **PIHAK PERTAMA** yang selanjutnya akan disetor ke Kas Negara.
- (2) Bukti setor sebagaimana dimaksud pada ayat (1) disimpan oleh **PIHAK PERTAMA**.

**Pasal 14**  
**Pajak-Pajak**

Hal-hal dan/atau segala sesuatu yang berkenaan dengan kewajiban pajak berupa PPN dan/atau PPh menjadi tanggungjawab **PIHAK KEDUA** dan harus dibayarkan oleh **PIHAK KEDUA** ke kantor pelayanan pajak setempat sesuai ketentuan yang berlaku.

**Pasal 15**  
**Peralatan dan/alat Hasil Penelitian**

Hasil Pelaksanaan Penelitian ini yang berupa peralatan dan/atau alat yang dibeli dari pelaksanaan Penelitian ini adalah milik Negara yang dapat dihibahkan kepada Politeknik Negeri Sriwijaya sesuai dengan ketentuan peraturan perundang-undangan.

**Pasal 16**  
**Penyelesaian Sengketa**

Apabila terjadi perselisihan antara **PIHAK PERTAMA** dan **PIHAK KEDUA** dalam pelaksanaan perjanjian ini akan dilakukan penyelesaian secara musyawarah dan mufakat, dan apabila tidak tercapai penyelesaian secara musyawarah dan mufakat maka penyelesaian dilakukan melalui proses hukum.

**Pasal 17**  
**Lain-lain**

- (1) **PIHAK KEDUA** menjamin bahwa penelitian dengan judul tersebut di atas belum pernah dibiayai dan/atau diikutsertakan pada Pendanaan Penelitian lainnya, baik yang diselenggarakan oleh instansi, lembaga, perusahaan atau yayasan, baik di dalam maupun di luar negeri.

- (2) Segala sesuatu yang belum cukup diatur dalam Perjanjian ini dan dipandang perlu diatur lebih lanjut dan dilakukan perubahan oleh **PARA PIHAK**, maka perubahan-perubahannya akan diatur dalam perjanjian tambahan atau perubahan yang merupakan satu kesatuan dan bagian yang tidak terpisahkan dari Perjanjian ini.


Perjanjian ini dibuat dan ditandatangani oleh PARA PIHAK pada hari dan tanggal tersebut di atas, dibuat dalam rangkap 2 (dua) dan bermeterai cukup sesuai dengan ketentuan yang berlaku, yang masing-masing mempunyai kekuatan hukum yang sama.

PIHAK PERTAMA



Dr. Rita Martini, S.E., M.Si., Ak., CA.  
NIDN: 0012036508

PIHAK KEDUA



Dr. Ir. Abu Hasan, M.Si.  
NIDN: 0023106402

MENGETAHUI  
DIREKTUR POLITEKNIK NEGERI SRIWIJAYA



Dr. Dipl. Ing Ahmad Taqwa, M.T.  
NIDN: 0004126802

- (2) Segala sesuatu yang belum cukup diatur dalam Perjanjian ini dan dipandang perlu diatur lebih lanjut dan dilakukan perubahan oleh **PARA PIHAK**, maka perubahan-perubahannya akan diatur dalam perjanjian tambahan atau perubahan yang merupakan satu kesatuan dan bagian yang tidak terpisahkan dari Perjanjian ini.

Perjanjian ini dibuat dan ditandatangani oleh PARA PIHAK pada hari dan tanggal tersebut di atas, dibuat dalam rangkap 2 (dua) dan bermeterai cukup sesuai dengan ketentuan yang berlaku, yang masing-masing mempunyai kekuatan hukum yang sama.

PIHAK PERTAMA



Dr. Rita Martini, S.E., M.Si., Ak., CA.  
NIDN: 0012036508

PIHAK KEDUA



Dr. Ir. Abu Hasan, M.Si.  
NIDN: 0023106402

MENGETAHUI  
DIREKTUR POLITEKNIK NEGERI SRIWIJAYA



Dr. Dipl. Ing Ahmad Taqwa, M.T.  
NIDN: 0004126802



**KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN  
POLITEKNIK NEGERI SRIWIJAYA**

**PUSAT PENELITIAN DAN PENGABDIAN KEPADA MASYARAKAT**

Jalan Sriwijaya Negara, Bukit Besar, Palembang 30139

Telp. 0711-353414 Fax.0711- 355918

Laman: <http://polsri.ac.id>, email: [p3m@polsri.ac.id](mailto:p3m@polsri.ac.id)

**SURAT PERNYATAAN TANGGUNGJAWAB MUTLAK  
KONTRAK PENELITIAN**

Yang bertanda tangan dibawah ini :

**Nama** : Dr. Ir. Abu Hasan, M.Si.  
**NIP** : 196410231992031001  
**Institusi** : Politeknik Negeri Sriwijaya  
**No. Kontrak** : 260/SP2H/LT/DRPM/2021  
**Jenis Kontrak** : Penelitian Terapan Tahun Jamak  
**Jumlah Dana** : Rp 248.700.000  
**Judul** : Modifikasi Tanah Liat untuk Bahan Pengisi Karet Alam  
**Skim** : Penelitian Terapan Unggulan Perguruan Tinggi

Menyatakan dengan sesungguhnya bahwa:

1. Bertanggungjawab mutlak dalam pembelanjaan dana dan berkewajiban untuk menyimpan semua bukti-bukti pengeluaran sesuai dengan jumlah dana yang diberikan;
2. Berkewajiban mengembalikan sisa dana yang tidak dibelanjakan ke Kas Negara;
3. Bertanggungjawab penuh atas data administrasi pelaksana penerima dana ;
4. Berkewajiban untuk menindaklanjuti dan mengupayakan hasil yang dilakukan terlaksana secara efektif dan efisien, berupa luaran wajib dan tambahan yang telah dijanjikan dalam proposal penelitian;
5. Berkewajiban untuk menyimpan hardcopy dan softcopy Laporan Kemajuan dan Laporan Akhir .

Palembang, Maret 2021

Menyetujui,  
Ptt. Kepala P3M  
  
Dr. Rita Martini, S.E., M.Si., Ak., CA.  
NIP 196503121990032001



Dr. Ir. Abu Hasan, M.Si.  
NIP 196410231992031001

Mengetahui,  
Direktur Politeknik Negeri Sriwijaya  
  
Dr. Dipl. Ing. Ahmad Taqwa, M.T.  
NIP 196812041997031001





**KEMENTERIAN PENDIDIKAN, KEBUDAYAAN,  
RISET, DAN TEKNOLOGI**  
**POLITEKNIK NEGERI SRIWIJAYA**  
**PUSAT PENELITIAN DAN PENGABDIAN KEPADA MASYARAKAT**  
Jalan Sriwijaya Negara, Bukit Besar, Palembang 30139  
Telp. 0711-353414 Fax.0711- 355918

**PERNYATAAN KESANGGUPAN PELAKSANAAN DAN  
PENYUSUNAN LAPORAN PENELITIAN**

Saya yang bertanda-tangan di bawah ini:

Nama : Dr. Ir. Abu Hasan, MSi.  
NIDN : 0023106402  
Instansi : Politeknik Negeri Sriwijaya Palembang

Tanggal Kontrak Induk\* : **18 Maret 2021**  
Nomor Kontrak Induk\* : **260 /SP2H/LT/DRPM/2021**  
Tanggal Kontrak Turunan\*\* : **18 Maret 2021**  
Nomor Kontrak Turunan\*\* : **034/PL6.2.1/PL/2021**  
Judul Penelitian : MODIFIKASI TANAH LIAT UNTUK BAHAN PENGISI KARET  
ALAM  
Tahun Usulan : 2020  
Tahun Pelaksanaan : 2021  
Jangka Waktu Penelitian : 2 tahun  
Periode Penelitian : Tahun ke 1 dari 2 tahun\*  
Dana Penelitian : PTUPT Rp. 524.000.000,-

Sehubungan dengan Kontrak Penelitian:

Periode	Dana Penelitian (Rp)	Dana Tambahan (Rp)
Tahun ke-1	248.700.000,-	-
Tahun ke-2	275.300.000,-	-
Tahun ke-3	-	-

Dengan ini menyatakan bahwa Saya bertanggungjawab penuh untuk menyelesaikan penelitian serta mengunggah laporan kemajuan dan laporan akhir penelitian sebagaimana diatur dalam Kontrak Penelitian tersebut diatas.

Apabila sampai dengan masa penyelesaian pekerjaan sebagaimana diatur dalam Kontrak Penelitian tersebut di atas saya lalai/cidera janji/wanprestasi dan/atau terjadi pemutusan Kontrak Penelitian, saya bersedia untuk mengembalikan/menyetorkan kembali uang ke kas negara sebesar nilai sisa pekerjaan yang belum ada prestasinya.

Demikian surat pernyataan ini dibuat dengan sebenarnya.

Palembang, 17 Juli 2021



(Dr. Ir. Abu Hasan, MSi.)

## SURAT PERNYATAAN TANGGUNG JAWAB BELANJA

Yang bertanda tangan di bawah ini :

Nama : Dr Ir ABU HASAN M.Si

Alamat : PERUMAHAN BSI BLOK F2 NO 02 RT/RW 009/005 BUKIT BARU

KECAMATAN ILIR BARAT I KOTA PALEMBANG 30139

berdasarkan Surat Keputusan Nomor B/112/E3/RA.00/2021 dan Perjanjian / Kontrak Nomor 260/E4.1/AK.04.PT/2021 12 Juli 2021 mendapatkan Anggaran Penelitian MODIFIKASI TANAH LIAT UNTUK BAHAN PENGISI KARET ALAM sebesar 248,700,000 .

Dengan ini menyatakan bahwa :

1. Biaya kegiatan penelitian di bawah ini meliputi :

No	Uraian	Jumlah
01	<b>Bahan</b> ATK, bahan persediaan, dan bahan habis pakai	42,000,000
02	<b>Pengumpulan Data</b> Uang rapat, honor sekretariat, transfort, tiket, FGD, penginapan, dan uang harian	63,200,000
03	<b>Analisis Data (Termasuk Sewa Peralatan)</b> penginapan, uang harian, biaya analisis sampel, transfort, penginapan, dan honor pengelola data serta biaya sewa peralatan.	87,000,000
04	<b>Pelaporan, Luaran Wajib dan Luaran Tambahan</b> Biaya seminar international, luaran KI, biaya pembuatan dokumen, uang rapat dan lain-lain	56,500,000
	<b>Jumlah</b>	<b>248.700.000</b>

2. Jumlah uang tersebut pada angka 1, benar-benar dikeluarkan untuk pelaksanaan kegiatan penelitian dimaksud.

Demikian surat pernyataan ini dibuat dengan sebenarnya.



Palembang, 22 - 11 - 2021

Ketua,

(Dr Ir ABU HASAN, M.Si)  
NIP/NIK 196410231992031001



### PROTEKSI ISI LAPORAN AKHIR PENELITIAN

Dilarang menyalin, menyimpan, memperbanyak sebagian atau seluruh isi laporan ini dalam bentuk apapun kecuali oleh peneliti dan pengelola administrasi penelitian

## LAPORAN AKHIR PENELITIAN MULTI TAHUN

ID Proposal: f91fa921-cb83-4c41-b2df-81975e58129c  
Laporan Akhir Penelitian: tahun ke-1 dari 2 tahun

### 1. IDENTITAS PENELITIAN

#### A. JUDUL PENELITIAN

MODIFIKASI TANAH LIAT UNTUK BAHAN PENGISI KARET ALAM
--

#### B. BIDANG, TEMA, TOPIK, DAN RUMPUN BIDANG ILMU

Bidang Fokus RIRN / Bidang Unggulan Perguruan Tinggi	Tema	Topik (jika ada)	Rumpun Bidang Ilmu
Teknologi dan Manajemen Material Maju	-	Pengujian sifat fisik –kimia material/perkakas mesin yang didesain untuk teknologi tepat guna	Teknik Material (Ilmu Bahan)

#### C. KATEGORI, SKEMA, SBK, TARGET TKT DAN LAMA PENELITIAN

Kategori (Kompetitif Nasional/ Desentralisasi/ Penugasan)	Skema Penelitian	Strata (Dasar/ Terapan/ Pengembangan)	SBK (Dasar, Terapan, Pengembangan)	Target Akhir TKT	Lama Penelitian (Tahun)
Penelitian Desentralisasi	Penelitian Terapan Unggulan Perguruan Tinggi	SBK Riset Terapan	SBK Riset Terapan	5	2

### 2. IDENTITAS PENGUSUL

Nama, Peran	Perguruan Tinggi/ Institusi	Program Studi/ Bagian	Bidang Tugas	ID Sinta	H-Index
ABU HASAN Ketua Pengusul	Politeknik Negeri Sriwijaya	Teknik Energi Terbarukan		6099539	2
Ir ROBERT JUNAIDI M.T Anggota Pengusul 1	Politeknik Negeri Sriwijaya	Teknologi Kimia Industri	Membantu analisis kompon dan sifat fisik karet alam, karakterisasi tanah liat, dan uji xrd dan SEM	6098402	1
Dr Ir MUHAMMAD YERIZAM M.T	Politeknik Negeri Sriwijaya	Teknologi Kimia Industri	Membantu proses pembuatan kompon karet	6044022	0

Anggota Pengusul 2			alam dan analisis sifat fisiknya		
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### 3. MITRA KERJASAMA PENELITIAN (JIKA ADA)

Pelaksanaan penelitian dapat melibatkan mitra kerjasama, yaitu mitra kerjasama dalam melaksanakan penelitian, mitra sebagai calon pengguna hasil penelitian, atau mitra investor

Mitra	Nama Mitra
Mitra Calon Pengguna	Handono

### 4. LUARAN DAN TARGET CAPAIAN

#### Luaran Wajib

Tahun Luaran	Jenis Luaran	Status target capaian ( <i>accepted, published, terdaftar atau granted, atau status lainnya</i> )	Keterangan ( <i>url dan nama jurnal, penerbit, url paten, keterangan sejenis lainnya</i> )
1	Dokumen pendaftaran paten proses	Terbit nomor pendaftaran paten	

#### Luaran Tambahan

Tahun Luaran	Jenis Luaran	Status target capaian ( <i>accepted, published, terdaftar atau granted, atau status lainnya</i> )	Keterangan ( <i>url dan nama jurnal, penerbit, url paten, keterangan sejenis lainnya</i> )
1	Artikel pada Conference/Seminar Internasional di Pengindeks Bereputasi	Terbit dalam Prosiding	International Rubber Conference 2021 DKT IRC 2021; 28. June to 1. July 2021 Nürnberg

### 5. ANGGARAN

Rencana anggaran biaya penelitian mengacu pada PMK yang berlaku dengan besaran minimum dan maksimum sebagaimana diatur pada buku Panduan Penelitian dan Pengabdian kepada Masyarakat Edisi 12.

**Total RAB 2 Tahun Rp. 713,750,000**

**Tahun 1 Total Rp. 363,100,000**

Jenis Pembelanjaan	Komponen	Item	Satuan	Vol.	Biaya Satuan	Total
Bahan	ATK	Kertas, tinta printer,	paket	1	1,000,000	1,000,000
Bahan	ATK	hardisk eksternal	unit	1	1,000,000	1,000,000
Bahan	ATK	kabel	paket	1	500,000	500,000
Bahan	Bahan Penelitian (Habis Pakai)	SIR 20/sheet 1	kg	20	60,000	1,200,000
Bahan	Bahan Penelitian (Habis Pakai)	bahan kimia karet	paket	1	60,000,000	60,000,000
Bahan	Barang Persediaan	bahan bantu proses	paket	1	15,000,000	15,000,000
Pengumpulan Data	FGD persiapan penelitian	persiapan penelitian	paket	3	1,000,000	3,000,000



Jenis Pembelanjaan	Komponen	Item	Satuan	Vol.	Biaya Satuan	Total
Pengumpulan Data	FGD persiapan penelitian	persiapan artikel ilmiah termasuk paten	paket	9	1,000,000	9,000,000
Pengumpulan Data	HR Pembantu Peneliti	pembantu peneliti	org.blm	6	500,000	3,000,000
Pengumpulan Data	HR Sekretariat/Administrasi Peneliti	sekretaris peneliti	tahun	1	1,500,000	1,500,000
Pengumpulan Data	Transport	transprot lokal	paket	6	1,000,000	6,000,000
Pengumpulan Data	Tiket	sampling dan uji produk	paket	6	2,500,000	15,000,000
Pengumpulan Data	Uang Harian	lumpsum	hari	24	400,000	9,600,000
Pengumpulan Data	Penginapan	Hotel	hari	12	800,000	9,600,000
Pengumpulan Data	Uang harian rapat di dalam kantor	konsolidasi dengan tim peneliti	orang	9	500,000	4,500,000
Pengumpulan Data	Uang harian rapat di luar kantor	konsolidasi tim dengan perusahaan	orang	12	700,000	8,400,000
Pengumpulan Data	HR Pembantu Lapangan	pembantu analisis	orang	7	300,000	2,100,000
Sewa Peralatan	Peralatan penelitian	alat uji mutu dan karakterisasi	paket	1	40,000,000	40,000,000
Sewa Peralatan	Transport penelitian	transport	org.hari	12	300,000	3,600,000
Sewa Peralatan	Transport penelitian	transport ke mitra	org.hari	12	50,000	600,000
Analisis Data	HR Pengolah Data	pengolah data	org.blm	7	500,000	3,500,000
Analisis Data	Biaya analisis sampel	uji mutu dan karakterisasi	paket	1	40,000,000	40,000,000
Analisis Data	Tiket	ke Jabodetabek	org.hari	4	2,500,000	10,000,000
Analisis Data	Uang Harian	lumpsum	org.hari	12	400,000	4,800,000
Analisis Data	Transport Lokal	dalam kota	org.hari	4	150,000	600,000
Analisis Data	Penginapan	ke Jabodetabek	org.hari	12	800,000	9,600,000
Analisis Data	Biaya konsumsi rapat	konsolidasi dengan tim dan mitra	org.hari	12	500,000	6,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Uang harian rapat di dalam kantor	konsolidasi tim	paket	4	1,500,000	6,000,000

Jenis Pembelanjaan	Komponen	Item	Satuan	Vol.	Biaya Satuan	Total
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya konsumsi rapat	konsolidasi dengan tim	paket	3	1,000,000	3,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya seminar internasional	Erofa	paket	1	30,000,000	30,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Publikasi artikel di Jurnal Internasional	Jurnal international	paket	1	25,000,000	25,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Luaran KI (paten, hak cipta dll)	Draft paten	paket	1	15,000,000	15,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya Luaran Iptek lainnya (purwa rupa, TTG dll)	TTG	paket	1	15,000,000	15,000,000

**Tahun 2 Total Rp. 350,650,000**

Jenis Pembelanjaan	Komponen	Item	Satuan	Vol.	Biaya Satuan	Total
Bahan	ATK	tinta dan kertas	paket	1	800,000	800,000
Bahan	Bahan Penelitian (Habis Pakai)	bahan kimia untuk karet	paket	1	40,000,000	40,000,000
Bahan	Bahan Penelitian (Habis Pakai)	karet alam	kg	15	60,000	900,000
Bahan	Bahan Penelitian (Habis Pakai)	bahan pengisi	paket	1	15,000,000	15,000,000
Bahan	Barang Persediaan	bahan pembantu proses penelitian	paket	1	15,000,000	15,000,000
Pengumpulan Data	FGD persiapan penelitian	konsolidasi tim	paket	3	1,000,000	3,000,000
Pengumpulan Data	FGD persiapan penelitian	persiapan jurnal international	paket	3	1,000,000	3,000,000
Pengumpulan Data	HR Pembantu Peneliti	pembantu olah data	bulan	8	500,000	4,000,000
Pengumpulan Data	Transport	rumah bandara	orang.kali	3	200,000	600,000
Pengumpulan Data	Transport	dalam kota	orang.kali	9	150,000	1,350,000
Pengumpulan Data	Tiket	percobaan dan uji mutu	orang.kali	3	2,500,000	7,500,000

Jenis Pembelanjaan	Komponen	Item	Satuan	Vol.	Biaya Satuan	Total
Pengumpulan Data	Uang Harian	percobaan dan uji mutu	orang.hari	9	400,000	3,600,000
Pengumpulan Data	Penginapan	percobaan dan uji mutu	orang.hari	9	800,000	7,200,000
Pengumpulan Data	Uang harian rapat di dalam kantor	konsolidasi tim, paper	orang	3	150,000	450,000
Pengumpulan Data	Uang harian rapat di dalam kantor	paten	orang	3	150,000	450,000
Pengumpulan Data	Uang harian rapat di luar kantor	paten dan jurnal international	paket	3	1,500,000	4,500,000
Sewa Peralatan	Peralatan penelitian	uji kutu dan karakterisasi	paket	1	40,000,000	40,000,000
Sewa Peralatan	Transport penelitian	uji mutu dan karakterisasi produk	paket	9	500,000	4,500,000
Analisis Data	HR Pengolah Data	pengolah data	org.tahun	1	1,500,000	1,500,000
Analisis Data	Biaya analisis sampel	uji mutu dan karakterisasi sampel dan produk	paket	2	20,000,000	40,000,000
Analisis Data	Tiket	uji mutu produk	org	3	2,500,000	7,500,000
Analisis Data	Uang Harian	uji mutu	hari	9	400,000	3,600,000
Analisis Data	Transport Lokal	uji mutu	paket	3	500,000	1,500,000
Analisis Data	Penginapan	uji mutu produk	org	9	800,000	7,200,000
Analisis Data	Biaya konsumsi rapat	konsolidasi tim	paket	3	700,000	2,100,000
Analisis Data	Biaya konsumsi rapat	pembahasan data	paket	3	700,000	2,100,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	HR Sekretariat/Administrasi Peneliti	adm peneliti	org.tahun	1	1,500,000	1,500,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Uang harian rapat di dalam kantor	konsolidasi tim	paket	3	1,500,000	4,500,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Uang harian rapat di luar kantor	paper	paket	3	1,500,000	4,500,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya konsumsi rapat	rapat persiapan publikasi jurnal	paket	3	700,000	2,100,000

Jenis Pembelanjaan	Komponen	Item	Satuan	Vol.	Biaya Satuan	Total
		international				
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya konsumsi rapat	pemantauan paten	paket	1	700,000	700,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya seminar internasional	seminar international	paket	1	30,000,000	30,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Publikasi artikel di Jurnal Internasional	artikel international	naskah	1	30,000,000	30,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Luaran KI (paten, hak cipta dll)	patent granted	paket	1	60,000,000	60,000,000

## 6. HASIL PENELITIAN

**A. RINGKASAN:** Tuliskan secara ringkas latar belakang penelitian, tujuan dan tahapan metode penelitian, luaran yang ditargetkan, serta uraian TKT penelitian.

Pemanfaatan tanah liat sebagai bahan pengisi pada kompon karet sudah banyak dilakukan. Tanah liat dapat mengurangi volume karet sebagai bahan pengisi kompon karet.

Disamping itu, tanah liat juga dapat menyebabkan penurunan harga kompon karet itu sendiri

karena sebagian volume karet digantikan tanah liat. Ini berarti bahwa efisiensi kompon karet

dapat diciptakan. Di Indonesia sendiri, tanah liat untuk bahan pengisi karet masih diimpor

dari luar negeri terutama dari negeri Cina misalnya China clay. Salah satu sumber deposit

tanah liat yang cukup besar kandungannya di Indonesia adalah berada di lokasi penambangan batubara PT. Bukit Asam (Persero) Tbk., Tanjung Enim Provinsi Sumatera

Selatan. Seimbang dengan deposit lapisan batubara yang ada, jumlah total deposit tanah liat

ini cukup banyak sekitar lima kali deposit batubara dan belum bisa dimanfaatkan secara

ekonomi yang optimal. Oleh karena itulah, pemanfaatan tanah liat sebagai bahan pengisi

kompon karet di lokasi ini perlu dilakukan. Tanah liat masih perlu dilakukan modifikasi permukaannya. Modifikasi ini dapat menyebabkan permukaan aktif bertambah dan diharapkan dapat menjadi bahan pengisi yang baik dibandingkan dengan sebelum modifikasi. Silika juga merupakan salah satu jenis bahan pengisi kompon karet yang bersifat

semi reinforcing filler yang banyak digunakan di industri barang jadi karet dimana silika merupakan komponen terbesar di dalam tanah liat. Pengeringan, pemisahan, dan pengecilan ukuran tanah liat Tanjung Enim dilakukan sebagai persiapan sebagai

bahan

pengisi. Modifikasi tanah liat dan menjadikannya sebagai bahan pengisi karet alam.

Luaran

yang ditargetkan adalah satu prosiding international, satu artikel international, dan paten

sederhana. Sementara target TKT sekitar minimal 6.

**B. KATA KUNCI:** Tuliskan maksimal 5 kata kunci.

Bahan pengisi; tanah liat; tanah liat termodifikasi; karet alam; kompon karet

Pengisian poin C sampai dengan poin H mengikuti template berikut dan tidak dibatasi jumlah kata atau halaman namun disarankan ringkas mungkin. Dilarang menghapus/memodifikasi template ataupun menghapus penjelasan di setiap poin.

**C. HASIL PELAKSANAAN PENELITIAN:** Tuliskan secara ringkas hasil pelaksanaan penelitian yang telah dicapai sesuai tahun pelaksanaan penelitian. Penyajian dapat berupa data, hasil analisis, dan capaian luaran (wajib dan atau tambahan). Seluruh hasil atau capaian yang dilaporkan harus berkaitan dengan tahapan pelaksanaan penelitian sebagaimana direncanakan pada proposal. Penyajian data dapat berupa gambar, tabel, grafik, dan sejenisnya, serta analisis didukung dengan sumber pustaka primer yang relevan dan terkini.

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Data hasil penelitian untuk draft artikel ilmiah Prosiding merupakan data hasil uji curing characteristics kompon karet alam hasil rancangan. Juga sudah diperoleh data hasil uji sifat fisik vulkanisat karet alam. Kedua jenis data tersebut terdiri dari karet dengan filler tanah liat lokal original dan yang menggunakan tanah liat lokal yang termodifikasi oleh cetyltrimethyl ammonium bromide (CTAB).

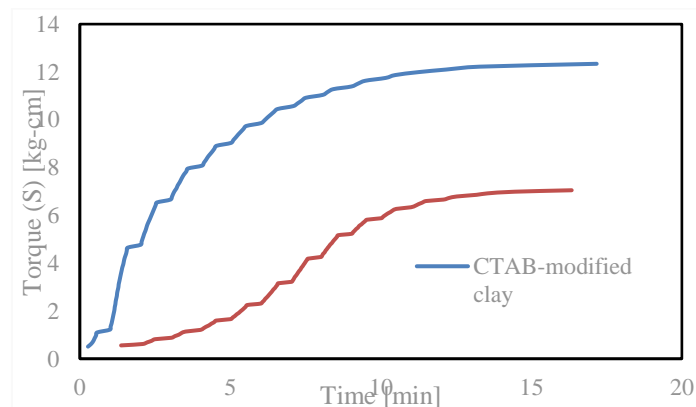
Kedua tersebut adalah sebagai berikut:

1. Data formula karet alam

Tabel 1. Formula karet alam yang menggunakan filler CTAB-modified clay dan original clay

No	Ingredients	Compounds, phr	
		CTAB-modified clay	Original clay
1	Natural rubber RSS 1	100	100
2	Stearic acid	2	2
3	ZnO	5	5
4	TMQ	2	2
5	TMTD	0,5	0,5
6	Sulfur	3	3
7	Oli	3	3
8	clay	-	15
9	Modified clay	15	-

2. Data curing characteristics kompon karet alam



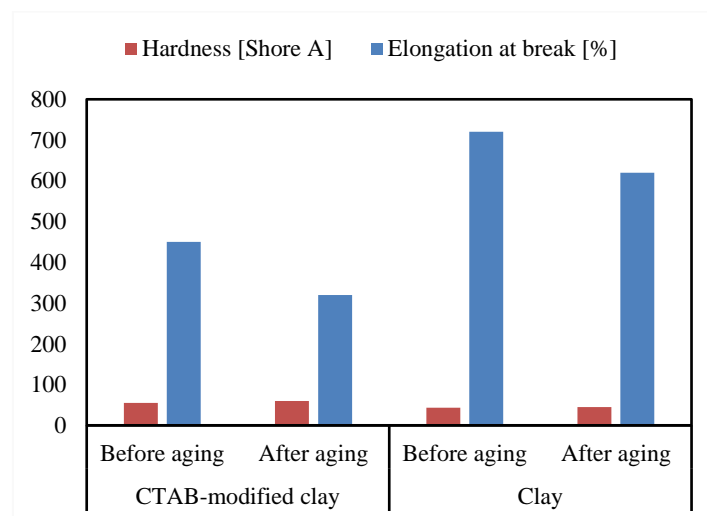
Gambar 1. hasil uji curing characteristics kompon karet alam dengan filler tanah liat lokal dan yang termodifikasi oleh CTAB  
 Dari gambar 2 tersebut diperoleh data curing characteristics Tabel 2.

Tabel 2. Curing characteristics yang menggunakan filler CTAB-modified clay dan original clay

Curing characteristics kompon karet alam	CTAB-modified clay	Original clay
S max- Smin, kg-cm	11.83	6.49
S mak, kg-cm	12.34	7.05
S min, kg-cm	0.51	0.56
Optimum cure, min	8.38	11.23
scorch time, min	1.35	6.35

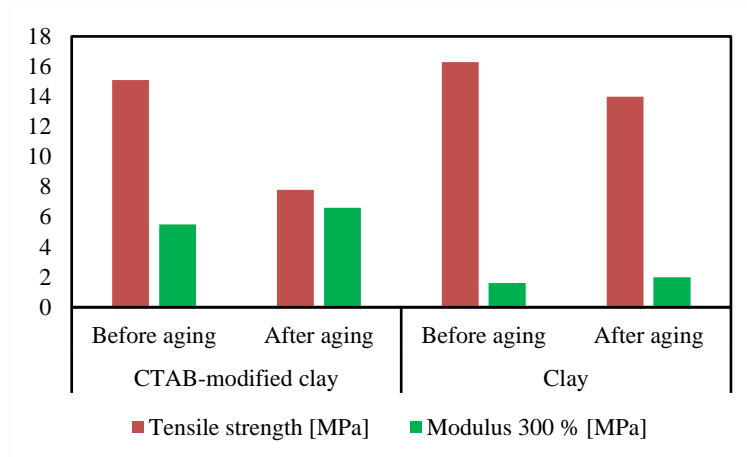
Hasil uji rheometer kompon karet alam yang menggunakan CTAB-modified clay dan unmodified clay filler dapat dilihat pada Gambar 1. Kurva yang tercantum pada Gambar tersebut mengungkap bahwa reaksi vulkanisasi yang terjadi pada kompon dengan menggunakan filler CTAB-modified clay naik secara tajam dibandingkan dengan menggunakan filler unmodified clay. Penyerapan CTAB dipermukaan clay menyebabkan permukaan clay lebih aktif sehingga modified clay mampu menjadi filler yang lebih baik dibandingkan dengan original clay. Filler dapat juga menyebabkan kekakuan pada vulkanisat karet disamping akibat reaksi vulkanisasi. Pergerakan molekul karet tidak bisa bebas dan tertahan oleh permukaan filler sehingga kelenturan vulkanisat karet turun dan menyebabkan peningkatan kekakuan. Kekakuan ini menghasilkan torsi tinggi pada vulkanisat karet. Berbeda dengan kompon yang menggunakan unmodified clay filler, kekakuan yang terjadi pada vulkanisat karet hanya disebabkan oleh reaksi vulkanisasi dan lebih sedikit dari pengaruh keberadaan filler. Disini unmodified clay tidak dapat berfungsi dengan baik sebagai filler. Jaringan antar molekul karet atau jaringan tiga dimensi antara molekul karet belerang molekul karet yang terbentuk hanya diakibatkan oleh reaksi vulkanisasi menyebabkan kekakuan vulkanisat karet meningkat.

3. Data sifat fisik vulkanisat karet alam, hardness dan elongation at break tercantum pada gambar 3 dan untuk tensile strength dan modulus 300% dapat dilihat pada gambar 4.



Gambar 2. Hasil uji sifat fisik hardness dan elongation at break vulkanisat karet alam dengan filler tanah liat lokal dan yang termodifikasi oleh CTAB. Juga dibanding antara sifat befor and after aging

Gambar 2 tersebut memperlihatkan bahwa hardness vulkanisat karet alam naik setelah dilakukan proses aging baik dengan menggunakan CTAB-modified clay maupun dengan menggunakan unmodified clay filler or original clay filler. Hal ini menunjukkan bahwa disini reaksi vulkanisasi masih terjadi. Pembentukan jaringan tiga dimensi antara molekul karet belerang molekul karet yang terjadi akibat reaksi vulkanisasi menyebabkan kenaikan kekakuan. Sifat kekakuan ini menyumbang peningkatan hardness. Hardness untuk vulkanisat karet yang menggunakan filler CTAB-modified clay juga menunjukkan lebih tinggi dibandingkan dengan hardness dengan unmodified clay filler. Keberhasilan modifikasi permukaan clay filler menggunakan CTAB sebagai modifiernya dapat diidentifikasi melalui penyerapan molekul karet di permukaannya. Semakin banyak molekul karet terserap di permukaan filler menyebabkan kenaikan bound rubber. Kenaikan bound rubber berpengaruh terhadap sifat fisik vulkanisat karet diantaranya hardness. Bound rubber tinggi dapat menyebabkan hardness yang meningkat. Elongation at break pada Gambar 5 tersebut menunjukkan penurunan setelah aging baik dengan menggunakan filler CTAB-Modified clay maupun unmodified clay. Perubahan elongation at break ini disebabkan oleh kenaikan hardness. Kenaikan ini menghasilkan penurunan elongation at break. Elongation at break yang menggunakan unmodified clay filler lebih tinggi dari elongation at break vukanisat karet yang memanfaatkan filler CTAB-modified clay. Dampak ini merupakan sifat yang berkebalikan dengan hardness. Hardness tinggi dengan CTAB-modified clay namun elongation at break rendah dan sebaliknya. Disini ternyata memang unmodified clay tidak berfungsi dengan baik sebagai filler dibandingkan dengan CTAB-modified clay. Interaksi ionik, diantara muatan positif CTAB dan muatan negatif clay menyebabkan permukaan CTAB-modified clay filler mampu menyerap molekul karet di permukaannya dan ini berarti bahwa CTAB-modified clay filler berfungsi sebagai filler yang baik dari original clay.



Gambar 3. Hasil uji sifat fisik tensile strength dan modulus 300% vulkanisat karet alam dengan filler tanah liat lokal dan yang termodifikasi oleh CTAB. Juga dibanding antara sifat before and after aging

Gambar 3 memperlihatkan kurva hubungan antara tensile strength dan modulus 300% yang diamati untuk aging dan before aging. Dari Gambar 3 tersebut, tensile strength turun cukup jauh untuk kedua vulkanisat yang menggunakan CTAB modified clay dan unmodified clay filler dari before aging ke after aging. Penurunan tensile strength terbesar terjadi pada vulkanisat karet yang menggunakan CTAB modified clay dibandingkan dengan unmodified clay filler. Ini disebabkan oleh CTAB modified clay lebih dapat berfungsi sebagai filler. Kekakuan meningkat akibat fungsi filler yang lebih baik. Disamping pengaruh filler, reaksi vulkanisasi masih terjadi ketika proses aging dilaksanakan. Reaksi vulkanisasi juga menyumbang kekakuan pada vulkanisat karet.

Sesuatu yang lain terjadi dimana modulus 300% naik dengan proses aging dilakukan. Ini terjadi pada kedua vulkanisat karet yang menggunakan baik CTAB modified clay maupun clay fillers. Modulus 300% itu mempunyai hubungan berbanding lurus dengan tensile strength dan terbalik dengan elongation at break. Gambar 3 menyatakan bahwa elongation at break vulkanisat yang menggunakan unmodified clay filler lebih tinggi dari vulkanisat yang menggunakan CTAB-modified clay filler.

Data mentah hasil pengujian sifat fisik vulkanisat karet alam tercantum pada tabel 1. Data tersebut berhubungan dengan gambar 2 dan 3 atau merupakan data mentah sebelum digambar.

Tabel 3. data hasil uji sifat fisik vulkanisat karet alam

Sifat fisik vulkanisat	CTAB-modified clay		Original Clay	
	Before aging	After aging	Before aging	After aging
Hardness [Shore A]	55	60	43	45
Tensile strength [MPa]	15.1	7.8	16.3	14.0
Elongation at break [%]	450	320	720	620
Modulus 300 % [MPa]	5.5	6.6	1.6	2.0

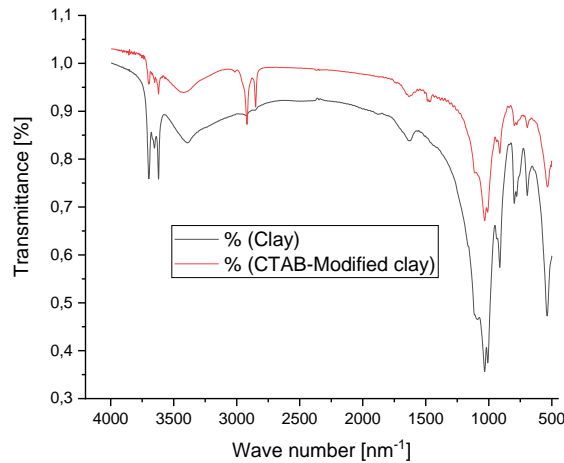
- Data lain yang juga penting untuk ditampilkan disini adalah data hasil karakterisasi tanah liat termodifikasi dengan CTAB yang dibandingkan terhadap data tanah liat original. Karakterisasi tanah liat termodifikasi CTAB dilakukan menggunakan FTIR dan XRD. Penjelasan kedua data spektra FTIR ditampilkan pada gambar 4.

Menurut Madejova pada tahun 2003, kaolinit dengan sebagian besarnya mengandung Al di posisi oktahedral memiliki empat pita serapan dalam 3 stretching OH. Gugus OH ini terletak di antara tetrahedral dan oktahedral sheet yang mempunyai serapan sekitar  $3620\text{ cm}^{-1}$  atau pada serapan  $3625\text{ cm}^{-1}$  pada penelitian ini. Gugus OH lain berada pada permukaan oktahedral dan membentuk ikatan hidrogen lemah dengan oxygen ikatan Si-O-Si pada permukaan bawah lapisan berikutnya. Serapan pada  $3695\text{ cm}^{-1}$  terkait dengan phase symmetric stretching vibration yang di dalam pengamatan ini adalah pada serapan  $3697\text{ cm}^{-1}$ , dua serapan lemah pada  $3669$  dan  $3653\text{ cm}^{-1}$  dihubungkan plane stretching vibration. Gambar 2 juga menunjukkan spectra hasil karakterisasi FTIR penelitian dengan pola dan peak serapan yang hampir sama dengan hasil karakterisasi Madejova. Hasil penelitian lain yang dikemukakan oleh Belachew dan Hinsene di tahun 2020 menunjukkan bahwa untuk kaolin, puncak peak serapan terdapat pada  $3700$ ,  $3670$ ,  $3650$  and  $3620\text{ cm}^{-1}$  due to the inner OH attached to Al or O. Peak-peak ini juga terdapat pada kurva pada Gambar 4.

Pada Gambar 4 tersebut, tepatnya di kurva CTAB-Modified clay (kaolin) terdeteksi peak baru di sekitar angka gelombang  $3010\text{ cm}^{-1}$  yang disebabkan oleh vibrasi ulur  $\text{CH}_3\text{-N}$ . Peak ini juga dianalisis oleh Zenasni et. al. Vibrasi regangan simetris

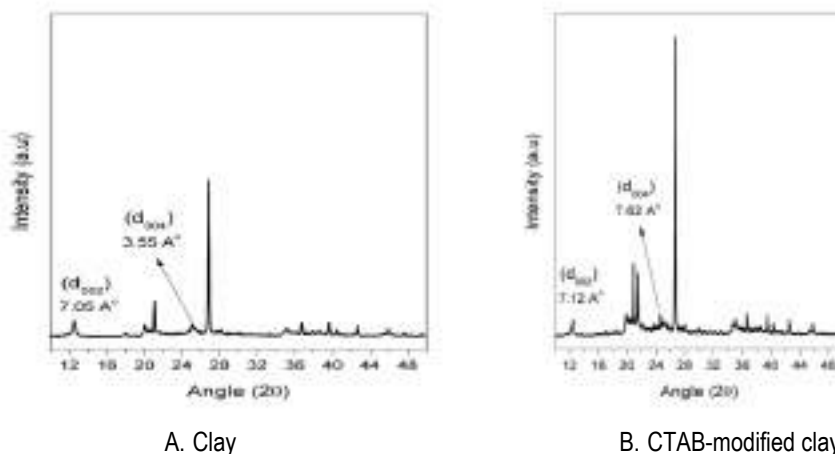


dan asimetris gugus metil (CH<sub>3</sub>) dan metilen (CH<sub>2</sub>) rantai alifatik dari surfaktan muncul serapan lebih kuat pada angka gelombang 2850 cm<sup>-1</sup> dan 2920 cm<sup>-1</sup>. pengamatan pada penelitian ini adalah pada serapan 2851 cm<sup>-1</sup> dan 2953 cm<sup>-1</sup>. Puncak serapan pada angka gelombang 1396 cm<sup>-1</sup> atau pada 1404 cm<sup>-1</sup> pada gambar 2 muncul dari ikatan C-N dari organic modifier, merupakan ciri ikatan molekul surfaktan antara silikat.



Gambar 4. Hasil karakterisasi spektra FTIR tanah liat termodifikasi oleh CTAB dan tanah liat original

Data asli atau data hasil pengukuran spektra FTIR pada gambar 4 tersebut tidak bisa ditampilkan disini karena sangat banyak begitu juga dengan data asli untuk pola difraksi XRD yang tercantum pada gambar 5. penting juga untuk disampaikan bahwa spektra FTIR dan pola difraksi XRD diukur secara insitu.



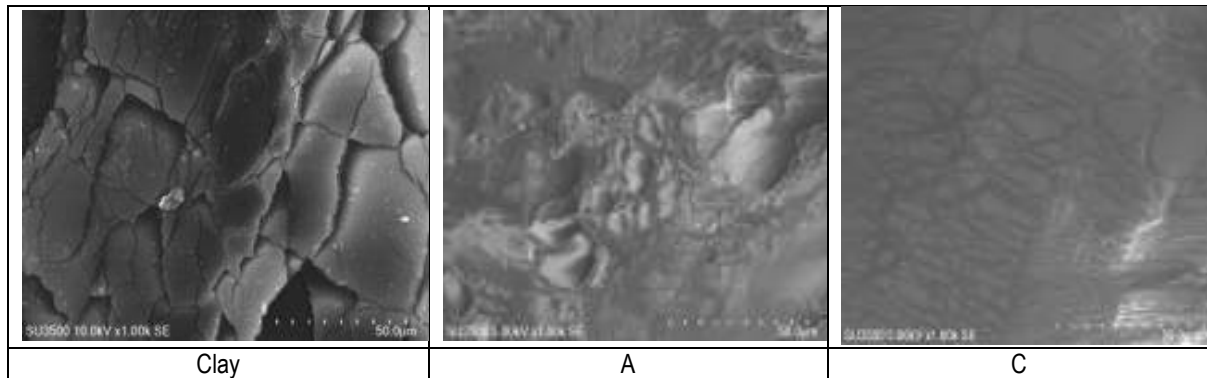
Gambar 5. Hasil karakterisasi pola difraksi XRD tanah liat termodifikasi oleh CTAB dan tanah liat original

Pola difraksi hasil dari XRD untuk clay and CTAB-modified clay fillers dicamtumkan pada gambar 5. dari gambar tersebut terdapat perubahan d-spacing clay dan CTAB-modified clay. D<sub>002</sub> untuk clay adalah 7.05Å<sup>o</sup> dan d<sub>004</sub>nya adalah 3.55Å<sup>o</sup> sementara d<sub>002</sub> untuk CTAB-modified clay adalah 7.12 Å<sup>o</sup> dan d<sub>004</sub> nya adalah 3.62Å<sup>o</sup>. Parameter kisi (lattice parameter) untuk clay adalah a= 5.19, b= 8.83 and c= 14.48 sementara untuk CTAB-modified clay, nilai lattice parameternya adalah a= 5.21, b= 8.87 and c= 14.59

Belachew and Hinsene (2020) melaporkan bahwa diantara dua sampel kaolin clay dan CTAB-modified kaolin clay tidak menghasilkan pola difraksi yang berbeda. Sedikit perbedaan terdapat pada d spacing kaolin clay yang berubah dari ke d<sub>001</sub> = 7,14531Å<sup>o</sup> ke d<sub>001</sub>= 7.14763 Å<sup>o</sup> untuk CTAB-modified kalin clay di sudut 2θ = 12.3735.

Data yang sudah tersedia untuk dimana sebagian dari data tersebut akan dijadikan data untuk paten sederhana:

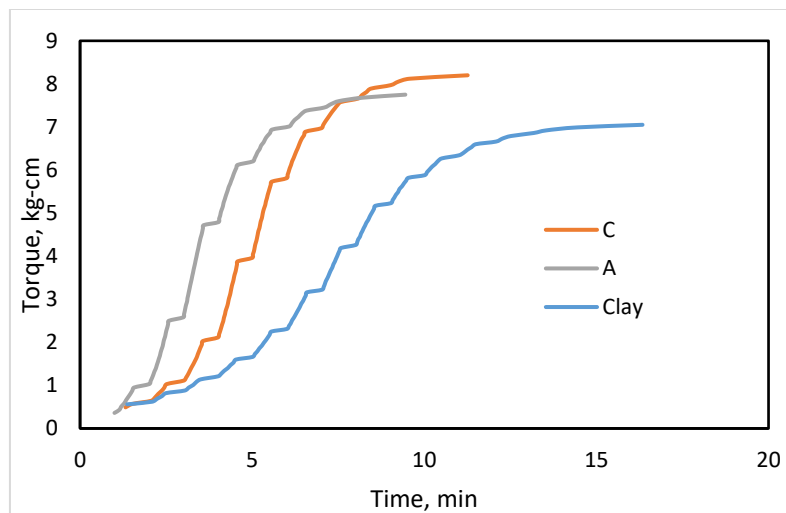
A. Data SEM



Gambar 6. SEM hasil kompon yang menggunakan Clay dan clay termodifikasi (A dan C)

Data di atas menunjukkan bahwa terdapat perbedaan yang cukup jelas diantara kompon karet alam yang menggunakan bahan pengisi tanah liat dan tanah liat termodifikasi. Gambar A dan C merupakan kompon karet alam yang menggunakan bahan pengisi tanah liat termodifikasi. Disini terlihat permukaan komponnya, A dan C lebih halus di dibandingkan dengan permukaan gambar kompon dengan tanah liat sebagai bahan pengisi.

B. Data Rheometer



Gambar 7. Rheograf kompon karet alam yang menggunakan tanah liat dan tanah liat termodifikasi

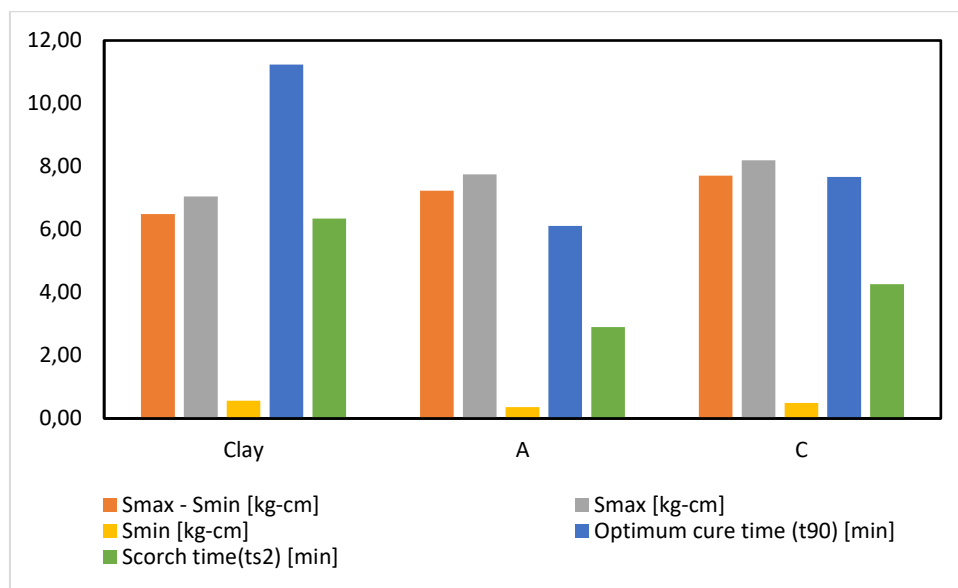
Catatan:

- Clay : Data spektra FTIR untuk tanah liat
- A : Data spektra FTIR untuk tanah liat termodifikasi oleh (3-mercaptopropyl)triethoxysilane
- C : Data spektra FTIR untuk tanah liat termodifikasi oleh (3-mercaptoprophyl)trimethoxy silane

Tabel 4. Parameter curing characteristics kompon karet alam

Curing characteristics	Clay	A	C
Smax - Smin [kg-cm]	6.49	7.23	7.71
Smax [kg-cm]	7.05	7.75	8.20
Smin [kg-cm]	0.56	0.36	0.49
Optimum cure time (t90) [min]	11.23	6.1	7.7
Scorch time(ts2) [min]	6.35	2.9	4.3

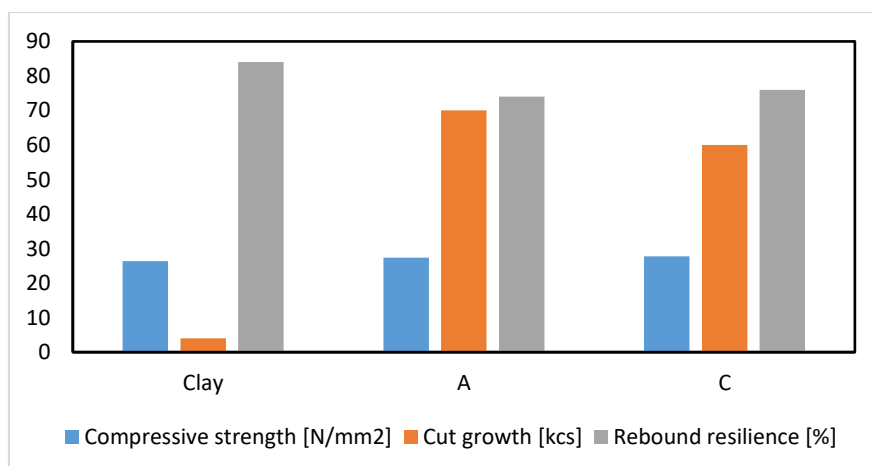
Gambar 7 memperlihatkan kurva rheograf kompon berpengisi tanah liat dan tanah liat termodifikasi menunjukkan perbedaan yang sangat jelas diantaranya. Bahan pengisi yang termodifikasi menunjukkan hasil yang cenderung lebih tinggi kecepatan reaksi vulkanisasinya. Ini menunjukkan bahwa ada percepatan reaksi vulkanisasinya. Disini fungsi tanah sebagai bahan pengisi meningkat dengan adanya modifikasi tanah liat. Tanah liat lebih bisa berikatan dengan molekul karet alam sehingga kekakuan pada karet naik yang diindikasikan oleh perubahan torsi yang cukup signifikan pada rheometer. Data yang diperoleh dari kurva pada gambar 7 diuraikan dengan parameternya pada table 4 dan masing-masing parameter tersebut ditampilkan dalam bentuk diagram batang pada gambar 8 agar lebih mudah dimengerti.



Gambar 8. Parameter curing characteristics Karet alam yang menggunakan bahan pengisi tanah liat dan tanah liat termodifikasi

C. Data sifat fisik

Data sifat fisik vulkanisat karet alam yang divulkanisasi dan dengan bahan pengisi tanah liat dan tanah liat termodifikasi dapat dilihat pada Gambar 8.



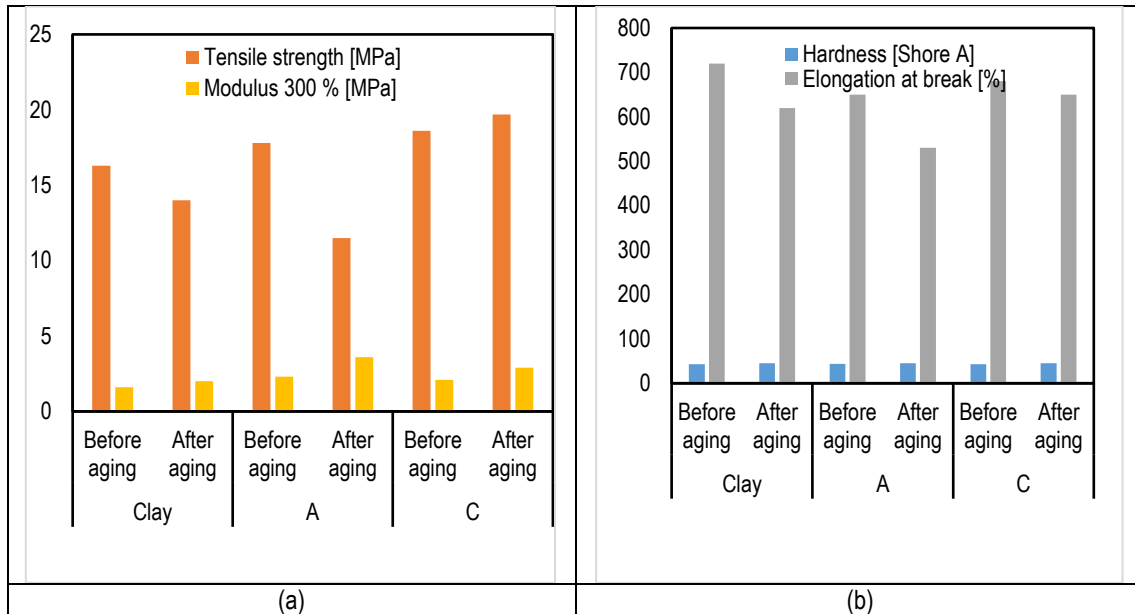
Gambar 8. Sifat fisik vulkanisat karet alam (compressive strength, cut growth, dan rebound resilience) yang merupakan fungsi bahan pengisi tanah liat dan tanah liat termodifikasi

Data diagram batang pada gambar 8 dan data pada table 5 sangat berhubungan. Dari data ini terlihat kenaikan data compressive strength. Kekuatan naik akibat fungsi bahan pengisi tanah liat termodifikasi lebih baik dari tanah liat murni. Cut growth juga naik, disini vulkanisat karet alam lebih tahan terhadap siklus uji potong. Rebound resilience turun. Sifat ini merupakan kebalikan dari dua sifat sebelumnya yang telah dibahas. Kekuatan dan ketahanan terhadap uji potong naik menyebabkan pantulan turun. Artinya karet vulkanisat menjadi semakin kaku.

Tabel 5. Sifat fisik vulkanisat karet alam (compressive strength, cut growth, dan rebound resilience)

Sifat fisik vulkanisat	Clay	A	C
Compressive strength [N/mm <sup>2</sup> ]	26.35	27.42	27.73
Cut growth [kcs]	4	70	60
Rebound resilience [%]	84	74	76

Data sifat fisik vulkanisat karet alam yang divulkanisasi dan dengan bahan pengisi tanah liat dan tanah liat termodifikasi untuk tensile strength, modulus 300%, hardness, dan elongation at break tertera pada Tabel 5 dan Gambar 9. Tabel 5 dan Gambar 9 ini disajikan agar dapat memudahkan dalam pengamatannya.



Gambar 9. Sifat fisik vulkanisat karet alam (tensile strength, modulus 300%, hardness, dan elongation at break) yang merupakan fungsi bahan pengisi tanah liat dan tanah liat termodifikasi

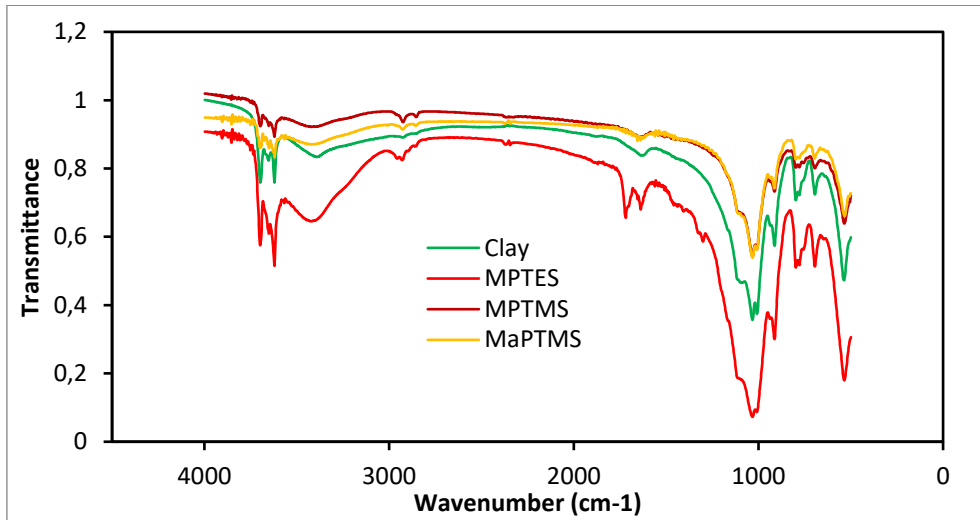
Tabel 5. Sifat fisik vulkanisat karet alam (tensile strength, modulus 300%, hardness, dan elongation at break)

Sifat fisik	Clay		A		C	
	Before aging	After aging	Before aging	After aging	Before aging	After aging
Hardness [Shore A]	43	45	44	45	43	45
Tensile strength [MPa]	16.3	14.0	17.8	11.5	18.6	19.7
Elongation at break [%]	720	620	650	530	680	650
Modulus 300% [MPa]	1.6	2.0	2.3	3.6	2.1	2.9

Dari Tabel 5 dan Gambar 9, kekerasan (hardness) naik untuk masing kompon karet baik yang menggunakan tanah liat dan atau yang menggunakan tanah liat termodifikasi sebagai bahan pengisinya. Proses aging menerapkan suhu tertentu dan dengan waktu yang tertentu pula. Kekerasan ini identic dengan kekakuan. Kekakuan ini dihasilkan dari proses vulkanisasi dan adanya bahan pengisi. Disini kekakuan diakibatkan oleh reaksi vulkanisasi yang masih dapat berlangsung. Perbedaan kekerasan diantara ketiga sampel disini akibat dari pengaruh bahan pengisi. Fungsi bahan pengisi termodifikasi lebih baik dari fungsi tanah liat. Modulus 300% juga naik akibat proses aging dan juga naik akibat penggunaan bahan pengisi tanah liat termodifikasi.

Kuat Tarik (tensile strength) dan perpanjangan putus (elongation at break) umumnya turun akibat pengaruh suhu dan waktu pada proses aging sementara untuk pengaruh bahan pengisinya menunjukkan bahwa terdapat peningkatan bagi yang menggunakan tanah liat termodifikasi. Disini, ternyata pengaruh tanah liat termodifikasi lebih baik dibandingkan dengan bahan pengisi tanah liat. Untuk kedua clay modifier, yang lebih banyak berpengaruh adalah kompon C. Artinya MPTMS lebih baik dibandingkan dengan MPTES. Disini hanya perbedaan antara etoksi dan metoksi. Metoksi lebih pendek melekulnya, sehingga molekul karet yang terserap dipermukaan bahan pengisi termodifikasi lebih mudah dan tidak terganggu oleh molekul clay modifiernya.

D. Data FTIR



Gambar 10. Spektra FTIR clay dan clay termodifikasi

Catatan:

- Clay Data spektra FTIR untuk tanah liat
- MPTES Data spektra FTIR untuk tanah liat termodifikasi oleh (3-mercaptopropyl)triethoxysilane
- MPTMS Data spektra FTIR untuk tanah liat termodifikasi oleh (3-mercaptoprophyl)trimethoxy silane

Hasil analisis gugus fungsi yang terdapat pada clay dan clay termodifikasi menggunakan FTIR dapat dilihat pada table 6.

Tabel 6. Gugus fungsi pada tanah liat (clay) dan tanah liat termodifikasi

Gugus Fungsi	Bilangan Gelombang			
	Clay	Clay termodifikasi oleh silane		
		Clay + MPTES	Clay + MPTMS	Clay + MaPTMS
Si-O-Mg stretching	530	530	534	528
Phenyl ring	698	693	693	693
Phenyl ring stretching	772	776	778	778
Si-C stretching	797	797	783	797
	908	914	914	914
	1027	1004	1009	1009
Si-O-Si stretching	1038	1034	1033	1033
Si-O-CH3	1109	1099	1095	1095
	-	1302	-	-
	-	1376	-	-
	-	1439	-	-
-OH bending	1607	1635	1622	1622
C=O vibration	-	1719	-	-
	-	2339	-	2349
	2369	2356	2352	2356
Aliphatic C-H str	2859	2850	2834	2838
	-	2909	-	-
Aliphatic C-H str	-	2926	2905	2919
	-	2949	-	-
-OH Vibration	3385	3421	3414	3425
MMT structure hydroxyl O-H stretching	3619	3621	3605	3619
	3657	3647	3646	3638
	3714	3693	3717	3690

Analisis gugus fungsi yang terdapat pada table 6 tersebut dapat dijelaskan sebagai berikut:

1. Spektra clay murni dibandingkan dengan sampel clay yang telah dicampur dengan silane. Analisis FTIR yang dilakukan pada sampel clay termodifikasi menunjukkan ada beberapa gugus fungsi yang menjadi karakteristik silane. Berdasarkan referensi dari Monasterio dkk. pada tahun 2010, intensitas pada  $3385 - 3425 \text{ cm}^{-1}$  merujuk pada -OH vibration dari air yang terserap. Gugus fungsi ini bisa berikatan dengan atom Si atau Al. Spektra sampel yang telah dicampur dengan MPTMS dan MaPTMS menunjukkan penurunan intensitas pada  $3385-3425 \text{ cm}^{-1}$  yang mengindikasikan penurunan penyerapan air, sedangkan pada sampel yang dicampur dengan MPTES intensitasnya meningkat dan mengindikasikan adanya peningkatan penyerapan air. Indikasi lain yang menggambarkan keberadaan air terdapat pada intensitas  $1607-1635 \text{ cm}^{-1}$ , yang menunjukkan hasil yang sama dengan intensitas  $3450 \text{ cm}^{-1}$ , dimana sampel MPTES memiliki serapan air yang lebih tinggi.
2. Absorpsi pada  $2905-2926 \text{ cm}^{-1}$  merujuk pada gugus asymmetrical stretching dari gugus metilena dimana gugus ini muncul pada semua sampel yang telah dicampur dengan silane kecuali pada clay murni.
3. Absorpsi pada  $1719 \text{ cm}^{-1}$  ditemukan pada sampel yang dicampur MPTES merupakan C=O vibration yang mengindikasikan adanya degradasi pada rantai hidrokarbon yang ada di sampel atau MPTES.
4. Terdapat puncak karakteristik silane yang muncul pada sampel clay yang telah dimodifikasi seperti pada:
  - $1439 \text{ cm}^{-1}$  pada sampel MPTES yang merupakan gugus phenyl ring
  - puncak pada antara  $750$  hingga  $650 \text{ cm}^{-1}$  pada semua sampel yang menandakan out of plane bending aromatic C-H.
  - Indikasi lainnya tergambar pada  $783-797 \text{ cm}^{-1}$  yang merupakan stretching dari Si-C, yang ditemukan pada semua sampel.

Puncak-puncak ini menandakan adanya kemungkinan silane telah tercangkok pada permukaan clay atau juga hanya terikat secara mekanik.

D. **STATUS LUARAN:** Tuliskan jenis, identitas dan status ketercapaian setiap luaran wajib dan luaran tambahan (jika ada) yang dijanjikan pada tahun pelaksanaan penelitian. Jenis luaran dapat berupa publikasi, perolehan kekayaan intelektual, hasil pengujian atau luaran lainnya yang telah dijanjikan pada proposal. Uraian status luaran harus didukung dengan bukti kemajuan ketercapaian luaran sesuai dengan luaran yang dijanjikan. Lengkapi isian jenis luaran yang dijanjikan serta mengunggah bukti dokumen ketercapaian luaran wajib dan luaran tambahan melalui Simlitabmas mengikuti format sebagaimana terlihat pada bagian isian luaran

Di dalam penelitian ini terdapat dua jenis luaran. Luaran yang dimaksud adalah Prosiding pada Seminar International yang sudah terdaftar di (<http://wrfase.org/Conference2021/10/Indonesia/2/ICCISSET/>, 359th International conference on contemporary issues in science, engineering and technology (ICCISSET)) yang merupakan **luaran tambahan** dan **Paten Sederhana** yang terdaftar untuk **luaran wajib**.

Prosiding international **telah diperoleh** dengan bukti sebagai berikut:

1. Artikel prosiding WRFASE terlampir,
2. Foto saat mengikuti seminar (terlampir) yang sebelumnya diselenggarakan secara offline dirubah oleh penyelenggara menjadi online (terlampir bukti perubahan pelaksanaan seminar) karena suatu sebab, dan
3. Jadwal seminar internasionalnya,
4. PPT materi seminar international, dan
5. Surat-menyurat yang mendukung perlaksana seminar international

Luaran wajib berupa paten sederhana sesuai dengan yang dijanjikan pada proposal **telah didaftarkan**. Bukti pendaftaran paten tersebut adalah sebagai berikut:

1. Formulir Permohonan Pendaftaran Paten Indonesia dengan nomor: **S00202110235** tanggal 18 November 2021
2. Voucher bukti bayar biaya pendaftaran paten sederhana dan pemeriksaan substantif.

P3M Politeknik Negeri Sriwijaya juga mengadakan monitor kemajuan penelitian dan pengabdian melalui seminar laporan akhir tanggal 15-18 November 2021. Bukti foto seminar dan ppt sebagai bahan presentasi terlampir.

E. **PERAN MITRA:** Tuliskan realisasi kerjasama dan kontribusi Mitra baik *in-kind* maupun *in-cash* (jika ada). Bukti

pendukung realisasi kerjasama dan realisasi kontribusi mitra dilaporkan sesuai dengan kondisi yang sebenarnya. Bukti dokumen realisasi kerjasama dengan Mitra diunggah melalui Simlitabmas mengikuti format sebagaimana terlihat pada bagian isian mitra

Sesuai dengan janji pada proposal bahwa Mitra "PT Utama Karya Techindo" tidak berperan aktif dalam penelitian ini seperti menyertakan dana dan lain-lain namun Mitra mau menerima hasil penelitian atau hasil realisasi penelitian ini. Bukti kerjasama pendukung penelitiannya ini oleh mitra dilampirkan kembali.

**F. KENDALA PELAKSANAAN PENELITIAN:** Tuliskan kesulitan atau hambatan yang dihadapi selama melakukan penelitian dan mencapai luaran yang dijanjikan, termasuk penjelasan jika pelaksanaan penelitian dan luaran penelitian tidak sesuai dengan yang direncanakan atau dijanjikan.

Kendala pelaksanaan penelitian ini adalah masa antri dalam pembuatan sampel dan pengujian untuk hasil karakterisasi sampel. Jika hasil karakterisasi tidak memuaskan maka harus diulang dengan nomor antrian yang baru. Perlu juga dijelaskan bahwa penelitian ini dilakukan di Bogor "Balai Penelitian Teknologi Karet" untuk sampel kompon karet dan uji curing characteristics serta uji sifat fisik vulkanisat karet. Karakterisasi FTIR di laboratorium MIPA KIMIA ITB dan XRD dan SEM dilakukan di laboratotium Pusat Penelitian Nanosains dan Nanoteknologi ITB.

Dalam melaksanakan seminar internasional, yang sedianya dilakukan offline di Yogyakarta, oleh penyelenggara dirubah menjadi online dengan alasan tertentu. Terlampir surat perubahannya.

**G. RENCANA TINDAK LANJUT PENELITIAN:** Tuliskan dan uraikan rencana tindaklanjut penelitian selanjutnya dengan melihat hasil penelitian yang telah diperoleh. Jika ada target yang belum diselesaikan pada akhir tahun pelaksanaan penelitian, pada bagian ini dapat dituliskan rencana penyelesaian target yang belum tercapai tersebut.

Pengalaman yang telah saya peroleh ketika mendaftarkan paten, prosesnya sangat lambat dan dengan waktu lama. Ini menyebabkan target tahun selanjutnya, tahun kedua (2) akan terhambat. Target tahun kedua yaitu tersedia paten sederhana. Untuk target paten tahun pertama ini 2021, hanya sebatas terdaftar dan sudah terdaftar. Pemeriksaan formalitas Paten Sederhana **S00202110235** (2021) telah ada dan masih dalam proses upload file yang diminta oleh DJKI Kemenkumham RI.

**H. DAFTAR PUSTAKA:** Penyusunan Daftar Pustaka berdasarkan sistem nomor sesuai dengan urutan pengutipan. Hanya pustaka yang disitasi pada laporan akhir yang dicantumkan dalam Daftar Pustaka.

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tersebut masih terdapat kekurangan yaitu belum mencoba menggunakan (3-mercaptopropyl) triethoxysilane dan (3-mercaptoprophyl) trimethoxy silane sebagai surfaktannya. Invensi lainnya sebagaimana diungkapkan pada paten Amerika Serikat Nomor US 7342065B2 dengan judul Preparation of nanocomposite of elastomer and exfoliated clay platelets, rubber compositions comprised of said nanocomposite and articles of manufacture, including tires dimana diungkapkan penggunaan tanah liat. Namun demikian invensi yang tersebut di atas masih mempunyai kelemahan-kelemahan dan keterbatasan yang antara lain adalah belum menggunakan tanah liat termodifikasi oleh (3-mercaptopropyl) triethoxysilane dan (3-mercaptoprophyl) trimethoxy silane.

Selanjutnya Invensi yang diajukan ini dimaksudkan untuk mengatasi permasalahan yang dikemukakan di atas dengan cara menggunakan bahan pengisi tanah liat yang dimodifikasi dengan surfaktan (3-mercaptopropyl) triethoxysilane dan (3-mercaptoprophyl) trimethoxy silane.

#### **Uraian Singkat Invensi**

Tujuan utama dari invensi ini adalah untuk mengatasi permasalahan yang telah ada sebelumnya khususnya penggunaan tanah liat lokal, dimana suatu formula karet alam yang dicirikan dengan penggunaan tanah liat lokal termodifikasi (3-mercaptopropyl) triethoxysilane dan (3-mercaptoprophyl) trimethoxy silane.

Tujuan lain dari invensi ini adalah mendapatkan sifat fisik dari formula karet yang disajikan.

Tujuan dan manfaat-manfaat yang lain serta pengertian yang lebih lengkap dari invensi berikut ini sebagai perwujudan yang lebih disukai dan akan dijelaskan dengan mengacu pada tabel-tabel yang menyertainya.

### Uraian Singkat Gambar

Gambar 1 adalah gambar yang menjelaskan kurva spektra FTIR untuk tanah liat lokal, tanah liat lokal termodifikasi (3-mercaptopropyl) triethoxysilane dan (3-mercaptoprophyl) trimethoxy silane.

### Uraian Singkat Tabel

Tabel-tabel 1, 2, dan 3 merupakan rumusan formula karet alam yang menggunakan bahan pengisi tanah liat lokal, tanah liat lokal termodifikasi oleh (3-mercaptopropyl) triethoxysilane dan tanah liat lokal termodifikasi oleh (3-mercaptoprophyl) trimethoxy silane.

Tabel 4 adalah tabel yang menampilkan data sifat pematangan karet alam sementara tabel-tabel 5 dan 6 merupakan tabel yang menampilkan sifat fisik vulkanisat karet alam.

### Uraian Lengkap Invensi

Invensi ini akan secara lengkap diuraikan dengan mengacu kepada :

a. Penyusunan formula awal atau satu (1)

Tabel 1. Formula karet 1

No	Formula karet	phr
1	RSS-1	100
2	ZnO	5
3	Asam Stearat	2
4	Tanah Liat Lokal	15
5	<i>Paraffinic oil</i>	5
6	TMQ	2
7	TMTD	0,5
8	Sulfur	2,5

Tabel 1, 2, dan 3 sebelumnya ini merupakan acuan untuk mengetahui sifat pematangan kompon karet alam dan sifat fisik vulkanisat karet alam.

- 5 b. Untuk membandingkan sifat pematangan dan sifat fisik vulkanisat karet sebagai hasil dari pengujian sifat pematangan dan sifat fisik, dibuat perubahan Tabel 1 dengan mengubah tanah liat lokal menjadi tanah liat lokal termodifikasi oleh (3-mercaptopropyl) triethoxysilane menjadi Tabel 2.
- 10 c. Perbandingan sifat pematangan dan sifat fisik vulkanisat karet alam juga dilakukan untuk formula 1 pada Tabel 1 dengan mengganti bahan pengisi tanah liat lokal menjadi tanah liat lokal termodifikasi oleh (3-mercaptoprophyl) trimethoxy silane sehingga Tabel 1 berubah menjadi Tabel
- 15 3.

Tabel 2. Formula karet 2

No	Formula karet	phr
1	RSS-1	100
20 2	ZnO	5
3	Asam Stearat	2
4	Tanah Liat Lokal termodifikasi (3-mercaptopropyl) triethoxysilane	15
5	<i>Paraffinic oil</i>	5
6	TMQ	2
25 7	TMTD	0,5
8	Sulfur	2,5

Tabel 3. Formula karet 3

No	Formula karet	phr
1	RSS-1	100
2	ZnO	5
3	Asam Stearat	2
4	Tanah Liat Lokal termodifikasi (3-mercaptopropyl) trimethoxysilane	15
5	<i>Paraffinic oil</i>	5
6	TMQ	2
7	TMTD	0,5
8	Sulfur	2,5

d. Hasil uji pematangan untuk formula 1, 2, dan 3 dapat dilihat pada Tabel 4 sementara hasil uji sifat fisik vulkanisat karet alam tercantum pada Tabel 5 dan 6.

Tabel 4. Sifat pematangan karet alam formula 1, 2, dan 3

Sifat pematangan	1	2	3
Smax - Smin [kg-cm]	7.23	11.83	7.71
Smax [kg-cm]	7.75	12.34	8.20
Smin [kg-cm]	0.36	0.51	0.49
Optimum cure time (t90) [min]	6.1	8.4	7.7
Scorch time(ts2) [min]	2.9	1.4	4.3

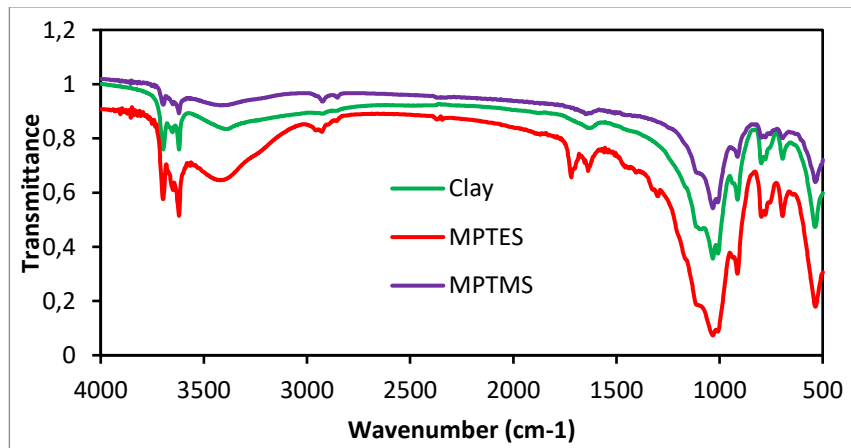
Tabel 5. Sifat fisik vulkanisat karet alam formula 1, 2, dan 3

Sifat fisik vulkanisat	1	2	3
Compressive strength [N/mm <sup>2</sup> ]	25,75	27.42	27.73
Cut growth [kcs]	70	70	60
Rebound resilience [%]		74	76

Tabel 6. Sifat fisik vulkanisat karet alam formula 1, 2, dan 3 serta proses aging untuk masing-masing formula

Sifat fisik	1		2		3	
	Before aging	After aging	Before aging	After aging	Before aging	After aging
Kekerasan [Shore A]	44	45	55	60	43	45
Kuat tarik [MPa]	17.8	11.5	15.1	7.8	18.6	19.7
Perpanjangan putus [%]	650	530	450	320	680	650
Modulus 300% [MPa]	2.3	3.6	5.5	6.6	2.1	2.9

Hasil karakterisasi FTIR untuk tanah liat lokal, tanah liat lokal termodifikasi oleh (3-mercaptopropyl) triethoxysilane dan oleh (3-mercaptoprophyl) trimethoxy silane ditunjukkan pada Gambar 1.



10 Gambar 1. spektra FTIR untuk tanah liat, tanah liat termodifikasi MPTES, dan tanah liat termodifikasi MPTMS.

Analisis gugus fungsi spectra FTIR gambar 1 tercantum pada Tabel 7.

Table 7. Gugus fungsi spectra FTIR untuk tanah liat, tanah liat termodifikasi oleh (3-mercaptopropyl) triethoxysilane dan oleh (3-mercaptoprophyl) trimethoxy silane

Gugus Fungsi	Bilangan Gelombang		
	Clay	Clay + MPTES	Clay + MPTMS
Si-O-Mg stretching	530	530	534
Phenyl ring	698	693	693
Phenyl ring	772	776	778
stretching Si-C	797	797	783
	908	914	914
	1027	1004	1009
Si-O-Si stretching	1038	1034	1033
Si-O-CH <sub>3</sub>	1109	1099	1095
	-	1302	-
	-	1376	-
	-	1439	-
-OH bending	1607	1635	1622
C=O vibration	-	1719	-
	-	2339	-
	2369	2356	2352
Aliphatic C-H str	2859	2850	2834
	-	2909	-
Aliphatic C-H str	-	2926	2905
	-	2949	-
-OH Vibration	3385	3421	3414
MMT structure hydroxyl O-H stretching	3619	3621	3605
	3657	3647	3646
	3714	3693	3717

- 5 Spektra tanah liat murni dibandingkan dengan sampel tanah liat yang telah dicampur dengan silane pada Tabel 7 menunjukkan beberapa gugus fungsi yang menjadi karakteristik dari silane. Intensitas pada 3385 - 3425 cm<sup>-1</sup> merujuk pada -OH vibration dari air yang terserap. Gugus fungsi ini bisa
- 10 berikatan dengan atom Si atau Al. Spektra sampel yang telah dicampur dengan MPTMS menunjukkan penurunan intensitas pada 3385-3425 cm<sup>-1</sup> yang mengindikasikan penurunan penyerapan air, sedangkan pada sampel yang dicampur dengan MPTES



intensitasnya meningkat dan mengindikasikan adanya peningkatan penyerapan air. Indikasi lain yang menggambarkan keberadaan air terdapat pada intensitas 1607-1635  $\text{cm}^{-1}$ , yang menunjukkan hasil yang sama dengan intensitas 3450  $\text{cm}^{-1}$ , di mana sampel MPTES memiliki serapan air yang lebih tinggi.

Absorpsi pada 2905-2926  $\text{cm}^{-1}$  merujuk pada gugus asymmetrical stretching dari gugus metilena, gugus ini muncul pada semua sampel yang telah dicampur dengan silane kecuali pada clay murni.

Absorpsi pada 1719  $\text{cm}^{-1}$  ditemukan pada sampel yang dicampur MPTES merupakan C=O vibration yang mengindikasikan adanya degradasi pada rantai hidrokarbon yang ada di sampel atau MPTES.

Disini terdapat puncak karakteristik silane yang muncul pada sampel tanah liat yang telah dimodifikasi seperti pada:

- 1439  $\text{cm}^{-1}$  pada sampel MPTES yang merupakan gugus phenyl ring
- puncak pada antara 750 hingga 650  $\text{cm}^{-1}$  pada semua sampel yang menandakan out of plane bending aromatic C-H.
- Indikasi lainnya tergambar pada 783-797  $\text{cm}^{-1}$  yang merupakan stretching dari Si-C, yang ditemukan pada semua sampel.

Puncak-puncak ini menandakan adanya kemungkinan silane telah tercangkok pada permukaan tanah liat atau juga hanya terikat secara mekanik.

**Klaim**

1. Formulasi karet yang mengandung karet alam sebesar 100 phr, ZnO sebesar 5 phr, asam stearat sebesar 2 phr, satu atau lebih bahan pengisi yang dipilih dari Tanah liat lokal, Tanah liat lokal termodifikasi oleh (3-mercaptopropyl) triethoxysilane dan tanah liat lokal termodifikasi oleh (3-mercaptoprophyl) trimethoxy silane sebesar 15 phr, salah satu bahan pelunak yang dipilih dari minyak paraffin dan minyak aromatik sebesar 3,75 sampai 5 phr, senyawa 2,2,4,trimetil-1,2-dihidrokuinon sebesar 2 phr, senyawa tetrametil tiuram disulfida sebesar 0,5, dan sulfur sebesar 2,5 sampai 3 phr.
2. Formulasi karet sesuai dengan klaim 1, dimana karet alam yang digunakan dalam komposisi tersebut adalah karet alam RSS 1.
3. Formulasi karet sesuai dengan klaim-klaim sebelumnya, dimana tanah liat yang digunakan dalam komposisi karet tersebut adalah tanah liat lokal, tanah liat lokal termodifikasi (3-mercaptopropyl) triethoxysilane dan tanah liat lokal termodifikasi (3-mercaptoprophyl) trimethoxy silane.
4. Formulasi karet sesuai dengan klaim-klaim sebelumnya, dimana komposisi tersebut memiliki sifat fisik sebagai berikut : Kekerasan sebesar 43-60 shore A, Kekuatan tarik sebesar 7,8-19,7 MPa, perpanjangan putus sebesar 320-680 %, Modulus 300 % sebesar 2,1-6,6 MPa, Compressive strength 26,35-27,73 N/mm<sup>2</sup>, Cut growth 60-70 kcs, dan Rebound resilience 74-84 %
5. Sifat pematangan yang ditunjukkan oleh Torsi (S max dan S min) sebesar 7,23-11,83 kg-cm, waktu optimum laju reaksi sebesar 6,1-8,4 menit, dan waktu scorch sebesar 1,4-4,3 menit.





**FORMULIR PERMOHONAN PENDAFTARAN PATEN INDONESIA**  
**APPLICATION FORM OF PATENT REGISTRATION OF INDONESIA**

**Data Permohonan (Application)**

Nomor Permohonan <i>Number of Application</i>	: S00202110235	Tanggal Permohonan <i>Date of Submission</i>	: 18-Nov-2021
Jenis Permohonan <i>Type of Application</i>	: PATEN SEDERHANA	Jumlah Klaim <i>Total Claim</i>	: 5
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Judul <i>Title</i>	: SIFAT FISIK DAN SIFAT PEMATANGAN KARET ALAM DENGAN BAHAN PENGISI TANAH LIAT LOKAL TERMODIFIKASI OLEH (3- 5 MERCAPTOPROPYL)TRIETHOXY SILANE DAN (3- MERCAPTOPROPHYL)TRIMETHOXY SILANE		
Abstrak <i>Abstract</i>	: Invensi ini mengenai formulasi karet alam yang menggunakan bahan pengisi tanah liat lokal termodifikasi 10 oleh (3-mercaptopropyl) triethoxysilane dan (3- mercaptoprophy) trimethoxy silane dan pengaruhnya terhadap sifat fisik vulkanisat karet alam yang terdiri atas kekerasan, perpanjangan putus, kekuatan tarik, modulus 300 %, ketahanan sobek, dan retak lentur. Juga diuji sifat 15 pematangan meliputi torsi maksimum dan minimum, waktu optimum laju reaksi, dan waktu scorch. Proses penggilingan, uji rheometer, dan uji sifat fisik merupakan langkah selanjutnya. Sifat fisik yang diuji terdiri atas kekerasan, kuat tarik, perpanjangan putus, 20 modulus 300 %, ketahanan sobek, dan retak lentur. Pengujian sifat fisik ini menggunakan standar uji ASTM.		

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Palembang, 16 November 2021

Inventor



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1. ABU HASAN  
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3. MUHAMMAD YERIZAM

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## **EDITORIAL**

It is my proud privilege to welcome you all to the WRFASE International Conference at Yogyakarta, Indonesia. I am happy to see the papers from all part of the world and some of the best paper published in this proceedings. This proceeding brings out the various Research papers from diverse areas of Science, Engineering, Technology and Management. This platform is intended to provide a platform for researchers, educators and professionals to present their discoveries and innovative practice and to explore future trends and applications in the field Science and Engineering. However, this conference will also provide a forum for dissemination of knowledge on both theoretical and applied research on the above said area with an ultimate aim to bridge the gap between these coherent disciplines of knowledge. Thus the forum accelerates the trend of development of technology for next generation. Our goal is to make the Conference proceedings useful and interesting to audiences involved in research in these areas, as well as to those involved in design, implementation and operation, to achieve the goal.

I once again give thanks to the Institute of Research and Journals, WRFASE & The IIER for organizing this event in Yogyakarta, Indonesia. I am sure the contributions by the authors shall add value to the research community. I also thank all the International Advisory members and Reviewers for making this event a Successful one.

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# MEDIATING ACTUAL AND PERCEIVED RISKS OF VISITORS AND TOURISTS IN A TOUR TRIP TO HERITAGE SITES (HISTORICAL JEDDAH) IN THE KINGDOM OF SAUDI ARABIA

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---

**Abstract** - Even though the pre-pandemic increase in the number of tourists worldwide in general and in the Kingdom of Saudi Arabia (KSA) in particular has been considered to be a positive phenomenon for different aspect of people's life, it also increases the probability that different types of risk will be confronted. This, in part, is due to the different perceptions of risk among tourists and host populations. Therefore, this research aims to examine the issue in the context of the heritage sites of Historical Jeddah (HJ) in the(KSA) and focuses, specifically, on investigation of the actual and perceived risk of visitors and tourists (V/T) and the factors that influence these kinds of risks. The research questions are answered, based on a qualitative approach to explore the phenomena. Therefore, in this study, the data were collected from (V/T) in a tour trip using different methods, semi-structured interviews and questionnaires that were appropriate for the analysis of the aims, research objectives and research questions, in a way that ensured that participants were provided with ample opportunities to freely voice their perceptions of risk. The findings highlight the different kinds of risk and the factors that may influence risk and perception of risk.

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**Keywords** - Heritage sites 'Historical Jeddah', Kingdom of Saudi Arabia, Risk and perception of risk, Tourists and visitors.

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## I. INTRODUCTION

“Risks in tourism is a controversial research topic with many disputes and paradoxes” [44]–[2]. According to Maslow (1943) cited in [44] safety is a basic human need. Much research and the existing literature has supported this idea as they found that most tourists tend to avoid any destinations that include higher potential risks[44].

There are two major types of risk: absolute risk and perceived risk [12]. Absolute risk can be estimated by organizations and individuals who implement security measures to ensure minimal risk and the maximize safety [36]. At the same time, perceived risk is “the consumer's perceptions of the uncertainty and adverse consequences of buying a product (or service)” [13]–[119]. Therefore, there are seven different types of risks that can be identified: a) financial, b) social, c) psychological, d) physical, e) functional, f) situational and finally g) travel risks [27]. Related to travel, there is different type of risk which are health concerns, terrorism, crime, or natural disasters at tourist destinations [27]. One study compared two groups of Saudis who visited Germany and found five types of risk which are: ego, money, time, health, and social risks[45]. Other studies examined four main types of risk which were human-induced risk, social–psychological risk, financial risk, and health risk[12]. Therefore, in this study the researcher will investigate different kinds of risk and these types of risks considered as either personal responsibility such as sports-risks, (eg drowning and so on), or local authorities' or the operator's responsibility such as transportation, accommodation, infrastructural and industrial risks[14]. All previous kinds of risks caused by external causes can generally be controllable unlike

natural hazards which may be considered as acts of God [14]. According to Jungermann & Slovic (1993) cited in [14]- [94] “Whereas natural risks are judged to be involuntary, uncontrollable, not socially attributable, and hence inevitable, risks of human origin are seen as voluntary, controllable, attributable and hence ultimately avoidable—and thus as more severe than risks from nature”. Moreover, many tourists perceive the threat of terrorism as part of life in general. In other words, terrorism risks exist in both the tourists' home country and at tourism destinations [39]. Therefore, for all these reasons, this study excludes the natural hazards and terrorism-related risks.

Regarding the factors that may influence risk and perception of risk, there are two that formed the risk perception of tourists which include both internal and external factors. Internal factors are related to tourists themselves while external factors are the information or recommendations the tourists will get from the travel agencies, tour guides, travel advisories, media, family or friends and destination image [21]. The researcher concludes that external factors provide tourists with the information about actual risks that might occur at the destination, while internal factors are the one which determine the interpretation and perception of the risks [44]. In addition, scholars have illustrated that there are variety of factors that may influence the risk perceptions of tourists in the tourism sector [37]. These factors depend on the type of risk and how important it is to the tourists. Risk perceptions are affected by sociodemographic variables such as age [19], gender to some degree [37] or level of education [34], social status, organizational factors such as travel arrangements (group versus individual travel), the situation that tourists are involved with and stage of travel[37].

Moreover, risk perception can be influenced by factors that relate to travel such as traveling with children or not as well as the wider travel experience [25].

## II. STUDY METHOD

### A. Study Area

The study setting is (KSA), which is located between Asia and Africa, in the Arabian Peninsula. (KSA) has borders with several countries and has coastlines on the Persian Gulf and the Red Sea. Millions of Muslims visitors worldwide come to visit (KSA) annually for religious purposes to perform Hajj and Umara in Makkah and to visit the holy mosque of Prophet Mohammed (peace be upon him) in Al-Madinah [26]. Beside religious purposes, (KSA) has developed several kinds of tourism such as nature tourism, culture and heritage, ecotourism, and leisure. This study will focus on heritage tourism, which is seen as a subset of cultural ethnic and educational travel which is believed to be of special interest to tourists [20]. Heritage has many forms and meanings. As a result, heritage is interpreted differently by one person from another based on their background and perspective [5]. Heritage sites are significantly important due to their role in introducing people to their roots and helping them to preserve their own history [3]. Nowadays, visiting heritage sites has grown rapidly in the modern tourism industry and thus contributes significantly to increase the number of international and domestic tourists [4]. Therefore, investigating risk and perceptions of risk for (V/T) in these sites can be considered to be a critical phenomenon. (KSA) is a country that is full of many cultural, historical, and attractive sites to present to (V/T) [33]. There are several sites in the (KSA) that were registered with the United Nations Educational, Scientific and Cultural Organization (UNESCO) between 2008 and 2015 and these are as follows: Madain Saleh, Historical Al-Dir'iyah, (HJ) and Rock Art in the Hail Region. The focus of this study is on Jeddah's old town known as Al-Balad (HJ) which is the old historic center of the city was included on UNESCO's world heritage list in 2014. This international recognition has strengthened demand from tourists as a heritage tourism destination [41]. (HJ) is in Jeddah which is located on the eastern shore of the Red Sea and in the west of (KSA), it is called the bride of the Red Sea. It is the second largest city. Jeddah has been the main and the largest seaport in the peninsula which make it known as a commercial capital. Jeddah is the gateway to Makkah and Al-Madinah which are Islam's holiest cities because they include the holiest mosques. (HJ) possesses several special features including its valuable history for (KSA) citizens, for Muslims and for wider society as well as it is the only intact world heritage site in (KSA), on the Red Sea coast, and in any of The Gulf Cooperation Council countries [5].

### B. Data Collection

This research involves (V/T) (local and international) visitors in order to understand the phenomena from their point of view. The researcher was able to collect data from a total of 19 participants divided into 11 (V/T) from (KSA) (from Jeddah or other cities) and 8 were international tourists and comprising 4 males and 15 females and these participants were on organized tours. Collecting the data started in summer 2019 between June and August in (HJ). The data collection process took about 40 days. This study targeted international tourists who visited the country either for leisure, work, or business purposes as well as local visitors.

### C. Research Instrument

Employing mixed methods that were predominantly qualitative, the study used different methods, including observation, semi-structured interviews and a questionnaire to gather core demographic information. Interviews are defined as "a form of communication, a means of extracting different forms of information from individuals and groups" [9]–[207]. There are different types of interviews used in qualitative research either unstructured or structured and choosing one of them depends on the aims of the study [22]. Semi-structured interviews provide the researcher with wider control over the conversation [22] and helps the researcher engage with different perspectives of the research problem and gain a deeper understanding of the study [38].

Questionnaire definition as a set of questions formulated by the researcher to reach the research's objectives by getting core personal and trip information from the participants [30]. As noted in the literature review, risk and risk perceptions can be influenced by media, friends and family members, or travel organizations, sociodemographic variables, travel with children, or not, and travel experience. Therefore, the researcher used the questionnaire for (V/T) to gain information about the socio-demographic variables as well as some general information related to the travel destination. There are several reasons why the researcher preferred to know about these kinds of information in a form of a questionnaire which are: first, to avoid any embarrassment that (V/T) can experience if asked about these matters face to face. In qualitative studies, when researchers conduct interviews, they need to pay attention to the questions that might be deemed sensitive that may cause stress to the participants [11]. Therefore, sociodemographic variables are considered by some people as sensitive. Further, it is important to note that the researcher is female, and it is difficult to ask these questions of men due to the societal context to which the researcher belongs, as well as some of the participants. Secondly, to save time during the interview, if the researcher spends the beginning of the interview addressing such questions, it might be challenging when reaching questions that

needs in-depth answers. Additionally, It is also noteworthy that participants came to visit a place to have fun and enjoy their time with their family, friends, or themselves. Therefore, for all these reasons, the link between the questionnaire and the interviews was the best way for the study conditions, the nature of the questions, the time, and the nature of the participating sample population.

#### **D. Data Analysis**

In qualitative data, researchers widely use the thematic analysis approach. Therefore, this research used this method to analyze the data which is defined as a method to identify, analyze, and report the patterns called themes [8]. The second stage was coding the data and categorize them into group with similarities, this process was conducted manually because using computer software may cause obstacles that may affect the judgment of the researcher over the data and create distance between the researcher and the data as well [11]. Since the data was collected in Arabic, the researcher preferred to analyze the data in Arabic and chose to translate just the quotes needed. Translation and analysis of the data to English from the first stage may have an effect of losing the meaning of the data especially that the participants were using slang, idiomatic, and informal Arabic. Therefore, this encouraged the researcher to give special attention when translating the quotes to reduce any risk of losing the meaning of the data.

### **III. FINDINGS AND DISCUSSION**

The participants identified several kinds of risk that might occur in (HJ) which can grouped as actual risk and perceived risk. However, some of the categories of the different kinds of risks in this research are different from the other studies and this is because the classifications of risk used by scholars in the travel literature were developed from the general industry which makes the typology of risk broad and limited [42].

#### **Actual risk:**

Based on the respondents' points of view the actual risk is represented in physical harm, health risks, issues of loss, and human issues.

#### **Physical harm:**

The physical harm was represented by participants as following: uneven ground, high, old, broken, or no railing steps of stairs, and falling from a higher area or be close to an edge. Even though most or some of these risks are a common factor in most heritage sites around the world, nevertheless it is important to try to avoid and reduce them because they may pose physical problems for tourists or pedestrians. Uneven ground is one of the risks that can cause falling, discomfort, and actual pain. Usually when (V/T) go to historical places, their focus is on looking at the

buildings and contemplating the aesthetics and details, and their focus is rarely on the steps under their feet, so the unevenness of the land may cause very big problems to them. Not to mention that these places are visited by visitors of all ages, healthy people, people with disabilities, baby strollers and the elderly who use wheelchairs or crutches, which makes it difficult to walk on unpaved roads while it should be accessible for everyone. The vibrations caused by unpaved streets can cause difficulties, acute pain, haematomas and fractures to people with particular diseases, to disabled people, people with wheelchairs or crutches, and even to other type of people [35]. Regard the (HJ), the researcher studied the visitors' satisfaction with facilities and accessibility and found out that visitors are dissatisfied with the quality of walkways, pedestrians' pathways and site accessibility as they scored (2.65/5) and (2.25/5) respectively [3]. Add to that, in the streets of (HJ) where (V/T) were walking enjoying their moments, there were golf carts for VIP visitors sharing the same pedestrian road with the other visitors.

Participants agreed that high, old, and broken steps of stairs can cause serious injury for tourists in (HJ). It might cause falls or injuries to tourists' legs as well as fatigue and exhaustion, especially for elderly tourists or tourists who may have a lack of fitness. As well, it can cause a problem in cases of emergency and when trying to evacuate the tourists in the site. This issue can be found in other historical sites such as historic buildings in Malacca as it is part of the old buildings' design and can cause a problem for being too steep and narrow such as danger of injury in the case of an evacuation and risk of further complications [2]. Moreover, some stairs do not just have broken steps but also have no handrails or upstands on the sides of the ramps which make them inaccessible for use and this corresponds to the stairwell problem in the Knole House as one of Britain's most significant and complete historic houses [29].

Participants mentioned that one of the issues that could happen in heritage sites is falling, the fall can be either from higher places such as mountains, roofs or being close to the edge. Tourists may fall either because of their lack of attention or because accidents while engaging in photography or taking selfies. Tourists enjoy taking pictures or selfies while they are traveling or even visiting local places to record the enjoyment moments. Even though this trending tends to be not risky, but in some situations, it can be considered as risky as it may cause serious injury or death. Self-capture photography in high places close to the edge, from the stairs, from the roof, or any place not prepared to capture the selfies may cause fall hazards, which may cause unpleasant risks as stated. The researcher noted that a Japanese tourist died at the Taj Mahal in India after slipping down the stairs while taking a selfie at the Royal Gate of the palace [15].

**Health risks:**

Health risks are one of the risks that (V/T) mentioned, it can be in the form of physical fatigue or physical illness such as diseases like diabetes, high or low pressure or heart diseases, asthma or because of the weather conditions. (V/T) considered health risk as a more threatening kind of risk than any other kinds in (HJ) due to the hot and humid weather. Most of the health issues related to travel destinations or visiting local places, are due to the low or even no precautionary measures such as forgetting to take medicine, or vaccine, or eating inappropriate food, and so on. Moreover, international travelers might be at higher level of health risk due to lack of awareness of health issues in the country, as well as neglecting precautions and planning ahead of travel [10]. Based on the data gathered from GeoSentinel for the years of 1997 to 2011, 8% of worldwide international travelers reported either that they had to seek health care during or after a trip or becoming ill, as well as 14% of travelers who fell ill and were diagnosed with a disease that could have been prevented if the travelers had had a vaccine [32].

Being in hot and humid weather like in Jeddah, the summer temperatures are approximately 41°C to 39°C and sometimes reach above that, and the humidity 61% to 62%, could really be a serious issue for tourists especially when spending time walking around to explore the beauty of the buildings and the history of the places. Due to the weather conditions most of the year in Jeddah, but especially in the mornings, (43%) of the participants to (HJ) prefer to visit it in the evening, while (41%) prefer to visit it at night, and only (16%) prefer to visit the (HJ) in the mornings [3]. Moreover, in the daytime especially in the summer conditions, the running of tour schedules for tourists will be affected therefore, it is very important to consider suitable climatic environment in order to prevent bad impacts on tourists' health [46].

**Human issues:**

Exposure to theft or harassment, as well as some behavior carried out by tourists, such as: walking alone in unfamiliar places, going into unsafe buildings, and some bad behavior from local people against tourists such as verbal assaults, all these issues were indicated by the (V/T) among the human issues. These actions may cause fear, anxiety, discomfort, and dissatisfaction to the (V/T). Studies indicate that being in the wrong place at the wrong time, one of the scenarios that expose tourists to crime and crimes against tourists can significantly damage a location's image [17].

**Perceptions of risk:**

Moving to the other kind of risk based on the participants' assessment is perceptions of risk. Perceptions of risk is vital and comprises many

different types of risk including financial risk, social risks, and psychological risks.

**Financial risks:**

The (V/T) were concerned that if they spend a lot of money in order to receive good services, but these are not delivered then this is not good value for money. Buying a product or service in the travel destination, at a high price or when there is a difference in selling price from one tourist to another makes tourists doubt the service, product and price, and thus feel dissatisfaction, which may affect the frequency of their visit or reflect a bad image for the destination. This matches with a study that shows that factors associated with repeat visitors are service quality risk, financial risk, natural disasters, and car accidents [16].

**Social risks:**

Social risks are kind of risks which are represented in cultural differences, different customs, tradition from one society or one country to another, language difficulties, and body language. Speaking a different language than the language of the host country results in ineffective communication with local people and prevents tourists from expressing their needs and wishes or seeking assistance in the event of any problem or danger. In terms of cultural differences, lack of tourists' awareness of culture, customs, tradition, and body language of the host country are likely to cause problems and lead to misunderstanding from the local people and thus each will begin to act accordingly. Local people in (KSA) have a special culture, therefore, international tourists have to respect the privacy of local people 'culture in terms of the appearance, body touching, taking photos, having conversations, and so on. Respect for the culture of the host country should be applied from the international tourists to local people as well as vice versa. The more cultural distance among people the more difficult to interact with them which may lead to misinterpretation and misunderstanding and thus increase risk perceptions [31].

**Psychological risks:**

The uncertainty of an unknown country and hearing something not appropriate about the country are the kind of risks fall under the psychological risks. Visiting a country for the first time and have no ideas about it in terms of the rules of the country or about the local people' culture might cause a risk for tourists. These risks may be exacerbated if tourists hear bad information or news about the country or certain destinations in it. In case of this study, media sometimes publish bad information and news about (KSA) which may affect tourists psychologically, thus affecting their ability to deal with risk as well as their lack of enjoyment and satisfaction from the trip. International tourists perceive (3.4255) mean value for psychological risk and this is the third highest level of risk when analysing the internal risk



perception at Ajanta caves which is part of the world heritage site of Ajanta [6].

(V/T) also mentioned that loss issues of any tourist are a kind of risk that may cause dispersion, anxiety, and fear for the whole group. Delay in following the group and walking in a dark or unknown road, are some of the reasons that lead to loss for tourists. In addition, total reliance on the use of smartphones to obtain directions may result in loss when the internet connection is lost or the battery is dead. Total reliance on smart devices may cause psychological problems and perception of risks for tourists, who thus do not enjoy the tourist trip. Failure in using mobile devices to guide them in the travel destination will impact tourists negatively. As well this will affect the tourists experience thus will cause the psychological risk to tourists [18].

#### **Uncomfortable feeling:**

Participants mentioned that crowded places can cause uncomfortable feelings. Crowded places may cause suffocation or health issues for (V/T), being robbed, being subjected to harassment, and difficulties for authorities in case of evacuation. Researchers studied the tourists experience in (HJ) and participants were unsatisfied about the crowded and suggested to explore methods to decrease people crowding [3]. One of the reasons might explain the crowded environment in (HJ) is the weather, due to the hot and humid climate in Jeddah during the summer season which was the time for (HJ), so most (V/T) came to the (HJ) after the sunset and even at night which cause so much crowding in the site. As stated by researchers that (43%) of the participants to (HJ) prefer to visit it in the evening, while (41%) prefer to visit it at night, and only (16%) prefer to visit the (HJ) in the morning [3].

#### **Factors influencing risk and perception of risk:**

Regarding age of the (V/T), this varied from 18 to 65+ years. The researcher claimed that the age of (V/T) did not affect the tourists' response. This is consistent with a study [43] find no relationships between age and risk perception.

Most of the interviewees were female because the researcher is female, and female participants show greater willingness to participate and felt more comfortable than men. In Saudi culture when there is a family and there is a female who want to chat with this family it is easier to have the conversation with a female like her to relieve any kind of jealousy or uncomfortable situations that might occur. Social differences seem to form in the problems that appear in the gender of (V/T) group. Some (V/T) encounter some situations when the tourist guide is male and (V/T) either women or families, some annoyance and discomfort occur by (V/T). The study found that gender does not have an impact on travel risk because

there are other factors besides gender that influence risk such as cultural background and tourist role [28]. As mentioned previously this study investigates (V/T) who were part of a tour trip as a travel arrangement method. The study found out that backpackers' who arranged the trip on their own were four times more likely to perceive risks in Ghana than backpackers who used travel intermediaries [1].

Among the most important reasons that affect the perceptions of risks among tourists are the people who are accompany the tour. (V/T) who have children as well as (V/T) who do not know each other may lead to a difference in perceptions of risks and it will be difficult to control that. This is consistent with a study [24] that stated that there is a link between trip characteristics and risk perception such as travel composition which represented in the size and presence of children.

The (V/T) thoughts of risk either due to hearing bad things or previously having had bad experiences. These two factors might have an impact on the (V/T) and might lead to preventing them from trying new things or even enjoying their time. The responses report about the source of knowledge about (KSA) was varied between friends, media ex. (TV, radio, social communications, others), and travel agencies. The research studied the effect of internal and external crisis on resistant tourists and found out that internal and external crisis- resistant tourists are more likely to be influenced by source of information come from social media, social clubs, and unknown travelers. However, information provided by friends or relatives are less likely to influence the members of external crisis- resistant tourists [19]. Despite, none of them were influenced by bad information or were worried about being in (KSA). The researcher also attributes the possibility of this for four reasons which were extracted from the questionnaires.

The first reason is because they have travelled to other countries in the Gulf Cooperation Region and thus they have knowledge of the general culture of the region. And this links to different nationality and culture. Participants stated that differences in culture, customs, and traditions from one society or one country to another is considered as a risk not just for the (V/T) but also for the local people as well. A study [23] noted that respondents to the same risk might be perceived differently by individuals in different situations. In addition, in terms of international tourism cultural, religious and political factors may play an important role in tourists' perceptions of risk. Moreover, risk perceptions of tourists increase according to proximity issues and nationality. They found out that 72% of American tourists thinking of fear have increased after the WTC attacks comparing with 42% of British tourists[40].

The second is that most of them came to (KSA) to work there or establish a business, and therefore they were accompanied by Saudi citizens to introduce

them to the region. This is link to the factor of reason for visit. The study of Dominguez, Burguette and Bernard (2007) cited in [27] finds that people who tend to travel for business purposes are less sensitive to negative events than people who travel for leisure. Thirdly is that some of the tourists have visited (KSA) for a second or third time and thus they have built their own knowledge and experience about it. This is as well linked with one of the factors that affect the perception of risk which is the number of visits and travel experience. A study stated that tourists who have high travel experience will help them to have a low perception of risk and contribute to choosing a destination with high levels of risk in their next vacation thus increasing their travel experience even more [25].

Last but not least, the majority of tourist have a high level of education consequently which can be considered as a factor that influences the (V/T) perceptions of risk. Because it may enhance their awareness and knowledge of the sources of taking information and verifying the news before it is believed. This is consistent with the study [43] that tourists who have high education level perceive lower travel risk than tourists who have lower education levels.

#### IV. CONCLUSION

The aim of this study was to explore both actual and perceived risk of the (V/T) in the (HJ) in the (KSA) and the different factors that have an impact on how do (V/T) perceive risks. The participants provide several kinds of risk as an actual risk such as physical harm, health risks, and human issues. While the financial risk, social risks, psychological risks, and uncomfortable feeling fall under the perception of risk. Regarding these factors, the study finds that age, gender as an independent factor, and source of knowing kinds of factors that do not have an impact on the risk perception of (V/T). While nationality and culture norms, reason for visit, number of visits, travel arrangement method, household structure, and level of education have a significant impact on the risk perception of (V/T).

At the end of this study, the researcher will present several implications to help (V/T) to mediate their perceptions of risk. When a tourist guide accompanies the tour, this has a significant impact on reducing the types of risks that can occur in heritage sites. This is because tourist guides play an important role in assuring the safety and security of (V/T). Government and tourism authorities have to set and develop measurements, plans and strategies to prepare heritage sites, including roads and buildings, to be ready to welcome (V/T) thus to ensure that risks they may face or perceive are reduced. In addition, providing wider understanding of the different kinds of risk either low risk or high risk as well as the factors that affect perceive risks will benefit different

parties in the tourism industry such as governments, travel companies, agencies, and tourist guides to prepare an accurate measurement and to avoid them as well as to be able to raise awareness of the (V/T) about the different kinds of risks through media, social media, ads, brochures, and even in the schoolbooks.

This research contributes further to the studies of actual risk and perceived risk. As a study found out by investigating 46 articles from 1974 to 2013 related to tourism risk, more than half have studied and investigated two subjects which are: the perceived risk rather than the actual risk, and the risk factors [44]. Moreover, it is very difficult and almost impossible to find a scale for the actual risk and range of risk [7]. Since there is lack of information in the present literature related to the actual risk, therefore, this study investigates the kinds of actual risk that occur in the heritage sites in general and in the (HJ) in particular.

In the literature, researchers have studied the risk in a specific destination or context such as in Thailand, Israel, Australia, China, Ghana, and Alpine. In addition, when studying travel risk especially for international travellers, it is very important to consider the destination context [7]. However, none of these studies examine the risk related to tourism in the context of the (KSA). Therefore, this study investigates the kind of risk in the (HJ) in the (KSA) as the country and the city of Jeddah are culturally, socially, and religiously unique from the rest of the world.

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# SUSTAINABILITY AND ECOLOGICAL RESTORATION THROUGH CONSTRUCTED WETLANDS - TAKING THE WANNIAN WETLANDS AS AN EXAMPLE

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**Abstract** - The upper reaches of the Wannian Creek in Pingtung, a county in the southernmost region in Taiwan, was seriously polluted by livestock wastewater and domestic sewage discharge in the past. To remedy the situation, the construction of the Wannian Wetlands was initiated in 2009 along the upper reaches of the Wannian Creek and completed in 2017 with a total area spanning 28 hectares to treat polluted waters through combination of free water surface system (FWS) and subsurface flow (SSF). The treatment processes consist of physical processes (including sedimentation, filtration and adsorption), and biological processes (including absorption by microorganisms and plants, mineralization and decomposition). Water quality analysis conducted from 2020 to 2021 showed that the Wannian Wetlands can treat about 40,000 CMD, with removal rates of 65% for BOD, 80% for SS, 66% for ammonia nitrogen (NH<sub>3</sub>-N) and 45% for total phosphorus (TP). The Wannian Wetlands are similar to a natural wetland because of their diversity and large variation in water depths. In addition to the function of water purification, the Wannian Wetlands also provide a habitat conducive to wild animals and plants. Precious and rare wildlife found in the wetlands show a great biodiversity and include protected and endangered species, e.g., Pheasant-Tailed Jacanas, Kusano Willow...etc. The results also demonstrate that the conversion of the Wannian Wetlands from the original uncultivated land to a constructed wetland not only has the benefit of improving water quality, but also provides functions of environmental education and promotion, ecological rehabilitation and the creation of biological habitats. Furthermore, the experience gained from wetland creation will serve as a reference for the design, planning and rehabilitation of multifunctional treatment-type constructed wetlands in the world.

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**Keywords** - Constructed Wetland, Water Purification, FWS, SSF.

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## I. INTRODUCTION

The Wannian Creek flows through the downtown area of Pingtung City (Taiwan) and is closely related to the quality of life in the urban area of Pingtung. However, pollution sources such as livestock wastewater and domestic sewage were discharged into the Chonglan Old Canal (the branch of Wannian creek) along the canal banks, resulting in the deterioration of water quality. In order to remedy this pollution situation, the Environmental Protection Bureau of the Pingtung County Government (PTEPB) has set up six constructed wetlands in the upper reaches of the Wannian Creek to remove pollutants and purify water quality by ecologically-friendly natural water purification means to create an ecological site with the functions of self-purification, ecological rehabilitation, environmental education, and leisure activities. The purified water is gradually introduced into the Wannian Creek in Pingtung City to some base flow and revitalizes the Wannian Creek.

Aquatic ecosystems in general, and wetlands in particular, have been used by humans over the centuries to the extent that not that many have remained today in their natural condition, as a result of pollution loads, among other reasons [1]. Constructed wetlands, also known as artificial wetlands, are mainly for wastewater purification by mimicking self-purification functions. They utilize ecological engineering technology for to wastewater (sewage)

management and treatment. Compared with the conventional wastewater (sewage) treatment systems, they are energy saving, low cost, no secondary pollution, simple in operation and maintenance, no ecological damage, and having the benefits of restoration of ecological habitats, land restoration and natural landscaping. They also have economic benefits in terms of better water resource utilization. In addition, if the treated wastewater can be recycled or re-used, the sustainability of water resources can be achieved.

Wetlands can purify wastewater via their aquatic plants. The main reason is that plants can transfer oxygen to their roots, turning the nearby soil into an aerobic zone to facilitate microorganisms to carry out anabolism, catabolism, nitrification, denitrification, and chemical precipitation of phosphorus; thus promoting the removal of nutrient salts in the wetland to purify wastewater [2],[3].

In general, wastewater pollutants entering the constructed wetland can be removed through physical sedimentation, filtration, adsorption, volatilization, adsorption, absorption, and biological metabolic decomposition and feeding, etc. The removal mechanisms of these pollutants by the constructed wetlands are very complex and depend on the pollutant types and hydraulic loading. For example, organic matter can be removed by precipitation and the metabolism of microorganisms; whereas suspended solids can be removed by sedimentation

and plant root filtration [4],[5],[6]. On the other hand, urban area on the water quality, in case of ammonium, of the wetlands, the impact of agricultural areas can be expected to be more significant than that of urban areas. [7]

In this study, the merits of six wetlands in the upper reaches of the Wannian Creek were investigated. By evaluating recent water purification data, the characteristics of the regional wastewater and the purification efficacy by the constructed wetlands were examined.

## II. WANNIAN WETLAND CONSTRUCTION SYSTEM

Taiwan EPA uses the River Pollution Index (RPI) as the comprehensive index for assessing river water quality. RPI consists of four water quality parameters, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Suspended Solids (SS) and Ammonia Nitrogen ( $\text{NH}_3\text{-N}$ ), which are calculated to index integral value, and which indicate the pollution level of river-water. Thus, the source of water in the Wannian Wetlands flows from the Chonglan Old Canal was detected. Water quality analysis from 2010 to 2018 shows the temperature: 18-34.2 °C, pH: 6.8-8.0, and total phosphorus (TP): 0.424-13.1 mg/L. In addition, DO is from 0.3 to 4.5 mg/L, BOD is from 2.9 to 37 mg/L, SS is from 5.8 to 108 mg/L, ammonia nitrogen is from 0.1 to 26 mg/L. According to the calculation of RPI is from 5 to 8. It's indicated that the water quality of Chonglan Old Canal was moderate to severe pollution. Purifying the water quality was a big challenge for Pingtung County Government. Thus, by constructing of the Wannian Wetland system was inspired by the team of government. The six Wannian Wetlands consist of the Huangjin Wetlands, Zunliao Wetland, and Haifeng Wetland, each one them has two phases as shown in Figure 1. Details are as follows by constructing order.

### A. Haifeng Wetland System

The first phase of the Haifeng Wetland began its operation in 2009, with an area of about 11 hectares and the maximum treatment capacity of 6,000 CMD (m<sup>3</sup>/day). Its configuration in sequence is the sedimentation pond, FWS natural purification channel and ecological pond. The treated water is discharged back to the Chonglan Old Canal to provide irrigation for farmers and increase the base flow of the Wannian Creek.

The second phase of Haifeng Wetland was completed in 2016, with an area of about 3.9 hectares and the treatment capacity of 5000 CMD. Its sequential configuration is the sedimentation pond, dense flora area 1, open water area, dense flora area 2, landscape ecological pond, and SSF pond. The treated water is discharged back to the Chonglan Old Canal.

### B. Zunliao Wetland System

The first phase of the Zunliao Wetland was launched in 2013, with an area of about 5 hectares and having the treatment capacity of 10,000 CMD. The site has 24 areas for water diffusion, 6 areas for shallow water, and 6 areas for deep water. Each treatment unit is configured as a sedimentation tank and can be operated independently. The treated water is collected into a pool before finally being discharges to the Chonglan New Canal.

The second phase of the Zunliao Wetland was launched in 2017, with an area of about 5 hectares and the treatment capacity of 5,000 CMD. The site adopts the surface flow method using the sequential configuration of sedimentation tank, dense flora area 1, open water area, dense flora area 2, landscape ecological pond, and SSF pond. The treated water is discharged back to the Chonglan New Canal.

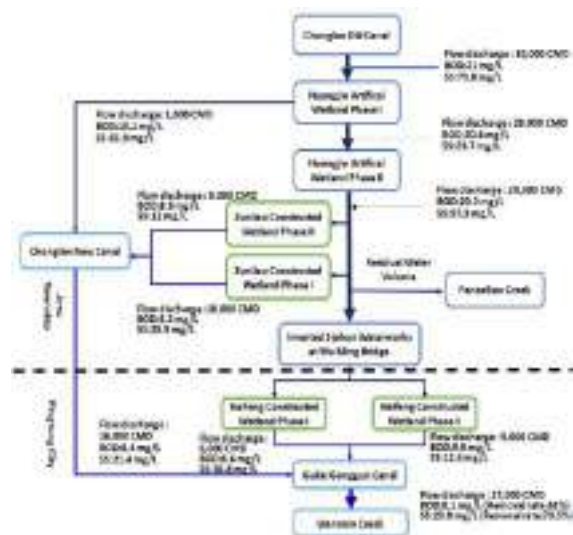


Figure 1. Expected effectiveness of wastewater treatments of Wannian Wetlands

### C. Huangjin Wetlands System

The first phase of the Huangjin Wetland was launched in 2017, with an area of about 1.4 hectares and the treatment capacity of 30,000 CMD of wastewater. The treated water is discharged back to the Chonglan Old Canal. Through pipelines, 1,000 CMD of water is intercepted into the second unit (dense flora area) for further treatment.

The second phase went into operations in 2017, with an area of about 1.1 hectares and the capacity of 30,000 CMD. The treated water is discharged back to the Chonglan Old Canal.

## III. WATER QUALITY ASSESSMENT METHODOLOGY

### A. Water Quality Testing Project

Water samples were collected and their qualities were examined from February 2020 to April 2021 [8],[9]. The quality indices include water temperature, pH,

DO, SS, BOD, NH<sub>3</sub>-N, total phosphorus (TP), and flow. The removal rate is defined as the percentage of the inlet concentration minus the outlet concentration and divided by the inlet concentration. The sampling points were located at the inlet and outlet of each system and each phase. Final Stage

When you submit your final version, after your paper has been accepted, prepare it in two-column format, including figures and tables.

### B. Pollutant Analysis

The following parameters were used to evaluate the effectiveness of wetland wastewater treatment according to the Research Project on the Design of River Water Purification Methods of Taiwan EPA [10],[11]:

1) **The pollutant removal rate (R):** given by formula (1) is the most common indicator used to evaluate the effectiveness of site operation and maintenance.

$$R = \frac{C_i - C_o}{C_i} \times 100 \% \quad (1)$$

2) **Pollutant removal rate (Re):** given by formula (2) is mainly used to understand the amount of pollutant content removed from water by daily wetland; unit: kg/day.

$$R_e = (C_i - C_o) \times Q \quad (2)$$

3) **RPI:** given by formula (3) is a comprehensive index indicating the degree of pollution of river water. It combines four water quality indices of DO, SS, BOD, and NH<sub>3</sub>-N were mentioned above using different weights listed in Table 1.

$$RPI = \frac{1}{4} \sum_{i=1}^4 Si \quad (3)$$

Parameter	Not (slightly) polluted	Lightly polluted	Moderately polluted	Severely polluted
DO (mg/L)	DO ≥ 6.5	6.5 > DO ≥ 4.6	4.5 ≥ DO ≥ 2.0	DO < 2.0
BOD (mg/L)	BOD ≤ 3.0	3.0 < BOD ≤ 4.9	5.0 ≤ BOD ≤ 15.0	BOD > 15.0
SS (mg/L)	SS ≤ 20.0	20.0 < SS ≤ 49.9	50.0 ≤ SS ≤ 100	SS > 100
NH <sub>3</sub> -N (mg/L)	NH <sub>3</sub> -N ≤ 0.5	0.50 < NH <sub>3</sub> -N ≤ 0.99	1.00 ≤ NH <sub>3</sub> -N ≤ 3.00	NH <sub>3</sub> -N > 3.00
Points	1	3	6	10
RPI Cumulative Score(S)	RPI ≤ 2.0	2.0 < RPI ≤ 3.0	3.1 ≤ RPI ≤ 6.0	RPI > 6.0

Table 1. Calculation and Comparison of RPI

### C. Ecological survey

During the study period, ecological surveys were conducted for the Wannian Wetlands, including flora, terrestrial animals (mammals, birds, butterflies, amphibians and reptiles), and aquatic animals (fishes, shrimps, crabs, snails and shellfish), in order to understand the changes of wetland species and to protect the habitat for the species. For aquatic insects, the Hilsenhoff family-level biotic index (FBI) [12] given in formula (4) is adopted for their ecological survey.

$$FBI = \frac{\sum [(TV_i)(n_i)]}{N} \quad (4)$$

Where TV<sub>i</sub> is the tolerance value of the family, n<sub>i</sub> is the number of individuals in the family, and N is the total number of individuals.

Tolerance values ranging from 1 to 10 as listed in Table 2 were assigned to different families or species of aquatic insects according to their tolerance levels to pollution and the relative number of insects of the family in the whole aquatic insect population to calculate the biological index and used to assess water quality.

FBI	Water quality assessment	Occurrence of organic pollutants
0.00-3.75	Excellent	no apparent organic pollution
3.76-4.25	very good	possible slight organic pollution
4.26-5.00	Good	some organic pollution
5.01-5.75	Fair	fairly significant organic pollution
5.76-6.50	fairly poor	significant organic pollution
6.50-7.25	Poor	very significant organic pollution
7.26-10.00	very poor	severe organic pollution

Table 2 Hilsenhoff Family-level Biotic Index Evaluation Indicators

## IV. RESULTS AND DISCUSSION

### A. Water Quality Analysis

The water quality of the wastewater treated by the constructed wetlands described is presented in the following.

#### 1) Water Treatment Volume and General Water Quality Characteristics

The volumes of the wastewater treated range from 34,727 to 42,227 CMD with an average of 37,928 ± 2,538 CMD. The general water qualities of the influent water to the wetlands are temperature from 24.9°C to 28.4°C, pH from 7.2 to 7.6, and DO between 3.3~3.6mg/L. The corresponding temperature, pH, and DO for the effluent water are 25.9°C to 28.4°C, 7.1 to 7.5, and 3.6 to 4.4 mg/L, respectively.

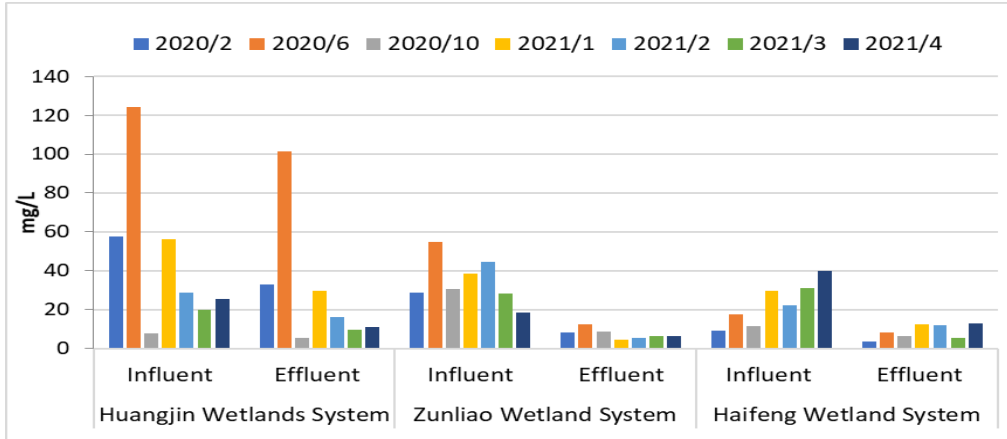


Figure 2. SS of influent and effluent in the Wannian Wetlands

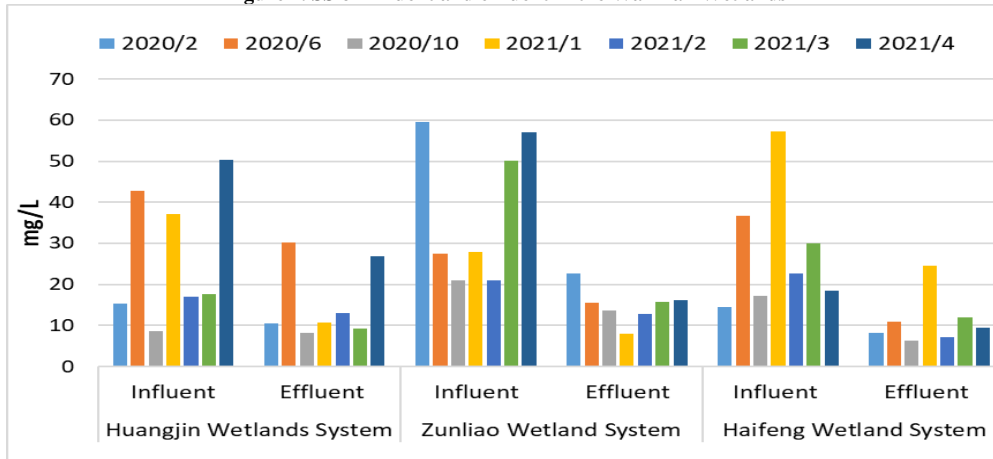


Figure 3. BOD of influent and effluent in the Wannian Wetlands

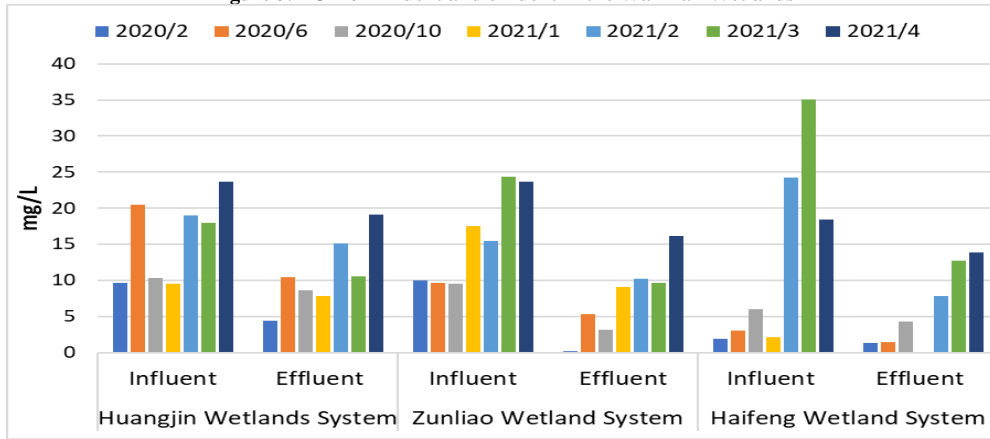


Figure 4. NH3-N of influent and effluent in the Wannian Wetlands

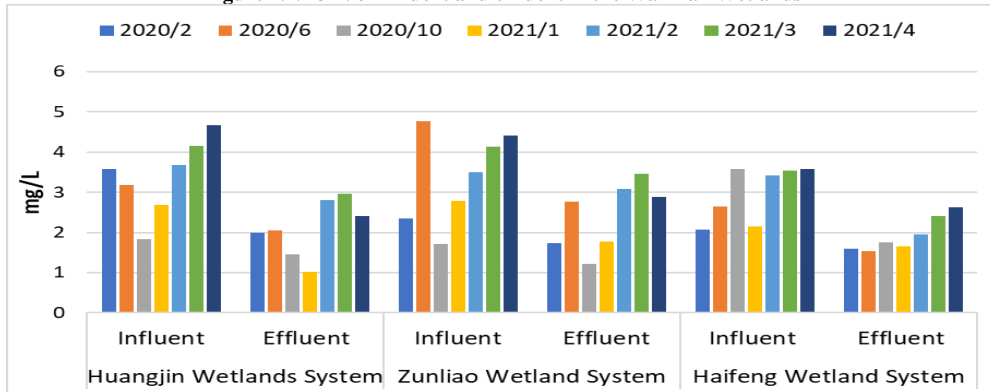


Figure 5. TP of influent and effluent in the Wannian Wetlands

## 2) Pollutant concentration

The measured results of BOD, SS, NH<sub>3</sub>-N, and TP during the observation period are summarized in Table 3 and depicted in Figures 2 to 5. The results show that for the influent water, BOD is from 18.5 to 45.4 mg/L, SS from 16.43 to 33.27 mg/L, NH<sub>3</sub>-N from 2.58 to

32.83 mg/L, and TP from 2.15 to 3.92 mg/L. In contrast, for the effluent water, they are 8.8 to 17.8 mg/L, 5.24 to 10.09 mg/L, 1.21 to 14.32 mg/L, and 1.53 to 2.84 mg/L for BOD, SS, NH<sub>3</sub>-N, and TP, respectively. Thus, the reductions of the pollutants by the wetlands are obvious.

Item	Treated water (CMD)	Influent	Effluent	R (%)	Re (kg/day)
Temperature (°C)	37,928±2,538 (34,727~42,227)	26.7±1.2 (24.9~28.4)	26.9±0.9 (25.9~28.4)		
pH	37,928±2,538 (34,727~42,227)	7.4±0.2 (7.2~7.6)	7.3±0.1 (7.1~7.5)		
DO(mg/L)	37,928±2,538 (34,727~42,227)	3.5±0.1 (3.3~3.6)	4±0.3 (3.6~4.4)		
BOD(mg/L)	37,928±2,538 (34,727~42,227)	31.9±8.5 (18.5~45.4)	12.6±2.8 (8.8~17.8)	60%±4% (52%~65%)	729±252 (362~1103)
SS(mg/L)	37,928±2,538 (34,727~42,227)	26.8±6.3 (16.4~33.3)	8.1±1.8 (5.2~10.1)	69%±6% (60%~80%)	716±218 (389~961)
NH <sub>3</sub> -N (mg/L)	37,928±2,538 (34,727~42,227)	13.4±10.8 (2.58~32.8)	6.2±5 (1.21~14.3)	52%±13% (27%~66%)	199±185 (32~544)
Total Phosphorus (mg/L)	37,928±2,538 (34,727~42,227)	3.1±0.6 (2.15~3.92)	2.1±0.5 (1.53~2.84)	32%±8% (24%~45%)	40±15 (16~67)
RPI	37,928±2,538 (34,727~42,227)	6.96±0.52 (5.75~7.25)	5.46±0.45 (4.75~5.75)		

Table 3. Water Quality Data of the Wannian Wetlands

## 3) Pollutant removal benefits

After water treatment through the Wannian Wetlands, The results show that the removal rates and amounts are about 52%~65% with 362~1103 kg/day, 60%~80% with 389~961 kg/day, 27%~66% with 32~544 kg/day, and 24%~45% with 16~67 kg/day for BOD, SS, ammonia nitrogen, and total phosphorus, respectively.

## 4) RPI Indicator

The RPI value of the influent water of the Wannian Wetlands ranges from 5.75 to 7.25 with an average value of 6.96±0.52, indicating severe pollution. In contrast, the RPI value of the effluent water is from 4.75 to 5.75 with an average value of 5.46±0.45, indicating moderate pollution. Namely, after the water treatment through the wetlands, the pollution level is reduced from serious to moderate conditions, thus signifying a notable improvement in water quality.

## B. Ecological survey

During the study period, ecological surveys were conducted. The survey results show that there are 241 species of 79 families of plants, 42 species of 25 families of birds, 10 species of 4 families of mammals, 5 species of 4 families of amphibians, 4 species of 3 families of reptiles, 7 species of 5 families of fishes, 3 species of 3 families of shrimps, crabs and snails, including Category II protected species Black Kite,

Crested Goshawk, Pheasant-Tailed Jacanas and Greater Painted-Snipe and Category III protected species Plover and Brown Shrike. Among them, the population Pheasant-Tailed Jacanas has increased in recent years. There are also four species endemic to Taiwan, including the Taiwan Scimitar Babbler, Swinhoe's Japalure, Formosa Grass Lizard, and Taiwan Tube-nosed Bat [13].

On the other hand, among the wetland flora, six species are classified as Vulnerable (VU) in the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, including the Milky Mangrove, Swamp Gelonium, Umbrella Tree, Indian Barringtonia, Taiwan Incense Cedar, and Small-leaved Barringtonia. Two endemic species are classified as Near Threatened (NT), including the Lanyu Tabernaemontana and the Ceylon Ardisia. One species, the Kusano Willow, is classified as Endangered (EN). Moreover, the obtained FBI before treatment is 6.77~7.11, which is the sixth level, indicating poor water quality rating. However, we believe that the animal and plant species will be furthermore increase and the FBI will decrease in the future.

## C. Exploration of Value-Added Benefits

### 1) Water recycling and reuse

The treated water from the wetlands can be discharged back to the Chonglan Old Canal for further recycling.



At present, the treated effluent water is not only used as tributary water flowing into the Wannian Creek, but also used for irrigation of the nearby farmland and plants [14].

## 2) Habitat or Refuge for Wild Animals

The Wannian Wetlands system has ecological conditions similar to those of a natural wetland because its planning and construction were carried out by minimizing disturbances to the site. In addition, the system is surrounded by a variety of insects and nectar plants, and has water bodies of varying depths. Thus, it is conducive to a variety of habitats with a rich variety of ecological species already found in the site. Moreover, the system also provides a shelter for wildlife and plants.

## 3) Environmental Education

The success of the Wannian Wetlands creates an ecological site with the functions of water self-purification, landscaping and recreation, and ecological rehabilitation. The site has been favored by schools and community groups at all levels, and has been actively used to promote environmental education, ecological tours and wetland water purification activities of Constructed Wetlands. Through explanatory signs and guides, the public can have a better understanding of environmental issues and the importance of ecological conservation.

Furthermore, the success and experience gained from this study can serve as a reference for future design, planning and rehabilitation of multifunctional treatment-type constructed wetlands for better resources utilization. Thus, we are now applying certification of national level important wetland and environmental education site.

## V. CONCLUSION

The Wannian Constructed Wetlands are successfully constructed in Pingtung County, Taiwan. The key findings in this study are as follows:

### A. Effectiveness of water treatment

1) Good water purification capacity: the maximum treated water volume is 42,227 CMD with the removals of 60~80% SS, 52~65% BOD, 27~66% NH<sub>3</sub>-N, and 24~45% TP. Further, the RPI reduces from about 7 to 5.5.

2) Low technical barriers: construction, operation, and maintenance are easy, requiring only common technical skills and domestic construction techniques and can be easily promoted.

3) Economical and energy saving: gravity flows and biological treatments were adopted without electricity consumption.

**B. Ecological Results:** the flora and fauna surveys show the richness and varieties of species, including protected and endangered ones. Namely, the constructed wetlands create a friendly environment for plants, insects, fishes, and animals.

**C. Development Advantages:** In addition to providing a better environment, the present "surface flow wetlands" system enables water resources reuse as the treated water can be used for irrigation, aquaculture and ecological landscaping ponds. Because of its simplicity, it can be readily extended and implemented by using the abandoned agricultural land or ponds for their revitalization. Thus, the Pingtung County Government plans to apply for it to become a Wetland of National Importance in 2021.

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# CURRENT LEARNING DISABILITIES ASSOCIATION AND THEIR POLICIES ACROSS THE WORLD: SOME OBSERVATIONS

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## Abstract -

Learning disabilities comprises as difficulty in reading, writing, listening, speaking, reasoning and mathematical skills. The term learning disabilities sometimes referred to as specific learning disabilities that cover a range of neurological based disorders in learning and various degrees of severity of such disorders (LDA, 1986). There are 5-9 % of people having learning disabilities of general population (Vuleta, 2020) and many policies and laws are also making to solve these problems. This paper looks at some of the associations working on learning disabilities at global level. Further, it explored the policies, laws and advocacy with respect to learning disabilities. This paper also highlighted the funds and online work of the learning disabilities associations.

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**Keywords -** Learning Disabilities, Associations, Policies, Laws, Dyslexia

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In 1963 Samuel Kirk, then a professor of special education at the University of Illinois, suggested that we use the term 'Learning Disabled' to describe 'children who have disorders in development of language, speech, reading, and associated communication skills.' In 1977 the **Federal Definition of Learning Disability of U.S. office** was introduced and the term Learning Disability includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. IDEA (2004) defines a specific learning disability (SLD) as: A disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. Indian **RPWDACT, 2016** first time defined the term learning disabilities as 'Specific learning disabilities' means a heterogeneous group of conditions wherein there is a deficit in processing language, spoken or written, that may manifest itself as a difficulty to comprehend, speak, read, write, spell, or to do mathematical calculations and includes such conditions as perceptual disabilities, dyslexia, dysgraphia, dyscalculia, dyspraxia and developmental aphasia.

There are so many associations working on LDs, but mostly U.S.A. and Canada Region are focusing on learning disabilities. India is in a nascent stage yet. There are few associations explained their work as well as policies also.

## Learning Disabilities Association of America

LDA is working as leading resource on learning disabilities since 1964. It is providing the guidance for college accommodation, scholarships, assistive technology as well as key strategies for learning

disabled children. It also practices on use of cognitive assessment for Learning disabilities identification and evaluation. LDA supports the LD parents, teachers and other related professionals, whom they help the LD people. Further, this association supports the federal laws protecting the rights of students with learning disabilities: Coronavirus Child Care and Relief Act, Research Investment to secure the Economy Act (RISE) and Supporting Children Disabilities during Covid-19 Act. Equity access also focuses on LD's civil right for education; ensure proper identification, evaluation, intervention & accommodation at all level; for healthy brain development high quality early education for maternal & child healthcare nutrition suggested (ldaamerica.org).

## National Association of Special Education Teacher

This professional association provides support and assistance to many American's special education teachers those are teaching in the field of special education. NASET published the LD Report on current issues of learning disabilities. It published monthly report on learning disabilities and provides latest information. There is 50% around LD from those students, who are taking the special education services. This report also collects the practical information about Learning disabilities, research and writing as well (www.naset.org).

## National Joint Committee on Learning Disabilities

This committee has founded in 1975 and doing work on education & welfare for learning disabled people. This has also an official website named as LDonline, which provides the valuable knowledge regarding learning disabilities. This committee has mission to identify & address needs of LD research, policy, professional education & development. It also develops the understanding from local level to national among educational institute, committee & Governmental agencies. Further, it develop the

statement, repair & improve the practices, increase the knowledge & clear issue, influenced policy for LD ([www.ldonline.org/about/partners/njclcd](http://www.ldonline.org/about/partners/njclcd)).

### **British Dyslexia Association**

BDA is a dyslexic people voice for achieve a dyslexic friendly society for all, started from 1972. It has mission to influence government and other institute for dyslexia individuals, so that all ages of dyslexia individuals can reach their full potential. It is also doing campaigning, provide objective advice, set accredits & some standards, promote & share research, best practices for local to international level for learning disabled people ([www.bdadyslexia.org.uk](http://www.bdadyslexia.org.uk)).

### **National Center for Learning Disabilities**

It is the leading institute for learning disabilities community solving the issues & improve the lives of individuals with LDs. And also empowering the families, transforming schools, creating new policy & advocacy impact in the field of learning disabilities. This center ensures that 15 million children & all people with learning disabilities have each and every opportunity for their successful life. It has also started the campaigning named as 'Get Ready to Read' for building literacy skills at all primary level. Further, promote research & advocacy policies to protect the educational rights & opportunities for LD and also strengthen the information for professionals, parents & all ages of LD people ([www.nclld.org](http://www.nclld.org)).

### **Learning Disabilities Association of Ontario**

LDAO is a charity registered charity dedicated for working on improving the lives of all ages of LDs people. It has designed many products, resources, services, venues for helping the LD individuals their parents, teachers & other professionals. It works on every aspect social, educational, medical, vocational and employment of LD in Ontario. It also suggested accessible policies, accessible custom service policy and public policy round up for with reference to learning disabilities. It offers the online workshop due to Covid-19 for parents, students as well as professionals. They share the real life experiences of parents, students & teachers, those attended the previous public sessions. Ontario Human Rights Commission releases new video on 26 October, 2020 for the progress of Right to Read. LD@ school is a project based website that providing information & research, professional development, practice information, approaches, practices & strategies relate with LDS directly use in the classroom ([www.ldao.ca](http://www.ldao.ca)).

### **Learning Disability Society**

LDS is charitable society that has strengthen the individuals diagnosed with learning disabilities from 50 years. LDS Greater Vancouver offers financially accessible, high-quality learning support for students.

It has Research Informed Individualized Student Education (RISE) program that provide the individual attention with small group learning support for diagnosed learning differences children between the age group of 6-18. It also facilitate RISE program in schools, through camps, online & at learning centers as well. It has a goal to provide remedial tutoring, intensive intervention, small group camps & family coaching. It follows the holistic approach for instructor training, student assessment to deliver comprehensive individualized support & remedial program that would be according to the children's need ([ldsociety.ca](http://ldsociety.ca)).

### **Learning Disabilities Association of London Region**

LDALR provides the services and advocacy, conduct program for learning disabilities & ADHD people's help. It offers training, workshop & knowledge sessions with the collaboration of community agencies and schools. It also provides the adaptive technologies, comprehensive information and resources for learning disabilities. ([www.ldalondon.ca](http://www.ldalondon.ca))

### **Learning Disabilities Association of Alberta**

This association working on building resilience and explore the potentials in LD people, that promoting the public understanding and cultivate support networks. This is the first association in 1968 incorporated for children with LDs. Training programs for teachers, two scholarship funds, official website and social media has also offered by the association. LDAC (Learning Disabilities Association of Canada, 1963) is the national voice of LD people and supporters federally part and LDAA is the federally part of this association. LDAC has one member committee in every province and territory except Nunavut. The volunteer psychologists committee & reading specialists has developed. It has also started the Right to Read program for helping children with reading difficulties in their language at primary school ([ldalberta.ca](http://ldalberta.ca)).

### **Learning Disabilities Association of Canada**

Its aim to provide equal opportunities for Canadian LD individual that can help to reach their potentials. Due to covid pandemic it has started online learning for parents and educators for better preparation of the students. This has more than 10 years of Canada peer-reviewed journals/articles on LDs, which provide information on every aspect of LD. Presently 9 province LDA & one territory in the Canada and more than 50 community agencies across the country. Accessible Canada Act suggested that create a barrier free Canada for every person, especially persons with disabilities. This law helps to ensure that full economic, social & civil participation of all Canadian people regardless of their disabilities ([www.ldacta.ca](http://www.ldacta.ca)).

### **Council for Learning Disabilities**

It is an international council providing the education and quality of life for people with LDs throughout the life. CLD is doing evidence based research for LDs. It also strengthens the LD people at local, state & national level through collaboration with professionals, developing leader & advocacy for policies. The Liaison Committee in its advocacy represents the CLD for individuals with LD. It also announced the three new resources to help states and district improve the evaluation process under the PSLD & eligibility under IDEA: Practice & Policy July 2019. In October, 2017, NCLD report (state of LD, understanding the 1 in 5) released the report on state of LDs and this can also found online at [nclld.org/state](http://nclld.org/state) of LD. It has also mention some recommendations on more early intervention for children ([council-for-learning-disabilities.org](http://council-for-learning-disabilities.org)).

### **Learning Disabilities Association of New Jersey**

New Jersey nonprofit association state affiliation by LDA of America is providing information, support and advocacy for people with learning disabilities, their families, professionals as well. It has mission to ensure that LD should universally understood and effectively addressed, early identification, advocates the legislation that protects the rights of LD and their families, ensure all LD individuals live lead and successful lives. In March, 2017 Supreme Court of U.S. suggested Individualized Education Programs (IEPs) for students with disabilities. Court suggested NCLD and [understood.org](http://understood.org) developed the Advocacy toolkit for parents. It has also mention the some Acts working on special needs children like IDEA, The Rehabilitation Act of 1973 (Section 504), The Rehabilitation Act-Section 511-Workforce Innovation & Opportunities Act (WIOA), The Americans with Disabilities Act (ADA) and Andrew F.V. Douglas Country School District ([www.ldanj.org](http://www.ldanj.org)).

### **LD Online**

This is an online national educational service website of WETA-TV (Washington, D.C.) that provides up to date information and advice regarding LDs & ADHA. Approximately 5% of students are LD out of 2.9 million school students in U.S. Students are not receiving the appropriate remedy/ interventions on time, that's why this website provides the competent educators, authentic information regarding LD that can help on time. It also provides the knowledge & resources, which help individuals with LDs in transition from school to college and school to work ([www.ldonline.org](http://www.ldonline.org)).

### **Learning Disabilities Association of British Columbia**

It is a voice and province network of LD persons, since 1973. It has also provide the resources and knowledge to ensure the full participation of learning

disabled students, youth and adults in current society. It works on LD's education, employment, social development, legal rights and general wellbeing as well. It is reported that 1 in 10 people in BC (approximately 400000) from all ages, ethnic, social groups are influenced by LDs. Presently in Victoria, Vancouver, Surrey, Vernon & William's Lake are chapters that provided community programming. LDABC especially working on improving education policy that can be according to children's need and also incorporate assessment & remedial programs, teachers, special trainer, parent resources & accountability mechanism ([www.ldabc.ca](http://www.ldabc.ca)).

### **Learning Disabilities Resources Foundation Action**

Under IRS section 501(c) founded a non-profit foundation in 2001, that helps to find out the solution for affected specific learning disabled children, dyslexia & ADHD. It offers the resources for all ages people, parents and educators with specific focus on the low-income households. This foundation also working on social media (Facebook, Twitter) for lead & successful life of learning disable individuals. It also support laws for special need children, ADA Americans with Disabilities Act, Jo Anne Simon Law Office, K&W Guide to Colleges for Students with Learning Differences, U.S. Department of Justice, Civil Rights Division, New York City Commission on Human, Wright's Law, NYC Mayor's Office for People with Disabilities and Advocates for Children ([www.ldrfa.org](http://www.ldrfa.org)).

### **Association for Learning Disabilities India**

It is a non-profit association helping students and their parents, teachers, professionals, social workers, since 1992. It also created ALDI Remedial & Rehabilitation measures, that conducting the many scientific studies in the field of learning problems and their effects. It has conducted educational programs, projects for assessing the classroom strategies and also worked on so many seminars & workshops with the collaboration IAP (Indian Assessment of Pediatrics), which is recognized, by WHO. ALDI has been promoting approximately 100 support group in Kerala. ALDI also trained the SSA (SarvaSiksha Abhiyan) and IEDC (Integrated Education for Disabled Children). And it has also published the authentic book for parents in malayalam language named as 'Know Your Child' ([enabled.in](http://enabled.in)).

### **Dyslexia Association of India**

DAI is a charitable trust that provides the opportunity approximately 250 million LD children adolescents & adults for lead and successful life. It gives the information for parents, students, teachers, professionals and children with learning disabilities. It has mission to strengthen the interest, research & development program, advocates policies for strengthen the rights & opportunities for dyslexic

children. This association has unique point being a nonprofit assessment & educational institutional, that is focusing on needy educational for dyslexic children and adults throughout the Delhi NCR region & Pan India sphere as well ([www.dyslexiaindia.org.in](http://www.dyslexiaindia.org.in)).

United State America and Canada are majorly contributing their great work on learning disabilities perspective & also collaborating with other organizations. These all are the associations basically provide accurate information with respect to LD, funds, make laws/policies & strengthen the Acts related with LDs, trained the teachers, patents and professionals as well. In covid-19 pandemic these all organizations provide the each and every information through online workshops, seminars & other programs. India is on nascent stage yet in learning disabilities, it has first time announced the LDs in RPWD, 2016. There is need for more awareness about LDs, because this concept is new for other countries. This research paper will provide the online associations information for people that can help them to understand the LDs concept, and they can get the relevant & accurate information. There are so many research associations on LDs, but people don't

have knowledge about it. This research paper will provide the help for them.

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# ANALYSIS OF SATISFACTION AND NUTRITION CONCEPTS ON NEWSPAPERS IN TERMS OF HEALTH COMMUNICATION

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**Abstract** - The concept of health and the phenomenon of staying healthy has once again increased its importance due to the covid-19 between the 2020 and 2021 pandemic period. Each promise that comes out of the mouth of physicians, every information they give, every foresight they make provides a significant improvement in terms of health communication. On behalf of modernization in medicine, health communication has gained a different dimension. The communication provided by the doctor and the dietician with the patients and their relatives has made a breakthrough especially in protecting health and taking precautions before the acute phase. Media also give importance to this health prevention and health protection. This study, which seeks an answer to the question of whether we are eating for fullness or for nourishment, aims to examine the news about "health and nutrition" in the media and especially in the printed media on a monthly basis in 2007 and a month in 2021. It objects to create a prediction about the perception of "nutrition" created by the content analysis made in line with this goal. The two newspapers considered within the scope of the research have been offering supplementary newspapers to their readers every day, every weekdays, and every weekends for many years. It has been understood that both newspapers have started to carry out the nutritional errors by creating a perception on the society in the changing conditions of healthy nutrition and healthy life on the new generation cuisine in the past 14 years. Although supplementary newspapers of both were analysed and planned to generate data, there was a restriction in reaching the entire research universe.

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**Keywords** - Feeding Methods, Health Communication, Nutrition, Pandemics

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## I. INTRODUCTION

Health is the context that can be explained according to the feelings. Being healthy is very important but not realized well enough until a person has lost it. According to World Health Organization (WHO) [1], so as to call a person is healthy, not only should a person feel himself/herself healthy, but also should be in good condition physically, psychologically, socially. In 1981 another definition was uttered by WHO. Their slogan was "in 2000, health for everybody." The organization wants to emphasize production to lead a high qualified life. To call a person healthy, there are three factors to be considered:

1. To have a healthy diet and do regular exercises.
2. To have routine check-ups.
3. To lead a dynamic life.

During the pandemic period being healthy is considered an important factor. Everybody has gotten hypnotized in front of the TVs. The words that the doctors have uttered seem very vital. Health communication gets its importance during the Covid-19 period too much. Health communication, as a part of interpersonal relationship, plays its advantage to inform and to motivate the society, target, or organization. In history, It started in the 18<sup>th</sup> century after the vaccine application. It was the time for hygiene propaganda. This helped the public be aware of the precautions to avoid the spreading of diseases. As Arkin [2] mentions, health communication is so powerful that it can change the attitudes of individuals, societies, and groups. In the 21<sup>st</sup> century "knowledge" gets its right place. By sharing the knowledge on behalf of the media, doctors and health workers help

people organize their life, the living areas again. The information forces people to change their behaviors among themselves. Mass media is so powerful that people can get aware of all the facts happening around. As Mc Luhan[3] says, the development of new communication technologies provides a "global village" understanding. Communication tools shape societies for sensory reasons. Communication tools affect personalities. Mass media and new media tools use their power to enlighten the community. Media has a really important role in manipulation. As Dearing and Rogers[4] emphasize the subjects mentioned in the media play an important role in perception management of public opinion. This perception makes the community improve their perspectives on that notion. In the 2019 pandemic period, the changing conditions on the concept of health and the perspective of staying healthy have gained great importance by saying that getting a healthy and a balanced diet is a healthy life understanding. In order not to repeat the mistakes made in the name of nutrition, during the 2019-pandemics, health professionals have been given wide coverage in the media. The importance of physical activities at home has increased during the period of confinement. The gastronomic culture, which has been started by the young generation since the end of the 20th century, has begun to take place in the media along with the pandemic process, so-called "new generation cuisine". The new generation kitchen, which abstains from three whites, differentiates flour types, sugar amount and type, and changes the taste of the mouth. For example; the youth, who started to prefer almond or walnut flour instead of wheat flour, which is called white flour, use carob or dates instead

of sugar. In other words, consuming healthy food to stay healthy has become a new philosophy of life for them. To be healthy and to keep fit, preventive and protective health are essential points to avoid the virus. During epidemics, the thought of preventive health gets its essential point. A healthy diet is very important for the sake of society. Nutrients are the parts of healthy diet that are essential for life and health. Nutrients provide energy, build and repair body tissues. Taking right nutrition is important to keep body healthy. Preventive health is a new perspective for the economic development of the public. By this way, there will be a decrease in health expenditures in family budget and a resource increase in the item spent in the state budget on health. With this study, a useful contribution is objected to the literature. In this regard, this study aims to create a foresight about the perception of "nutrition" created by content analysis. It focuses on "health and nutrition". In this context, the news on nutrition in 2007 and the news in 2021 were examined for 1 month. The two largest-circulation newspapers Sabah with its additional newspaper Günaydın and Hürriyet with its additional newspaper Kelebek considered within the scope of the research, have been offering additional news to their readers every day, on weekdays, and on weekends for many years.

## II. PROBLEM OF THE RESEARCH

Do we have to eat to feel full or do we have to eat to get adequate nutrition so as to keep fit?

### 2.1. Sub Problems of the Research

1. What is the point of view of these two newspapers when it is compared according to the health perspective?

#### 3.1.1 Study Selection

HürriyetKelebek 2007	Supporting News	Non-supporting News	Neutral	Total
Point of view for the health perspective	33,3%	46,6%	20,1%	100
Point of view for the Nutrition Perspective	26,6%	53,3%	20,1%	100
Suggestion on preventive and protective health	20%	60%	20%	100
Sharing the ideas of physicians to keep fit	0	80%	20%	100

**Table 1.**  
The news Hürriyet-Kelebek makes (2007 March)

The analyzed pages in Hürriyet- Kelebek revealed that the mentality not favoring to stay fit was quite high in 2007. Non-supporting view points were dominant from every angle. Neutral news was stable, each one is 20%.

2. What is the point of view of these two newspapers when it is compared according to the nutrition perspective?
3. Does each newspaper suggest preventive and protective health?
4. Does each newspaper share the ideas of physicians to keep fit?

## III. THE METHOD, THE UNIVERSE, THE SAMPLE OF THE RESEARCH

The results were obtained in two newspapers in Turkey. The two newspapers were chosen since they had been offering additional newspapers for a long time. The suggestion on food, cooking, and health generally take place in those additional ones. In order to obtain the news, as a researcher, I used the 2007 digital and hard copy archive for 1 month. Besides, in 2021 as a researcher I examined both newspapers from May to June. In the analysis of the news, the content analysis method was used by scanning the descriptive method. The title of the news was coded and grouped as "supportive news", "not supportive news", and "neutral". Supportive news is the one for good digestive food. It is full of vegetables and fruit, away from the three white. Non-supporting news is the one which includes too many calories, energy. They are not recommended by the physicians. In this way, the perception management of the newspapers on the target audience especially during the pandemic period was evaluated.

### 3.1 Data Extraction

Studies on the newspapers between 2007 and 2021 were extracted by using Microsoft excel. The information was written in four different tables according to the year differences of each newspaper. The extracted information from each study is mentioned below the tables.

Generally, readers were fed gourmet treats filled with crème, sugar, and flour. The calories were not taken into account.

Sabah Günaydın2007	Supporting News	Non-supporting News	Neutral	Total
Point of view for the health perspective	20%	60%	20%	100
Point of view for the Nutrition Perspective	10%	80%	10%	100
Suggestion on preventive and protective health	0	80%	20%	100
Sharing the ideas of physicians to keep fit	0	80%	20%	100

**Table2.**  
The news Sabah Günaydın makes (2007 March)

The pages which were examined in Sabah- Günaydın showed that there was a lot of non-supporting news on the pages. The readers were unaware of preventive and protective health. The concentration was only on gourmet recipes full of pastries, cakes, and cookies, too.

HürriyetKelebek 2021	Supporting News	Non-supporting News	Neutral	Total
Point of view for the health perspective	80%	0	20%	100
Point of view for the Nutrition Perspective	40%	40%	20%	100
Suggestion on preventive and protective health	60%	40%	0	100
Sharing the ideas of physicians to keep fit	100%	0	0	100

**Table 3.**  
The news Hürriyet-Kelebek makes (2021 May)

The analyzed pages in Hürriyet- Kelebek reveal that the mentality favoring to stay fit is quite high in 2021. Supporting viewpoints are dominant from every angle. Neutral news covers 20% in health perspective and in nutrition part. Generally, readers are recommended to eat more vegetables and fruit. Suggestions of physicians on healthy diet to avoid cancer, diabetes are mentioned daily. Dentists recommend mouth care. They emphasize the starting point of disease is uncared teeth.

Sabah Günaydın 2007	Supporting News	Non-supporting News	Neutral	Total
Point of view for the health perspective	33,3%	26,6%	20,1%	100
Point of view for the Nutrition Perspective	46,6%	26,6%	26,8%	100
Suggestion on preventive and protective health	26,6%	6,6%	66,8%	100
Sharing the ideas of physicians to keep fit	6,6%	0	93,4%	100

**Table4.**  
The news Sabah Günaydın makes (2021 May)



The pages reviewed in Sabah- Günaydın show that supporting news to be healthy is little more than non-supporting news. The goal is to reach for nutritious gourmet recipes rather than the recipes full of pastries, fries, cakes, and cookies. The news supporting nutritional diet is 46,6 % compared to the news not supporting it; 26,6%. Sharing the opinions of physicians or discussing on preventive and protective health in this newspaper are too neutral; 66, 8 % and 93, 4 %.

#### IV. DISCUSSION AND RESULT

The covid-19 pandemic period has caused a surreal ignites in the perspective of international relationships, social relationships, and health communication. To decipher the unscrupulous virus, each country has mobilized the system of health. This study consists of the news based on health and nutrition published in two prestigious and largest circulated written newspapers in 2007 and 2021 for 1 month. The news was analyzed in the content analysis method by scanning the descriptive method. The news is sorted out into three-point of view; supporting news, non-supporting news, and neutral.

Newspapers as one part of mass media not only gives messages to public but also impress the target group with their reputations. It is very clear that the alluring part of nutrition has gotten its right enlightenment after the pandemic period. The news from both newspapers declare that satisfying hunger by eating something should be hampered. Nevertheless, Hürriyet- Kelebek seem delicate on the ideas of keeping fit, having healthy diet.

It is impressive to find news on qualified living in both newspapers. The examined news on Sabah- Günaydın

seems to take place in the neutral part much more than Hürriyet-Kelebek. The deprivation of feeding healthily is covered by Hürriyet- Kelebek much more than Sabah-Günaydın.

Consequently, in order to have a society with lots of healthy people, making effective news is really encouraging. Media is so powerful to manipulate the target group impressively. In order to defy the virus, suggestions on protective and preventive health, sharing the ideas of the authorities are very sensitive to public opinion. Although supplementary newspapers of both gazettes were analyzed and planned to generate data, there was a restriction in reaching the entire research universe.

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# FORECASTING BITCOIN VOLATILITY WITH ASYMMETRIC -WARIMAX-GARCH MODELS

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## Abstract -

As an alternative to traditional currencies, crypto currencies have started to take place in the financial markets both as an investment and payment method. Bitcoin is not dependent on the central authority and its price effectiveness factors affecting supply and demand with high volatility.

The volatility and endogenous factor is taken with one of the methods frequently used in the literature in the application part of the study and The asymmetric Generalized Auto-Regressive Conditional Heteroscedasticity models such as GARCH, ARCH-M, EGARCH and GJR-GARCH used to determine the asymmetric volatility which is frequently used in the literature in the application part of the study. This model is taken with Wavelet Auto-Regressive Integrated Moving Average with Exogenous Variable and Generalized Auto-Regressive Conditional Heteroscedasticity (WARIMAX-GARCH) This model is exhibiting non-linear characteristics such as conditional variance that depends on past values of observed data.

In the application part of this study the price data of Bitcoin closing prices have been taken between 2019 and 2020 and the Ethereum(ETH). The out of sample bitcoin forecasting is made for 2021 for 50 days.

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**Keywords -** Bitcoin, WARIMAX -Asymmetric-GARCH Models, Out of sample Volatility

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## I. INTRODUCTION

The finance and technology have become increasingly close in recent years, and financial products based on technology and, accordingly the use of brokerage services has also increased. The cryptocurrency market has emerged and its leading currency, Bitcoin, has captured global attention.

Money transfer in digital environment, banking transactions and shopping transactions are mediated by banks. The Blockchain system is taken which is combination finance and technology by Nakamoto and Satoshi where there is no central authority and it can be defined as a cryptographic system that allows interpersonal payment. Nakamoto (2008), in his article, he published a peer-to-peer (p2p) system blockchain without the need for a third part in his system. The blockchain system can be defined with any data in the digital environment on the communication networks.

Bitcoin has been issued to ensure the continuity of the operation of the Blockchain system prize money Şahin, (2018). In this context, in the first part of the study, Bitcoin and the blockchain system, which forms the infrastructure of bitcoin, is briefly mentioned. In the second part of the study studies on bitcoin volatility literature will be included. The third part will be about the WARIMAX-GARCH models and the last section will be the application of the volatility of bitcoin which it is estimated using Bitcoin/USD closing prices between the 01.01.2019-30.12.2020.

## II. LITERATURE REVIEW

Glaser et al. (2014), found an answer if the cryptocurrency users had better information and

whether Bitcoin is treated as an asset or a currency. Bouoiyour et al. (2014), they looked at the price formation of Bitcoin from a new perspective in their study. and the result of the study is that the price of Bitcoin can be guided by speculative movements. have arrived. Dyhrberg (2016) found in his study whether Bitcoin is a financial asset or not.

Katsiampa (2017) made the best result of the volatility estimation for Bitcoin in his study. ARCH models that give the best results and as a result of the study the AR-GARCH model was found the best fit model.

The bitcoin studies are taken by many researchers. The Kristoufek (2013) examined the relationship between cryptocurrency Bitcoin, Google Trends and Wikipedia in the study.

Ciaian et al., (2016), the study addressed both currency price determinants and cryptocurrency-specific factors.

Chu et al., (2015) conducted statistical analysis of eight different exchange rates with the first electronic payment system, the BTC/USD rate.

Brière et al., (2015), the study analyzed both traditional investment instruments and alternative investment instruments in Bitcoin investment portfolio diversification using weekly data for the period 2010-2013.

MacDonell (2014) investigated the price bubble in the cryptocurrency Bitcoin and found that there was a bubble in 2013.

The study by Malhotra and Maloo (2014) examined the success of Bitcoin in exchange rates in 2013-2014 and the reasons behind price movements.

Cheung et al., (2015), the study examined the existence of bubbles in Bitcoin prices using econometric techniques.

In July February 20, 2013, Hencic and Gourièroux (2015) used a Bitcoin price series consisting of 150 observations between February 20, 2013 and July 20, 2013 as the data set in the study.

In the study, Kristoufek (2015) examined the factors that influence Bitcoin prices. Frascaroli and Pinto (2016) used Bitcoin's return series from June 2015 as a sample, which they treated as a financial innovation in the study.

Katsiampa (2017) investigated the optimal model for the price volatility of Bitcoin as a financial asset in the study. Stavroyiannis (2017) used bitcoin, Entereum, Litecoin, Ripple and the S&P 500 index as a sample of major cryptocurrencies as part of risk management in the study.

Kormaz, Kucuksahin and Caglar (2019) studied the volatility structure of the cryptocurrencies with Garch models for Turkey . In the study of Dyhrberg (2016), whether Bitcoin is a financial asset he looked into it.

Corea et al., (2016) examined an application to a daily time series of dam displacement in Brazil shows the WARIMAX-GARCH method to remarkably outperform the ARIMA-GARCH method

**III. THE WARIMAX -GARCH MODELS**

ARIMA method to be easily applicable and acceptable results it has quite widespread use due to its verdicts. The general exogenous model employed by the ARIMA model has been discussed by Box and Tiao (1975), where it is referred to as an Auto-Regressive Integrated Moving Average with eXogenous variables (ARIMAX) model.

In the ARIMAX method it is possible to use more than one argument Fan et al., (2009) and Jalalkamali et al.. (2015). The ARIMAX method is generalized by Bierens (1987). The ARIMAX method equality is

$$(1 - \sum_{s=1}^p \alpha_s L^s) \Delta y_t = \mu + \sum_{s=1}^p \beta_s L^s x_t + (1 + \sum_{s=1}^q \gamma_s L^s) \epsilon_t \tag{1}$$

L is the lag operator. The dependent variable in the ARIMAX method is  $Y_t$  only with historical data instead of guessing together  $Y_t$  both historical values and explanatory variables are  $X_t$ . it is intended to be estimated with variables. Thus ARIMA according to the method, more accurate results are obtained Cool et al.(2009); Neter et al.,(1996).

ARIMAX methods is generelized by Bierens, (1987). The ARIMAX model consists of four parts. These sections are, respectively, Auto Regressive (AR), Integrated (I), Moving Average( MA), and the external variable (X) is called Sutthichaimethee and Ariyasajjakorn (2017).

The Auto-Regressive Conditional Heteroscedastic (ARCH) model of Engle (1982) allows for the conditional variance to depend on past values of the conditional variance itself; while the Generalized ARCH (GARCH) model of Bollerslev (1986) enable the volatility to depend on past values of both the

squared innovation and conditional variance itself. The WARIMAX-GARCH method proposed here employs a GARCH model as one of its components.

Wavelet Auto-Regressive Integrated Moving Average with eXogenous variables and Generalized Auto-Regressive Conditional Heteroscedasticity (WARIMAX-GARCH) method, is proposed to improve predictive performance and accuracy. WARIMAX-GARCH method obtains Wavelet “EVs” (WEVs) from Auto-Regressive Integrated Moving Average with eXogenous variables and Generalized Auto-Regressive Conditional Heteroscedasticity (ARIMAXGARCH) models applied to Wavelet Components (WCs) that are initially determined from the underlying time series Correa,et.al (2016). The unconditional variance is determined by Bollerslev (1990),

$$\sigma^2_t = \gamma_0 + \sum_{j=1}^r \gamma_j R_{j1} \sigma^2_{t-j} + \sum \delta_l \epsilon_t \tag{2}$$

Equation 2 is used by the WARIMAX-GARCH method to generate insample and out-of-sample forecasts of the conditional variance of the time series  $y_t (t = 1, \dots, T)$ .

The WARIMAX-GARCH model has some steps.Step 1: a wavelet decomposition of level r (described in Section 1) of the underlying time series  $y_t (t = 1, \dots, T)$  is performed, generating r+1 WCs. That is, one WC of approximation at level  $m_0$ , denoted by  $\tilde{y}A_{m_0,t} (t = 1, \dots, T)$ , and r WCs of detail at levels from  $m_0$  to  $m_0 + (r - 1)$ , denoted by  $\tilde{y}D_{m,t} (t = 1, \dots, T)$  for  $m=m_0, \dots, m_0+(r-1)$ ; Step 2: each WC obtained in Step 1 is individually modeled by using a distinct ARIMAGARCH in order to generate their out-of-sample forecasts; Step 3: the WCs of the Step 1 are completed by their out-of-sample forecasts (of horizon h) of the Step 2, producing the Completed WCs (CWCs) consisting of the wavelet EVs (WEVs) Correa ,et all. (2016)

**IV. DATA AND METHODOLOGY**

In this part of study the data set and volatility methods are taken the period of the year between 01.01.2019-30.12.2020 and using daily returns calculated from the daily closing price were used. The data are taken from the www.tr.investing.com website. The table 1 shows the descriptive statistics of bitcoin/usd and Ethereum /usd variables .

Mean	0.0056	0.0345
Median	-0.0038	0.4573
Maximum	0.4322	0.5621
Minimum	-1.000	-1.000
Standart Deviation	00483	0.3478

skewness		-0,5638	1.4533
Kurtosis		6.3266	5.7632
Jarque-Bera		642.366	237.99
ARCH-LM	F - Value	326,8	220,56
	Prob	0.000	0.000
White-LM test	F-value	176.00	145.58
	prob	0.000	0.000

Table 1. Descriptive Statistics of RBTC And RETR

Since the kurtosis coefficient of the RBTC return series is greater than 3 (9,32 ) so the means it has a thick tail and the skewness level is less than zero (-0,50) so it has left asymmetry distribution and the asymmetric WARIMAX -GARCH models we can use in this study. The RETR is the endogenous variable and it has fat tail (5,67) and right skewed distribution (1,45). The White test results there is a heteroscedasticity and the Arch-Lm test indicates the there is an ARCH effect in the serial for conditional heteroscedasticity . In this case, RBTC and RETR returns are in accordance with ARCH modeling.The Table 2 shows the Btc and the exedogenous variable Ethereum return series ADF and Philips Perron stability test analysis.

	ADF test		Phillip -Perron (PP Test)	
	Constant+trend		Constant +trend	
	T value	p value	T value	p value
<b>RBTC</b>	2.6633	0.0001	2.4411	0.0001
<b>RETR</b>	3,6511	0,0014	3,1856	0,0014

Table 2. ADF and PP Test Results

The return series are calculated taking logarithmic differences with series of BTC variable. Such as;  
 $RBTC = \log RBTC_t - \log RBTC_{t-1}$  (3)

According to the test results in Table 2 the two variable both of ADF tests according to the statistics and according to the PP test statistics, the probability values are less than 0.05 (0.0001 , $p < 0.05$ ) and the RETR series probability values are less than 0.005

(0.0014) since the null hypothesis would be rejected, it was found to be both stationary.

A WARIMAX-GARCH model however can model the high-frequency oscillations in the underlying series time through the ARIMA-GARCH models integrated with the wavelet decomposition approach. For volatility the ARIMA GARCH model is used to find the volatility of btc and ethereum in the Table 3.

Dependent Variable	Independent Variable	EGARCH - gsd(1,1)	GJR-GARCH-student-t (1,2)
RBTC	RETR	ARIMA(2,1,2)	ARIMA(3,1,2)
MAPE		0.84637	0.21225
MAE		1.67393	0.44295
APE		1.2366	0.85612
R <sup>2</sup>		0.0662	0.0887

Table 3. Asymmetric ARIMAX-GARCH model

ARIMA-GARCH models was determined by comparing the forecasting performances of each candidate model as measured by their Absolute Percentage Error (APE), Mean Absolute Percentage Error (MAPE), Mean Absolute Error (MAE) and R<sup>2</sup>. The another asymmetric models are tried and they are'nt found statistically significant and the best model is GJR-GARCH ARIMA(3,1,2) is more fit than another asymmetric model with minimum selection criteries and maksimum R<sup>2</sup>.

The BDS tests to detect non-linear serial auto-correlations and ARCH tests for unconditionally constant residual variance (see e.g. Hamilton, 1994).

Dimensions	BDS statistics	Probability
2	-3.22E-05	0.7833
3	-7.82E-06	0.8955
4	-5.22E-06	0.9672
5	-2.32E-05	0.9214
6	-2.5639-04	0.7234

Table 4. BDS Test Of In-Sample Ordinary Residuals Of The GJR-GARCH-ARIMAX Model.

Table 4 shows the statistics and the corresponding p-values for dimensions 2 to 6 of a BDS test (which consists of a statistical test used to verify the existence of linear and non-linear autodependence existing in a data set applied to the in-sample residuals of the ARIMA-GJR-GARCH-GED (3, 1, 2) x (1, 2) model. The first step of the WARIMAX-GARCH method was implemented .A wavelet decomposition of level sample of the BTC variable. The WARIMAX-GARCH method, each one of the WCs  $\tilde{y}A2,t$  ,  $\tilde{y}D2,t$  and  $\tilde{y}D3,t$  ( $t = 1, \dots 657$ ) were

individually modeled by three different asymmetric ARIMA-GARCH models. The WARIMAX-GARCH method can adopt any GARCH approach to forecast volatilities.

In the study for WARIMAX-GARCH model we used the  $r+1$  wavelet exogenous variables by the following WARIMAX-GARCH  $(p, d, q) \times (P, D, Q)$  model to generate in-sample and out-of-sample forecasts. The wavelet methods are suitable for the non-stationary and/or non-linear time series Mallat( 2009), all WEVs of a WARIMAX-GARCH model should be stationary to satisfy this requirement of the ARIMAX modelling approach.

Table 4 shows the application of the WARIMAX-GARCH method to a daily time series of the bitcoin and exogenous variable etherium results The beloved models,

$$x1,t = \beta_{BTC2,t}, C = \{(\beta_{A2,t}) t=1..657; (\beta_{A2,t}) t=657..703\} \quad (4)$$

$$x2,t = \beta_{BTC02,t}, C = \{(\beta_{D2,t}) t=1..657; (\beta_{D2,t}) t=657..703\}; \text{ and} \quad (5)$$

$$x3,t = \beta_{BTC03,t}, C = \{(\beta_{D3,t}) t=1..657; (\beta_{D3,t}) t=657..703\}. \quad (6)$$

All three WEVs,  $x1,t$ ,  $x2,t$  and  $x3,t$ , were required in the best WARIMAX models .

Dimensions	BDS statistics	Probability
2	-4.79E-05	0.9377
3	-8.17E-06	0.9445
4	-4.35E-06	0.9567
5	-3.17E-05	0.8275
6	-4.356E-04	0.8945

Table 5. BDS Test Of In-Sample Ordinary Residuals Of The WARIMAX-GARCH Model.

Table 5 shows the BDS test for WARIMAX-GJRGARCH models. Therefore, the in-sample forecasting residuals can be considered as a white noise process with mean of zero, validating the WARIMAX-GJRGARCH model.

Table 6 shows the MAPE and the MAE statistics for the in-sample and the out-of-sample forecasting performances of the three benchmark methods WARIMAX-garch and ARIMAX-garch model .

	MAPE		MAE	
	In-sample	Out-of-sample	In-sample	Out-of-sample
WARIMAX-GJRGARCH-GED	0.7691	<b>0.2217</b>	0.6788	<b>0.2945</b>
ARIMAX-GJRGARCH-student-t	0.439	0.8922	0.5123	0.7913

Table 6 – The In-Sample and Out-Of-Sample Forecasting Performances.

\*The bold level number is the minimum level of selection criteria

The table 6 shows the WARIMAX-garch model has the minimum MAPE,MAE criteria so this model more effective for t he out of sample of with exegenious variable etherium and out of sample for 50 days forecasting.

## V. CONCLUSION

The aim of this study is to take bitcoin and independent variable etherium from cryptocurrencies and to take asymmetric GARCH models by selecting the WARIMAX mean model. For this purpose, Bitcoin, Ethereum's daily return series were used including the weekend between 01.01.2019 - 30.12.2020.

The increasing popularity in cryptocurrencies has become widespread around the world. As a result the daily trading volume in the cryptocurrency market has increased and it has led to increased volatility during the day. The results in this paper suggest that

BTC/USD (RBTC) and exogenous variable etherium ETR/USD (RETR) returns can be forecasted with WARIMAX-GJRGARCH model using past returns . The wavelet components have good statistical properties to be used as exogenous variables by the WARIMAX-GARCH method.

Even the volatilly model is found ARIMA in asymmetric GARCH with usefull ARIMA and GARCH models. ARIMAX model is used for in sample volatility and we found the GJR-GARCH model is statistically significant. For out of sample forecasting we tried also exegoneius varaible etherium and we used composition of Wavelet composiation (WC) with aproximation with three level for in sample volatility. In addition, the WARIMAX-GARCH model has achieved considerably better forecasting performance than ARIMAX-GJR-GARCH model with different distribution.The out of 50 days ahead the BTC will be increasead and the etherium level will effect these result because we can see the effect of

another cryptocurrency levels will be effective on BTC level volatility .The GJR-garch model also can proof the bad volatility effect on the btc volatility level so we can see the threshold effect on BTC level in this time period.

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# ASSESSING INFLUENCE OF CONSUMERS EXPECTATIONS FROM ONLINE VS OFFLINE PURCHASING ENVIRONMENTS ON SATISFACTION

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**Abstract** - Customer expectations of both offline and online purchasing environments are strongly attached to actual consumer satisfaction, while expectations are perceptions of future service performance that are commonly thought to reflect what a customer believes or anticipates is likely to happen. The purpose of this research paper is to investigate the influence of consumers' expectations from online and offline purchasing environments service quality on their satisfaction, seeking for the future improvement in a corporate purchasing environment. The study was conducted according to the original SERVQUAL method. The questionnaire administrated comprised of the four out of five original SERVQUAL dimensions, namely Responsiveness- Reliability - Assurance – Empathy, while Tangibles dimension was replaced with Perceived Value - P.V., to more appropriately reflect the online environment. Six Hypotheses were formulated and data were analyzed through were analyzed with IBM SPSS version 19. Regression analysis for both environments was performed to test the first five Hypotheses and Laplace criterion was chosen, as a Decision theory selection criterion to test the last one. It was proved that that for customers of both online and offline purchasing environments Perceived Value – P.V. was the most important feature, followed by Assurance, Responsiveness and last Reliability. It was also showed that there is actually a different level of expectations between the two purchasing environments, where consumers seem to expect more from offline purchasing environments than online ones.

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**Keywords** - Customer Expectations, Online Purchasing Environment, Offline Purchasing Environment, SERVQUAL, Customer Satisfaction

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## I. INTRODUCTION

The retail industry today is a highly competitive business with a large economic footprint. In the International Journal of Research in Marketing, Degeratu, Rangaswami & Wu (2000) noted that, "An issue of particular interest to both practitioners and academics is in determining whether there are systematic differences in consumer purchase behavior between online and regular offline stores, and if there are differences, in understanding the reasons for these differences."

Online consumers have the opportunity to compare between a plethora of goods in just a few clicks, especially for functional products and services. Past researches reveal many systematic differences in customer attitudes and behavior for products and services chosen online versus offline channels. For example, price sensitivity may actually be lower online than offline (Degeratu et al., 2000; Lynch & Ariely, 2000; Shankar et al., 2001). Brand names (brand equity) could also have higher impact online than offline (Degeratu et al., 2000).

Customer expectations of offline and online services are strongly attached to actual consumer satisfaction. Expectations are perceptions of future service performance that are commonly thought to reflect what a customer believes or anticipates is likely to happen (Olson, J. C., & Dover, 1979; Yi, 1990). After a service encounter, customers evaluate their

satisfaction with the service based upon initial expectations, perceptions of actual service performance, and a comparison of expectations against performance in which expectations are positively or negatively disconfirmed (Oliver, 1980; Yi, 1990; Spreng & Page, 2003). Thus, the current research deals with whether there are differences in customer expectations between online and offline purchasing environments affecting their outcome satisfaction. The five-dimensional service quality scale (SERVQUAL) will be used to investigate two different purchasing environments (online and offline). The results will be useful for theorists and policy makers, since besides the influence degree of the five service quality constructs on consumers expectations from online and offline purchasing environments and thus satisfaction, the effect of them on consumers expectations of the entire commerce arena service quality and consumer satisfaction with the products/services providers will be explored.

## II. LITERATURE REVIEW AND HYPOTHESES

According to Oliver & Burke (1999), satisfaction is defined as the perception of pleasurable fulfillment of a service. A satisfied consumer is not only a high return-low risk economic asset (Fornell et al., 2016), but the de facto brand ambassador of a retail company (Wangenheim & Bayón 2007). Researchers have examined customer satisfaction through an expectation-disconfirmation paradigm that holds that

satisfaction is formed by both a customer's initial expectations and their subsequent comparison of how the product or service performs in relation to these expectations known as disconfirmation (Churchill & Surprenant, 1982; Oliver, 1980; Yi 1990).

Customers base their expectations on a variety of factors. For example, predictive-will expectations are based upon what customers think is likely to happen, desired-ideal expectations are based upon what customers wish for or desire, and adequate-should expectations are based upon the lowest level of performance customers will accept (Kettinger et al., 1997; Spreng et al., 1996; Zeithaml, 1993).

Evidence concerning the connection between expectations and satisfaction are mixed. There are surveys indicating a negative impact of expectations on satisfaction, while others a positive one through performance satisfaction (Yi, 1990; Spreng et al., 1996; Boulding et al., 1993). Spreng et al. (1996) found that the simple correlation between expectations and satisfaction is positive in many marketing studies, suggesting an overall positive influence of expectations on satisfaction. Literature on online service settings reveals that expectations are either positively correlated with satisfaction or have a total positive effect on satisfaction (Khalifa & Liu, 2002; Susarla et al., 2006).

Service quality was defined as "the global evaluation or attitude of overall excellence of services" (Parasuraman et al., 1985). It can be seen as the difference between customer perception or expectation of service delivered by using confirmation/disconfirmation theory. Expectation could be considered in terms of what a service would offer (Boulding et al., 1993). Service quality has been investigated across many industries and the results revealed that it could be defined by the various dimensions such as reliability, responsiveness, competence, understanding, courtesy, communication, access, security, credibility and tangibility. These dimensions were later evaluated by Parasuraman et al. (1988), verifying the SERVQUAL scale, with the following five dimensions for assessing service quality: tangibility, reliability, responsiveness, assurance, and empathy.

SERVQUAL scale is one of the most accepted scales used to measure service quality. According to Khorshidi et al. (2016), SERVQUAL is a method to evaluate service quality following the gap theory as introduced by Parasuraman et al. According to the founders of SERVQUAL scale, the construct of quality as gauged by SERVQUAL encompasses perceived quality whereas perceived quality is the consumer's judgment about an organization's overall excellence or superiority. Parasuraman et al. (1988) also compared perceived quality (involving

consumer's attitude) with objective quality (involving objective aspect or feature of a service or product) in their study. According to them, perceived quality is though linked but not equals satisfaction and events of satisfaction over time leads to the perceptions of service quality (Parasuraman et al., 1988). Parasuraman et al.'s (1988) operationalization of SERVQUAL method of measuring service quality was derived from the gap theory involving the comparison or expectations and perceptions of performance. This classic conceptualization of perceived service quality is still reliable and the SERVQUAL method is still popular in modern days' studies. The five dimensions of the SERVQUAL scale are Tangibility: "Physical facilities, equipment, and appearance of personnel"; Reliability; "Ability to perform the promised service dependably and accurately"; Responsiveness: "Willingness to help customers and provide prompt service"; Assurance: "Knowledge and courtesy of employees and their ability to inspire trust and confidence"; Empathy: "Caring, individualized attention the firm provides its customers" (Parasuraman et al., 1988)

Along with the above review and the research objectives of the current research, the following hypotheses have been developed:

H1: Responsiveness is expected to be positively related to customer satisfaction in a given purchasing environment.

H2: Reliability is expected to be positively related to customer satisfaction in a given purchasing environment.

H3: Perceived Value – P.V. is expected to be positively related to customer satisfaction in a purchasing environment.

H4: Assurance is expected to be positively related to customer satisfaction in a given purchasing environment.

H5: Empathy is expected to be positively related to customer satisfaction in a given purchasing environment.

H6: A difference exists between the customers' expectations from online and offline purchasing environments.

### III. METHODOLOGY

#### *Survey instrument*

The study was conducted according to the original SERVQUAL method, following the recommendations of its authors and also of researchers who have used this method across contexts and cultures. The purpose was the assessment of customers' expectations influence from online and offline purchasing environments on their satisfaction, seeking for the future improvement in a corporate purchasing environment.



The questionnaire consisted of three parts. The first part used nominal scales to collect basic respondents' demographics, while the second and third part comprised of the theoretical constructs of SERVQUAL. Considering the unique characteristics of online purchasing environments services, four out of five original SERVQUAL dimensions, namely Responsiveness- Reliability - Assurance - Empathy were included in the questionnaire. Tangibles dimension was replaced with Perceived Value -P.V., to more appropriately reflect the online environment. Previously validated questions were used, though minor modifications were made to survey items to reflect training program environments. All questions, except those which gather demographic data, were presented on a 5-point Likert scale.

The 22 items instrument to measure the four original SERVQUAL dimensions consisted of 14 question which have been previously used other research (Stodnick& Rogers, 2008; Olorunniwo et al., 2006). The items were adapted from Olorunniwo et al. (2006) and Stodnick and Rogers (2008) but partially altered to reflect and fit purchasing environments. Perceived Value was measured with four items (Zeithaml, 1988). Satisfaction was measured with four items from the study by Oliver (1997). The methodology of the research reported here follows the original SERVQUAL method in terms of data acquisition.

#### Data collection

An intercept method was followed in Greek public locations that are considered to be busy (shopping malls, bus and train stations, public parks etc). The respondents were chosen based on a sampling schedule. Multiple timescales were created to secure random selection, and sampling hours were adjusted different for working days and weekends. Timescales, places, and individuals were randomly selected.

The self-administered instrument was delivered to 500 individuals. A total of 359 completed questionnaires were returned – response rate 71.8 percent. The first questionnaire was in English and was reviewed for content validity by a university staff of International Hellenic University, Greece. The reviewed questionnaire was administered in Greek, so the English questionnaire was translated into Greek and then back into English to ensure translation equivalence (Brislin, 1970). The respondents who accepted to participate in the survey were first asked whether they had experience of both online and offline purchasing environments. Only those who declared “yes” could participate in the survey because they were about to report their expectations from both environments.

#### Data analysis

Questionnaires were analyzed with IBM SPSS version 19. Testing the presence of normality is essential (Hair et al., 2011). If the data is not

normally distributed, the validity and reliability of the results may be affected. Kurtosis tests were used to check whether data is normally distributed. The response rate (71.8 percent) was quite high, confirming the validity and Cronbach's  $\alpha$  values were calculated to test reliability (Table 2). Reliability and correlation analysis were implemented for both online and offline purchasing environments. Regression analysis for both environments was performed to test Hypotheses. For testing Hypothesis 6, Laplace criterion was chosen, as a Decision theory selection criterion for decision making under uncertainty (Taha, 2007; Prasad, 2015). In the Laplace criterion equal probabilities are assigned to the result of each strategy, from which the highest is chosen.

## IV. RESULTS

#### Demographics and Hypothesis 1-5 tests

46.6 per cent of the respondents are loyal users of online purchasing environments and 53.4 per cent are loyal customers of offline purchasing environments. The sample consists of more females (57.9 per cent) than males (42.1 per cent). More data have been gathered from the age group of 28-38 years old (39.3 per cent) and least from >48 years old (8.1 per cent), Table 1.

		Frequency	%	Cumulative %
Purchasing environment	Online	167	46.6	46.6
	offline	192	53.4	100
	Total	359	100	
Gender	Male	151	42.1	42.1
	Female	208	57.9	100
	Total	359	100	
Age	18-28	103	28.7	28.7
	28-38	141	39.3	68.0
	38-48	86	23.9	91.9
	>48	29	8.1	100
	Total	359	100	

Table 1: Demographics

Table 2 shows the variables, number of items for each variable, Cronbach's  $\alpha$ , mean, Standard deviation and Pearson correlation between customer satisfaction and the five variables of the modified SERVQUAL, for both environments. In the offline purchasing environments, the Pearson correlation is relatively stronger with Perceived value – P.V. (0.708), then by Reliability (0.637), Empathy (0.597), Responsiveness (0.592), Assurance (0.486). In the online purchasing environment, the Pearson correlation is relatively stronger with Reliability (0.592), then with Perceived value – P.V. (0.582), Responsiveness (0.522), Empathy (0.461) and Assurance (0.394).

Variables	No. Items	Cronbach's $\alpha$	Mean	SD	1	2	3	4	5	6
Responsiveness	3	0.772	8.34 <sup>i</sup>	2.28 <sup>i</sup>	1.00					
Reliability	3	0.692	10.57 <sup>ii</sup>	3.63 <sup>ii</sup>	0.715**	1.00				
Perceived Value - P.V	4	0.703	11.26 <sup>ii</sup>	2.17 <sup>ii</sup>	0.631*** <sup>ii</sup>		1.00			
Assurance	4	0.701	10.92 <sup>ii</sup>	2.14 <sup>ii</sup>	0.590*** <sup>ii</sup>	0.534***		1.00		
Empathy	4	0.769	11.20 <sup>ii</sup>	2.52 <sup>ii</sup>	0.682***	0.601***	0.617***		1.00	
Customer Satisfaction	4	0.697	7.36 <sup>ii</sup>	2.34 <sup>ii</sup>	0.603*** <sup>ii</sup>	0.510***	0.517***	0.582***	1.00	
			16.82 <sup>ii</sup>	2.93 <sup>ii</sup>	0.642*** <sup>ii</sup>	0.421***	0.503***	0.492***		1.00
			8.35 <sup>i</sup>	1.82 <sup>i</sup>	0.592***	0.657***	0.708***	0.486***	0.597***	1.00
			11.26 <sup>ii</sup>	2.06 <sup>ii</sup>	0.522***	0.592***	0.582***	0.394***	0.461***	

Table 2. Number of items, reliability, mean, SD, correlation for online and offline purchasing environments

<sup>i</sup>Offline programs <sup>ii</sup>Online programs. \*\*Correlation is significant at 0.01 level (two-tailed)

	Offline programs			Online programs			Combined effect		
	$\beta$	t-value		$\beta$	t-value		$\beta$	t-value	
(constant)	1.127*	1.742		1.293*	2.691		1.261*	2.993	
Responsiveness	0.136***	1.521		0.028***	2.872		0.151*	2.875	
Reliability	0.235***	2.513		0.046*	0.481		0.118*	2.201	
Perceived Value -P.V	0.714***	6.201		0.494***	7.903		0.491***	9.995	
Assurance	0.203*	2.439		0.317***	5.201		0.278***	4.896	
Empathy	0.046*	0.701		0.061**	1.203		-0.049**	1.392	
F		51.401			95.281			142.241	
R <sup>2</sup>		0.612			0.692			0.668	
Adjusted R <sup>2</sup>		0.601			0.686			0.661	
Durbin-Watson		1.947			1.902			1.942	

Table 3. Online, offline and overall purchasing environment regression analysis

Predictors: (constant), Assurance, Empathy, Perceived Value – P.V., Reliability, Responsiveness; Dependent variable: customer satisfaction. \*p,0.001, \*\*p,0.01, \*\*\*p,0.05

Table 3 shows the regression analysis results for both environments. As it seems Responsiveness, Reliability, Perceived Value -P.V. and Assurance are significantly related to customer satisfaction. Though, Empathy is insignificantly related to customer satisfaction. Therefore, Hypotheses 1,2,3,4 are accepted and Hypothesis 5 is rejected. Therefore, given Table 4 findings, it can be concluded that for all customers, the most important purchasing environment feature is Perceived Value – P.V., followed by Assurance, Responsiveness and last Reliability. Also, features' preference order for both environments separately, indicate a closely resembling allocation where the first one, in both of them is Perceived Value-P.V. and the last Responsiveness.

**Hypothesis 6 test**

The Laplace criterion is based on the optimistic assumption that each possible outcome of decision making under uncertainty likely equally. Therefore, if there are n outcomes, the probability of each is 1/n. This is computed by average payoff for each

alternative by adding all the payoffs and dividing by states of nature. This approach allows the decision maker to compute the expected payoff for each alternative and chose the alternative with the largest value (Webster, 1991). Laplace decision rule is followed:

1. Assign  $p_j = P(S_j) = 1/n$  to each  $S_j$  in  $S$ , for  $j = 1, 2, \dots, n \dots (i)$
2. For each  $A_i$  (payoff matrix row), compute its expected value:  $E(A_i) = \sum p_j (R_{ij})$  for  $i = 1, 2, \dots, m \dots (ii)$  Since  $p_j$  is a constant in Laplace,  $E(A_i) = \sum p_j (R_{ij}) = p_j \sum R_{ij} \dots (iii)$
3. Select the action alternative with the best  $E(A_i)$  as the optimal decision

The Laplace's criterion assumes that in case of absence of any information regarding probabilities of possible outcomes of decision making under uncertainty, then it is reasonable to assume that they are likely equally. Therefore, if there are n outcomes,

the probability of each is 1/n. Laplace criterion assumes that all state of nature will occur with equal probabilities. Therefore, this is computed by average payoff for each alternative by adding all the payoffs and dividing by states of nature. This approach allows the decision maker to compute the expected payoff for each alternative and chose he alternative with the largest value (Webster, 1991).

Finding in which of the two environments customers expectation is higher, the optimal alternative is performed step by step as follows:

a) Construct a decision Table which rows are the two different environments under investigation and columns are coupling metrics –  $\beta$  values (Table 4).

b) According to the states of nature (n) and each one's probability (1/n), calculate the expected payoff for each alternative ( $\alpha_i, s_j$ ).

States of nature: n=5, Probability: 1/5, i=1,2 and j=1,2,3,4,5

$\beta$	$s_1$	$s_2$	$s_3$	$s_4$	$s_5$
$\alpha_1$	$v(\alpha_1, s_1)$ = 0.136	$v(\alpha_1, s_2)$ = 0.235	$v(\alpha_1, s_3)$ = 0.714	$v(\alpha_1, s_4)$ = 0.203	$v(\alpha_1, s_5)$ = 0.046
$\alpha_2$	$v(\alpha_2, s_1)$ = 0.028	$v(\alpha_2, s_2)$ = 0.046	$v(\alpha_2, s_3)$ = 0.494	$v(\alpha_2, s_4)$ = 0.317	$v(\alpha_2, s_5)$ = 0.061

Table 4. Payoff values

## V. CONCLUSION

There is an extensive literature review on customer satisfaction in offline purchasing environments but information systems research is in the beginning of investigating origins of customer satisfaction and online expectations. This study added to this area first by investigating the connection of expectations to customer satisfaction on both online and offline purchasing environments separately and together, and secondly by comparing them and revealing differences on expectations using the SERVQUAL model. It was proved that that for customers of both online and offline purchasing environments Perceived Value – P.V. was the most important feature, followed by Assurance, Responsiveness and last Reliability. It was also, proved that there is actually a different level of expectations between the two purchasing environments, where consumers seem to expect more from offline purchasing environments than online ones. The result can be used as a preliminary guide for managers by showing them the expectations differences in terms of service quality dimensions.

c) Choose the optimal alternative with maximum value as the following formula:

$$\max \alpha_i \left\{ \frac{1}{n} \sum_{j=1}^n v(\alpha_i, s_j) \right\}$$

$$E(\alpha_1) = (1/5) * (0.136 + 0.235 + 0.714 + 0.203 + 0.046) = 1.334/5 = 0.267$$

$$E(\alpha_2) = (1/5) * (0.028 + 0.046 + 0.494 + 0.317 + 0.061) = 0.947/5 = 0.190$$

$E(\alpha_1)$  and  $E(\alpha_2)$  values indicate that there is actually a different level of expectations between the two environments. Thus, Hypothesis 6 is accepted. Consumers seem to expect more from offline purchasing environments than Online ones. Thereby, online purchasing environments' consumers are easier to satisfy, due to lower expectations than offline ones. Higher expectations from offline purchasing environments may derive from the fact that when customers visit a business in person, they are willing to give something up, for example, the time and effort it takes to travel to the store and the energy required to interact—because they believe there is some unique “payoff.”

## LIMITATIONS

This research has several limitations. First of all, is the fact that the sample of individuals was convenient rather than statistical. Also, the population must be considered before generalizing the results. In addition, there is the possibility that there may systematic bias between individuals who responded to participate and those who did not.

## ACKNOWLEDGMENTS

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# SIMULATION OF CONTROL SYSTEM HYBRID SOLAR CELL AND WIND POWER PLANT USING BATTERIES AS A INDEPENDENT HOUSEHOLD ELECTRICITY MANUFACTURER

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**Abstract** - The Use and utilization of existing energy is increasingly limited because fossil power plants which are still massively used have many impacts on the environment due to the emissions released. The use of renewable energy as a source of electricity is a solution to reduce the use of fossil fuels that provide a lot of emissions. However, this renewable energy has drawbacks because the input and output provided by the source are unpredictable, causing the energy released to be unstable and allowing energy supplies to not be available when needed (intermittent). In this study, the use of hybrid solar cells and wind turbines will be simulated to be applied to the roof of the house. The test of this research uses Matlab/Simulink software to calculate several input conditions from wind speed and irradiant received by the system input with the aim of meeting the electrical load of the house. In this study, the total electrical load was 48.51kWh/day by taking into account the work protection factor of the load system increased to 63.06kWh/day. The results showed that the hybrid generating system used 18 units of 300Wp solar cells and 2000W wind turbine with a total of 20 batteries. The battery works in a bi-directional manner to control the system output so that the output provided is stable in meeting load requirements. This hybrid system can supply 67kW of power which already meets the electricity needs of the house independently.

**Keywords** - Renewable Powerplant, Green Energy, Hybrid System, PLTS Roof, PLTB Roof

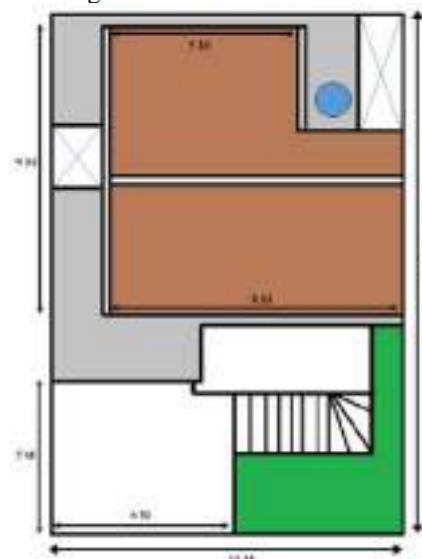
## I. INTRODUCTION

Electrical energy has become one of the basic needs of people everywhere, both in developing countries such as Indonesia, as well as developed countries. The more and the development of technology used by humans makes the need for electrical energy in the world is increasing. Meanwhile, the supply of electrical energy sourced from oil, natural gas, and coal has several limitations, in which the fossil energy source will one day run out if it is continuously used. Electrical energy from renewable sources, such as solar power, geothermal, wind, biomass, ocean currents, to waves has not been fully utilized.

Along with the development of technology, the use of renewable energy plants can replace the use of fossil fuels that are not friendly to the environment, but the use of renewable energy generation systems has a major drawback, namely the energy output provided is uncertain due to unpredictable natural conditions(intermittent). One step is to combine 2 renewable energy plants that have different sources with high work system compatibility. Solar power plant andwind power generation have a high work system compatibility where the optimal output from solar cells during the day while the output from wind turbines is optimal at night so that if hybridized these two systems can support each other. However, because these two plants are intermittent power sources, batteries are needed as energy storage and support for supplying electrical power in order to provide output that is in accordance with electricity needs [1].

In this study, a hybrid system will be created between a solar cell power plant and rooftop wind power plant that integrated in order to continuously distribute

power. The roof structure of the house in this study is as shown in Figure 1.



**Fig 1. Roof structure**

The dimensions of the PV module are 1.5 X 1 X 0.5m<sup>2</sup> with an output capacity of 300Wp and for wind dimension Wheel Diameter: 3.2 meters. So that the potential for the construction of rooftop solar and wind cell generators is obtained as shown in Table 1.

PV-Wind potential					
	Area (m <sup>2</sup> )	dimension	Quantity generation apply	Watt produce	Total potential (Watt)
PV module	35	1.5	36	300 Wp	10800
Wind turbine			2	2000 W	4000

**Table 1: Potential of PV-Wind**

Based on the potential data, the total potential from the construction of these two hybrid plants is 14800Wp. Both of these generators are intermittent so energy management is needed for a hybrid solar-wind cell system to maintain the distribution of electric power so that it can replace the electricity source provided by the electricity provider. Utilization of this energy can maximize the use of environmentally friendly energy

so that every home can produce electricity and use it independently without using electricity from electricity service companies that use fossil energy as the main source in providing electricity.

In this system, wind and sun are the main sources for generating electrical power with a battery storage system as a continuous maintenance of system performance. It can be seen in Figure 2 the configuration of the hybrid system used in this study

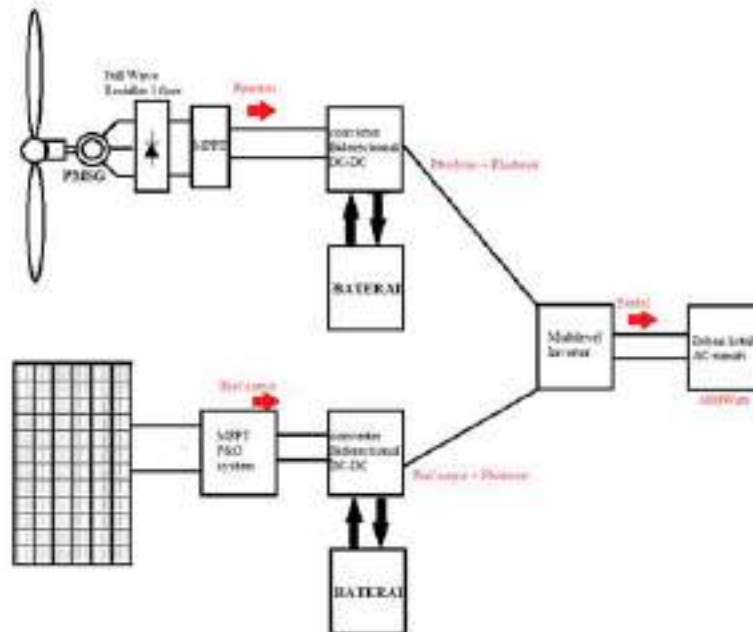


Fig. 2 System design configuration

To provide power supply to the load continuously without any disturbance, it is necessary to estimate the load that will be used in this study in order to get the

amount of production that must be given by the generator accordingly, the electrical load that must be met in this study is as in table 2 below.

LEVEL	equipment	quantity	Load (W)	total (W)	Operation time (Hour/day)	Power (Wh/day)
1	Lamp	16	10	160	14	2240
	Washing machine	1	250	250	1	250
	Water pump	1	650	650	2	1300
	Iron	1	300	300	1	300
	TV 65"	1	160	160	9	1440
	AC 1/2PK	1	400	400	4	1600
	home theater	1	1000	1000	8	8000
	Microwave	1	800	800	1	800
	Blender	1	280	280	1	280
	Refrigerator	1	100	100	24	2400
	magic jar	1	400	400	1	400
	dispenser	1	250	250	2	500
Lamp	14	10	140	13	1820	
3	TV 32"	1	100	100	3	300
	AC 1PK	3	840	2520	9	22680
	Lamp	10	10	100	12	1200
	water heater	1	1500	1500	2	3000
TOTAL			9110		48510	

Table 2. Home Electrical load data.



The total daily electrical load is 48.510 Wh taking into account the protection factor to prevent power build-up and keep energy storage from being exhausted by 1.3 so that the hybrid system must be able to supply 48.5 Kwh X 1.3 = 63.05 Kwh of power which must be met by this hybrid system.

## II. SYSTEM ELEMENT MODELING

### A. Wind Turbine Modeling

The wind turbine and permanent magnet synchronic generator (PMSG) are combined as a wind generator. Based on the system model used in this simulation, the parameters used for the wind turbine are according to the following equation [2].

$$P_{turbine} = \frac{1}{2} C_p(\beta, \lambda) \rho \pi R^2 V_v^3 (1)$$

Where, (kg.m<sup>-3</sup>) air density, R (m) turbine radius, v (ms<sup>-1</sup>) wind speed and Cp ( $\lambda, \beta$ ) power coefficient which describes the aerodynamic efficiency of the turbine and also depends on the speed ratio and angle. Ratiospeed  $\lambda$ :

$$\lambda = \frac{R\Omega_{turbine}}{v} (2)$$

Modeling the equations of the permanent magnetic synchronous generator (PMSG) using mathematical equations (3) and (4) as follows [2]:

$$V_q = -R_s i_q - L_q \frac{di_q}{dt} + \omega_e L_d i_q + \omega_e \lambda_m (3)$$

$$V_d = -R_s i_d - L_d \frac{dd}{dt} + \omega_e L_q i_q (4)$$

Simulation of the wind turbine system in MATLAB/Simulink can be seen as shown in Figure 3 below.

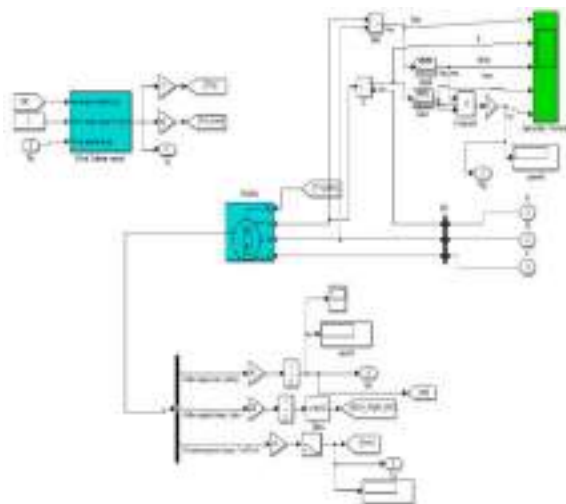


Fig.3 Wind turbine and PMSG configuration in MATLAB

Figure 3, modeling a wind turbine system in MATLAB-simulink, a wind turbine with a capacity of 2000 watts when the rate speed is 10m/s, the output voltage and power provided by the wind turbine are as shown in Figure 3 below.

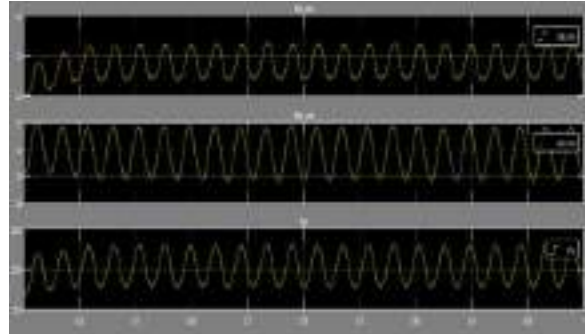


Fig. 4 Wind turbine output.

### B. Solar Cell Modeling

Solar cell modeling and simulation is usually represented by a simplified equivalent circuit as shown in the figure. 1 and for the characteristic equation of the solar cell using the following equation [3].

$$I = I_{ph} - I_d (5)$$

$$I_d = I_s \left[ \exp \left[ \frac{q \cdot V_{pv}}{A \cdot k \cdot T} \right] - 1 \right] (6)$$

$$I_s = I_{Rs} \left( \frac{T}{T_{Ref}} \right)^{\left( \frac{3}{\lambda} \right)} x \exp \left[ \frac{q \cdot E_{gap}}{A \cdot k} \left( \frac{1}{T_{Ref}} - \frac{1}{T} \right) \right] (7)$$

$$I_{Rs} = \frac{I_{sc}}{\exp \left( \frac{q \cdot V_{oc}}{A \cdot k \cdot T_{Ref}} \right) - 1} (8)$$

$$I = I_{ph} - I_s \left[ \exp \left( \frac{q \cdot (V_{pv} + 1) R_s}{A \cdot k \cdot T} \right) - 1 \right] - \left( \frac{V_{pv} + I \cdot R_s}{R_{sh}} \right) (9)$$

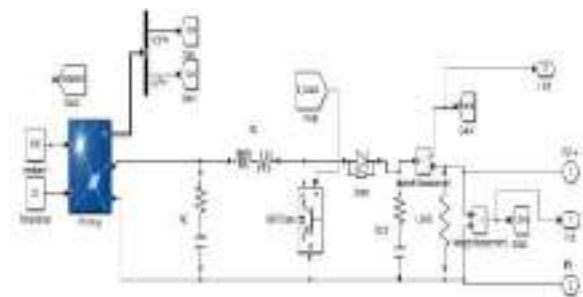


Fig. 5 Solar cell configuration in MATLAB.

Max Power	Max Voltage	Temperature Coefficient
300 W	45.43 V	25°C

Table. 3 parameter of Photovoltaic module.

The solar cell module provides DC voltage output if it is in a temperature difference and the energy irradiations received by the panel so that the solar module does not have a constant value, but in this study the irradiant that solar cell receive considered constant.

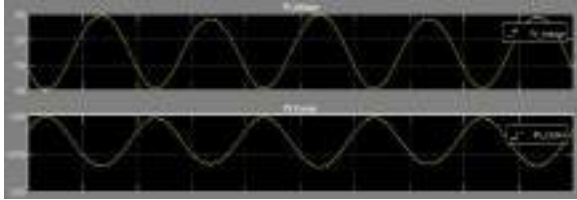


Fig. 6 Output solar cell with 1000 irradiant

C. Battery Storage

All solar cell charging systems and wind turbines are combined with batteries that have a charging controller setting in this study DC-DC bidirectional system. This is to avoid overcharging and also the battery sends power back to the generating system that works as a source. (i.e., the solar modules, Wind generators)[4].

The solar and wind cell controllers do their work in alignment between the array of solar panels on one side and the wind generator on the other, and the battery. Therefore, the selection of the size will be under the condition of the component. And it has to be done exactly in this case study.

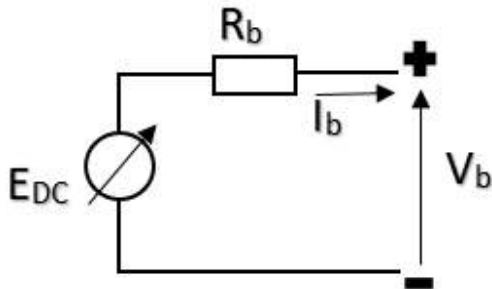


Fig.7 Battery model

The equation for the controlled voltage source is as follows [5].

$$E = E_o - K \frac{Q}{Q - \int i_b dt} + A \exp(-B \cdot \int i_b dt) \tag{10}$$

Where, E = no-load voltage (V), E<sub>o</sub> = battery constant voltage (V), K = polarity voltage (V), Q = battery capacity (V), A = exponential zone amplitude (V), B = inverse time constant exponential zone (Ah<sup>-1</sup>).

Parameter	value
voltage	2 volt
Nominal capacity	1000Ah
Internal Resistance	24mΩ

Table4. Parameter modeled battery

Variables such as Voltage and current values are data used in PV and wind load controller measurements. The PV or wind controller must be able to accept the desired voltage and withstand the current generated by the solar panel (DC source) or wind generator.

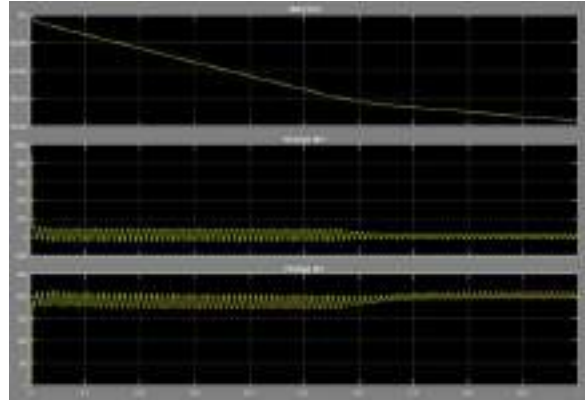


Fig. 8 Output battery

State of charge (SoC) is the level of charging the battery capacity. The units of the SoC in percentage form (0% = empty; 100% = full) has an important role in determining the remaining capacity of the battery pack.

III. RESULT

From the data in table 2, it is known that the total electricity demand in this study is 63.063 Watt so that the solar module and wind turbine used to meet the electricity needs in this study are as follows.

	Capacity	Operation time	Quantity	Total
Wind turbine	2000 watt	20 jam	1	40.000
Solar panel	300 watt	5 jam	18	27.000
Electrical load				67.000

Table 5. Total generators used in this study

Both of these generator sources are intermittent so that batteries are needed to support the work of these two plants with the capacity of the batteries used.

Battery Capacity for solar cell:

$$\begin{aligned} \text{Reserve} &= \text{solar cell load} : \text{battery capacity} \\ &= 27000 \text{ W} : (2 \text{ V} \times 1000 \text{ Ah}) \\ &= 13.5 \approx 14 \text{ battery} \end{aligned}$$

Battery capacity for wind turbine:

To get the inverter capacity (12 V), then the number of batteries used:

$$\frac{V_{\text{inverter}}}{V_{\text{batterai}}} = \frac{12}{2} = 6 \text{ baterai}$$

So the total battery used in this hybrid system is 20 batteries.



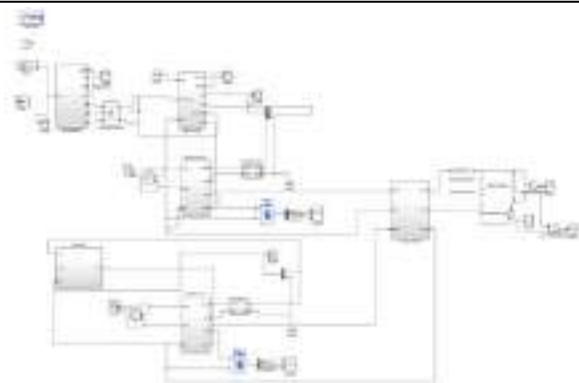


Fig. 9 Simulation PV-Wind hybrid model in matlab.

Wind generators and solar cells are interconnected with their respective MPPT systems with MPPT perturb and observe (P&O) controllers so that they can provide maximum voltage output before being connected to a battery bidirectional system that will control the work of the battery when to charge and discharge.

With a system configuration as shown in Figure 9, it will provide output when the optimal working conditions of solar cells with irradiant 800 and wind turbines are less than 4 m/s this operation usually runs at 10:00 to 15:00 then the output of the solar cell is.

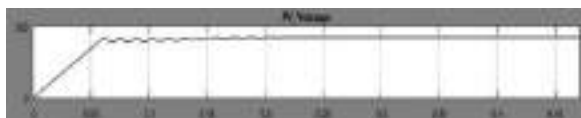


Fig. 10 PV output voltage

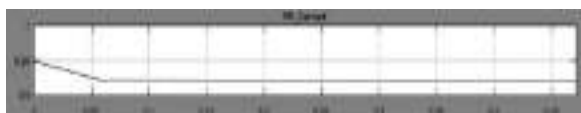


Fig. 11 PV output Current

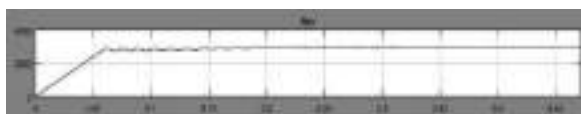


Fig. 12 PV output power

The output during optimal working conditions of solar cells with irradiant 800 provides a power output of 2900 Watts with a voltage of 400 V and a current of 6.92 A. While under these conditions, the air speed is usually low at 4 m/s with a wind turbine output.

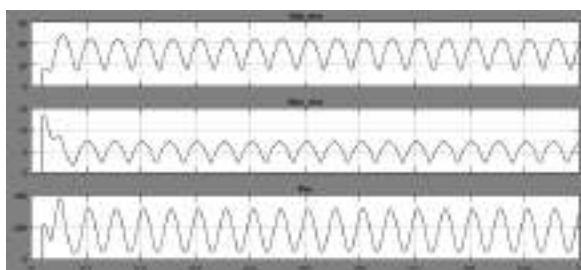


Fig. 13 Wind generator output with wind speed 4 m/s.

During this working condition, the wind turbine is only able to provide power of 283 watts with a voltage of 45 volts and a current of 6.8 amperes.

Meanwhile, in the afternoon until the morning from 16.00-08.00 the wind turbine will work more actively to supply power to the load with an output.



Fig. 14 Output voltage wind generator with 9 m/s wind speed.

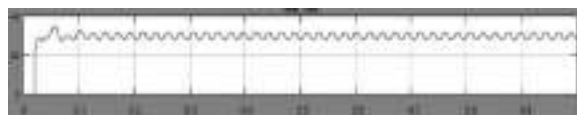


Fig. 15 Output current wind generator with 9 m/s wind speed

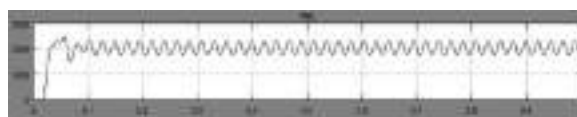


Fig. 16 Output power wind generator with 9 m/s wind speed

In this condition wind turbine can provide power of 2100 Watt with a voltage of 73 Volts and a current of 29 Amperes. Meanwhile, solar cells do not operate optimally (considered without the sun) so that the lack of power in this load will be assisted by the batteries used in this system.

#### IV. CONCLUSION

1. The construction of hybrid power plants (solar cells and wind turbines) on the roof of the house as an independent electricity producer can produce 67Kwh of power so that the house's electrical load of 63.05Kwh can be fulfilled properly.
2. Hybrid systems (wind turbines and solar cells) work with high compatibility so that the work of the Bi-directional battery is more as a stabilizer for the system output so that the total required battery capacity is not too large, the costs incurred for the storage system can be minimized.
3. The use of 2000W wind turbine generator and 18 300Wp solar cells in this study was the most efficient in meeting the needs of the house's electrical load considering protection factor.

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# ANALYSIS OF PHYSICAL PROPERTIES OF NATURAL RUBBER COMPOSITES USING CTAB-MODIFIED CLAY FILLER#

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**Abstract** - This study aims to compare the physical properties of natural rubber vulcanizates using clay filler and modified clay with CTAB. The processes that were followed to achieve the objectives of this research were the design of rubber formulas, mastication and milling of rubber, and testing of the physical properties of rubber vulcanization. The clay characterization and its modification using FTIR and XRD were also carried out. Characterization using FTIR and XRD showed that there was indeed a clay modification with CTAB. Torque on rheograph for modified clay with CTAB is 12.34 kg-cm higher than torque for original clay 7.05 kg-cm. Elongation at break and tensile strength for vulcanisate using CTAB-modified clay filler is lower than that using original clay but 300% modulus and hardness increase. Thus, clay modification using CTAB as a filler has a fairly good effect on the curing characteristics and physical properties of natural rubber vulcanization compared to only using original clay as a filler.

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**Keywords** - Clay, Filler, Natural Rubber, Physical Properties.

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## I. INTRODUCTION

Filler is a supporting material in the manufacture of finished rubber products. A variety of fillers have been used. Fillers are divided into reinforcing, semi reinforcing and non-reinforcing fillers. These three fillers each have their own characteristics when used as a filler. Reinforcing filler which is well known and cannot be replaced until now is carbon black. Carbon black in its production produces CO<sub>2</sub> so that many researchers and practitioners have tried to reduce its use. Researchers have paid much attention to the use of natural materials as fillers, such as clay. There are quite a lot of clay deposits in nature, one of which is found in the Bukit Asam coal mine area.

Clay cannot replace carbon black as a filler in rubber, including natural rubber. Because clay is a non-reinforcing filler, there are many researchers changing the active surface of the clay by modifying it. Modification of clay can be done in various ways, for example using surfactants. Surfactants consist of cationic (quaternary ammonium (quat)), anionic(sulfonate) and nonionic (polyethylene glycol (PEG)) surfactants [1]-[2]. Many scientific articles have been published, which have studied the use of cationic surfactants. One of them, for example, cetyltrimethylammonium bromide (CTAB) is used to modify the SiO<sub>2</sub> surface with the aim of expanding the absorption on the SiO<sub>2</sub> surface and is used as an absorbent for dyes. The maximum absorption of CTAB on the SiO<sub>2</sub> surface took place well at pH 8.0. There is an ionic interaction here, between the positive and negative charges of CTAB and SiO<sub>2</sub> [3]. A series of the cationic surfactants, dodecyltrimethylammonium bromide (DTAB), tetradecyltrimethylammonium bromide (TTAB) and

CTAB were evaluated the effects of the chain length of cationic surfactant on the grain size of silica nanoparticles. The results of this modification are used to evaluate the physical properties of cement [4]. The surface of silica nanoparticle was modified with CTAB, and the different experimental conditions including the amount of surfactant as well as the modification temperature has been studied [5]. Solid adsorbent made by using CTAB for surface modification of silica was applied to the absorption of carbamate pesticides [6]. Besides modified silica, organomodified kaolin is used for natural rubber filler where as the kaolin modifier is CTAB. Here, variation of cation exchange capacity is carried out and its effect on abrasion resistance, modulus, and hardness is observed [7]. CTAB is also used as a kaolin modifier where the organomodified kaolin is used as a filler in natural rubber latex. Variations in the concentration of organomodified kaolin were carried out in this study and observed through changes in the physical properties of modulus, elongation, abrasion and tensile strength [8]. Analysis of Mooney viscosity and psychomechanical properties of natural rubber using organomodified kaolin fillers with varying concentrations of organomodified kaolin has also been carried out. CTAB is used here as a clay modifier [9].

From the description above, it turns out that no researcher has compared the effect of CTAB modified clay and unmodified clay as a filler on the physical properties of natural rubber composites. Thus, the purpose of this study was to compare the physical properties of natural rubber composites before and after aging with CTAB modified clay and unmodified clay as a filler. CTAB characterization of modified clay and unmodified clay used FTIR where the FTIR spectra were used to observe the bond between clay

and clay modifier while XRD was used to characterize changes in the crystallization of clay before and after modification. The physical properties in question, macro properties of natural rubber composites due to the influence of filler modification are hardness, elongation at break, 300% modulus, and tensile strength.

## II. MATERIALS AND METHODS

### A. Materials

Local clay in the Bukit Asam coal mining area, South Sumatra, Indonesia, contains around 50.83–75.29% silica [10] with the type of clay being kaolin clay [11]. Natural rubber RSS 1 obtained from PTPN IX, Semarang, Indonesia were used in this study. The rubber chemicals were Sulfur Midas SP-325 (Miwon Chemicals Co., Ltd, Korea), TMTD Accelerator (Qingdao Ever Century Trading Co., Ltd. China), ZnO Zinkoxyd Aktiv UN 3077 and TMQ Vulkanox HS/LG (LANXESS Deutschland GmbH, Germany), stearic acid Aflux 52 (Rhein Chemie Rheinau Mannheim GmbH, Germany), and Minarex oil (Pertamina, Indonesia). Cetyltrimethylammonium bromide (CTAB) (Merck, Germany) was used as the clay modifier. All rubber chemicals and clay modifier are not treated and used directly.

### B. Clay Modification, characterization, and treatments

Modification of clay using CTAB has been carried out according to previous researchers [12]. After obtaining the modified clay CTAB, characterization was carried out using FTIR and XRD. This characterization was also carried out on the original clay.

The pretreatment of the clay and modified clay samples was carried out using powder pressed KBr pellets and an FTIR Alpha instrument (Bruker, Germany). FTIR spectra were recorded in the 500–4000  $\text{cm}^{-1}$  range.

XRD measurements were carried out using a Bruker D8 Advance X-ray diffractometer (Bruker, Germany) with Cu  $\alpha$  radiation at  $\lambda = 1.54060$  Å, current of 20 mA, and voltage of 40 kV. XRD patterns for the clay and modified clay samples were determined at a scan rate of 0.02  $^\circ/\text{s}$  in the  $2\theta$  range of 2–90 $^\circ$ .

### C. Natural rubber compounding

General processes for natural rubber composites are listed in Figure 1. The natural rubber formula (see table 1) which includes original clay and modified clay, rubber chemicals, and rubber is then weighed according to their respective contents in phr (parts per hundred rubber). then ground with an open two roll mill and the resulting compound was tested for its curing properties using a rheometer. The results of this test are useful for making rubber vulcanization test samples which are then tested for physical properties of natural rubber vulcanization using the standard ASTM test method.

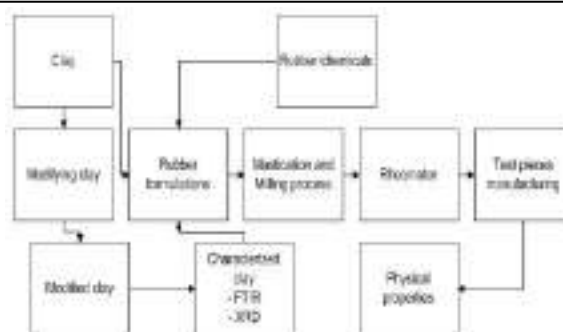


Figure 1 General processes for natural rubber compounding until natural rubber vulcanizates and its characteristics

## III. RESULTS AND DISCUSSION

### A. FTIR spectra analysis

The characterization of clay and CTAB-Modified clay using FTIR spectra analysis can be seen in Figure 2. According to Madejova in 2003 [13], kaolinite with mostly Al containing in octahedral position has four absorption bands in 3 OH stretching. This OH group is located between the tetrahedral and octahedral sheet which has an absorption of about 3620  $\text{cm}^{-1}$  or an absorption of 3625  $\text{cm}^{-1}$  in this study. Another OH group is on the octahedral surface and forms weak hydrogen bonds with the Si–O–Si bonded oxygen on the lower surface of the next layer. Absorption at 3695  $\text{cm}^{-1}$  is associated with phase symmetric stretching vibration which in this observation is at 3697  $\text{cm}^{-1}$ , two weak absorptions at 3669 and 3653  $\text{cm}^{-1}$  are associated with plane stretching vibration. Figure 2 also shows the spectra of the FTIR characterization results with patterns and absorption peaks that are almost the same as those of Madejova's characterization. The results of another study published by Belachew and Hinsene in 2020 [14] showed that for kaolin, the absorption peaks were at 3700, 3670, 3650 and 3620  $\text{cm}^{-1}$  due to the inner OH attached to Al or O. These peaks also contained in the curve in Figure 2.

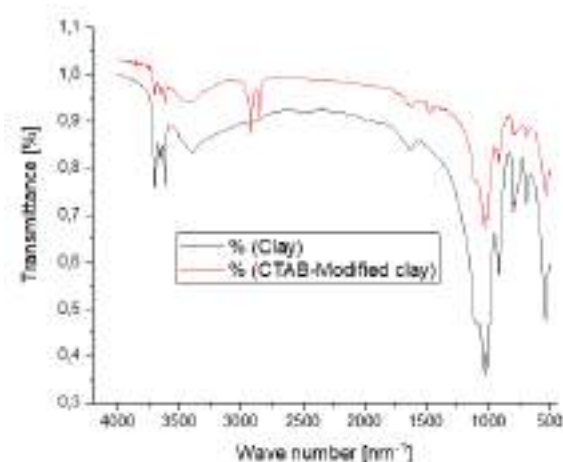
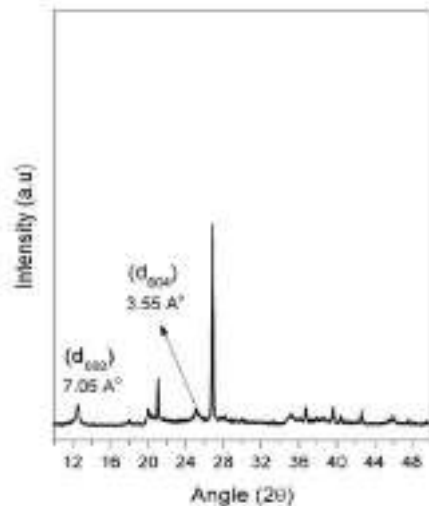


Figure 2. FTIR spectra analysis of clay and CTAB-modified clay (kaolin clay). The black line shows the FTIR spectra of original clay and the red line is the FTIR spectra of CTAB-modified clay

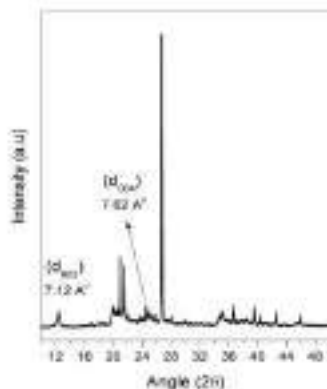
In Figure 2, precisely on the CTAB-Modified clay (kaolin) curve, a new peak was detected around the wave number of  $3010\text{ cm}^{-1}$  caused by the  $\text{CH}_3\text{-N}$  stretching vibration. This peak was also analyzed by Zenasni et. al [15]. Symmetrical and asymmetrical strain vibrations of the aliphatic chain methyl ( $\text{CH}_3$ ) and methylene ( $\text{CH}_2$ ) of the surfactant showed stronger absorption at wave numbers  $2850\text{ cm}^{-1}$  and  $2920\text{ cm}^{-1}$  [14]-16]. Observations in this study were at the absorption of  $2851\text{ cm}^{-1}$  and  $2953\text{ cm}^{-1}$ . The absorption peak at wave number  $1396\text{ cm}^{-1}$  or at  $1404\text{ cm}^{-1}$  in Figure 2 appears from the C-N bond of the organic modifier, which is a feature of the surfactant molecular bond between silicates [15].

#### B. Diffraction pattern analysis

The diffraction pattern from XRD for clay and CTAB-modified clay fillers is shown in Figure 3. From this image, there are changes in d-spacing clay and CTAB-modified clay.  $d_{002}$  for clay is  $7.05\text{ \AA}$  and  $d_{004}$  is  $3.55\text{ \AA}$  while  $d_{002}$  for CTAB-modified clay is  $7.12\text{ \AA}$  and  $d_{004}$  is  $7.62\text{ \AA}$ . The lattice parameter for clay is  $a= 5.19$ ,  $b= 8.83$  and  $c= 14.48$  while for CTAB-modified clay, the lattice parameter value is  $a= 5.21$ ,  $b= 8.87$  and  $c= 14.59$



A. Clay



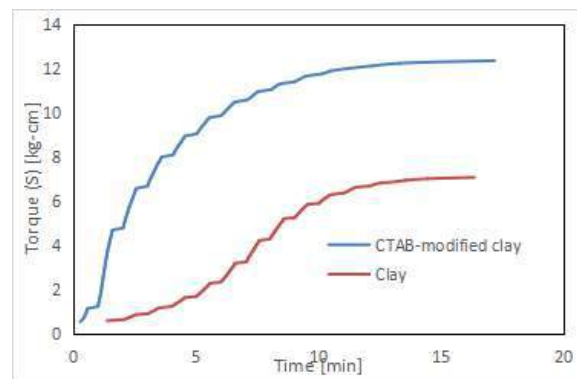
B. CTAB-modified clay

**Figure 3.** XRD patterns for original clay and CTAB-modified clay. 3.a shows the diffraction pattern of clay filler and 3.b is the diffraction pattern of CTAB-modified clay.

Belachew and Hinsene (2020) reported that between two samples of kaolin clay and CTAB-modified kaolin clay did not produce different diffraction patterns. There is a slight difference in the d spacing of kaolin clay which changes from  $d_{001} = 7.14531\text{ \AA}$  to  $d_{001} = 7.14763\text{ \AA}$  for CTAB-modified kaolin clay at an angle of  $2\theta = 12.3735$  [14].

#### C. Curing characteristics of natural rubber compound

The results of the natural rubber compound rheometer test using CTAB-modified clay and unmodified clay filler can be seen in Figure 4. The curves listed in the figure reveal that the vulcanization reaction that occurs in the compound using CTAB-modified clay filler increases sharply compared to using filler unmodified clay. The absorption of CTAB on the clay surface causes the clay surface to be more active so that the modified clay is able to become a better filler than the original clay. Filler can also cause stiffness in rubber vulcanization in addition to the vulcanization reaction. The movement of the rubber molecules cannot be free and is restrained by the filler surface so that the flexibility of the rubber vulcanization decreases and causes an increase in stiffness. This stiffness results in high torque on the vulcanized rubber [17]. In contrast to the compound that uses unmodified clay filler, the stiffness that occurs in rubber vulcanization is only caused by the vulcanization reaction and is less affected by the presence of filler. Here unmodified clay can not function well as a filler. The intermolecular network of rubber or a three-dimensional network between sulfur rubber molecules of rubber molecules formed only due to the vulcanization reaction causes the stiffness of the rubber vulcanization to increase [18].



**Figure 4.** Comparison of the stiffness properties of natural rubber vulcanizates observed through torsion between natural rubber composites using CTAB modified clay and original clay fillers using a rheometer

#### D. The effect of filler on the physical properties of natural rubber vulcanizates Hardness and elongation at break

The relationship between hardness and elongation at break of natural rubber vulcanization with filler clay and modified clay is shown in Figure 5.



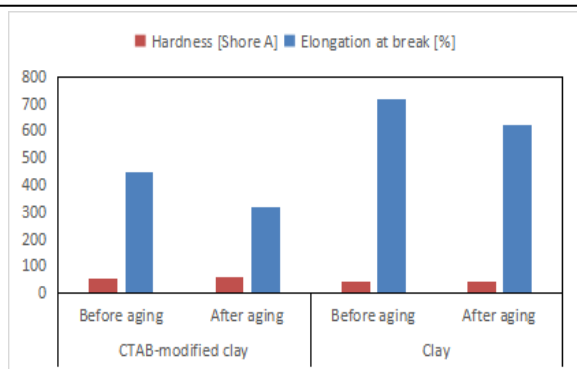


Figure 5. Comparison between hardness and elongation at break of natural rubber vulcanizates observed before and after aging using CTAB modified clay and clay filler

Figure 5 shows that the hardness of natural rubber vulcanization increased after the aging process was carried out either by using CTAB-modified clay or by using unmodified clay filler or original clay filler. This shows that here the vulcanization reaction is still occurring. The formation of a three-dimensional network between rubber molecules sulfur rubber molecules that occurs due to the vulcanization reaction causes an increase in stiffness. This rigidity contributes to an increase in hardness. Hardness for rubber vulcanization using CTAB-modified clay also showed higher hardness than the hardness with unmodified clay filler. The success of surface modification of clay filler using CTAB as a modifier can be identified through the absorption of rubber molecules on its surface. The more rubber molecules adsorbed on the surface of the filler causes an increase in the bound rubber [19]. The increase in bound rubber affects the physical properties of rubber vulcanization, including hardness. High rubber bound can cause increased hardness. The elongation at break in Figure 5 shows a decrease after aging using either CTAB-Modified clay or unmodified clay as filler. This change in elongation at break is caused by an increase in hardness. This increase results in a decrease in elongation at break. The elongation at break that uses unmodified clay filler is higher than the elongation at break of vulcanized rubber that uses CTAB-modified clay as filler. This impact is the opposite of hardness. High hardness with CTAB-modified clay but low elongation at break and vice versa. Here it turns out that unmodified clay does not function well as a filler compared to CTAB-modified clay. Ionic interaction, between the positive charge of CTAB and negative charge of clay [3] causes the surface of CTAB-modified clay filler to be able to absorb rubber molecules on its surface and this means that CTAB-modified clay filler functions as a better filler than the original clay.

#### Tensile strength and modulus 300%

Figure 6 shows the relationship curve between tensile strength and modulus of 300% observed for aging and before aging.

From Figure 6, the tensile strength decreased considerably for both vulcanizates using CTAB modified clay and unmodified clay filler from before aging to after aging. The greatest decrease in tensile strength occurred in rubber vulcanization using CTAB modified clay compared to unmodified clay filler. This is because CTAB modified clay is more able to function as a filler. Stiffness increases due to better filler function [17]. Besides the effect of the filler, the vulcanization reaction still occurs when the aging process is carried out. The vulcanization reaction also contributes to the stiffness of rubber vulcanization [18].

Something else happens where the modulus increases by 300% with the aging process. This occurred in both rubber vulcanizations using both CTAB modified clay and clay fillers. The 300% modulus is directly proportional to tensile strength and inversely related to elongation at break. Figure 6 shows that the elongation at break of vulcanization using unmodified clay filler is higher than vulcanization using CTAB-modified clay filler.

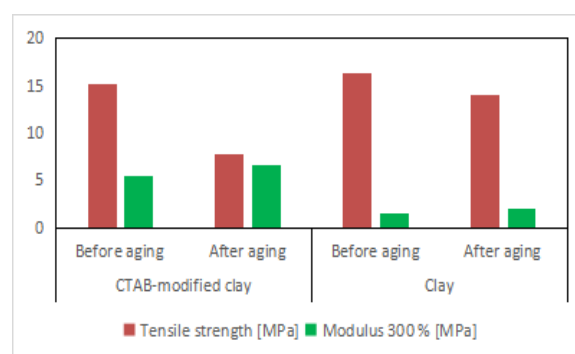


Figure 6. Comparison between tensile strength and modulus of 300% natural rubber vulcanizates observed before and after aging using CTAB modified clay and clay filler

## IV. CONCLUSION

The conclusions obtained from this study are as follows:

1. Modification of clay using CTAB as a modifier has been successfully carried out and has been proven by the results of FTIR spectra analysis and diffraction pattern of XRD.
2. The curing characteristics of the two natural rubber compounds using CTAB-modified clay as filler resulted in a much higher torque of 12.34 kg-cm compared to 7.05 kg-cm of original clay.
3. Comparison of the physical properties between natural rubber vulcanized filled with original clay and CTAB modified clay shows very different properties. Elongation at break and tensile strength for natural rubber vulcanized using CTAB-modified clay as filler is lower than that using original clay but the modulus is 300% and hardness is increased.

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# A PATTERN OF BRAND BETRAYAL: THE DISCONNECTION BETWEEN BRAND IDENTITY AND AESTHETICS

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**Abstract** - This paper intends to elucidate the pattern of brand betrayal. The disconnection between brand identity and aesthetics is what we recognized as the failure of brand moral obligation, thus we call brand betrayal. An illustration is made from three brands Nokia, Blackberry, and HTC to corroborate this framework, and the result of stock prices is shown. The author revitalizes the notion of brand identity and aesthetics as a part of brand life, and thus recognize as such by consumers. The two concepts speak to consumers in a united way. When they are dispersed, discordance between brand identity and aesthetics, consumers react vigorously.

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**Keywords** - Brand identity, Visual Identity, Aesthetics, Brand Betrayal, Disconnection, Nokia, Blackberry, HTC.

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Every brand comes into the business with a specific purpose, and it wants to stand for that purpose: that is its identity. This identity is expressed in a different way, among which the aesthetics are the perfect materialization of it (Schmitt and Simonson, 1997). The disconnection between identity and aesthetics is what we conceptualize by a pattern of brand betrayal because brand identity has failed to its moral duty.

Researchers have emphasized the necessity of a brand having an identity (Balmer, 2012; de Chernatory and Cottam, 2006; Kapferer, 2008; Melewar, 2003). Brand identity refers to what the brand is, what value it stands for. The quest of expressing the identity has been emphasized with the visual identity. For instance, Van den Bosch et al. (2005) has pointed that logo, typography, color, slogan all those visual elements are part of brand identity. Visual identity is the face of the brand (Phillips et al. 2014), and is the path for distinctiveness: the use of visual elements makes the brand to be noticeable (Balmer and Gray, 2000).

Complementary to identity is the aesthetics, from which a brand can benefit. For example the beauty of packaging as a motivator to impress consumers (Orth and Malkewitz, 2008; Berkowitz, 1987), the importance of good product shape (Bloch, 1995; Folkes and Matta, 2004), and the impact of a color combination (Garber et al. 2000). Thus brand identity and aesthetics become fundamentally related. The noticeably broken bond is perceived as betrayal.

Considerably, the pattern of brand betrayal is the breach of a relationship between a brand and its customers. The relationship occurs when the brand stance to keep its moral obligation through its identity and aesthetics as the realization of its identity. Once a brand does not stand on its promise, its aesthetics do not reflect the identity, the brand breaks its moral obligation, and then the betrayal occurs (Finkel et al. 2002). Parmentier and Fisher (2015) recognized

betrayal as the contravention of the norms that consumers consider important. In this present study is the aesthetics of the brand.

In this paper, the author interprets the pattern of betrayal of three leading mobile communication brands Nokia, Blackberry, and HTC as their aesthetics failed to reflect their identity, thus leading to consumers' disapproval. We took a longitudinal study of the three brands that once were recognized as a top successful brand, but dropped from their pedestal, even though, they are still in the market but no more as the most influential brand.

This paper commences by presenting what visual brand identity is, and what brand aesthetics is, and their substantial link before digging into the case studies.

## **Brand identity and Aesthetics terminologies**

The concept of brand identity (BI) has increasingly prevailed in the marketing literature while it cannot be disassociated with the concept of the brand itself, the basis of its nature. What is a brand, then? A brand is a social contract between a well-known source and a consumer. The well-known source promises to deliver a service, or a quality product, or anything else that responds to consumer needs. For example (Aaker, 2014) defines a brand as the seller's promise to customers. Kotler (2003) conceptualizes it as "any label that carries meaning and associations" (p.8). In that sense, anything can be branded, from Coca-Cola to cities such as New York, London, or Taipei, because these names conjure meanings that are attached to them and trigger some emotional experience.

Although brand identity is set to express the exclusive nature of the brand (Aaker, 1996) it is the pre-requisite of the market. Brand uniqueness is also what differentiates one brand from the others (Wilkinson and Balmer, 1996; Albert and Whetten, 1985).



Differentiation is a compelling aspect for a brand and its survival. Thus Howard Schultz (CEO of Starbucks) stated that you have to stand for something unique that makes the consumer recognize you.

Visual is the ultimate language of the brand (Schroeder, 2005; Birkight and Stadler, 1986). Everything we know about a brand comes to us through visual representation. For example, logos and other design elements are visually displayed to make a distinction. Academics in the marketing field are more and more exploring the effect of visuals on consumers. Visual help recognition and remembrance over text concluded Pieters and Wedel (2004).

## METHODOLOGY

In this research, we have adopted for the longitudinal data analysis. Because it presents well the situation of the brands during a period, from 2008 to 2018.

### Nokia

The Finnish brand got into the communication business with the purpose of 'Connecting people' as its mission, and the endeavor to create a new world of transforming the big planet into a small village, as its vision. For some time, Nokia stand for what it come to business, winning the ticket for the best brand in 2008, with a brand value estimated at 35,942 million USD. Nokia, also holds almost 40% of the mobile market share, with products referred to as the most reliable in the market. But once competitors arise, Nokia failed to keep the pace. Mostly, its Symbian Operating System was almost shut off to other Apps, the changing need of the customers. The brand vanished for lacking innovation, thus consumers felt betrayed. Also, the decision to associate with Windows Phone has destroyed their brand identity (Annual report 2012). The financial operation also reveal the downfall; at the top Nokia share worth 23, 73 Euro in January 2008, and it was down to 5, 06 Euro in December 2018. (Fig. 1).

### Blackberry

The Canadian-based brand was once the leading innovative brand in the telecommunication sector. Blackberry features itself as the world's leading provider mobility solution. And envision itself as the securing connection for the future that can be trusted. The brand introduce in 2000, a smartphone with a push email button, allowing a user to receive and send an email. This device captures everyone's attention, and has become the iconic brand of a government official to celebrities'. Nevertheless, due to product malfunctioning, products not meeting consumers' expectations, user experience less favorable compare to competing brands in the market. This harms the Blackberry brand (Annual report 2013). The emergence of the 'Apps economy', by freelancer developers, which fueled widespread adoption of

iPhone and Android-based smartphone, was missed by the brand. Rather, blackberry continue to focus on security issues, which was their differentiation portion. Again consumers take shift quickly to more convenient commodities, but brand managers' response was too slow. Consequently, the innovative brand was dethroned. The company was not able to convince Blackberry developers to develop an additional application for their products (Annual report 2013). The financial report bears witness to this. (Fig. 2).

### HTC

HTC is the Taiwanese base mobile telecommunication brand that was the flag bearer of the Android Operating System. HTC surprised the world by getting in the club of the 100 best global brands, by introducing some cut-edge technology such as aluminum case, ultra pixels, boom sound, Zoe camera. Etc. HTC is devoted to giving consumers high-quality products; its mission stands 'serving society and making life better. The brand always puts consumers at the center of its projects (2014 HTC Annual report). But for several years HTC has definitely struggled to keep the pace of a high-end smartphone brand. This is due to the dissociation between its brand identity and aesthetics. Several times, the brand has to change its mission and vision.

The dissonance became more visible, and consumers hardly can differentiate HTC products from others. Secondly, the intense competition in the industry, especially the eagerness of new entrants has pushed the brand to lose its steadiness up to forget its brand identity. Back in 2011, the year HTC has been at the apogee of its earning, making the headline of any business news, topping Apple Inc. in the US by retaining 24% of the market share and being listed among the three major players in the industry.

All three brands have portrayed the pattern of failure by not keeping their promise, they betrayed consumers who at one point trusted these brands; their aesthetics could no more reflect the brand identity.

## ANALYSIS AND DISCUSSION

At first, the three brands, Nokia, Blackberry, and HTC surprise the world and were listed among the 100 most valuable brands ranked by Interbrand. Although they are still in the business, but no more as a brand model in the industry by failing to keep their differentiation. Differentiation has been recognized as the foundation of the marketing theory (Levitt, 1980; MacMillan and McGrath, 1997). Through differentiation, a brand can lower direct competition, by presenting different characteristics that attract consumers (Lancaster, 1984). Differentiation makes the brand to be exclusive, desirable, valuable, therefore create loyalty. And so, a brand can ask for a premium price, make a profit and

lower the marketing costs (Sharp and Dawes, 2001). The best understanding of differentiation and where we agree upon is the assertion made by Selden and Colvin (2004): “differentiation is knowing your customer and their needs.

Haig (2003) has pointed three symptoms that trace to brand failure, and these symptoms are concurrent to the three brands: brand amnesia, brand paranoia, and brand irrelevance.

#### Brand amnesia:

It recalls the state of a brand that has forgotten its identity. In the words of Aaker (1996), it is a brand that has lost its uniqueness. The three brands have forgotten what they stand for; their identity has vanished, leading away to an aesthetics that does not correlate to its principal.

#### Brand paranoia:

Reminiscence state of a brand that duplicates its competitors. For example, the launch of the HTC A9 (2015) made consumers confused because the phone looks like an Apple phone. The visual HTC identity occurred as a visual Apple identity, and HTC lovers could not recognize HTC language in that design.

#### Brand irrelevance:

The fact of high competition and market evolving may put the brand at risk of becoming insignificant. The three brands suffered irrelevancy by losing value proposition to their consumers, thus making the brand obsolete. Their financial situation struggled to present a positive result.

The visual brand identity and aesthetics are not merely cosmetic makeup: making a brand appear beautiful. In a reality, it can mean loss when the two do not convey the same message. For instance, an identity that is swinging may be problematic for the brand itself and its consumer. For example, in a consecutive year, HTC has changed its identity from: “Quietly brilliant” to “Pursuit of brilliance”. Making it difficult either for the brand or for the customer.

We can conclude that brand as a whole is an interplay structure: identity is linked to aesthetics, vision is linked to communication and everything is interconnected. An identity is brand DNA, any attempt to depart from your DNA can destroy the brand.

In our research, we have chosen Nokia, Blackberry, and HTC brands as a study unit. The research can be extended to other industries, but we believe that the principle may be the same: your identity is your DNA and is interrelated to another part of your business. Your visual identity is surely related to the aesthetics of your brand, and its vision to your communication. Any separation does not help the brand. There is an urgent need of recognizing that identity and aesthetics are still imperative in our time.

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# REGIONAL GEOPOLITICS IN THE COMMUNITY OF PORTUGUESE-SPEAKING COUNTRIES

JOSÉ PALMEIRA

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**Abstract** - The Community of Portuguese-Speaking Countries (CPLP) was established in 1996 and currently has nine members states with regional integration on four continents and bathed by three oceans. Defense, and in particular maritime security, cooperation is one of their main areas of support. Most members are in the Atlantic, with Portugal in Europe, Brazil in South America and five countries in Africa (Cape Verde, Guinea-Bissau, Sao Tome and Principe, Equatorial Guinea and Angola). The sixth African member (Mozambique) is bathed by the Indian Ocean and the only Asian member (East Timor) is in the Pacific area. Regional integrations of member states into diverse geopolitical spaces (European Union, Mercosur, Economic Community of West African States, Economic Community of Central African States, and Southern African Development Community) co-exist with their participation in the community of countries of Portuguese language. The aim of this paper is to analyze the place of CPLP in the geopolitics of the member states. Using a qualitative research methodology it appears that regional insertion is more valued than cooperation in the Lusophone space. East Timor is the only exception for now, as it awaits its admission to the Association of Southeast Asian Nations (ASEAN).

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**Keywords** - Regional Geopolitics, Multilateralism, Cooperation, Portuguese-Speaking Countries.

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# A PARAMETRIC SEISMIC PERFORMANCE ANALYSIS OF REINFORCED CONCRETE BUILDING UNDER VARIOUS SOIL CONDITIONS BY CONSIDERING SOIL-STRUCTURE INTERACTION

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## **Abstract -**

In this paper, the seismic response of a reinforced concrete structure under different soil conditions considering soil-structure interaction (SSI) is investigated. For this purpose, the dynamic analysis was carried out for 6-storey reinforced concrete building which is founded on three different types of soils, and two different types of foundation, with and without soil interaction. The local soil conditions and the characteristics of input motion are important parameters for the numerical simulation and seismic analysis. The analysis was performed for three different cases: Fixed base without considering SSI and flexible base by considering SSI in dense and soft soil conditions. Kobe (Japan, 1995) earthquake record were used as input motion in the seismic and response spectrum analysis. Two-dimensional finite element model of the soil-structure system established with Mohr-Coulomb failure criterion under plane-strain conditions and a 2D version of Plaxis software has been performed in numerical analysis. In the present paper, nonlinear time history analysis was carried out in order to investigate the influence of different soil conditions. The analysis is compared for its parameters such as storey displacements and accelerations. The numerical analysis under different soil conditions demonstrated that, the acceleration and displacements for each soil type change according to its mechanical properties. In general, it is seen that the displacements increase values are increasing from hard rock to soft soil. Furthermore, more conclusions were carried out according to the obtained results and important findings are outlined.

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**Keywords -** RC Building, Seismic Response, Plaxis 2D, Finite Element Method, Soil-Structure Interaction.

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# THE SUCCESS FACTORS OF EFFECTIVE RISK MANAGEMENT IN A CLOUD COMPUTING SYSTEM

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## Abstract -

Cloud computing has become an emerging economic model that provides a flexible and scalable infrastructure for efficient business processing using big data. With the increase of cloud computing use, the importance of the proper risk management framework has increased across industries, as cloud computing carries a number of risk issues, such as confidentiality, third-party and security and privacy concerns. The necessity of building capabilities for managing related risks is especially pronounced in the corporates, who would like to take an advantage of cloud computing services. Risk management framework for cloud computing has been studied in the context of standard and framework in general, but empirical research on the success factors for managing risk in cloud computing has almost not yet been conducted.

The aim of this paper is to evaluate existing literature in developing an effective risk management framework incorporating key success factors, necessary steps, and processes and empirically examine the key success factors for managing associated risks in a cloud ecosystem. Based on an intensive literature review and on extended theoretical analysis as well as on preliminary empirical evidence, this paper presents a theoretical framework propose specific cause and effect relations key success factors as the independent variable and corporate value as the dependent variable. Furthermore, empirical study in German publicly traded corporates based on questionnaire, structured interviews and case study will be conducted to collect empirical data for demonstrating the relationship between success factors and risk management framework for cloud computing. As such, the research will develop conceptual and empirical explanation on the key success factors for managing risk in the cloud computing ecosystem and shall help to shape the future of an effectively enterprise risk management framework to protect and enhance corporate value.

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**Keywords** - Risk Management Framework, Risk Governance, Digital Risk, Third-Party Risk, Digital Business Ecosystem, Cloud Computing System.

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# CHARACTERISATION OF THERMALLY ACTIVATED RECYCLED CEMENT AND MORTARS AT HIGH TEMPERATURE

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**Abstract** - The necessity to reduce the overall energy consumption in building construction leads to extensive renovation projects and to demolition/reconstruction programmes. Accordingly, it is necessary to select of environment-friendly construction materials to reduce waste generation. The recycling of waste cementitious materials is one suitable option for sustainable development.

A lot of studies showed the recycled concrete aggregates (RCAs) possibility of use. Nevertheless, a lot of studies have investigated the recycled coarse aggregates and the study of recycled cementitious materials still incomplete. Recent reviews have highlighted that the partial replacement of recycled cement and recycled fine aggregate had not significant effect on the physical and mechanical properties of mortars.

First, the properties of recycled cement powder and recycled sand were investigated. The particle size (50 and 80  $\mu\text{m}$ ), dehydration temperature (105 and 500°C), and chemical composition were studied via SEM, XRD and TG/DTG/DSC analyse as well as initial and final setting time tests. Second, different recycled cement and recycled sand mortars were produced to study the workability and shrinkage properties. The mechanical, microstructural, and physical properties of recycled mortars at ambient and high temperatures (200 and 500°C) were also studied.

TG/DTG/DSC and XRD analysis of RC powders and RS chemical composition is influenced by the particle size (0/80  $\mu\text{m}$  or 0/2mm). The minutest particle size of 0/80  $\mu\text{m}$  presents a large number of chemical elements from the reference cement (such as ettringite, and portlandite), when the RS only had quartz and albite inclusions. The RC powder has more hydrates than recycled sand of 0/2 mm.

The RC dehydrating method is efficient in increasing the cement reactivity according to SEM analysis, TG/DSC analysis, and thermal response.

Between the room temperature and 200°C, the residual compressive and flexural strength of RM decreases gradually. Beyond 200 °C the residual mechanical strength loses up to 50% of its initial values, which are consistent with the findings for total porosity.

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**Keywords** - High Temperatures, Mechanical Properties, Physicochemical Properties, Recycled Mortar

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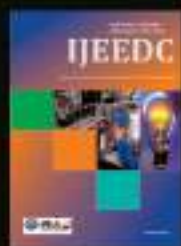
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**Gitanjali**

Assistant Organizing Secretary

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Thanks and Regards**Gitanjali**

Assistant Organizing Secretary

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The image displays a Zoom meeting interface with a grid of 21 participants. The participants are arranged in a 5x5 grid, with the bottom-right cell containing a large pink square with the letter 'A'. The control bar at the bottom includes icons for Mute, Stop Video, Security, Participants (21), Chat, Share Screen, Reactions, Apps, More, and an End button.

Participant Name	Participant Name	Participant Name	Participant Name	Participant Name
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PURNENDRA KUMAR SAHU	Rish Dubeey	Kamaljit Kaur	Iona alejanasam	akashdeep singh
Ekara Nagpal	Hyunsoo Kim	Solomon Megasiti	Subhaditya Mitra	Amritpal
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			ealmu001's iPhone 11 Pro	

Control Bar: Mute, Stop Video, Security, Participants (21), Chat, Share Screen, Reactions, Apps, More, End

Dokumen pendukung luaran Wajib #1

Luaran dijanjikan: Paten produk

Target: Terbit nomor pendaftaran paten sederhana

Dicapai: Draft

Dokumen wajib diunggah:

1. Dokumen Draft

Dokumen sudah diunggah:

1. Dokumen Draft

Dokumen belum diunggah:

- Sudah lengkap



tersebut masih terdapat kekurangan yaitu belum mencoba menggunakan (3-mercaptopropyl) triethoxysilane dan (3-mercaptoprophyl) trimethoxy silane sebagai surfaktannya. Invensi lainnya sebagaimana diungkapkan pada paten Amerika Serikat Nomor US 7342065B2 dengan judul Preparation of nanocomposite of elastomer and exfoliated clay platelets, rubber compositions comprised of said nanocomposite and articles of manufacture, including tires dimana diungkapkan penggunaan tanah liat. Namun demikian invensi yang tersebut di atas masih mempunyai kelemahan-kelemahan dan keterbatasan yang antara lain adalah belum menggunakan tanah liat termodifikasi oleh (3-mercaptopropyl) triethoxysilane dan (3-mercaptoprophyl) trimethoxy silane.

Selanjutnya Invensi yang diajukan ini dimaksudkan untuk mengatasi permasalahan yang dikemukakan di atas dengan cara menggunakan bahan pengisi tanah liat yang dimodifikasi dengan surfaktan (3-mercaptopropyl) triethoxysilane dan (3-mercaptoprophyl) trimethoxy silane.

#### **Uraian Singkat Invensi**

Tujuan utama dari invensi ini adalah untuk mengatasi permasalahan yang telah ada sebelumnya khususnya penggunaan tanah liat lokal, dimana suatu formula karet alam yang dicirikan dengan penggunaan tanah liat lokal termodifikasi (3-mercaptopropyl) triethoxysilane dan (3-mercaptoprophyl) trimethoxy silane.

Tujuan lain dari invensi ini adalah mendapatkan sifat fisik dari formula karet yang disajikan.

Tujuan dan manfaat-manfaat yang lain serta pengertian yang lebih lengkap dari invensi berikut ini sebagai perwujudan yang lebih disukai dan akan dijelaskan dengan mengacu pada tabel-tabel yang menyertainya.

### Uraian Singkat Gambar

Gambar 1 adalah gambar yang menjelaskan kurva spektra FTIR untuk tanah liat lokal, tanah liat lokal termodifikasi (3-mercaptopropyl) triethoxysilane dan (3-mercaptoprophyl) trimethoxy silane.

### Uraian Singkat Tabel

Tabel-tabel 1, 2, dan 3 merupakan rumusan formula karet alam yang menggunakan bahan pengisi tanah liat lokal, tanah liat lokal termodifikasi oleh (3-mercaptopropyl) triethoxysilane dan tanah liat lokal termodifikasi oleh (3-mercaptoprophyl) trimethoxy silane.

Tabel 4 adalah tabel yang menampilkan data sifat pematangan karet alam sementara tabel-tabel 5 dan 6 merupakan tabel yang menampilkan sifat fisik vulkanisat karet alam.

### Uraian Lengkap Invensi

Invensi ini akan secara lengkap diuraikan dengan mengacu kepada :

a. Penyusunan formula awal atau satu (1)

Tabel 1. Formula karet 1

No	Formula karet	phr
1	RSS-1	100
2	ZnO	5
3	Asam Stearat	2
4	Tanah Liat Lokal	15
5	<i>Paraffinic oil</i>	5
6	TMQ	2
7	TMTD	0,5
8	Sulfur	2,5

Tabel 1, 2, dan 3 sebelumnya ini merupakan acuan untuk mengetahui sifat pematangan kompon karet alam dan sifat fisik vulkanisat karet alam.

- 5 b. Untuk membandingkan sifat pematangan dan sifat fisik vulkanisat karet sebagai hasil dari pengujian sifat pematangan dan sifat fisik, dibuat perubahan Tabel 1 dengan mengubah tanah liat lokal menjadi tanah liat lokal termodifikasi oleh (3-mercaptopropyl) triethoxysilane menjadi Tabel 2.
- 10 c. Perbandingan sifat pematangan dan sifat fisik vulkanisat karet alam juga dilakukan untuk formula 1 pada Tabel 1 dengan mengganti bahan pengisi tanah liat lokal menjadi tanah liat lokal termodifikasi oleh (3-mercaptoprophyl) trimethoxy silane sehingga Tabel 1 berubah menjadi Tabel
- 15 3.

Tabel 2. Formula karet 2

No	Formula karet	phr
1	RSS-1	100
20 2	ZnO	5
3	Asam Stearat	2
4	Tanah Liat Lokal termodifikasi (3-mercaptopropyl) triethoxysilane	15
5	<i>Paraffinic oil</i>	5
6	TMQ	2
25 7	TMTD	0,5
8	Sulfur	2,5



Tabel 3. Formula karet 3

No	Formula karet	phr
1	RSS-1	100
2	ZnO	5
3	Asam Stearat	2
4	Tanah Liat Lokal termodifikasi (3-mercaptopropyl) trimethoxysilane	15
5	<i>Paraffinic oil</i>	5
6	TMQ	2
7	TMTD	0,5
8	Sulfur	2,5

d. Hasil uji pematangan untuk formula 1, 2, dan 3 dapat dilihat pada Tabel 4 sementara hasil uji sifat fisik vulkanisat karet alam tercantum pada Tabel 5 dan 6.

Tabel 4. Sifat pematangan karet alam formula 1, 2, dan 3

Sifat pematangan	1	2	3
Smax - Smin [kg-cm]	7.23	11.83	7.71
Smax [kg-cm]	7.75	12.34	8.20
Smin [kg-cm]	0.36	0.51	0.49
Optimum cure time (t90) [min]	6.1	8.4	7.7
Scorch time(ts2) [min]	2.9	1.4	4.3

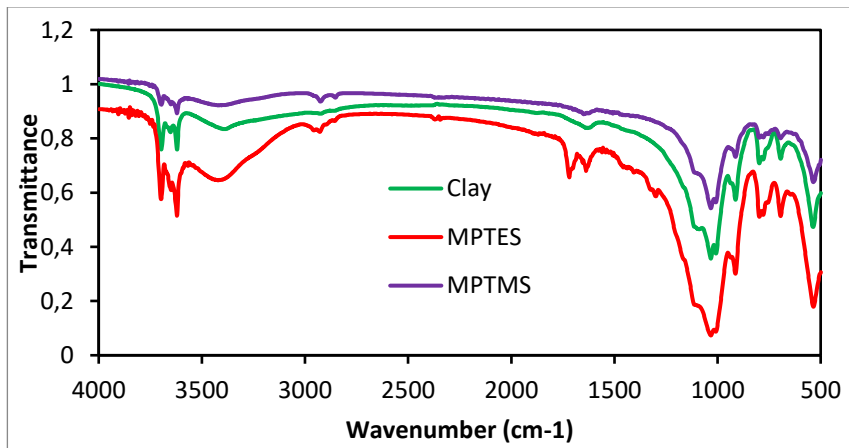
Tabel 5. Sifat fisik vulkanisat karet alam formula 1, 2, dan 3

Sifat fisik vulkanisat	1	2	3
Compressive strength [N/mm <sup>2</sup> ]	25,75	27.42	27.73
Cut growth [kcs]	70	70	60
Rebound resilience [%]		74	76

Tabel 6. Sifat fisik vulkanisat karet alam formula 1, 2, dan 3 serta proses aging untuk masing-masing formula

Sifat fisik	1		2		3	
	Before aging	After aging	Before aging	After aging	Before aging	After aging
Kekerasan [Shore A]	44	45	55	60	43	45
Kuat tarik [MPa]	17.8	11.5	15.1	7.8	18.6	19.7
Perpanjangan putus [%]	650	530	450	320	680	650
Modulus 300% [MPa]	2.3	3.6	5.5	6.6	2.1	2.9

Hasil karakterisasi FTIR untuk tanah liat lokal, tanah liat lokal termodifikasi oleh (3-mercaptopropyl) triethoxysilane dan oleh (3-mercaptoprophyl) trimethoxy silane ditunjukkan pada Gambar 1.



10 Gambar 1. spektra FTIR untuk tanah liat, tanah liat termodifikasi MPTES, dan tanah liat termodifikasi MPTMS.

Analisis gugus fungsi spectra FTIR gambar 1 tercantum pada Tabel 7.

Table 7. Gugus fungsi spectra FTIR untuk tanah liat, tanah liat termodifikasi oleh (3-mercaptopropyl) triethoxysilane dan oleh (3-mercaptoprophyl) trimethoxy silane

Gugus Fungsi	Bilangan Gelombang		
	Clay	Clay + MPTES	Clay + MPTMS
Si-O-Mg stretching	530	530	534
Phenyl ring	698	693	693
Phenyl ring	772	776	778
stretching Si-C	797	797	783
	908	914	914
	1027	1004	1009
Si-O-Si stretching	1038	1034	1033
Si-O-CH <sub>3</sub>	1109	1099	1095
	-	1302	-
	-	1376	-
	-	1439	-
-OH bending	1607	1635	1622
C=O vibration	-	1719	-
	-	2339	-
	2369	2356	2352
Aliphatic C-H str	2859	2850	2834
	-	2909	-
Aliphatic C-H str	-	2926	2905
	-	2949	-
-OH Vibration	3385	3421	3414
MMT structure hydroxyl O-H stretching	3619	3621	3605
	3657	3647	3646
	3714	3693	3717

- 5 Spektra tanah liat murni dibandingkan dengan sampel tanah liat yang telah dicampur dengan silane pada Tabel 7 menunjukkan beberapa gugus fungsi yang menjadi karakteristik dari silane. Intensitas pada 3385 - 3425 cm<sup>-1</sup> merujuk pada -OH vibration dari air yang terserap. Gugus fungsi ini bisa
- 10 berikatan dengan atom Si atau Al. Spektra sampel yang telah dicampur dengan MPTMS menunjukkan penurunan intensitas pada 3385-3425 cm<sup>-1</sup> yang mengindikasikan penurunan penyerapan air, sedangkan pada sampel yang dicampur dengan MPTES

intensitasnya meningkat dan mengindikasikan adanya peningkatan penyerapan air. Indikasi lain yang menggambarkan keberadaan air terdapat pada intensitas 1607-1635  $\text{cm}^{-1}$ , yang menunjukkan hasil yang sama dengan intensitas 3450  $\text{cm}^{-1}$ , di mana sampel MPTES memiliki serapan air yang lebih tinggi.

Absorpsi pada 2905-2926  $\text{cm}^{-1}$  merujuk pada gugus asymmetrical stretching dari gugus metilena, gugus ini muncul pada semua sampel yang telah dicampur dengan silane kecuali pada clay murni.

Absorpsi pada 1719  $\text{cm}^{-1}$  ditemukan pada sampel yang dicampur MPTES merupakan C=O vibration yang mengindikasikan adanya degradasi pada rantai hidrokarbon yang ada di sampel atau MPTES.

Disini terdapat puncak karakteristik silane yang muncul pada sampel tanah liat yang telah dimodifikasi seperti pada:

- 1439  $\text{cm}^{-1}$  pada sampel MPTES yang merupakan gugus phenyl ring
- puncak pada antara 750 hingga 650  $\text{cm}^{-1}$  pada semua sampel yang menandakan out of plane bending aromatic C-H.
- Indikasi lainnya tergambar pada 783-797  $\text{cm}^{-1}$  yang merupakan stretching dari Si-C, yang ditemukan pada semua sampel.

Puncak-puncak ini menandakan adanya kemungkinan silane telah tercangkok pada permukaan tanah liat atau juga hanya terikat secara mekanik.

**Klaim**

1. Formulasi karet yang mengandung karet alam sebesar 100 phr, ZnO sebesar 5 phr, asam stearat sebesar 2 phr, satu atau lebih bahan pengisi yang dipilih dari Tanah liat lokal, Tanah liat lokal termodifikasi oleh (3-mercaptopropyl) triethoxysilane dan tanah liat lokal termodifikasi oleh (3-mercaptoprophyl) trimethoxy silane sebesar 15 phr, salah satu bahan pelunak yang dipilih dari minyak paraffin dan minyak aromatik sebesar 3,75 sampai 5 phr, senyawa 2,2,4,trimetil-1,2-dihidrokuinon sebesar 2 phr, senyawa tetrametil tiuram disulfida sebesar 0,5, dan sulfur sebesar 2,5 sampai 3 phr.
2. Formulasi karet sesuai dengan klaim 1, dimana karet alam yang digunakan dalam komposisi tersebut adalah karet alam RSS 1.
3. Formulasi karet sesuai dengan klaim-klaim sebelumnya, dimana tanah liat yang digunakan dalam komposisi karet tersebut adalah tanah liat lokal, tanah liat lokal termodifikasi (3-mercaptopropyl) triethoxysilane dan tanah liat lokal termodifikasi (3-mercaptoprophyl) trimethoxy silane.
4. Formulasi karet sesuai dengan klaim-klaim sebelumnya, dimana komposisi tersebut memiliki sifat fisik sebagai berikut : Kekerasan sebesar 43-60 shore A, Kekuatan tarik sebesar 7,8-19,7 MPa, perpanjangan putus sebesar 320-680 %, Modulus 300 % sebesar 2,1-6,6 MPa, Compressive strength 26,35-27,73 N/mm<sup>2</sup>, Cut growth 60-70 kcs, dan Rebound resilience 74-84 %
5. Sifat pematangan yang ditunjukkan oleh Torsi (S max dan S min) sebesar 7,23-11,83 kg-cm, waktu optimum laju reaksi sebesar 6,1-8,4 menit, dan waktu scorch sebesar 1,4-4,3 menit.



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Judul artikel: Analysis of Physical Properties of Natural Rubber Composites using CTABModified Clay Filler

# Proceedings of **WRFASE**



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## **EDITORIAL**

It is my proud privilege to welcome you all to the WRFASE International Conference at Yogyakarta, Indonesia. I am happy to see the papers from all part of the world and some of the best paper published in this proceedings. This proceeding brings out the various Research papers from diverse areas of Science, Engineering, Technology and Management. This platform is intended to provide a platform for researchers, educators and professionals to present their discoveries and innovative practice and to explore future trends and applications in the field Science and Engineering. However, this conference will also provide a forum for dissemination of knowledge on both theoretical and applied research on the above said area with an ultimate aim to bridge the gap between these coherent disciplines of knowledge. Thus the forum accelerates the trend of development of technology for next generation. Our goal is to make the Conference proceedings useful and interesting to audiences involved in research in these areas, as well as to those involved in design, implementation and operation, to achieve the goal.

I once again give thanks to the Institute of Research and Journals, WRFASE & The IIER for organizing this event in Yogyakarta, Indonesia. I am sure the contributions by the authors shall add value to the research community. I also thank all the International Advisory members and Reviewers for making this event a Successful one.

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# MEDIATING ACTUAL AND PERCEIVED RISKS OF VISITORS AND TOURISTS IN A TOUR TRIP TO HERITAGE SITES (HISTORICAL JEDDAH) IN THE KINGDOM OF SAUDI ARABIA

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**Abstract** - Even though the pre-pandemic increase in the number of tourists worldwide in general and in the Kingdom of Saudi Arabia (KSA) in particular has been considered to be a positive phenomenon for different aspect of people's life, it also increases the probability that different types of risk will be confronted. This, in part, is due to the different perceptions of risk among tourists and host populations. Therefore, this research aims to examine the issue in the context of the heritage sites of Historical Jeddah (HJ) in the(KSA) and focuses, specifically, on investigation of the actual and perceived risk of visitors and tourists (V/T) and the factors that influence these kinds of risks. The research questions are answered, based on a qualitative approach to explore the phenomena. Therefore, in this study, the data were collected from (V/T) in a tour trip using different methods, semi-structured interviews and questionnaires that were appropriate for the analysis of the aims, research objectives and research questions, in a way that ensured that participants were provided with ample opportunities to freely voice their perceptions of risk. The findings highlight the different kinds of risk and the factors that may influence risk and perception of risk.

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**Keywords** - Heritage sites 'Historical Jeddah', Kingdom of Saudi Arabia, Risk and perception of risk, Tourists and visitors.

---

## I. INTRODUCTION

“Risks in tourism is a controversial research topic with many disputes and paradoxes” [44]–[2]. According to Maslow (1943) cited in [44] safety is a basic human need. Much research and the existing literature has supported this idea as they found that most tourists tend to avoid any destinations that include higher potential risks[44].

There are two major types of risk: absolute risk and perceived risk [12]. Absolute risk can be estimated by organizations and individuals who implement security measures to ensure minimal risk and the maximize safety [36]. At the same time, perceived risk is “the consumer's perceptions of the uncertainty and adverse consequences of buying a product (or service)” [13]–[119]. Therefore, there are seven different types of risks that can be identified: a) financial, b) social, c) psychological, d) physical, e) functional, f) situational and finally g) travel risks [27]. Related to travel, there is different type of risk which are health concerns, terrorism, crime, or natural disasters at tourist destinations [27]. One study compared two groups of Saudis who visited Germany and found five types of risk which are: ego, money, time, health, and social risks[45]. Other studies examined four main types of risk which were human-induced risk, social–psychological risk, financial risk, and health risk[12]. Therefore, in this study the researcher will investigate different kinds of risk and these types of risks considered as either personal responsibility such as sports-risks, (eg drowning and so on), or local authorities' or the operator's responsibility such as transportation, accommodation, infrastructural and industrial risks[14]. All previous kinds of risks caused by external causes can generally be controllable unlike

natural hazards which may be considered as acts of God [14]. According to Jungermann & Slovic (1993) cited in [14]- [94] “Whereas natural risks are judged to be involuntary, uncontrollable, not socially attributable, and hence inevitable, risks of human origin are seen as voluntary, controllable, attributable and hence ultimately avoidable—and thus as more severe than risks from nature”. Moreover, many tourists perceive the threat of terrorism as part of life in general. In other words, terrorism risks exist in both the tourists' home country and at tourism destinations [39]. Therefore, for all these reasons, this study excludes the natural hazards and terrorism-related risks.

Regarding the factors that may influence risk and perception of risk, there are two that formed the risk perception of tourists which include both internal and external factors. Internal factors are related to tourists themselves while external factors are the information or recommendations the tourists will get from the travel agencies, tour guides, travel advisories, media, family or friends and destination image [21]. The researcher concludes that external factors provide tourists with the information about actual risks that might occur at the destination, while internal factors are the one which determine the interpretation and perception of the risks [44]. In addition, scholars have illustrated that there are variety of factors that may influence the risk perceptions of tourists in the tourism sector [37]. These factors depend on the type of risk and how important it is to the tourists. Risk perceptions are affected by sociodemographic variables such as age [19], gender to some degree [37] or level of education [34], social status, organizational factors such as travel arrangements (group versus individual travel), the situation that tourists are involved with and stage of travel[37].

Moreover, risk perception can be influenced by factors that relate to travel such as traveling with children or not as well as the wider travel experience [25].

## II. STUDY METHOD

### A. Study Area

The study setting is (KSA), which is located between Asia and Africa, in the Arabian Peninsula. (KSA) has borders with several countries and has coastlines on the Persian Gulf and the Red Sea. Millions of Muslims visitors worldwide come to visit (KSA) annually for religious purposes to perform Hajj and Umara in Makkah and to visit the holy mosque of Prophet Mohammed (peace be upon him) in Al-Madinah [26]. Beside religious purposes, (KSA) has developed several kinds of tourism such as nature tourism, culture and heritage, ecotourism, and leisure. This study will focus on heritage tourism, which is seen as a subset of cultural ethnic and educational travel which is believed to be of special interest to tourists [20]. Heritage has many forms and meanings. As a result, heritage is interpreted differently by one person from another based on their background and perspective [5]. Heritage sites are significantly important due to their role in introducing people to their roots and helping them to preserve their own history [3]. Nowadays, visiting heritage sites has grown rapidly in the modern tourism industry and thus contributes significantly to increase the number of international and domestic tourists [4]. Therefore, investigating risk and perceptions of risk for (V/T) in these sites can be considered to be a critical phenomenon. (KSA) is a country that is full of many cultural, historical, and attractive sites to present to (V/T) [33]. There are several sites in the (KSA) that were registered with the United Nations Educational, Scientific and Cultural Organization (UNESCO) between 2008 and 2015 and these are as follows: Madain Saleh, Historical Aldir'iyah, (HJ) and Rock Art in the Hail Region. The focus of this study is on Jeddah's old town known as Al-Balad (HJ) which is the old historic center of the city was included on UNESCO's world heritage list in 2014. This international recognition has strengthened demand from tourists as a heritage tourism destination [41]. (HJ) is in Jeddah which is located on the eastern shore of the Red Sea and in the west of (KSA), it is called the bride of the Red Sea. It is the second largest city. Jeddah has been the main and the largest seaport in the peninsula which make it known as a commercial capital. Jeddah is the gateway to Makkah and Al-Madinah which are Islam's holiest cities because they include the holiest mosques. (HJ) possesses several special features including its valuable history for (KSA) citizens, for Muslims and for wider society as well as it is the only intact world heritage site in (KSA), on the Red Sea coast, and in any of The Gulf Cooperation Council countries [5].

### B. Data Collection

This research involves (V/T) (local and international) visitors in order to understand the phenomena from their point of view. The researcher was able to collect data from a total of 19 participants divided into 11 (V/T) from (KSA) (from Jeddah or other cities) and 8 were international tourists and comprising 4 males and 15 females and these participants were on organized tours. Collecting the data started in summer 2019 between June and August in (HJ). The data collection process took about 40 days. This study targeted international tourists who visited the country either for leisure, work, or business purposes as well as local visitors.

### C. Research Instrument

Employing mixed methods that were predominantly qualitative, the study used different methods, including observation, semi-structured interviews and a questionnaire to gather core demographic information. Interviews are defined as "a form of communication, a means of extracting different forms of information from individuals and groups" [9]–[207]. There are different types of interviews used in qualitative research either unstructured or structured and choosing one of them depends on the aims of the study [22]. Semi-structured interviews provide the researcher with wider control over the conversation [22] and helps the researcher engage with different perspectives of the research problem and gain a deeper understanding of the study [38].

Questionnaire definition as a set of questions formulated by the researcher to reach the research's objectives by getting core personal and trip information from the participants [30]. As noted in the literature review, risk and risk perceptions can be influenced by media, friends and family members, or travel organizations, sociodemographic variables, travel with children, or not, and travel experience. Therefore, the researcher used the questionnaire for (V/T) to gain information about the socio-demographic variables as well as some general information related to the travel destination. There are several reasons why the researcher preferred to know about these kinds of information in a form of a questionnaire which are: first, to avoid any embarrassment that (V/T) can experience if asked about these matters face to face. In qualitative studies, when researchers conduct interviews, they need to pay attention to the questions that might be deemed sensitive that may cause stress to the participants [11]. Therefore, sociodemographic variables are considered by some people as sensitive. Further, it is important to note that the researcher is female, and it is difficult to ask these questions of men due to the societal context to which the researcher belongs, as well as some of the participants. Secondly, to save time during the interview, if the researcher spends the beginning of the interview addressing such questions, it might be challenging when reaching questions that

needs in-depth answers. Additionally, It is also noteworthy that participants came to visit a place to have fun and enjoy their time with their family, friends, or themselves. Therefore, for all these reasons, the link between the questionnaire and the interviews was the best way for the study conditions, the nature of the questions, the time, and the nature of the participating sample population.

#### D. Data Analysis

In qualitative data, researchers widely use the thematic analysis approach. Therefore, this research used this method to analyze the data which is defined as a method to identify, analyze, and report the patterns called themes [8]. The second stage was coding the data and categorize them into group with similarities, this process was conducted manually because using computer software may cause obstacles that may affect the judgment of the researcher over the data and create distance between the researcher and the data as well [11]. Since the data was collected in Arabic, the researcher preferred to analyze the data in Arabic and chose to translate just the quotes needed. Translation and analysis of the data to English from the first stage may have an effect of losing the meaning of the data especially that the participants were using slang, idiomatic, and informal Arabic. Therefore, this encouraged the researcher to give special attention when translating the quotes to reduce any risk of losing the meaning of the data.

### III. FINDINGS AND DISCUSSION

The participants identified several kinds of risk that might occur in (HJ) which can grouped as actual risk and perceived risk. However, some of the categories of the different kinds of risks in this research are different from the other studies and this is because the classifications of risk used by scholars in the travel literature were developed from the general industry which makes the typology of risk broad and limited [42].

#### Actual risk:

Based on the respondents' points of view the actual risk is represented in physical harm, health risks, issues of loss, and human issues.

#### Physical harm:

The physical harm was represented by participants as following: uneven ground, high, old, broken, or no railing steps of stairs, and falling from a higher area or be close to an edge. Even though most or some of these risks are a common factor in most heritage sites around the world, nevertheless it is important to try to avoid and reduce them because they may pose physical problems for tourists or pedestrians. Uneven ground is one of the risks that can cause falling, discomfort, and actual pain. Usually when (V/T) go to historical places, their focus is on looking at the

buildings and contemplating the aesthetics and details, and their focus is rarely on the steps under their feet, so the unevenness of the land may cause very big problems to them. Not to mention that these places are visited by visitors of all ages, healthy people, people with disabilities, baby strollers and the elderly who use wheelchairs or crutches, which makes it difficult to walk on unpaved roads while it should be accessible for everyone. The vibrations caused by unpaved streets can cause difficulties, acute pain, haematomas and fractures to people with particular diseases, to disabled people, people with wheelchairs or crutches, and even to other type of people [35]. Regard the (HJ), the researcher studied the visitors' satisfaction with facilities and accessibility and found out that visitors are dissatisfied with the quality of walkways, pedestrians' pathways and site accessibility as they scored (2.65/5) and (2.25/5) respectively [3]. Add to that, in the streets of (HJ) where (V/T) were walking enjoying their moments, there were golf carts for VIP visitors sharing the same pedestrian road with the other visitors.

Participants agreed that high, old, and broken steps of stairs can cause serious injury for tourists in (HJ). It might cause falls or injuries to tourists' legs as well as fatigue and exhaustion, especially for elderly tourists or tourists who may have a lack of fitness. As well, it can cause a problem in cases of emergency and when trying to evacuate the tourists in the site. This issue can be found in other historical sites such as historic buildings in Malacca as it is part of the old buildings' design and can cause a problem for being too steep and narrow such as danger of injury in the case of an evacuation and risk of further complications [2]. Moreover, some stairs do not just have broken steps but also have no handrails or upstands on the sides of the ramps which make them inaccessible for use and this corresponds to the stairwell problem in the Knole House as one of Britain's most significant and complete historic houses [29].

Participants mentioned that one of the issues that could happen in heritage sites is falling, the fall can be either from higher places such as mountains, roofs or being close to the edge. Tourists may fall either because of their lack of attention or because accidents while engaging in photography or taking selfies. Tourists enjoy taking pictures or selfies while they are traveling or even visiting local places to record the enjoyment moments. Even though this trending tends to be not risky, but in some situations, it can be considered as risky as it may cause serious injury or death. Self-capture photography in high places close to the edge, from the stairs, from the roof, or any place not prepared to capture the selfies may cause fall hazards, which may cause unpleasant risks as stated. The researcher noted that a Japanese tourist died at the Taj Mahal in India after slipping down the stairs while taking a selfie at the Royal Gate of the palace [15].

### **Health risks:**

Health risks are one of the risks that (V/T) mentioned, it can be in the form of physical fatigue or physical illness such as diseases like diabetes, high or low pressure or heart diseases, asthma or because of the weather conditions. (V/T) considered health risk as a more threatening kind of risk than any other kinds in (HJ) due to the hot and humid weather. Most of the health issues related to travel destinations or visiting local places, are due to the low or even no precautionary measures such as forgetting to take medicine, or vaccine, or eating inappropriate food, and so on. Moreover, international travelers might be at higher level of health risk due to lack of awareness of health issues in the country, as well as neglecting precautions and planning ahead of travel [10]. Based on the data gathered from GeoSentinel for the years of 1997 to 2011, 8% of worldwide international travelers reported either that they had to seek health care during or after a trip or becoming ill, as well as 14% of travelers who fell ill and were diagnosed with a disease that could have been prevented if the travelers had had a vaccine [32].

Being in hot and humid weather like in Jeddah, the summer temperatures are approximately 41°C to 39°C and sometimes reach above that, and the humidity 61% to 62%, could really be a serious issue for tourists especially when spending time walking around to explore the beauty of the buildings and the history of the places. Due to the weather conditions most of the year in Jeddah, but especially in the mornings, (43%) of the participants to (HJ) prefer to visit it in the evening, while (41%) prefer to visit it at night, and only (16%) prefer to visit the (HJ) in the mornings [3]. Moreover, in the daytime especially in the summer conditions, the running of tour schedules for tourists will be affected therefore, it is very important to consider suitable climatic environment in order to prevent bad impacts on tourists' health [46].

### **Human issues:**

Exposure to theft or harassment, as well as some behavior carried out by tourists, such as: walking alone in unfamiliar places, going into unsafe buildings, and some bad behavior from local people against tourists such as verbal assaults, all these issues were indicated by the (V/T) among the human issues. These actions may cause fear, anxiety, discomfort, and dissatisfaction to the (V/T). Studies indicate that being in the wrong place at the wrong time, one of the scenarios that expose tourists to crime and crimes against tourists can significantly damage a location's image [17].

### **Perceptions of risk:**

Moving to the other kind of risk based on the participants' assessment is perceptions of risk. Perceptions of risk is vital and comprises many

different types of risk including financial risk, social risks, and psychological risks.

### **Financial risks:**

The (V/T) were concerned that if they spend a lot of money in order to receive good services, but these are not delivered then this is not good value for money. Buying a product or service in the travel destination, at a high price or when there is a difference in selling price from one tourist to another makes tourists doubt the service, product and price, and thus feel dissatisfaction, which may affect the frequency of their visit or reflect a bad image for the destination. This matches with a study that shows that factors associated with repeat visitors are service quality risk, financial risk, natural disasters, and car accidents [16].

### **Social risks:**

Social risks are kind of risks which are represented in cultural differences, different customs, tradition from one society or one country to another, language difficulties, and body language. Speaking a different language than the language of the host country results in ineffective communication with local people and prevents tourists from expressing their needs and wishes or seeking assistance in the event of any problem or danger. In terms of cultural differences, lack of tourists' awareness of culture, customs, tradition, and body language of the host country are likely to cause problems and lead to misunderstanding from the local people and thus each will begin to act accordingly. Local people in (KSA) have a special culture, therefore, international tourists have to respect the privacy of local people 'culture in terms of the appearance, body touching, taking photos, having conversations, and so on. Respect for the culture of the host country should be applied from the international tourists to local people as well as vice versa. The more cultural distance among people the more difficult to interact with them which may lead to misinterpretation and misunderstanding and thus increase risk perceptions [31].

### **Psychological risks:**

The uncertainty of an unknown country and hearing something not appropriate about the country are the kind of risks fall under the psychological risks. Visiting a country for the first time and have no ideas about it in terms of the rules of the country or about the local people' culture might cause a risk for tourists. These risks may be exacerbated if tourists hear bad information or news about the country or certain destinations in it. In case of this study, media sometimes publish bad information and news about (KSA) which may affect tourists psychologically, thus affecting their ability to deal with risk as well as their lack of enjoyment and satisfaction from the trip. International tourists perceive (3.4255) mean value for psychological risk and this is the third highest level of risk when analysing the internal risk

perception at Ajanta caves which is part of the world heritage site of Ajanta [6].

(V/T) also mentioned that loss issues of any tourist are a kind of risk that may cause dispersion, anxiety, and fear for the whole group. Delay in following the group and walking in a dark or unknown road, are some of the reasons that lead to loss for tourists. In addition, total reliance on the use of smartphones to obtain directions may result in loss when the internet connection is lost or the battery is dead. Total reliance on smart devices may cause psychological problems and perception of risks for tourists, who thus do not enjoy the tourist trip. Failure in using mobile devices to guide them in the travel destination will impact tourists negatively. As well this will affect the tourists experience thus will cause the psychological risk to tourists [18].

#### **Uncomfortable feeling:**

Participants mentioned that crowded places can cause uncomfortable feelings. Crowded places may cause suffocation or health issues for (V/T), being robbed, being subjected to harassment, and difficulties for authorities in case of evacuation. Researchers studied the tourists experience in (HJ) and participants were unsatisfied about the crowded and suggested to explore methods to decrease people crowding [3]. One of the reasons might explain the crowded environment in (HJ) is the weather, due to the hot and humid climate in Jeddah during the summer season which was the time for (HJ), so most (V/T) came to the (HJ) after the sunset and even at night which cause so much crowding in the site. As stated by researchers that (43%) of the participants to (HJ) prefer to visit it in the evening, while (41%) prefer to visit it at night, and only (16%) prefer to visit the (HJ) in the morning [3].

#### **Factors influencing risk and perception of risk:**

Regarding age of the (V/T), this varied from 18 to 65+ years. The researcher claimed that the age of (V/T) did not affect the tourists' response. This is consistent with a study [43] find no relationships between age and risk perception.

Most of the interviewees were female because the researcher is female, and female participants show greater willingness to participate and felt more comfortable than men. In Saudi culture when there is a family and there is a female who want to chat with this family it is easier to have the conversation with a female like her to relieve any kind of jealousy or uncomfortable situations that might occur. Social differences seem to form in the problems that appear in the gender of (V/T) group. Some (V/T) encounter some situations when the tourist guide is male and (V/T) either women or families, some annoyance and discomfort occur by (V/T). The study found that gender does not have an impact on travel risk because

there are other factors besides gender that influence risk such as cultural background and tourist role [28]. As mentioned previously this study investigates (V/T) who were part of a tour trip as a travel arrangement method. The study found out that backpackers' who arranged the trip on their own were four times more likely to perceive risks in Ghana than backpackers who used travel intermediaries [1].

Among the most important reasons that affect the perceptions of risks among tourists are the people who are accompany the tour. (V/T) who have children as well as (V/T) who do not know each other may lead to a difference in perceptions of risks and it will be difficult to control that. This is consistent with a study [24] that stated that there is a link between trip characteristics and risk perception such as travel composition which represented in the size and presence of children.

The (V/T) thoughts of risk either due to hearing bad things or previously having had bad experiences. These two factors might have an impact on the (V/T) and might lead to preventing them from trying new things or even enjoying their time. The responses report about the source of knowledge about (KSA) was varied between friends, media ex. (TV, radio, social communications, others), and travel agencies. The research studied the effect of internal and external crisis on resistant tourists and found out that internal and external crisis- resistant tourists are more likely to be influenced by source of information come from social media, social clubs, and unknown travelers. However, information provided by friends or relatives are less likely to influence the members of external crisis- resistant tourists [19]. Despite, none of them were influenced by bad information or were worried about being in (KSA). The researcher also attributes the possibility of this for four reasons which were extracted from the questionnaires.

The first reason is because they have travelled to other countries in the Gulf Cooperation Region and thus they have knowledge of the general culture of the region. And this links to different nationality and culture. Participants stated that differences in culture, customs, and traditions from one society or one country to another is considered as a risk not just for the (V/T) but also for the local people as well. A study [23] noted that respondents to the same risk might be perceived differently by individuals in different situations. In addition, in terms of international tourism cultural, religious and political factors may play an important role in tourists' perceptions of risk. Moreover, risk perceptions of tourists increase according to proximity issues and nationality. They found out that 72% of American tourists thinking of fear have increased after the WTC attacks comparing with 42% of British tourists [40].

The second is that most of them came to (KSA) to work there or establish a business, and therefore they were accompanied by Saudi citizens to introduce

them to the region. This is link to the factor of reason for visit. The study of Dominguez, Burguette and Bernard (2007) cited in [27] finds that people who tend to travel for business purposes are less sensitive to negative events than people who travel for leisure. Thirdly is that some of the tourists have visited (KSA) for a second or third time and thus they have built their own knowledge and experience about it. This is as well linked with one of the factors that affect the perception of risk which is the number of visits and travel experience. A study stated that tourists who have high travel experience will help them to have a low perception of risk and contribute to choosing a destination with high levels of risk in their next vacation thus increasing their travel experience even more [25].

Last but not least, the majority of tourist have a high level of education consequently which can be considered as a factor that influences the (V/T) perceptions of risk. Because it may enhance their awareness and knowledge of the sources of taking information and verifying the news before it is believed. This is consistent with the study [43] that tourists who have high education level perceive lower travel risk than tourists who have lower education levels.

#### IV. CONCLUSION

The aim of this study was to explore both actual and perceived risk of the (V/T) in the (HJ) in the (KSA) and the different factors that have an impact on how do (V/T) perceive risks. The participants provide several kinds of risk as an actual risk such as physical harm, health risks, and human issues. While the financial risk, social risks, psychological risks, and uncomfortable feeling fall under the perception of risk. Regarding these factors, the study finds that age, gender as an independent factor, and source of knowing kinds of factors that do not have an impact on the risk perception of (V/T). While nationality and culture norms, reason for visit, number of visits, travel arrangement method, household structure, and level of education have a significant impact on the risk perception of (V/T).

At the end of this study, the researcher will present several implications to help (V/T) to mediate their perceptions of risk. When a tourist guide accompanies the tour, this has a significant impact on reducing the types of risks that can occur in heritage sites. This is because tourist guides play an important role in assuring the safety and security of (V/T). Government and tourism authorities have to set and develop measurements, plans and strategies to prepare heritage sites, including roads and buildings, to be ready to welcome (V/T) thus to ensure that risks they may face or perceive are reduced. In addition, providing wider understanding of the different kinds of risk either low risk or high risk as well as the factors that affect perceive risks will benefit different

parties in the tourism industry such as governments, travel companies, agencies, and tourist guides to prepare an accurate measurement and to avoid them as well as to be able to raise awareness of the (V/T) about the different kinds of risks through media, social media, ads, brochures, and even in the schoolbooks.

This research contributes further to the studies of actual risk and perceived risk. As a study found out by investigating 46 articles from 1974 to 2013 related to tourism risk, more than half have studied and investigated two subjects which are: the perceived risk rather than the actual risk, and the risk factors [44]. Moreover, it is very difficult and almost impossible to find a scale for the actual risk and range of risk [7]. Since there is lack of information in the present literature related to the actual risk, therefore, this study investigates the kinds of actual risk that occur in the heritage sites in general and in the (HJ) in particular.

In the literature, researchers have studied the risk in a specific destination or context such as in Thailand, Israel, Australia, China, Ghana, and Alpine. In addition, when studying travel risk especially for international travellers, it is very important to consider the destination context [7]. However, none of these studies examine the risk related to tourism in the context of the (KSA). Therefore, this study investigates the kind of risk in the (HJ) in the (KSA) as the country and the city of Jeddah are culturally, socially, and religiously unique from the rest of the world.

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# SUSTAINABILITY AND ECOLOGICAL RESTORATION THROUGH CONSTRUCTED WETLANDS - TAKING THE WANNIAN WETLANDS AS AN EXAMPLE

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**Abstract** - The upper reaches of the Wannian Creek in Pingtung, a county in the southernmost region in Taiwan, was seriously polluted by livestock wastewater and domestic sewage discharge in the past. To remedy the situation, the construction of the Wannian Wetlands was initiated in 2009 along the upper reaches of the Wannian Creek and completed in 2017 with a total area spanning 28 hectares to treat polluted waters through combination of free water surface system (FWS) and subsurface flow (SSF). The treatment processes consist of physical processes (including sedimentation, filtration and adsorption), and biological processes (including absorption by microorganisms and plants, mineralization and decomposition). Water quality analysis conducted from 2020 to 2021 showed that the Wannian Wetlands can treat about 40,000 CMD, with removal rates of 65% for BOD, 80% for SS, 66% for ammonia nitrogen (NH<sub>3</sub>-N) and 45% for total phosphorus (TP). The Wannian Wetlands are similar to a natural wetland because of their diversity and large variation in water depths. In addition to the function of water purification, the Wannian Wetlands also provide a habitat conducive to wild animals and plants. Precious and rare wildlife found in the wetlands show a great biodiversity and include protected and endangered species, e.g., Pheasant-Tailed Jacanas, Kusano Willow...etc. The results also demonstrate that the conversion of the Wannian Wetlands from the original uncultivated land to a constructed wetland not only has the benefit of improving water quality, but also provides functions of environmental education and promotion, ecological rehabilitation and the creation of biological habitats. Furthermore, the experience gained from wetland creation will serve as a reference for the design, planning and rehabilitation of multifunctional treatment-type constructed wetlands in the world.

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**Keywords** - Constructed Wetland, Water Purification, FWS, SSF.

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## I. INTRODUCTION

The Wannian Creek flows through the downtown area of Pingtung City (Taiwan) and is closely related to the quality of life in the urban area of Pingtung. However, pollution sources such as livestock wastewater and domestic sewage were discharged into the Chonglan Old Canal (the branch of Wannian creek) along the canal banks, resulting in the deterioration of water quality. In order to remedy this pollution situation, the Environmental Protection Bureau of the Pingtung County Government (PTEPB) has set up six constructed wetlands in the upper reaches of the Wannian Creek to remove pollutants and purify water quality by ecologically-friendly natural water purification means to create an ecological site with the functions of self-purification, ecological rehabilitation, environmental education, and leisure activities. The purified water is gradually introduced into the Wannian Creek in Pingtung City to some base flow and revitalizes the Wannian Creek.

Aquatic ecosystems in general, and wetlands in particular, have been used by humans over the centuries to the extent that not that many have remained today in their natural condition, as a result of pollution loads, among other reasons [1]. Constructed wetlands, also known as artificial wetlands, are mainly for wastewater purification by mimicking self-purification functions. They utilize ecological engineering technology for to wastewater (sewage)

management and treatment. Compared with the conventional wastewater (sewage) treatment systems, they are energy saving, low cost, no secondary pollution, simple in operation and maintenance, no ecological damage, and having the benefits of restoration of ecological habitats, land restoration and natural landscaping. They also have economic benefits in terms of better water resource utilization. In addition, if the treated wastewater can be recycled or re-used, the sustainability of water resources can be achieved.

Wetlands can purify wastewater via their aquatic plants. The main reason is that plants can transfer oxygen to their roots, turning the nearby soil into an aerobic zone to facilitate microorganisms to carry out anabolism, catabolism, nitrification, denitrification, and chemical precipitation of phosphorus; thus promoting the removal of nutrient salts in the wetland to purify wastewater [2],[3].

In general, wastewater pollutants entering the constructed wetland can be removed through physical sedimentation, filtration, adsorption, volatilization, adsorption, absorption, and biological metabolic decomposition and feeding, etc. The removal mechanisms of these pollutants by the constructed wetlands are very complex and depend on the pollutant types and hydraulic loading. For example, organic matter can be removed by precipitation and the metabolism of microorganisms; whereas suspended solids can be removed by sedimentation

and plant root filtration [4],[5],[6]. On the other hand, urban area on the water quality, in case of ammonium, of the wetlands, the impact of agricultural areas can be expected to be more significant than that of urban areas. [7]

In this study, the merits of six wetlands in the upper reaches of the Wannian Creek were investigated. By evaluating recent water purification data, the characteristics of the regional wastewater and the purification efficacy by the constructed wetlands were examined.

## II. WANNIAN WETLAND CONSTRUCTION SYSTEM

Taiwan EPA uses the River Pollution Index (RPI) as the comprehensive index for assessing river water quality. RPI consists of four water quality parameters, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Suspended Solids (SS) and Ammonia Nitrogen ( $\text{NH}_3\text{-N}$ ), which are calculated to index integral value, and which indicate the pollution level of river-water. Thus, the source of water in the Wannian Wetlands flows from the Chonglan Old Canal was detected. Water quality analysis from 2010 to 2018 shows the temperature: 18-34.2 °C, pH: 6.8-8.0, and total phosphorus (TP): 0.424-13.1 mg/L. In addition, DO is from 0.3 to 4.5 mg/L, BOD is from 2.9 to 37 mg/L, SS is from 5.8 to 108 mg/L, ammonia nitrogen is from 0.1 to 26 mg/L. According to the calculation of RPI is from 5 to 8. It's indicated that the water quality of Chonglan Old Canal was moderate to severe pollution. Purifying the water quality was a big challenge for Pingtung County Government. Thus, by constructing of the Wannian Wetland system was inspired by the team of government. The six Wannian Wetlands consist of the Huangjin Wetlands, Zunliao Wetland, and Haifeng Wetland, each one them has two phases as shown in Figure 1. Details are as follows by constructing order.

### A. Haifeng Wetland System

The first phase of the Haifeng Wetland began its operation in 2009, with an area of about 11 hectares and the maximum treatment capacity of 6,000 CMD (m<sup>3</sup>/day). Its configuration in sequence is the sedimentation pond, FWS natural purification channel and ecological pond. The treated water is discharged back to the Chonglan Old Canal to provide irrigation for farmers and increase the base flow of the Wannian Creek.

The second phase of Haifeng Wetland was completed in 2016, with an area of about 3.9 hectares and the treatment capacity of 5000 CMD. Its sequential configuration is the sedimentation pond, dense flora area 1, open water area, dense flora area 2, landscape ecological pond, and SSF pond. The treated water is discharged back to the Chonglan Old Canal.

### B. Zunliao Wetland System

The first phase of the Zunliao Wetland was launched in 2013, with an area of about 5 hectares and having the treatment capacity of 10,000 CMD. The site has 24 areas for water diffusion, 6 areas for shallow water, and 6 areas for deep water. Each treatment unit is configured as a sedimentation tank and can be operated independently. The treated water is collected into a pool before finally being discharges to the Chonglan New Canal.

The second phase of the Zunliao Wetland was launched in 2017, with an area of about 5 hectares and the treatment capacity of 5,000 CMD. The site adopts the surface flow method using the sequential configuration of sedimentation tank, dense flora area 1, open water area, dense flora area 2, landscape ecological pond, and SSF pond. The treated water is discharged back to the Chonglan New Canal.

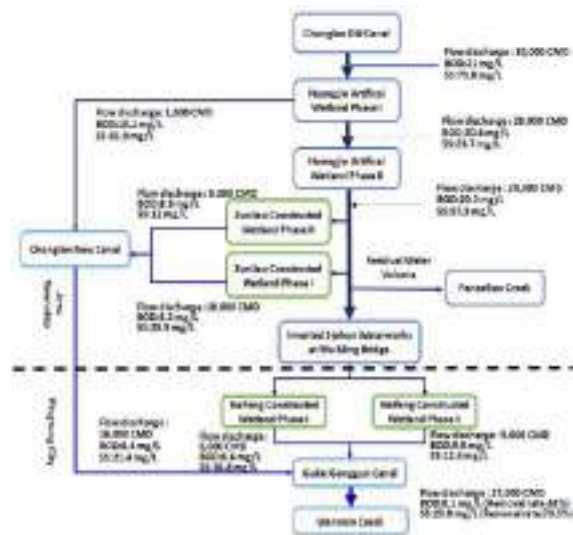


Figure 1. Expected effectiveness of wastewater treatments of Wannian Wetlands

### C. Huangjin Wetlands System

The first phase of the Huangjin Wetland was launched in 2017, with an area of about 1.4 hectares and the treatment capacity of 30,000 CMD of wastewater. The treated water is discharged back to the Chonglan Old Canal. Through pipelines, 1,000 CMD of water is intercepted into the second unit (dense flora area) for further treatment.

The second phase went into operations in 2017, with an area of about 1.1 hectares and the capacity of 30,000 CMD. The treated water is discharged back to the Chonglan Old Canal.

## III. WATER QUALITY ASSESSMENT METHODOLOGY

### A. Water Quality Testing Project

Water samples were collected and their qualities were examined from February 2020 to April 2021 [8],[9]. The quality indices include water temperature, pH,

DO, SS, BOD, NH<sub>3</sub>-N, total phosphorus (TP), and flow. The removal rate is defined as the percentage of the inlet concentration minus the outlet concentration and divided by the inlet concentration. The sampling points were located at the inlet and outlet of each system and each phase. Final Stage

When you submit your final version, after your paper has been accepted, prepare it in two-column format, including figures and tables.

### B. Pollutant Analysis

The following parameters were used to evaluate the effectiveness of wetland wastewater treatment according to the Research Project on the Design of River Water Purification Methods of Taiwan EPA [10],[11]:

1) **The pollutant removal rate (R):** given by formula (1) is the most common indicator used to evaluate the effectiveness of site operation and maintenance.

$$R = \frac{C_i - C_o}{C_i} \times 100\% \quad (1)$$

2) **Pollutant removal rate (Re):** given by formula (2) is mainly used to understand the amount of pollutant content removed from water by daily wetland; unit: kg/day.

$$R_e = (C_i - C_o) \times Q \quad (2)$$

3) **RPI:** given by formula (3) is a comprehensive index indicating the degree of pollution of river water. It combines four water quality indices of DO, SS, BOD, and NH<sub>3</sub>-N were mentioned above using different weights listed in Table 1.

$$RPI = \frac{1}{4} \sum_{i=1}^4 S_i \quad (3)$$

Parameter	Not (slightly) polluted	Lightly polluted	Moderately polluted	Severely polluted
DO (mg/L)	DO ≥ 6.5	6.5 > DO ≥ 4.6	4.5 ≥ DO ≥ 2.0	DO < 2.0
BOD (mg/L)	BOD ≤ 3.0	3.0 < BOD ≤ 4.9	5.0 ≤ BOD ≤ 15.0	BOD > 15.0
SS (mg/L)	SS ≤ 20.0	20.0 < SS ≤ 49.9	50.0 ≤ SS ≤ 100	SS > 100
NH <sub>3</sub> -N (mg/L)	NH <sub>3</sub> -N ≤ 0.5	0.50 < NH <sub>3</sub> -N ≤ 0.99	1.00 ≤ NH <sub>3</sub> -N ≤ 3.00	NH <sub>3</sub> -N > 3.00
Points	1	3	6	10
RPI Cumulative Score(S)	RPI ≤ 2.0	2.0 < RPI ≤ 3.0	3.1 ≤ RPI ≤ 6.0	RPI > 6.0

Table 1. Calculation and Comparison of RPI

### C. Ecological survey

During the study period, ecological surveys were conducted for the Wannian Wetlands, including flora, terrestrial animals (mammals, birds, butterflies, amphibians and reptiles), and aquatic animals (fishes, shrimps, crabs, snails and shellfish), in order to understand the changes of wetland species and to protect the habitat for the species. For aquatic insects, the Hilsenhoff family-level biotic index (FBI) [12] given in formula (4) is adopted for their ecological survey.

$$FBI = \frac{\sum [(TV_i)(n_i)]}{N} \quad (4)$$

Where TV<sub>i</sub> is the tolerance value of the family, n<sub>i</sub> is the number of individuals in the family, and N is the total number of individuals.

Tolerance values ranging from 1 to 10 as listed in Table 2 were assigned to different families or species of aquatic insects according to their tolerance levels to pollution and the relative number of insects of the family in the whole aquatic insect population to calculate the biological index and used to assess water quality.

FBI	Water quality assessment	Occurrence of organic pollutants
0.00-3.75	Excellent	no apparent organic pollution
3.76-4.25	very good	possible slight organic pollution
4.26-5.00	Good	some organic pollution
5.01-5.75	Fair	fairly significant organic pollution
5.76-6.50	fairly poor	significant organic pollution
6.50-7.25	Poor	very significant organic pollution
7.26-10.00	very poor	severe organic pollution

Table 2 Hilsenhoff Family-level Biotic Index Evaluation Indicators

## IV. RESULTS AND DISCUSSION

### A. Water Quality Analysis

The water quality of the wastewater treated by the constructed wetlands described is presented in the following.

#### 1) Water Treatment Volume and General Water Quality Characteristics

The volumes of the wastewater treated range from 34,727 to 42,227 CMD with an average of 37,928 ± 2,538 CMD. The general water qualities of the influent water to the wetlands are temperature from 24.9°C to 28.4°C, pH from 7.2 to 7.6, and DO between 3.3~3.6mg/L. The corresponding temperature, pH, and DO for the effluent water are 25.9°C to 28.4°C, 7.1 to 7.5, and 3.6 to 4.4 mg/L, respectively.

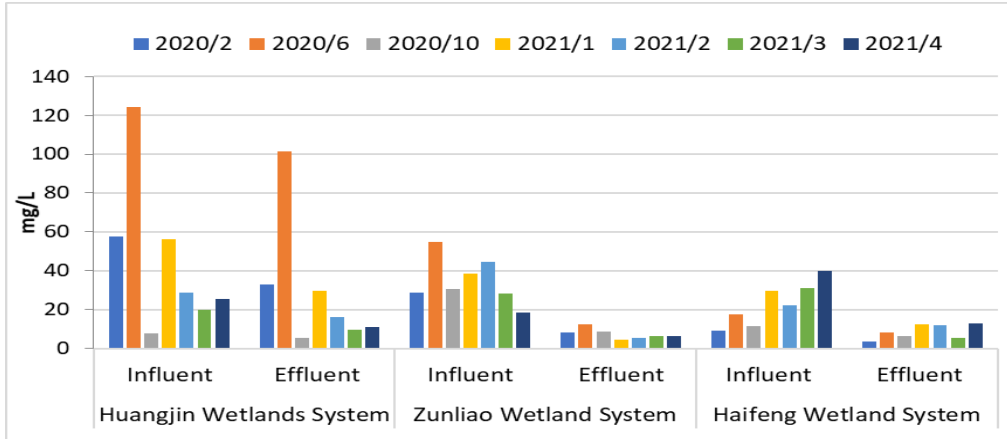


Figure 2. SS of influent and effluent in the Wannian Wetlands

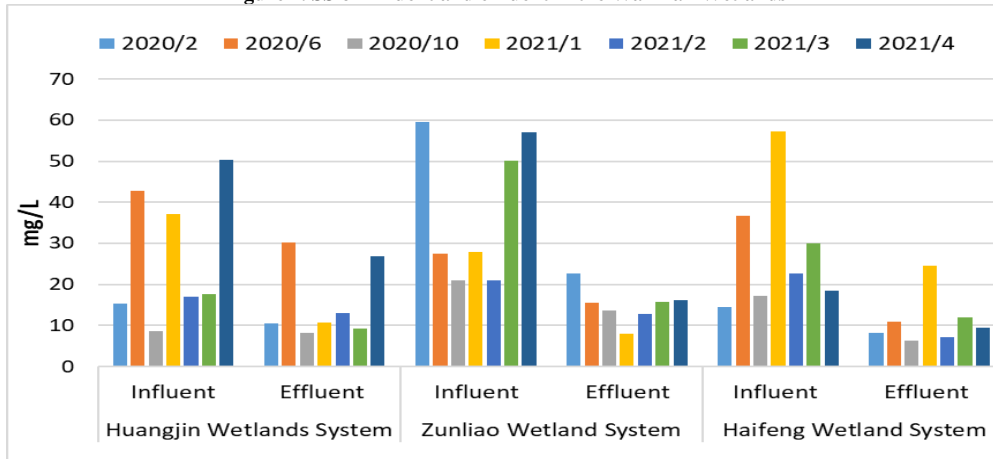


Figure 3. BOD of influent and effluent in the Wannian Wetlands

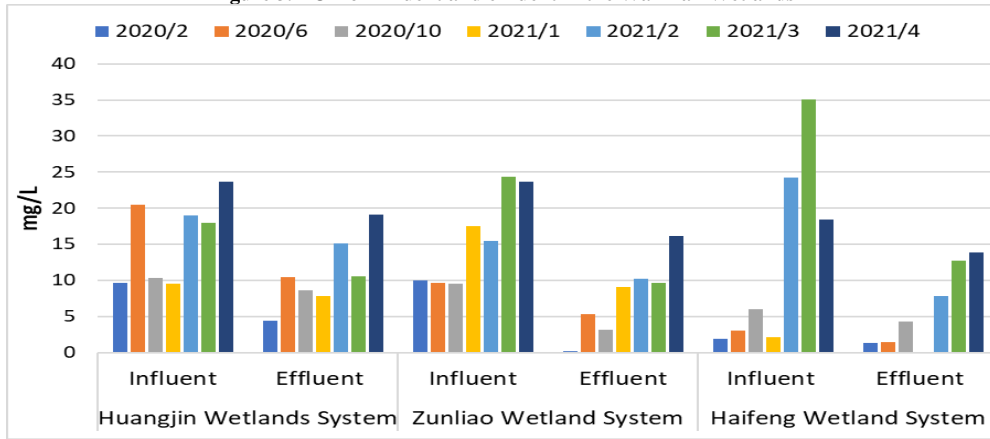


Figure 4. NH3-N of influent and effluent in the Wannian Wetlands

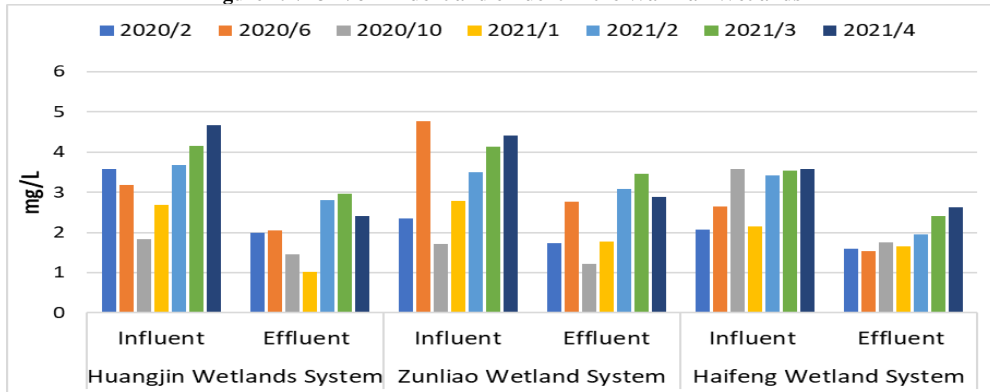


Figure 5. TP of influent and effluent in the Wannian Wetlands

## 2) Pollutant concentration

The measured results of BOD, SS, NH<sub>3</sub>-N, and TP during the observation period are summarized in Table 3 and depicted in Figures 2 to 5. The results show that for the influent water, BOD is from 18.5 to 45.4 mg/L, SS from 16.43 to 33.27 mg/L, NH<sub>3</sub>-N from 2.58 to

32.83 mg/L, and TP from 2.15 to 3.92 mg/L. In contrast, for the effluent water, they are 8.8 to 17.8 mg/L, 5.24 to 10.09 mg/L, 1.21 to 14.32 mg/L, and 1.53 to 2.84 mg/L for BOD, SS, NH<sub>3</sub>-N, and TP, respectively. Thus, the reductions of the pollutants by the wetlands are obvious.

Item	Treated water (CMD)	Influent	Effluent	R (%)	Re (kg/day)
Temperature (°C)	37,928±2,538 (34,727~42,227)	26.7±1.2 (24.9~28.4)	26.9±0.9 (25.9~28.4)		
pH	37,928±2,538 (34,727~42,227)	7.4±0.2 (7.2~7.6)	7.3±0.1 (7.1~7.5)		
DO(mg/L)	37,928±2,538 (34,727~42,227)	3.5±0.1 (3.3~3.6)	4±0.3 (3.6~4.4)		
BOD(mg/L)	37,928±2,538 (34,727~42,227)	31.9±8.5 (18.5~45.4)	12.6±2.8 (8.8~17.8)	60%±4% (52%~65%)	729±252 (362~1103)
SS(mg/L)	37,928±2,538 (34,727~42,227)	26.8±6.3 (16.4~33.3)	8.1±1.8 (5.2~10.1)	69%±6% (60%~80%)	716±218 (389~961)
NH <sub>3</sub> -N (mg/L)	37,928±2,538 (34,727~42,227)	13.4±10.8 (2.58~32.8)	6.2±5 (1.21~14.3)	52%±13% (27%~66%)	199±185 (32~544)
Total Phosphorus (mg/L)	37,928±2,538 (34,727~42,227)	3.1±0.6 (2.15~3.92)	2.1±0.5 (1.53~2.84)	32%±8% (24%~45%)	40±15 (16~67)
RPI	37,928±2,538 (34,727~42,227)	6.96±0.52 (5.75~7.25)	5.46±0.45 (4.75~5.75)		

Table 3. Water Quality Data of the Wannian Wetlands

## 3) Pollutant removal benefits

After water treatment through the Wannian Wetlands, The results show that the removal rates and amounts are about 52%~65% with 362~1103 kg/day, 60%~80% with 389~961 kg/day, 27%~66% with 32~544 kg/day, and 24%~45% with 16~67 kg/day for BOD, SS, ammonia nitrogen, and total phosphorus, respectively.

## 4) RPI Indicator

The RPI value of the influent water of the Wannian Wetlands ranges from 5.75 to 7.25 with an average value of 6.96±0.52, indicating severe pollution. In contrast, the RPI value of the effluent water is from 4.75 to 5.75 with an average value of 5.46±0.45, indicating moderate pollution. Namely, after the water treatment through the wetlands, the pollution level is reduced from serious to moderate conditions, thus signifying a notable improvement in water quality.

## B. Ecological survey

During the study period, ecological surveys were conducted. The survey results show that there are 241 species of 79 families of plants, 42 species of 25 families of birds, 10 species of 4 families of mammals, 5 species of 4 families of amphibians, 4 species of 3 families of reptiles, 7 species of 5 families of fishes, 3 species of 3 families of shrimps, crabs and snails, including Category II protected species Black Kite,

Crested Goshawk, Pheasant-Tailed Jacanas and Greater Painted-Snipe and Category III protected species Plover and Brown Shrike. Among them, the population Pheasant-Tailed Jacanas has increased in recent years. There are also four species endemic to Taiwan, including the Taiwan Scimitar Babbler, Swinhoe's Japalure, Formosa Grass Lizard, and Taiwan Tube-nosed Bat [13].

On the other hand, among the wetland flora, six species are classified as Vulnerable (VU) in the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, including the Milky Mangrove, Swamp Gelonium, Umbrella Tree, Indian Barringtonia, Taiwan Incense Cedar, and Small-leaved Barringtonia. Two endemic species are classified as Near Threatened (NT), including the Lanyu Tabernaemontana and the Ceylon Ardisia. One species, the Kusano Willow, is classified as Endangered (EN). Moreover, the obtained FBI before treatment is 6.77~7.11, which is the sixth level, indicating poor water quality rating. However, we believe that the animal and plant species will be furthermore increase and the FBI will decrease in the future.

## C. Exploration of Value-Added Benefits

### 1) Water recycling and reuse

The treated water from the wetlands can be discharged back to the Chonglan Old Canal for further recycling.

At present, the treated effluent water is not only used as tributary water flowing into the Wannian Creek, but also used for irrigation of the nearby farmland and plants [14].

## 2) Habitat or Refuge for Wild Animals

The Wannian Wetlands system has ecological conditions similar to those of a natural wetland because its planning and construction were carried out by minimizing disturbances to the site. In addition, the system is surrounded by a variety of insects and nectar plants, and has water bodies of varying depths. Thus, it is conducive to a variety of habitats with a rich variety of ecological species already found in the site. Moreover, the system also provides a shelter for wildlife and plants.

## 3) Environmental Education

The success of the Wannian Wetlands creates an ecological site with the functions of water self-purification, landscaping and recreation, and ecological rehabilitation. The site has been favored by schools and community groups at all levels, and has been actively used to promote environmental education, ecological tours and wetland water purification activities of Constructed Wetlands. Through explanatory signs and guides, the public can have a better understanding of environmental issues and the importance of ecological conservation.

Furthermore, the success and experience gained from this study can serve as a reference for future design, planning and rehabilitation of multifunctional treatment-type constructed wetlands for better resources utilization. Thus, we are now applying certification of national level important wetland and environmental education site.

## V. CONCLUSION

The Wannian Constructed Wetlands are successfully constructed in Pingtung County, Taiwan. The key findings in this study are as follows:

### A. Effectiveness of water treatment

1) Good water purification capacity: the maximum treated water volume is 42,227 CMD with the removals of 60~80% SS, 52~65% BOD, 27~66% NH<sub>3</sub>-N, and 24~45% TP. Further, the RPI reduces from about 7 to 5.5.

2) Low technical barriers: construction, operation, and maintenance are easy, requiring only common technical skills and domestic construction techniques and can be easily promoted.

3) Economical and energy saving: gravity flows and biological treatments were adopted without electricity consumption.

**B. Ecological Results:** the flora and fauna surveys show the richness and varieties of species, including protected and endangered ones. Namely, the constructed wetlands create a friendly environment for plants, insects, fishes, and animals.

**C. Development Advantages:** In addition to providing a better environment, the present “surface flow wetlands” system enables water resources reuse as the treated water can be used for irrigation, aquaculture and ecological landscaping ponds. Because of its simplicity, it can be readily extended and implemented by using the abandoned agricultural land or ponds for their revitalization. Thus, the Pingtung County Government plans to apply for it to become a Wetland of National Importance in 2021.

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# CURRENT LEARNING DISABILITIES ASSOCIATION AND THEIR POLICIES ACROSS THE WORLD: SOME OBSERVATIONS

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## Abstract -

Learning disabilities comprises as difficulty in reading, writing, listening, speaking, reasoning and mathematical skills. The term learning disabilities sometimes referred to as specific learning disabilities that cover a range of neurological based disorders in learning and various degrees of severity of such disorders (LDA, 1986). There are 5-9 % of people having learning disabilities of general population (Vuleta, 2020) and many policies and laws are also making to solve these problems. This paper looks at some of the associations working on learning disabilities at global level. Further, it explored the policies, laws and advocacy with respect to learning disabilities. This paper also highlighted the funds and online work of the learning disabilities associations.

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**Keywords -** Learning Disabilities, Associations, Policies, Laws, Dyslexia

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In 1963 Samuel Kirk, then a professor of special education at the University of Illinois, suggested that we use the term 'Learning Disabled' to describe 'children who have disorders in development of language, speech, reading, and associated communication skills.' In 1977 the **Federal Definition of Learning Disability of U.S. office** was introduced and the term Learning Disability includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. IDEA (2004) defines a specific learning disability (SLD) as: A disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. Indian **RPWDACT, 2016** first time defined the term learning disabilities as 'Specific learning disabilities' means a heterogeneous group of conditions wherein there is a deficit in processing language, spoken or written, that may manifest itself as a difficulty to comprehend, speak, read, write, spell, or to do mathematical calculations and includes such conditions as perceptual disabilities, dyslexia, dysgraphia, dyscalculia, dyspraxia and developmental aphasia.

There are so many associations working on LDs, but mostly U.S.A. and Canada Region are focusing on learning disabilities. India is in a nascent stage yet. There are few associations explained their work as well as policies also.

## Learning Disabilities Association of America

LDA is working as leading resource on learning disabilities since 1964. It is providing the guidance for college accommodation, scholarships, assistive technology as well as key strategies for learning

disabled children. It also practices on use of cognitive assessment for Learning disabilities identification and evaluation. LDA supports the LD parents, teachers and other related professionals, whom they help the LD people. Further, this association supports the federal laws protecting the rights of students with learning disabilities: Coronavirus Child Care and Relief Act, Research Investment to secure the Economy Act (RISE) and Supporting Children Disabilities during Covid-19 Act. Equity access also focuses on LD's civil right for education; ensure proper identification, evaluation, intervention & accommodation at all level; for healthy brain development high quality early education for maternal & child healthcare nutrition suggested (ldaamerica.org).

## National Association of Special Education Teacher

This professional association provides support and assistance to many American's special education teachers those are teaching in the field of special education. NASET published the LD Report on current issues of learning disabilities. It published monthly report on learning disabilities and provides latest information. There is 50% around LD from those students, who are taking the special education services. This report also collects the practical information about Learning disabilities, research and writing as well (www.naset.org).

## National Joint Committee on Learning Disabilities

This committee has founded in 1975 and doing work on education & welfare for learning disabled people. This has also an official website named as LDonline, which provides the valuable knowledge regarding learning disabilities. This committee has mission to identify & address needs of LD research, policy, professional education & development. It also develops the understanding from local level to national among educational institute, committee & Governmental agencies. Further, it develop the



statement, repair & improve the practices, increase the knowledge & clear issue, influenced policy for LD ([www.ldonline.org/about/partners/njclcd](http://www.ldonline.org/about/partners/njclcd)).

### **British Dyslexia Association**

BDA is a dyslexic people voice for achieve a dyslexic friendly society for all, started from 1972. It has mission to influence government and other institute for dyslexia individuals, so that all ages of dyslexia individuals can reach their full potential. It is also doing campaigning, provide objective advice, set accredits & some standards, promote & share research, best practices for local to international level for learning disabled people ([www.bdadyslexia.org.uk](http://www.bdadyslexia.org.uk)).

### **National Center for Learning Disabilities**

It is the leading institute for learning disabilities community solving the issues & improve the lives of individuals with LDs. And also empowering the families, transforming schools, creating new policy & advocacy impact in the field of learning disabilities. This center ensures that 15 million children & all people with learning disabilities have each and every opportunity for their successful life. It has also started the campaigning named as 'Get Ready to Read' for building literacy skills at all primary level. Further, promote research & advocacy policies to protect the educational rights & opportunities for LD and also strengthen the information for professionals, parents & all ages of LD people ([www.nclld.org](http://www.nclld.org)).

### **Learning Disabilities Association of Ontario**

LDAO is a charity registered charity dedicated for working on improving the lives of all ages of LDs people. It has designed many products, resources, services, venues for helping the LD individuals their parents, teachers & other professionals. It works on every aspect social, educational, medical, vocational and employment of LD in Ontario. It also suggested accessible policies, accessible custom service policy and public policy round up for with reference to learning disabilities. It offers the online workshop due to Covid-19 for parents, students as well as professionals. They share the real life experiences of parents, students & teachers, those attended the previous public sessions. Ontario Human Rights Commission releases new video on 26 October, 2020 for the progress of Right to Read. LD@ school is a project based website that providing information & research, professional development, practice information, approaches, practices & strategies relate with LDS directly use in the classroom ([www.ldao.ca](http://www.ldao.ca)).

### **Learning Disability Society**

LDS is charitable society that has strengthen the individuals diagnosed with learning disabilities from 50 years. LDS Greater Vancouver offers financially accessible, high-quality learning support for students.

It has Research Informed Individualized Student Education (RISE) program that provide the individual attention with small group learning support for diagnosed learning differences children between the age group of 6-18. It also facilitate RISE program in schools, through camps, online & at learning centers as well. It has a goal to provide remedial tutoring, intensive intervention, small group camps & family coaching. It follows the holistic approach for instructor training, student assessment to deliver comprehensive individualized support & remedial program that would be according to the children's need ([ldsociety.ca](http://ldsociety.ca)).

### **Learning Disabilities Association of London Region**

LDALR provides the services and advocacy, conduct program for learning disabilities & ADHD people's help. It offers training, workshop & knowledge sessions with the collaboration of community agencies and schools. It also provides the adaptive technologies, comprehensive information and resources for learning disabilities. ([www.ldalondon.ca](http://www.ldalondon.ca))

### **Learning Disabilities Association of Alberta**

This association working on building resilience and explore the potentials in LD people, that promoting the public understanding and cultivate support networks. This is the first association in 1968 incorporated for children with LDs. Training programs for teachers, two scholarship funds, official website and social media has also offered by the association. LDAC (Learning Disabilities Association of Canada, 1963) is the national voice of LD people and supporters federally part and LDAA is the federally part of this association. LDAC has one member committee in every province and territory except Nunavut. The volunteer psychologists committee & reading specialists has developed. It has also started the Right to Read program for helping children with reading difficulties in their language at primary school ([ldalberta.ca](http://ldalberta.ca)).

### **Learning Disabilities Association of Canada**

Its aim to provide equal opportunities for Canadian LD individual that can help to reach their potentials. Due to covid pandemic it has started online learning for parents and educators for better preparation of the students. This has more than 10 years of Canada peer-reviewed journals/articles on LDs, which provide information on every aspect of LD. Presently 9 province LDA & one territory in the Canada and more than 50 community agencies across the country. Accessible Canada Act suggested that create a barrier free Canada for every person, especially persons with disabilities. This law helps to ensure that full economic, social & civil participation of all Canadian people regardless of their disabilities ([www.ldacta.ca](http://www.ldacta.ca)).

### **Council for Learning Disabilities**

It is an international council providing the education and quality of life for people with LDs throughout the life. CLD is doing evidence based research for LDs. It also strengthens the LD people at local, state & national level through collaboration with professionals, developing leader & advocacy for policies. The Liaison Committee in its advocacy represents the CLD for individuals with LD. It also announced the three new resources to help states and district improve the evaluation process under the PSLD & eligibility under IDEA: Practice & Policy July 2019. In October, 2017, NCLD report (state of LD, understanding the 1 in 5) released the report on state of LDs and this can also found online at [nclld.org/state](http://nclld.org/state) of LD. It has also mention some recommendations on more early intervention for children ([council-for-learning-disabilities.org](http://council-for-learning-disabilities.org)).

### **Learning Disabilities Association of New Jersey**

New Jersey nonprofit association state affiliation by LDA of America is providing information, support and advocacy for people with learning disabilities, their families, professionals as well. It has mission to ensure that LD should universally understood and effectively addressed, early identification, advocates the legislation that protects the rights of LD and their families, ensure all LD individuals live lead and successful lives. In March, 2017 Supreme Court of U.S. suggested Individualized Education Programs (IEPs) for students with disabilities. Court suggested NCLD and [understood.org](http://understood.org) developed the Advocacy toolkit for parents. It has also mention the some Acts working on special needs children like IDEA, The Rehabilitation Act of 1973 (Section 504), The Rehabilitation Act-Section 511-Workforce Innovation & Opportunities Act (WIOA), The Americans with Disabilities Act (ADA) and Andrew F.V. Douglas Country School District ([www.ldanj.org](http://www.ldanj.org)).

### **LD Online**

This is an online national educational service website of WETA-TV (Washington, D.C.) that provides up to date information and advice regarding LDs & ADHA. Approximately 5% of students are LD out of 2.9 million school students in U.S. Students are not receiving the appropriate remedy/ interventions on time, that's why this website provides the competent educators, authentic information regarding LD that can help on time. It also provides the knowledge & resources, which help individuals with LDs in transition from school to college and school to work ([www.ldonline.org](http://www.ldonline.org)).

### **Learning Disabilities Association of British Columbia**

It is a voice and province network of LD persons, since 1973. It has also provide the resources and knowledge to ensure the full participation of learning

disabled students, youth and adults in current society. It works on LD's education, employment, social development, legal rights and general wellbeing as well. It is reported that 1 in 10 people in BC (approximately 400000) from all ages, ethnic, social groups are influenced by LDs. Presently in Victoria, Vancouver, Surrey, Vernon & William's Lake are chapters that provided community programming. LDABC especially working on improving education policy that can be according to children's need and also incorporate assessment & remedial programs, teachers, special trainer, parent resources & accountability mechanism ([www.ldabc.ca](http://www.ldabc.ca)).

### **Learning Disabilities Resources Foundation Action**

Under IRS section 501(c) founded a non-profit foundation in 2001, that helps to find out the solution for affected specific learning disabled children, dyslexia & ADHD. It offers the resources for all ages people, parents and educators with specific focus on the low-income households. This foundation also working on social media (Facebook, Twitter) for lead & successful life of learning disable individuals. It also support laws for special need children, ADA Americans with Disabilities Act, Jo Anne Simon Law Office, K&W Guide to Colleges for Students with Learning Differences, U.S. Department of Justice, Civil Rights Division, New York City Commission on Human, Wright's Law, NYC Mayor's Office for People with Disabilities and Advocates for Children ([www.ldrfa.org](http://www.ldrfa.org)).

### **Association for Learning Disabilities India**

It is a non-profit association helping students and their parents, teachers, professionals, social workers, since 1992. It also created ALDI Remedial & Rehabilitation measures, that conducting the many scientific studies in the field of learning problems and their effects. It has conducted educational programs, projects for assessing the classroom strategies and also worked on so many seminars & workshops with the collaboration IAP (Indian Assessment of Pediatrics), which is recognized, by WHO. ALDI has been promoting approximately 100 support group in Kerala. ALDI also trained the SSA (SarvaSiksha Abhiyan) and IEDC (Integrated Education for Disabled Children). And it has also published the authentic book for parents in malayalam language named as 'Know Your Child' ([enabled.in](http://enabled.in)).

### **Dyslexia Association of India**

DAI is a charitable trust that provides the opportunity approximately 250 million LD children adolescents & adults for lead and successful life. It gives the information for parents, students, teachers, professionals and children with learning disabilities. It has mission to strengthen the interest, research & development program, advocates policies for strengthen the rights & opportunities for dyslexic

children. This association has unique point being a nonprofit assessment & educational institutional, that is focusing on needy educational for dyslexic children and adults throughout the Delhi NCR region & Pan India sphere as well ([www.dyslexiaindia.org.in](http://www.dyslexiaindia.org.in)).

United State America and Canada are majorly contributing their great work on learning disabilities perspective & also collaborating with other organizations. These all are the associations basically provide accurate information with respect to LD, funds, make laws/policies & strengthen the Acts related with LDs, trained the teachers, patents and professionals as well. In covid-19 pandemic these all organizations provide the each and every information through online workshops, seminars & other programs. India is on nascent stage yet in learning disabilities, it has first time announced the LDs in RPWD, 2016. There is need for more awareness about LDs, because this concept is new for other countries. This research paper will provide the online associations information for people that can help them to understand the LDs concept, and they can get the relevant & accurate information. There are so many research associations on LDs, but people don't

have knowledge about it. This research paper will provide the help for them.

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# ANALYSIS OF SATISFACTION AND NUTRITION CONCEPTS ON NEWSPAPERS IN TERMS OF HEALTH COMMUNICATION

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**Abstract** - The concept of health and the phenomenon of staying healthy has once again increased its importance due to the covid-19 between the 2020 and 2021 pandemic period. Each promise that comes out of the mouth of physicians, every information they give, every foresight they make provides a significant improvement in terms of health communication. On behalf of modernization in medicine, health communication has gained a different dimension. The communication provided by the doctor and the dietician with the patients and their relatives has made a breakthrough especially in protecting health and taking precautions before the acute phase. Media also give importance to this health prevention and health protection. This study, which seeks an answer to the question of whether we are eating for fullness or for nourishment, aims to examine the news about "health and nutrition" in the media and especially in the printed media on a monthly basis in 2007 and a month in 2021. It objects to create a prediction about the perception of "nutrition" created by the content analysis made in line with this goal. The two newspapers considered within the scope of the research have been offering supplementary newspapers to their readers every day, every weekdays, and every weekends for many years. It has been understood that both newspapers have started to carry out the nutritional errors by creating a perception on the society in the changing conditions of healthy nutrition and healthy life on the new generation cuisine in the past 14 years. Although supplementary newspapers of both were analysed and planned to generate data, there was a restriction in reaching the entire research universe.

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**Keywords** - Feeding Methods, Health Communication, Nutrition, Pandemics

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## I. INTRODUCTION

Health is the context that can be explained according to the feelings. Being healthy is very important but not realized well enough until a person has lost it. According to World Health Organization (WHO) [1], so as to call a person is healthy, not only should a person feel himself/herself healthy, but also should be in good condition physically, psychologically, socially. In 1981 another definition was uttered by WHO. Their slogan was "in 2000, health for everybody." The organization wants to emphasize production to lead a high qualified life. To call a person healthy, there are three factors to be considered:

1. To have a healthy diet and do regular exercises.
2. To have routine check-ups.
3. To lead a dynamic life.

During the pandemic period being healthy is considered an important factor. Everybody has gotten hypnotized in front of the TVs. The words that the doctors have uttered seem very vital. Health communication gets its importance during the Covid-19 period too much. Health communication, as a part of interpersonal relationship, plays its advantage to inform and to motivate the society, target, or organization. In history, It started in the 18<sup>th</sup> century after the vaccine application. It was the time for hygiene propaganda. This helped the public be aware of the precautions to avoid the spreading of diseases. As Arkin [2] mentions, health communication is so powerful that it can change the attitudes of individuals, societies, and groups. In the 21<sup>st</sup> century "knowledge" gets its right place. By sharing the knowledge on behalf of the media, doctors and health workers help

people organize their life, the living areas again. The information forces people to change their behaviors among themselves. Mass media is so powerful that people can get aware of all the facts happening around. As Mc Luhan[3] says, the development of new communication technologies provides a "global village" understanding. Communication tools shape societies for sensory reasons. Communication tools affect personalities. Mass media and new media tools use their power to enlighten the community. Media has a really important role in manipulation. As Dearing and Rogers[4] emphasize the subjects mentioned in the media play an important role in perception management of public opinion. This perception makes the community improve their perspectives on that notion. In the 2019 pandemic period, the changing conditions on the concept of health and the perspective of staying healthy have gained great importance by saying that getting a healthy and a balanced diet is a healthy life understanding. In order not to repeat the mistakes made in the name of nutrition, during the 2019-pandemics, health professionals have been given wide coverage in the media. The importance of physical activities at home has increased during the period of confinement. The gastronomic culture, which has been started by the young generation since the end of the 20th century, has begun to take place in the media along with the pandemic process, so-called "new generation cuisine". The new generation kitchen, which abstains from three whites, differentiates flour types, sugar amount and type, and changes the taste of the mouth. For example; the youth, who started to prefer almond or walnut flour instead of wheat flour, which is called white flour, use carob or dates instead

of sugar. In other words, consuming healthy food to stay healthy has become a new philosophy of life for them. To be healthy and to keep fit, preventive and protective health are essential points to avoid the virus. During epidemics, the thought of preventive health gets its essential point. A healthy diet is very important for the sake of society. Nutrients are the parts of healthy diet that are essential for life and health. Nutrients provide energy, build and repair body tissues. Taking right nutrition is important to keep body healthy. Preventive health is a new perspective for the economic development of the public. By this way, there will be a decrease in health expenditures in family budget and a resource increase in the item spent in the state budget on health. With this study, a useful contribution is objected to the literature. In this regard, this study aims to create a foresight about the perception of "nutrition" created by content analysis. It focuses on "health and nutrition". In this context, the news on nutrition in 2007 and the news in 2021 were examined for 1 month. The two largest-circulation newspapers Sabah with its additional newspaper Günaydın and Hürriyet with its additional newspaper Kelebek considered within the scope of the research, have been offering additional news to their readers every day, on weekdays, and on weekends for many years.

## II. PROBLEM OF THE RESEARCH

Do we have to eat to feel full or do we have to eat to get adequate nutrition so as to keep fit?

### 2.1. Sub Problems of the Research

1. What is the point of view of these two newspapers when it is compared according to the health perspective?

#### 3.1.1 Study Selection

HürriyetKelebek 2007	Supporting News	Non-supporting News	Neutral	Total
Point of view for the health perspective	33,3%	46,6%	20,1%	100
Point of view for the Nutrition Perspective	26,6%	53,3%	20,1%	100
Suggestion on preventive and protective health	20%	60%	20%	100
Sharing the ideas of physicians to keep fit	0	80%	20%	100

**Table 1.**  
The news Hürriyet-Kelebek makes (2007 March)

The analyzed pages in Hürriyet- Kelebek revealed that the mentality not favoring to stay fit was quite high in 2007. Non-supporting view points were dominant from every angle. Neutral news was stable, each one is 20%.

2. What is the point of view of these two newspapers when it is compared according to the nutrition perspective?
3. Does each newspaper suggest preventive and protective health?
4. Does each newspaper share the ideas of physicians to keep fit?

## III. THE METHOD, THE UNIVERSE, THE SAMPLE OF THE RESEARCH

The results were obtained in two newspapers in Turkey. The two newspapers were chosen since they had been offering additional newspapers for a long time. The suggestion on food, cooking, and health generally take place in those additional ones. In order to obtain the news, as a researcher, I used the 2007 digital and hard copy archive for 1 month. Besides, in 2021 as a researcher I examined both newspapers from May to June. In the analysis of the news, the content analysis method was used by scanning the descriptive method. The title of the news was coded and grouped as "supportive news", "not supportive news", and "neutral". Supportive news is the one for good digestive food. It is full of vegetables and fruit, away from the three white. Non-supporting news is the one which includes too many calories, energy. They are not recommended by the physicians. In this way, the perception management of the newspapers on the target audience especially during the pandemic period was evaluated.

### 3.1 Data Extraction

Studies on the newspapers between 2007 and 2021 were extracted by using Microsoft excel. The information was written in four different tables according to the year differences of each newspaper. The extracted information from each study is mentioned below the tables.

Generally, readers were fed gourmet treats filled with crème, sugar, and flour. The calories were not taken into account.

Sabah Günaydın2007	Supporting News	Non-supporting News	Neutral	Total
Point of view for the health perspective	20%	60%	20%	100
Point of view for the Nutrition Perspective	10%	80%	10%	100
Suggestion on preventive and protective health	0	80%	20%	100
Sharing the ideas of physicians to keep fit	0	80%	20%	100

**Table2.**  
The news Sabah Günaydın makes (2007 March)

The pages which were examined in Sabah- Günaydın showed that there was a lot of non-supporting news on the pages. The readers were unaware of preventive and protective health. The concentration was only on gourmet recipes full of pastries, cakes, and cookies, too.

HürriyetKelebek 2021	Supporting News	Non-supporting News	Neutral	Total
Point of view for the health perspective	80%	0	20%	100
Point of view for the Nutrition Perspective	40%	40%	20%	100
Suggestion on preventive and protective health	60%	40%	0	100
Sharing the ideas of physicians to keep fit	100%	0	0	100

**Table 3.**  
The news Hürriyet-Kelebek makes (2021 May)

The analyzed pages in Hürriyet- Kelebek reveal that the mentality favoring to stay fit is quite high in 2021. Supporting viewpoints are dominant from every angle. Neutral news covers 20% in health perspective and in nutrition part. Generally, readers are recommended to eat more vegetables and fruit. Suggestions of physicians on healthy diet to avoid cancer, diabetes are mentioned daily. Dentists recommend mouth care. They emphasize the starting point of disease is uncared teeth.

Sabah Günaydın 2007	Supporting News	Non-supporting News	Neutral	Total
Point of view for the health perspective	33,3%	26,6%	20,1%	100
Point of view for the Nutrition Perspective	46,6%	26,6%	26,8%	100
Suggestion on preventive and protective health	26,6%	6,6%	66,8%	100
Sharing the ideas of physicians to keep fit	6,6%	0	93,4%	100

**Table4.**  
The news Sabah Günaydın makes (2021 May)

The pages reviewed in Sabah- Günaydın show that supporting news to be healthy is little more than non-supporting news. The goal is to reach for nutritious gourmet recipes rather than the recipes full of pastries, fries, cakes, and cookies. The news supporting nutritional diet is 46,6 % compared to the news not supporting it; 26,6%. Sharing the opinions of physicians or discussing on preventive and protective health in this newspaper are too neutral; 66, 8 % and 93, 4 %.

#### IV. DISCUSSION AND RESULT

The covid-19 pandemic period has caused a surreal ignites in the perspective of international relationships, social relationships, and health communication. To decipher the unscrupulous virus, each country has mobilized the system of health. This study consists of the news based on health and nutrition published in two prestigious and largest circulated written newspapers in 2007 and 2021 for 1 month. The news was analyzed in the content analysis method by scanning the descriptive method. The news is sorted out into three-point of view; supporting news, non-supporting news, and neutral.

Newspapers as one part of mass media not only gives messages to public but also impress the target group with their reputations. It is very clear that the alluring part of nutrition has gotten its right enlightenment after the pandemic period. The news from both newspapers declare that satisfying hunger by eating something should be hampered. Nevertheless, Hürriyet- Kelebek seem delicate on the ideas of keeping fit, having healthy diet.

It is impressive to find news on qualified living in both newspapers. The examined news on Sabah- Günaydın

seems to take place in the neutral part much more than Hürriyet-Kelebek. The deprivation of feeding healthily is covered by Hürriyet- Kelebek much more than Sabah-Günaydın.

Consequently, in order to have a society with lots of healthy people, making effective news is really encouraging. Media is so powerful to manipulate the target group impressively. In order to defy the virus, suggestions on protective and preventive health, sharing the ideas of the authorities are very sensitive to public opinion. Although supplementary newspapers of both gazettes were analyzed and planned to generate data, there was a restriction in reaching the entire research universe.

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# FORECASTING BITCOIN VOLATILITY WITH ASYMMETRIC -WARIMAX-GARCH MODELS

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## Abstract -

As an alternative to traditional currencies, crypto currencies have started to take place in the financial markets both as an investment and payment method. Bitcoin is not dependent on the central authority and its price effectiveness factors affecting supply and demand with high volatility.

The volatility and endogenous factor is taken with one of the methods frequently used in the literature in the application part of the study and The asymmetric Generalized Auto-Regressive Conditional Heteroscedasticity models such as GARCH, ARCH-M, EGARCH and GJR-GARCH used to determine the asymmetric volatility which is frequently used in the literature in the application part of the study. This model is taken with Wavelet Auto-Regressive Integrated Moving Average with Exogenous Variable and Generalized Auto-Regressive Conditional Heteroscedasticity (WARIMAX-GARCH) This model is exhibiting non-linear characteristics such as conditional variance that depends on past values of observed data.

In the application part of this study the price data of Bitcoin closing prices have been taken between 2019 and 2020 and the Ethereum(ETH). The out of sample bitcoin forecasting is made for 2021 for 50 days.

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**Keywords -** Bitcoin, WARIMAX -Asymmetric-GARCH Models, Out of sample Volatility

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## I. INTRODUCTION

The finance and technology have become increasingly close in recent years, and financial products based on technology and, accordingly the use of brokerage services has also increased. The cryptocurrency market has emerged and its leading currency, Bitcoin, has captured global attention.

Money transfer in digital environment, banking transactions and shopping transactions are mediated by banks. The Blockchain system is taken which is combination finance and technology by Nakamoto and Satoshi where there is no central authority and it can be defined as a cryptographic system that allows interpersonal payment. Nakamoto (2008), in his article, he published a peer-to-peer (p2p) system blockchain without the need for a third part in his system. The blockchain system can be defined with any data in the digital environment on the communication networks.

Bitcoin has been issued to ensure the continuity of the operation of the Blockchain system prize money Şahin, (2018). In this context, in the first part of the study, Bitcoin and the blockchain system, which forms the infrastructure of bitcoin, is briefly mentioned. In the second part of the study studies on bitcoin volatility literature will be included. The third part will be about the WARIMAX-GARCH models and the last section will be the application of the volatility of bitcoin which it is estimated using Bitcoin/USD closing prices between the 01.01.2019-30.12.2020.

## II. LITERATURE REVIEW

Glaser et al. (2014), found an answer if the cryptocurrency users had better information and

whether Bitcoin is treated as an asset or a currency. Bouoiyour et al. (2014), they looked at the price formation of Bitcoin from a new perspective in their study. and the result of the study is that the price of Bitcoin can be guided by speculative movements. have arrived. Dyhrberg (2016) found in his study whether Bitcoin is a financial asset or not.

Katsiampa (2017) made the best result of the volatility estimation for Bitcoin in his study. ARCH models that give the best results and as a result of the study the AR-GARCH model was found the best fit model.

The bitcoin studies are taken by many researchers. The Kristoufek (2013) examined the relationship between cryptocurrency Bitcoin, Google Trends and Wikipedia in the study.

Ciaian et al., (2016), the study addressed both currency price determinants and cryptocurrency-specific factors.

Chu et al., (2015) conducted statistical analysis of eight different exchange rates with the first electronic payment system, the BTC/USD rate.

Brière et al., (2015), the study analyzed both traditional investment instruments and alternative investment instruments in Bitcoin investment portfolio diversification using weekly data for the period 2010-2013.

MacDonell (2014) investigated the price bubble in the cryptocurrency Bitcoin and found that there was a bubble in 2013.

The study by Malhotra and Maloo (2014) examined the success of Bitcoin in exchange rates in 2013-2014 and the reasons behind price movements.

Cheung et al., (2015), the study examined the existence of bubbles in Bitcoin prices using econometric techniques.



In July February 20, 2013, Hencic and Gourièroux (2015) used a Bitcoin price series consisting of 150 observations between February 20, 2013 and July 20, 2013 as the data set in the study.

In the study, Kristoufek (2015) examined the factors that influence Bitcoin prices. Frascaroli and Pinto (2016) used Bitcoin's return series from June 2015 as a sample, which they treated as a financial innovation in the study.

Katsiampa (2017) investigated the optimal model for the price volatility of Bitcoin as a financial asset in the study. Stavroyiannis (2017) used bitcoin, Entereum, Litecoin, Ripple and the S&P 500 index as a sample of major cryptocurrencies as part of risk management in the study.

Kormaz, Kucuksahin and Caglar (2019) studied the volatility structure of the cryptocurrencies with Garch models for Turkey . In the study of Dyhrberg (2016), whether Bitcoin is a financial asset he looked into it.

Corea et al., (2016) examined an application to a daily time series of dam displacement in Brazil shows the WARIMAX-GARCH method to remarkably outperform the ARIMA-GARCH method

**III. THE WARIMAX -GARCH MODELS**

ARIMA method to be easily applicable and acceptable results it has quite widespread use due to its verdicts. The general exogenous model employed by the ARIMA model has been discussed by Box and Tiao (1975), where it is referred to as an Auto-Regressive Integrated Moving Average with eXogenous variables (ARIMAX) model.

In the ARIMAX method it is possible to use more than one argument Fan et al., (2009) and Jalalkamali et al.. (2015). The ARIMAX method is generalized by Bierens (1987). The ARIMAX method equality is

$$(1 - \sum_{s=1}^p \alpha_s L^s) \Delta y_t = \mu + \sum_{s=1}^p \beta_s L^s x_t + (1 + \sum_{s=1}^q \gamma_s L^s) \epsilon_t \tag{1}$$

L is the lag operator. The dependent variable in the ARIMAX method is  $Y_t$  only with historical data instead of guessing together  $Y_t$  both historical values and explanatory variables are  $X_t$ . it is intended to be estimated with variables. Thus ARIMA according to the method, more accurate results are obtained Cool et al.(2009); Neter et al.,(1996).

ARIMAX methods is generelized by Bierens, (1987). The ARIMAX model consists of four parts. These sections are, respectively, Auto Regressive (AR), Integrated (I), Moving Average( MA), and the external variable (X) is called Sutthichaimethee and Ariyasajjakorn (2017).

The Auto-Regressive Conditional Heteroscedastic (ARCH) model of Engle (1982) allows for the conditional variance to depend on past values of the conditional variance itself; while the Generalized ARCH (GARCH) model of Bollerslev (1986) enable the volatility to depend on past values of both the

squared innovation and conditional variance itself. The WARIMAX-GARCH method proposed here employs a GARCH model as one of its components.

Wavelet Auto-Regressive Integrated Moving Average with eXogenous variables and Generalized Auto-Regressive Conditional Heteroscedasticity (WARIMAX-GARCH) method, is proposed to improve predictive performance and accuracy. WARIMAX-GARCH method obtains Wavelet “EVs” (WEVs) from Auto-Regressive Integrated Moving Average with eXogenous variables and Generalized Auto-Regressive Conditional Heteroscedasticity (ARIMAXGARCH) models applied to Wavelet Components (WCs) that are initially determined from the underlying time series Correa,et.al (2016). The unconditional variance is determined by Bollerslev (1990),

$$\sigma^2_t = \gamma_0 + \sum_{j=1}^r \gamma_j R_{j1} \sigma^2_{t-j} + \sum \delta_l \epsilon_t \tag{2}$$

Equation 2 is used by the WARIMAX-GARCH method to generate insample and out-of-sample forecasts of the conditional variance of the time series  $y_t (t = 1, \dots, T)$ .

The WARIMAX-GARCH model has some steps.Step 1: a wavelet decomposition of level r (described in Section 1) of the underlying time series  $y_t (t = 1, \dots, T)$  is performed, generating r+1 WCs. That is, one WC of approximation at level  $m_0$ , denoted by  $\tilde{y}A_{m_0,t} (t = 1, \dots, T)$ , and r WCs of detail at levels from  $m_0$  to  $m_0 + (r - 1)$ , denoted by  $\tilde{y}D_{m,t} (t = 1, \dots, T)$  for  $m=m_0, \dots, m_0+(r-1)$ ; Step 2: each WC obtained in Step 1 is individually modeled by using a distinct ARIMAGARCH in order to generate their out-of-sample forecasts; Step 3: the WCs of the Step 1 are completed by their out-of-sample forecasts (of horizon h) of the Step 2, producing the Completed WCs (CWCs) consisting of the wavelet EVs (WEVs) Correa ,et all. (2016)

**IV. DATA AND METHODOLOGY**

In this part of study the data set and volatility methods are taken the period of the year between 01.01.2019-30.12.2020 and using daily returns calculated from the daily closing price were used. The data are taken from the www.tr.investing.com website. The table 1 shows the descriptive statistics of bitcoin/usd and Ethereum /usd variables .

Mean	0.0056	0.0345
Median	-0.0038	0.4573
Maximum	0.4322	0.5621
Minimum	-1.000	-1.000
Standart Deviation	00483	0.3478

skewness		-0,5638	1.4533
Kurtosis		6.3266	5.7632
Jarque-Bera		642.366	237.99
ARCH-LM	F - Value	326,8	220,56
	Prob	0.000	0.000
White-LM test	F- value	176.00	145.58
	prob	0.000	0.000

Table 1. Descriptive Statistics of RBTC And RETR

Since the kurtosis coefficient of the RBTC return series is greater than 3 (9,32 ) so the means it has a thick tail and the skewness level is less than zero (-0,50) so it has left asymmetry distribution and the asymmetric WARIMAX -GARCH models we can use in this study. The RETR is the endogenous variable and it has fat tail (5,67) and right skewed distribution (1,45). The White test results there is a heteroscedasticity and the Arch-Lm test indicates the there is an ARCH effect in the serial for conditional heteroscedasticity . In this case, RBTC and RETR returns are in accordance with ARCH modeling. The Table 2 shows the Btc and the exogenous variable Ethereum return series ADF and Philips Perron stability test analysis.

	ADF test		Phillip -Perron (PP Test)	
	Constant+trend		Constant +trend	
	T value	p value	T value	p value
<b>RBTC</b>	2.6633	0.0001	2.4411	0.0001
<b>RETR</b>	3,6511	0,0014	3,1856	0,0014

Table 2. ADF and PP Test Results

The return series are calculated taking logarithmic differences with series of BTC variable. Such as;  
 $RBTC = \log RBTC_t - \log RBTC_{t-1}$  (3)

According to the test results in Table 2 the two variable both of ADF tests according to the statistics and according to the PP test statistics, the probability values are less than 0.05 (0.0001 , $p < 0.05$ ) and the RETR series probability values are less than 0.005

(0.0014) since the null hypothesis would be rejected, it was found to be both stationary.

A WARIMAX-GARCH model however can model the high-frequency oscillations in the underlying series time through the ARIMA-GARCH models integrated with the wavelet decomposition approach. For volatility the ARIMA GARCH model is used to find the volatility of btc and ethereum in the Table 3.

Dependent Variable	Independent Variable	EGARCH - $\mu_0(1,1)$	GJR-GARCH-student-t (1,2)
RBTC	RETR	ARIMA(2,1,2)	ARIMA(3,1,2)
MAPE		0.84637	0.21225
MAE		1.67393	0.44295
APE		1.2366	0.85612
$R^2$		0.0662	0.0887

Table 3. Asymmetric ARIMAX-GARCH model

ARIMA-GARCH models was determined by comparing the forecasting performances of each candidate model as measured by their Absolute Percentage Error (APE), Mean Absolute Percentage Error (MAPE), Mean Absolute Error (MAE) and  $R^2$ . The another asymmetric models are tried and they are not found statistically significant and the best model is GJR-GARCH ARIMA(3,1,2) is more fit than another asymmetric model with minimum selection criteries and maximum  $R^2$ .

The BDS tests to detect non-linear serial auto-correlations and ARCH tests for unconditionally constant residual variance (see e.g. Hamilton, 1994).

Dimensions	BDS statistics	Probability
2	-3.22E-05	0.7833
3	-7.82E-06	0.8955
4	-5.22E-06	0.9672
5	-2.32E-05	0.9214
6	-2.5639-04	0.7234

Table 4. BDS Test Of In-Sample Ordinary Residuals Of The GJR-GARCH-ARIMAX Model.

Table 4 shows the statistics and the corresponding p-values for dimensions 2 to 6 of a BDS test (which consists of a statistical test used to verify the existence of linear and non-linear autodependence existing in a data set applied to the in-sample residuals of the ARIMA-GJR-GARCH-GED (3, 1, 2) x (1, 2) model. The first step of the WARIMAX-GARCH method was implemented .A wavelet decomposition of level sample of the BTC variable. The WARIMAX-GARCH method, each one of the WCs  $\tilde{y}A_{2,t}$  ,  $\tilde{y}D_{2,t}$  and  $\tilde{y}D_{3,t}$  ( $t = 1, \dots, 657$ ) were

individually modeled by three different asymmetric ARIMA-GARCH models. The WARIMAX-GARCH method can adopt any GARCH approach to forecast volatilities.

In the study for WARIMAX-GARCH model we used the r+1 wavelet exogenous variables by the following WARIMAX-GARCH (p, d, q) x (P, D, Q) model to generate in-sample and out-of-sample forecasts. The wavelet methods are suitable for the non-stationary and/or non-linear time series Mallat( 2009), all WEVs of a WARIMAX-GARCH model should be stationary to satisfy this requirement of the ARIMAX modelling approach.

Table 4 shows the application of the WARIMAX-GARCH method to a daily time series of the bitcoin and exogenous variable etherium results The beloved models,

$$x1,t = \beta BTC_{2,t}, C = (\beta A2,t) t=1...657 ; (\beta A2,t) t=657...703 \} \quad (4)$$

$$x2,t = \beta BTC_{D2,t}, C = ((\beta D2,t) t=1...657 ; (\beta D2,t) t=657...703) \text{ and } \quad (5)$$

$$x3,t = \beta BTC_{D3,t}, C = ((\beta D3,t) t=1...657 ; (\beta D3,t) t=657...703) \quad (6)$$

All three WEVs,  $x1,t$ ,  $x2,t$  and  $x3,t$ , were required in the best WARIMAX models .

	MAPE		MAE	
	In-sample	Out-of-sample	In-sample	Out-of-sample
WARIMAX-GJRGARCH-GED	0.7691	<b>0.2217</b>	0.6788	<b>0.2945</b>
ARIMAX-GJRGARCH-student-t	0.439	0.8922	0.5123	0.7913

Table 6 – The In-Sample and Out-Of-Sample Forecasting Performances.

\*The bold level number is the minimum level of selection criteria

The table 6 shows the WARIMAX-garch model has the minimum MAPE,MAE criteria so this model more effective for t he out of sample of with exegenious variable etherium and out of sample for 50 days forecasting.

## V. CONCLUSION

The aim of this study is to take bitcoin and independent variable etherium from cryptocurrencies and to take asymmetric GARCH models by selecting the WARIMAX mean model. For this purpose, Bitcoin, Ethereum's daily return series were used including the weekend between 01.01.2019 - 30.12.2020.

The increasing popularity in cryptocurrencies has become widespread around the world. As a result the daily trading volume in the cryptocurrency market has increased and it has led to increased volatility during the day. The results in this paper suggest that

Dimensions	BDS statistics	Probability
2	-4.79E-05	0.9377
3	-8.17E-06	0.9445
4	-4.35E-06	0.9567
5	-3.17E-05	0.8275
6	-4.356E-04	0.8945

Table 5. BDS Test Of In-Sample Ordinary Residuals Of The WARIMAX-GARCH Model.

Table 5 shows the BDS test for WARIMAX-GJRGARCH models. Therefore, the in-sample forecasting residuals can be considered as a white noise process with mean of zero, validating the WARIMAX-GJRGARCH model.

Table 6 shows the MAPE and the MAE statistics for the in-sample and the out-of-sample forecasting performances of the three benchmark methods WARIMAX-garch and ARIMAX-garch model .

BTC/USD (RBTC) and exogenous variable etherium ETR/USD (RETR) returns can be forecasted with WARIMAX-GJRGARCH model using past returns . The wavelet components have good statistical properties to be used as exogenous variables by the WARIMAX-GARCH method.

Even the volatilly model is found ARIMA in asymmetric GARCH with usefull ARIMA and GARCH models. ARIMAX model is used for in sample volatility and we found the GJR-GARCH model is statistically significant. For out of sample forecasting we tried also exegoneius varaible etherium and we used composition of Wavelet composiation (WC) with aproximation with three level for in sample volatility. In addition, the WARIMAX-GARCH model has achieved considerably better forecasting performance than ARIMAX-GJR-GARCH model with different distribution.The out of 50 days ahead the BTC will be increasead and the etherium level will effect these result because we can see the effect of

another cryptocurrency levels will be effective on BTC level volatility .The GJR-garch model also can proof the bad volatiliy effect on the btc volatility level so we can see the threshold effect on BTC level in this time period.

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# ASSESSING INFLUENCE OF CONSUMERS EXPECTATIONS FROM ONLINE VS OFFLINE PURCHASING ENVIRONMENTS ON SATISFACTION

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**Abstract** - Customer expectations of both offline and online purchasing environments are strongly attached to actual consumer satisfaction, while expectations are perceptions of future service performance that are commonly thought to reflect what a customer believes or anticipates is likely to happen. The purpose of this research paper is to investigate the influence of consumers' expectations from online and offline purchasing environments service quality on their satisfaction, seeking for the future improvement in a corporate purchasing environment. The study was conducted according to the original SERVQUAL method. The questionnaire administrated comprised of the four out of five original SERVQUAL dimensions, namely Responsiveness- Reliability - Assurance – Empathy, while Tangibles dimension was replaced with Perceived Value - P.V., to more appropriately reflect the online environment. Six Hypotheses were formulated and data were analyzed through were analyzed with IBM SPSS version 19. Regression analysis for both environments was performed to test the first five Hypotheses and Laplace criterion was chosen, as a Decision theory selection criterion to test the last one. It was proved that that for customers of both online and offline purchasing environments Perceived Value – P.V. was the most important feature, followed by Assurance, Responsiveness and last Reliability. It was also showed that there is actually a different level of expectations between the two purchasing environments, where consumers seem to expect more from offline purchasing environments than online ones.

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**Keywords** - Customer Expectations, Online Purchasing Environment, Offline Purchasing Environment, SERVQUAL, Customer Satisfaction

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## I. INTRODUCTION

The retail industry today is a highly competitive business with a large economic footprint. In the International Journal of Research in Marketing, Degeratu, Rangaswami & Wu (2000) noted that, "An issue of particular interest to both practitioners and academics is in determining whether there are systematic differences in consumer purchase behavior between online and regular offline stores, and if there are differences, in understanding the reasons for these differences."

Online consumers have the opportunity to compare between a plethora of goods in just a few clicks, especially for functional products and services. Past researches reveal many systematic differences in customer attitudes and behavior for products and services chosen online versus offline channels. For example, price sensitivity may actually be lower online than offline (Degeratu et al., 2000; Lynch & Ariely, 2000; Shankar et al., 2001). Brand names (brand equity) could also have higher impact online than offline (Degeratu et al., 2000).

Customer expectations of offline and online services are strongly attached to actual consumer satisfaction. Expectations are perceptions of future service performance that are commonly thought to reflect what a customer believes or anticipates is likely to happen (Olson, J. C., & Dover, 1979; Yi, 1990). After a service encounter, customers evaluate their

satisfaction with the service based upon initial expectations, perceptions of actual service performance, and a comparison of expectations against performance in which expectations are positively or negatively disconfirmed (Oliver, 1980; Yi, 1990; Spreng & Page, 2003). Thus, the current research deals with whether there are differences in customer expectations between online and offline purchasing environments affecting their outcome satisfaction. The five-dimensional service quality scale (SERVQUAL) will be used to investigate two different purchasing environments (online and offline). The results will be useful for theorists and policy makers, since besides the influence degree of the five service quality constructs on consumers expectations from online and offline purchasing environments and thus satisfaction, the effect of them on consumers expectations of the entire commerce arena service quality and consumer satisfaction with the products/services providers will be explored.

## II. LITERATURE REVIEW AND HYPOTHESES

According to Oliver & Burke (1999), satisfaction is defined as the perception of pleasurable fulfillment of a service. A satisfied consumer is not only a high return-low risk economic asset (Fornell et al., 2016), but the de facto brand ambassador of a retail company (Wangenheim & Bayón 2007). Researchers have examined customer satisfaction through an expectation-disconfirmation paradigm that holds that

satisfaction is formed by both a customer's initial expectations and their subsequent comparison of how the product or service performs in relation to these expectations known as disconfirmation (Churchill & Surprenant, 1982; Oliver, 1980; Yi 1990).

Customers base their expectations on a variety of factors. For example, predictive-will expectations are based upon what customers think is likely to happen, desired-ideal expectations are based upon what customers wish for or desire, and adequate-should expectations are based upon the lowest level of performance customers will accept (Kettinger et al., 1997; Spreng et al., 1996; Zeithaml, 1993).

Evidence concerning the connection between expectations and satisfaction are mixed. There are surveys indicating a negative impact of expectations on satisfaction, while others a positive one through performance satisfaction (Yi, 1990; Spreng et al., 1996; Boulding et al., 1993). Spreng et al. (1996) found that the simple correlation between expectations and satisfaction is positive in many marketing studies, suggesting an overall positive influence of expectations on satisfaction. Literature on online service settings reveals that expectations are either positively correlated with satisfaction or have a total positive effect on satisfaction (Khalifa & Liu, 2002; Susarla et al., 2006).

Service quality was defined as "the global evaluation or attitude of overall excellence of services" (Parasuraman et al., 1985). It can be seen as the difference between customer perception or expectation of service delivered by using confirmation/disconfirmation theory. Expectation could be considered in terms of what a service would offer (Boulding et al., 1993). Service quality has been investigated across many industries and the results revealed that it could be defined by the various dimensions such as reliability, responsiveness, competence, understanding, courtesy, communication, access, security, credibility and tangibility. These dimensions were later evaluated by Parasuraman et al. (1988), verifying the SERVQUAL scale, with the following five dimensions for assessing service quality: tangibility, reliability, responsiveness, assurance, and empathy.

SERVQUAL scale is one of the most accepted scales used to measure service quality. According to Khorshidi et al. (2016), SERVQUAL is a method to evaluate service quality following the gap theory as introduced by Parasuraman et al. According to the founders of SERVQUAL scale, the construct of quality as gauged by SERVQUAL encompasses perceived quality whereas perceived quality is the consumer's judgment about an organization's overall excellence or superiority. Parasuraman et al. (1988) also compared perceived quality (involving

consumer's attitude) with objective quality (involving objective aspect or feature of a service or product) in their study. According to them, perceived quality is though linked but not equals satisfaction and events of satisfaction over time leads to the perceptions of service quality (Parasuraman et al., 1988). Parasuraman et al.'s (1988) operationalization of SERVQUAL method of measuring service quality was derived from the gap theory involving the comparison or expectations and perceptions of performance. This classic conceptualization of perceived service quality is still reliable and the SERVQUAL method is still popular in modern days' studies. The five dimensions of the SERVQUAL scale are Tangibility: "Physical facilities, equipment, and appearance of personnel"; Reliability; "Ability to perform the promised service dependably and accurately"; Responsiveness: "Willingness to help customers and provide prompt service"; Assurance: "Knowledge and courtesy of employees and their ability to inspire trust and confidence"; Empathy: "Caring, individualized attention the firm provides its customers" (Parasuraman et al., 1988)

Along with the above review and the research objectives of the current research, the following hypotheses have been developed:

H1: Responsiveness is expected to be positively related to customer satisfaction in a given purchasing environment.

H2: Reliability is expected to be positively related to customer satisfaction in a given purchasing environment.

H3: Perceived Value – P.V. is expected to be positively related to customer satisfaction in a purchasing environment.

H4: Assurance is expected to be positively related to customer satisfaction in a given purchasing environment.

H5: Empathy is expected to be positively related to customer satisfaction in a given purchasing environment.

H6: A difference exists between the customers' expectations from online and offline purchasing environments.

### III. METHODOLOGY

#### *Survey instrument*

The study was conducted according to the original SERVQUAL method, following the recommendations of its authors and also of researchers who have used this method across contexts and cultures. The purpose was the assessment of customers' expectations influence from online and offline purchasing environments on their satisfaction, seeking for the future improvement in a corporate purchasing environment.



The questionnaire consisted of three parts. The first part used nominal scales to collect basic respondents' demographics, while the second and third part comprised of the theoretical constructs of SERVQUAL. Considering the unique characteristics of online purchasing environments services, four out of five original SERVQUAL dimensions, namely Responsiveness- Reliability - Assurance - Empathy were included in the questionnaire. Tangibles dimension was replaced with Perceived Value -P.V., to more appropriately reflect the online environment. Previously validated questions were used, though minor modifications were made to survey items to reflect training program environments. All questions, except those which gather demographic data, were presented on a 5-point Likert scale.

The 22 items instrument to measure the four original SERVQUAL dimensions consisted of 14 question which have been previously used other research (Stodnick& Rogers, 2008; Olorunniwo et al., 2006). The items were adapted from Olorunniwo et al. (2006) and Stodnick and Rogers (2008) but partially altered to reflect and fit purchasing environments. Perceived Value was measured with four items (Zeithaml, 1988). Satisfaction was measured with four items from the study by Oliver (1997). The methodology of the research reported here follows the original SERVQUAL method in terms of data acquisition.

#### Data collection

An intercept method was followed in Greek public locations that are considered to be busy (shopping malls, bus and train stations, public parks etc). The respondents were chosen based on a sampling schedule. Multiple timescales were created to secure random selection, and sampling hours were adjusted different for working days and weekends. Timescales, places, and individuals were randomly selected.

The self-administered instrument was delivered to 500 individuals. A total of 359 completed questionnaires were returned – response rate 71.8 percent. The first questionnaire was in English and was reviewed for content validity by a university staff of International Hellenic University, Greece. The reviewed questionnaire was administered in Greek, so the English questionnaire was translated into Greek and then back into English to ensure translation equivalence (Brislin, 1970). The respondents who accepted to participate in the survey were first asked whether they had experience of both online and offline purchasing environments. Only those who declared “yes” could participate in the survey because they were about to report their expectations from both environments.

#### Data analysis

Questionnaires were analyzed with IBM SPSS version 19. Testing the presence of normality is essential (Hair et al., 2011). If the data is not

normally distributed, the validity and reliability of the results may be affected. Kurtosis tests were used to check whether data is normally distributed. The response rate (71.8 percent) was quite high, confirming the validity and Cronbach's  $\alpha$  values were calculated to test reliability (Table 2). Reliability and correlation analysis were implemented for both online and offline purchasing environments. Regression analysis for both environments was performed to test Hypotheses. For testing Hypothesis 6, Laplace criterion was chosen, as a Decision theory selection criterion for decision making under uncertainty (Taha, 2007; Prasad, 2015). In the Laplace criterion equal probabilities are assigned to the result of each strategy, from which the highest is chosen.

## IV. RESULTS

#### Demographics and Hypothesis 1-5 tests

46.6 per cent of the respondents are loyal users of online purchasing environments and 53.4 per cent are loyal customers of offline purchasing environments. The sample consists of more females (57.9 per cent) than males (42.1 per cent). More data have been gathered from the age group of 28-38 years old (39.3 per cent) and least from >48 years old (8.1 per cent), Table 1.

		Frequency	%	Cumulative %
Purchasing environment	Online	167	46.6	46.6
	offline	192	53.4	100
	Total	359	100	
Gender	Male	151	42.1	42.1
	Female	208	57.9	100
	Total	359	100	
Age	18-28	103	28.7	28.7
	28-38	141	39.3	68.0
	38-48	86	23.9	91.9
	>48	29	8.1	100
	Total	359	100	

Table 1: Demographics

Table 2 shows the variables, number of items for each variable, Cronbach's  $\alpha$ , mean, Standard deviation and Pearson correlation between customer satisfaction and the five variables of the modified SERVQUAL, for both environments. In the offline purchasing environments, the Pearson correlation is relatively stronger with Perceived value – P.V. (0.708), then by Reliability (0.637), Empathy (0.597), Responsiveness (0.592), Assurance (0.486). In the online purchasing environment, the Pearson correlation is relatively stronger with Reliability (0.592), then with Perceived value – P.V. (0.582), Responsiveness (0.522), Empathy (0.461) and Assurance (0.394).

Variables	No. Items	Cronbach's $\alpha$	Mean	SD	1	2	3	4	5	6
Responsiveness	3	0.772	8.34 <sup>i</sup>	2.28 <sup>i</sup>	1.00					
Reliability	3	0.692	10.57 <sup>ii</sup>	3.63 <sup>ii</sup>	0.715**	1.00				
Perceived Value - P.V	4	0.703	11.26 <sup>ii</sup>	2.17 <sup>ii</sup>	0.631*** <sup>ii</sup>		1.00			
Assurance	4	0.701	10.92 <sup>ii</sup>	2.14 <sup>ii</sup>	0.590*** <sup>ii</sup>	0.534***		1.00		
Empathy	4	0.769	11.20 <sup>ii</sup>	2.52 <sup>ii</sup>	0.682***	0.601***	0.617***		1.00	
Customer Satisfaction	4	0.697	7.36 <sup>ii</sup>	2.34 <sup>ii</sup>	0.603*** <sup>ii</sup>	0.510***	0.517***	0.582***	1.00	
			16.82 <sup>ii</sup>	2.93 <sup>ii</sup>	0.642*** <sup>ii</sup>	0.421***	0.503***	0.492***		1.00
			8.35 <sup>i</sup>	1.82 <sup>i</sup>	0.592***	0.657***	0.708***	0.486***	0.597***	1.00
			11.26 <sup>ii</sup>	2.06 <sup>ii</sup>	0.522***	0.592***	0.582***	0.394***	0.461***	

Table 2. Number of items, reliability, mean, SD, correlation for online and offline purchasing environments

<sup>i</sup>Offline programs <sup>ii</sup>Online programs. \*\*Correlation is significant at 0.01 level (two-tailed)

	Offline programs			Online programs			Combined effect		
	$\beta$	t-value		$\beta$	t-value		$\beta$	t-value	
(constant)	1.127*	1.742		1.293*	2.691		1.261*	2.993	
Responsiveness	0.136***	1.521		0.028***	2.872		0.151*	2.875	
Reliability	0.235***	2.513		0.046*	0.481		0.118*	2.201	
Perceived Value -P.V	0.714***	6.201		0.494***	7.903		0.491***	9.995	
Assurance	0.203*	2.439		0.317***	5.201		0.278***	4.896	
Empathy	0.046*	0.701		0.061**	1.203		-0.049**	1.392	
F		51.401			95.281			142.241	
R <sup>2</sup>		0.612			0.692			0.668	
Adjusted R <sup>2</sup>		0.601			0.686			0.661	
Durbin-Watson		1.947			1.902			1.942	

Table 3. Online, offline and overall purchasing environment regression analysis

Predictors: (constant), Assurance, Empathy, Perceived Value – P.V., Reliability, Responsiveness; Dependent variable: customer satisfaction. \*p,0.001, \*\*p,0.01, \*\*\*p,0.05

Table 3 shows the regression analysis results for both environments. As it seems Responsiveness, Reliability, Perceived Value -P.V. and Assurance are significantly related to customer satisfaction. Though, Empathy is insignificantly related to customer satisfaction. Therefore, Hypotheses 1,2,3,4 are accepted and Hypothesis 5 is rejected. Therefore, given Table 4 findings, it can be concluded that for all customers, the most important purchasing environment feature is Perceived Value – P.V., followed by Assurance, Responsiveness and last Reliability. Also, features' preference order for both environments separately, indicate a closely resembling allocation where the first one, in both of them is Perceived Value-P.V. and the last Responsiveness.

**Hypothesis 6 test**

The Laplace criterion is based on the optimistic assumption that each possible outcome of decision making under uncertainty likely equally. Therefore, if there are n outcomes, the probability of each is 1/n. This is computed by average payoff for each

alternative by adding all the payoffs and dividing by states of nature. This approach allows the decision maker to compute the expected payoff for each alternative and chose the alternative with the largest value (Webster, 1991). Laplace decision rule is followed:

1. Assign  $p_j = P(S_j) = 1/n$  to each  $S_j$  in  $S$ , for  $j = 1, 2, \dots, n \dots (i)$
2. For each  $A_i$  (payoff matrix row), compute its expected value:  $E(A_i) = \sum p_j (R_{ij})$  for  $i = 1, 2, \dots, m \dots (ii)$  Since  $p_j$  is a constant in Laplace,  $E(A_i) = \sum p_j (R_{ij}) = p_j \sum R_{ij} \dots (iii)$
3. Select the action alternative with the best  $E(A_i)$  as the optimal decision

The Laplace's criterion assumes that in case of absence of any information regarding probabilities of possible outcomes of decision making under uncertainty, then it is reasonable to assume that they are likely equally. Therefore, if there are n outcomes,



the probability of each is  $1/n$ . Laplace criterion assumes that all state of nature will occur with equal probabilities. Therefore, this is computed by average payoff for each alternative by adding all the payoffs and dividing by states of nature. This approach allows the decision maker to compute the expected payoff for each alternative and chose he alternative with the largest value (Webster, 1991).

Finding in which of the two environments customers expectation is higher, the optimal alternative is performed step by step as follows:

a) Construct a decision Table which rows are the two different environments under investigation and columns are coupling metrics –  $\beta$  values (Table 4).

b) According to the states of nature ( $n$ ) and each one's probability ( $1/n$ ), calculate the expected payoff for each alternative ( $\alpha_i, s_j$ ).

States of nature:  $n=5$ , Probability:  $1/5$ ,  $i=1,2$  and  $j=1,2,3,4,5$

$\beta$	$s_1$	$s_2$	$s_3$	$s_4$	$s_5$
$\alpha_1$	$v(\alpha_1, s_1)$ = 0.136	$v(\alpha_1, s_2)$ = 0.235	$v(\alpha_1, s_3)$ = 0.714	$v(\alpha_1, s_4)$ = 0.203	$v(\alpha_1, s_5)$ = 0.046
$\alpha_2$	$v(\alpha_2, s_1)$ = 0.028	$v(\alpha_2, s_2)$ = 0.046	$v(\alpha_2, s_3)$ = 0.494	$v(\alpha_2, s_4)$ = 0.317	$v(\alpha_2, s_5)$ = 0.061

Table 4. Payoff values

## V. CONCLUSION

There is an extensive literature review on customer satisfaction in offline purchasing environments but information systems research is in the beginning of investigating origins of customer satisfaction and online expectations. This study added to this area first by investigating the connection of expectations to customer satisfaction on both online and offline purchasing environments separately and together, and secondly by comparing them and revealing differences on expectations using the SERVQUAL model. It was proved that that for customers of both online and offline purchasing environments Perceived Value – P.V. was the most important feature, followed by Assurance, Responsiveness and last Reliability. It was also, proved that there is actually a different level of expectations between the two purchasing environments, where consumers seem to expect more from offline purchasing environments than online ones. The result can be used as a preliminary guide for managers by showing them the expectations differences in terms of service quality dimensions.

c) Choose the optimal alternative with maximum value as the following formula:

$$\max \alpha_i \left\{ \frac{1}{n} \sum_{j=1}^n v(\alpha_i, s_j) \right\}$$

$$E(\alpha_1) = (1/5) * (0.136 + 0.235 + 0.714 + 0.203 + 0.046) = 1.334/5 = 0.267$$

$$E(\alpha_2) = (1/5) * (0.028 + 0.046 + 0.494 + 0.317 + 0.061) = 0.947/5 = 0.190$$

$E(\alpha_1)$  and  $E(\alpha_2)$  values indicate that there is actually a different level of expectations between the two environments. Thus, Hypothesis 6 is accepted. Consumers seem to expect more from offline purchasing environments than Online ones. Thereby, online purchasing environments' consumers are easier to satisfy, due to lower expectations than offline ones. Higher expectations from offline purchasing environments may derive from the fact that when customers visit a business in person, they are willing to give something up, for example, the time and effort it takes to travel to the store and the energy required to interact—because they believe there is some unique “payoff.”

## LIMITATIONS

This research has several limitations. First of all, is the fact that the sample of individuals was convenient rather than statistical. Also, the population must be considered before generalizing the results. In addition, there is the possibility that there may systematic bias between individuals who responded to participate and those who did not.

## ACKNOWLEDGMENTS

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# SIMULATION OF CONTROL SYSTEM HYBRID SOLAR CELL AND WIND POWER PLANT USING BATTERIES AS A INDEPENDENT HOUSEHOLD ELECTRICITY MANUFACTURER

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**Abstract** - The Use and utilization of existing energy is increasingly limited because fossil power plants which are still massively used have many impacts on the environment due to the emissions released. The use of renewable energy as a source of electricity is a solution to reduce the use of fossil fuels that provide a lot of emissions. However, this renewable energy has drawbacks because the input and output provided by the source are unpredictable, causing the energy released to be unstable and allowing energy supplies to not be available when needed (intermittent). In this study, the use of hybrid solar cells and wind turbines will be simulated to be applied to the roof of the house. The test of this research uses Matlab/Simulink software to calculate several input conditions from wind speed and irradiant received by the system input with the aim of meeting the electrical load of the house. In this study, the total electrical load was 48.51kWh/day by taking into account the work protection factor of the load system increased to 63.06kWh/day. The results showed that the hybrid generating system used 18 units of 300Wp solar cells and 2000W wind turbine with a total of 20 batteries. The battery works in a bi-directional manner to control the system output so that the output provided is stable in meeting load requirements. This hybrid system can supply 67kW of power which already meets the electricity needs of the house independently.

**Keywords** - Renewable Powerplant, Green Energy, Hybrid System, PLTS Roof, PLTB Roof

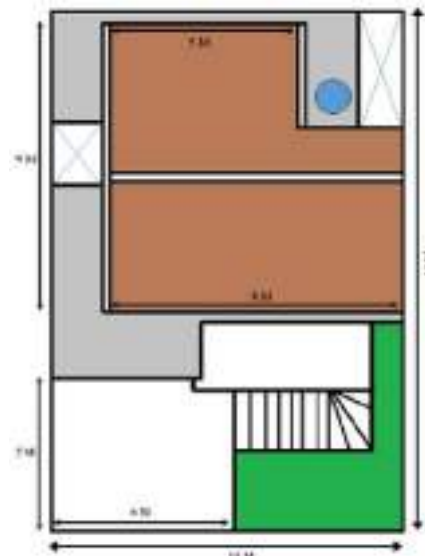
## I. INTRODUCTION

Electrical energy has become one of the basic needs of people everywhere, both in developing countries such as Indonesia, as well as developed countries. The more and the development of technology used by humans makes the need for electrical energy in the world is increasing. Meanwhile, the supply of electrical energy sourced from oil, natural gas, and coal has several limitations, in which the fossil energy source will one day run out if it is continuously used. Electrical energy from renewable sources, such as solar power, geothermal, wind, biomass, ocean currents, to waves has not been fully utilized.

Along with the development of technology, the use of renewable energy plants can replace the use of fossil fuels that are not friendly to the environment, but the use of renewable energy generation systems has a major drawback, namely the energy output provided is uncertain due to unpredictable natural conditions(intermittent). One step is to combine 2 renewable energy plants that have different sources with high work system compatibility. Solar power plant andwind power generation have a high work system compatibility where the optimal output from solar cells during the day while the output from wind turbines is optimal at night so that if hybridized these two systems can support each other. However, because these two plants are intermittent power sources, batteries are needed as energy storage and support for supplying electrical power in order to provide output that is in accordance with electricity needs [1].

In this study, a hybrid system will be created between a solar cell power plant and rooftop wind power plant that integrated in order to continuously distribute

power. The roof structure of the house in this study is as shown in Figure 1.



**Fig 1. Roof structure**

The dimensions of the PV module are 1.5 X 1 X 0.5m<sup>2</sup> with an output capacity of 300Wp and for wind dimension Wheel Diameter: 3.2 meters. So that the potential for the construction of rooftop solar and wind cell generators is obtained as shown in Table 1.

PV-Wind potential					
	Area (m <sup>2</sup> )	dimension	Quantity generation apply	Watt produce	Total potential (Watt)
PV module	35	1.5	36	300 Wp	10800
Wind turbine			2	2000 W	4000

**Table 1: Potential of PV-Wind**

Based on the potential data, the total potential from the construction of these two hybrid plants is 14800Wp. Both of these generators are intermittent so energy management is needed for a hybrid solar-wind cell system to maintain the distribution of electric power so that it can replace the electricity source provided by the electricity provider. Utilization of this energy can maximize the use of environmentally friendly energy

so that every home can produce electricity and use it independently without using electricity from electricity service companies that use fossil energy as the main source in providing electricity.

In this system, wind and sun are the main sources for generating electrical power with a battery storage system as a continuous maintenance of system performance. It can be seen in Figure 2 the configuration of the hybrid system used in this study

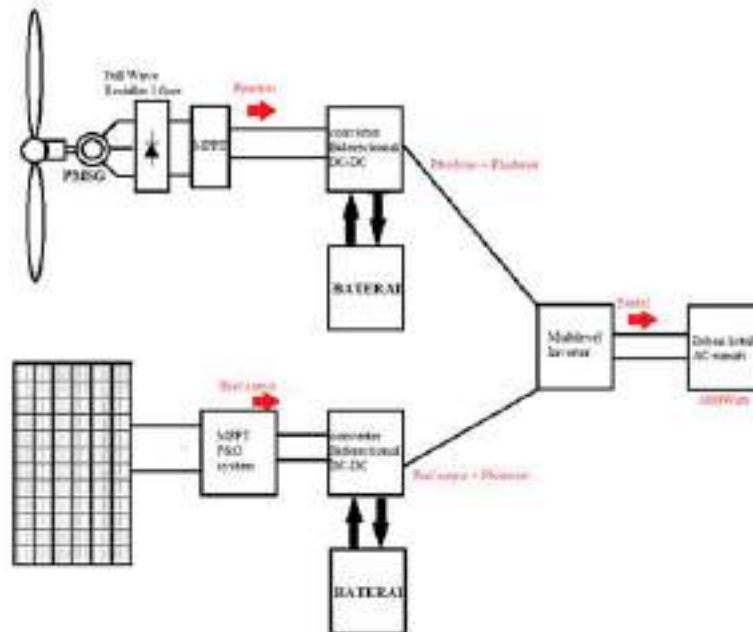


Fig. 2 System design configuration

To provide power supply to the load continuously without any disturbance, it is necessary to estimate the load that will be used in this study in order to get the

amount of production that must be given by the generator accordingly, the electrical load that must be met in this study is as in table 2 below.

LEVEL	equipment	quantity	Load (W)	total (W)	Operation time (Hour/day)	Power (Wh/day)
1	Lamp	16	10	160	14	2240
	Washing machine	1	250	250	1	250
	Water pump	1	650	650	2	1300
	Iron	1	300	300	1	300
	TV 65"	1	160	160	9	1440
	AC 1/2PK	1	400	400	4	1600
	home theater	1	1000	1000	8	8000
	Microwave	1	800	800	1	800
	Blender	1	280	280	1	280
	Refrigerator	1	100	100	24	2400
	magic jar	1	400	400	1	400
	dispenser	1	250	250	2	500
Lamp	14	10	140	13	1820	
3	TV 32"	1	100	100	3	300
	AC 1PK	3	840	2520	9	22680
	Lamp	10	10	100	12	1200
	water heater	1	1500	1500	2	3000
TOTAL				9110		48510

Table 2. Home Electrical load data.

The total daily electrical load is 48.510 Wh taking into account the protection factor to prevent power build-up and keep energy storage from being exhausted by 1.3 so that the hybrid system must be able to supply 48.5 Kwh X 1.3 = 63.05 Kwh of power which must be met by this hybrid system.

## II. SYSTEM ELEMENT MODELING

### A. Wind Turbine Modeling

The wind turbine and permanent magnet synchronic generator (PMSG) are combined as a wind generator. Based on the system model used in this simulation, the parameters used for the wind turbine are according to the following equation [2].

$$P_{turbine} = \frac{1}{2} C_p(\beta, \lambda) \rho \pi R^2 V_v^3 \quad (1)$$

Where, (kg.m<sup>-3</sup>) air density, R (m) turbine radius, v (ms<sup>-1</sup>) wind speed and C<sub>p</sub> (λ, β) power coefficient which describes the aerodynamic efficiency of the turbine and also depends on the speed ratio and angle. Ratiospeed λ:

$$\lambda = \frac{R \Omega_{turbine}}{v} \quad (2)$$

Modeling the equations of the permanent magnetic synchronous generator (PMSG) using mathematical equations (3) and (4) as follows [2]:

$$V_q = -R_s i_q - L_q \frac{di_q}{dt} + \omega_e L_d i_q + \omega_e \lambda_m \quad (3)$$

$$V_d = -R_s i_d - L_d \frac{dd}{dt} + \omega_e L_q i_q \quad (4)$$

Simulation of the wind turbine system in MATLAB/Simulink can be seen as shown in Figure 3 below.

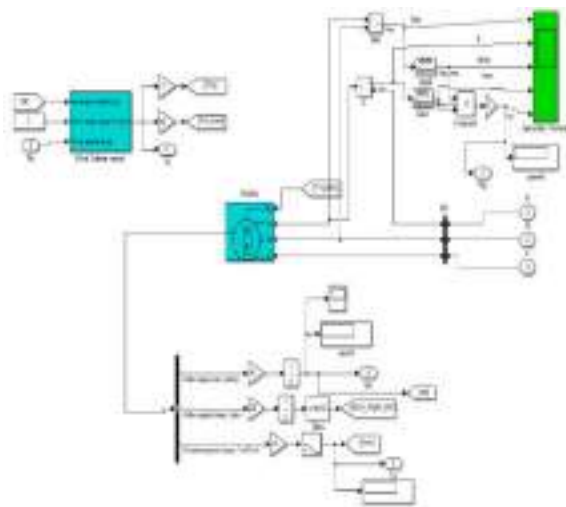


Fig.3 Wind turbine and PMSG configuration in MATLAB

Figure 3, modeling a wind turbine system in MATLAB-simulink, a wind turbine with a capacity of 2000 watts when the rate speed is 10m/s, the output voltage and power provided by the wind turbine are as shown in Figure 3 below.

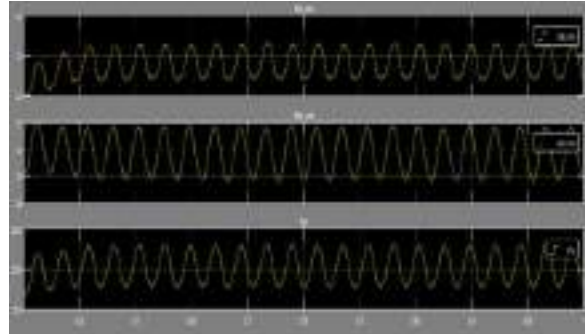


Fig. 4 Wind turbine output.

### B. Solar Cell Modeling

Solar cell modeling and simulation is usually represented by a simplified equivalent circuit as shown in the figure. 1 and for the characteristic equation of the solar cell using the following equation [3].

$$I = I_{ph} - I_d \quad (5)$$

$$I_d = I_s \left[ \exp \left[ \frac{q \cdot V_{pv}}{A \cdot k \cdot T} \right] - 1 \right] \quad (6)$$

$$I_s = I_{Rs} \left( \frac{T}{T_{Ref}} \right)^{\left( \frac{3}{\lambda} \right)} x \exp \left[ \frac{q \cdot E_{gap}}{A \cdot k} \left( \frac{1}{T_{Ref}} - \frac{1}{T} \right) \right] \quad (7)$$

$$I_{Rs} = \frac{I_{sc}}{\exp \left( \frac{q \cdot V_{oc}}{A \cdot k \cdot T_{Ref}} \right) - 1} \quad (8)$$

$$I = I_{ph} - I_s \left[ \exp \left( \frac{q \cdot (V_{pv} + 1) R_s}{A \cdot k \cdot T} \right) - 1 \right] - \left( \frac{V_{pv} + I \cdot R_s}{R_{sh}} \right) \quad (9)$$

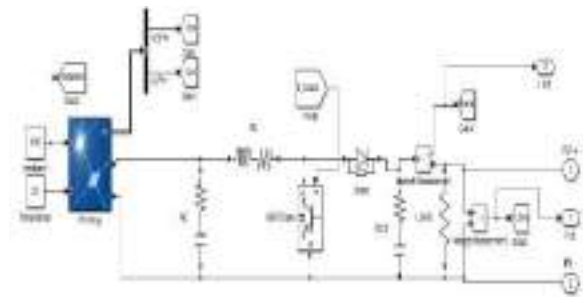


Fig. 5 Solar cell configuration in MATLAB.

Max Power	Max Voltage	Temperature Coefficient
300 W	45.43 V	25°C

Table. 3 parameter of Photovoltaic module.

The solar cell module provides DC voltage output if it is in a temperature difference and the energy irradiations received by the panel so that the solar module does not have a constant value, but in this study the irradiant that solar cell receive considered constant.

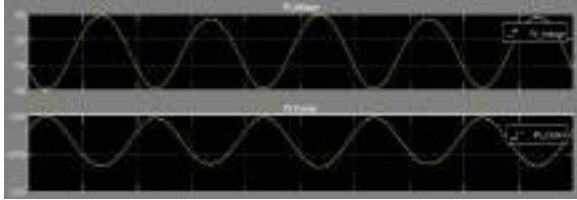


Fig. 6 Output solar cell with 1000 irradiant

C. Battery Storage

All solar cell charging systems and wind turbines are combined with batteries that have a charging controller setting in this study DC-DC bidirectional system. This is to avoid overcharging and also the battery sends power back to the generating system that works as a source. (i.e., the solar modules, Wind generators)[4].

The solar and wind cell controllers do their work in alignment between the array of solar panels on one side and the wind generator on the other, and the battery. Therefore, the selection of the size will be under the condition of the component. And it has to be done exactly in this case study.

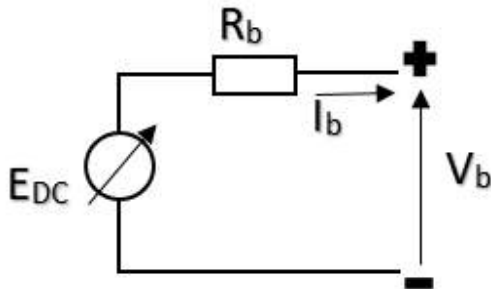


Fig.7 Battery model

The equation for the controlled voltage source is as follows [5].

$$E = E_o - K \frac{Q}{Q - \int i_b dt} + A \exp(-B \cdot \int i_b dt) \tag{10}$$

Where, E = no-load voltage (V), E<sub>o</sub> = battery constant voltage (V), K = polarity voltage (V), Q = battery capacity (V), A = exponential zone amplitude (V), B = inverse time constant exponential zone (Ah-1).

Parameter	value
voltage	2 volt
Nominal capacity	1000Ah
Internal Resistance	24mΩ

Table4. Parameter modeled battery

Variables such as Voltage and current values are data used in PV and wind load controller measurements. The PV or wind controller must be able to accept the desired voltage and withstand the current generated by the solar panel (DC source) or wind generator.

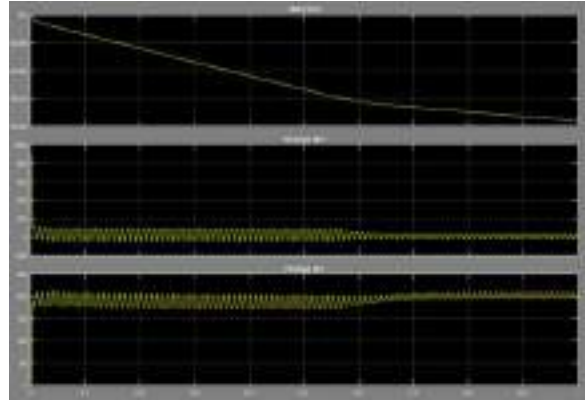


Fig. 8 Output battery

State of charge (SoC) is the level of charging the battery capacity. The units of the SoC in percentage form (0% = empty; 100% = full) has an important role in determining the remaining capacity of the battery pack.

III. RESULT

From the data in table 2, it is known that the total electricity demand in this study is 63.063 Watt so that the solar module and wind turbine used to meet the electricity needs in this study are as follows.

	Capacity	Operation time	Quantity	Total
Wind turbine	2000 watt	20 jam	1	40.000
Solar panel	300 watt	5 jam	18	27.000
Electrical load				67.000

Table 5. Total generators used in this study

Both of these generator sources are intermittent so that batteries are needed to support the work of these two plants with the capacity of the batteries used.

Battery Capacity for solar cell:

$$\begin{aligned} \text{Reserve} &= \text{solar cell load} : \text{battery capacity} \\ &= 27000 \text{ W} : (2 \text{ V} \times 1000 \text{ Ah}) \\ &= 13.5 \approx 14 \text{ battery} \end{aligned}$$

Battery capacity for wind turbine:

To get the inverter capacity (12 V), then the number of batteries used:

$$\frac{V_{\text{inverter}}}{V_{\text{batterai}}} = \frac{12}{2} = 6 \text{ baterai}$$

So the total battery used in this hybrid system is 20 batteries.



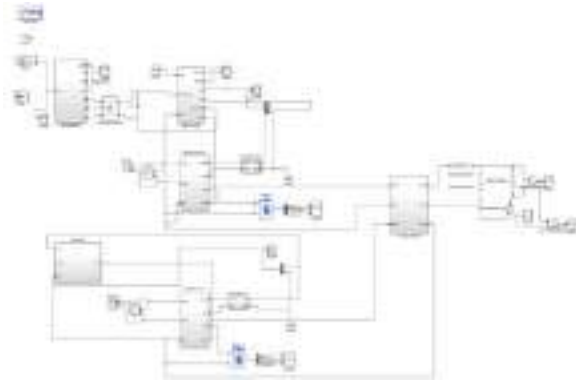


Fig. 9 Simulation PV-Wind hybrid model in matlab.

Wind generators and solar cells are interconnected with their respective MPPT systems with MPPT perturb and observe (P&O) controllers so that they can provide maximum voltage output before being connected to a battery bidirectional system that will control the work of the battery when to charge and discharge.

With a system configuration as shown in Figure 9, it will provide output when the optimal working conditions of solar cells with irradiant 800 and wind turbines are less than 4 m/s this operation usually runs at 10:00 to 15:00 then the output of the solar cell is.

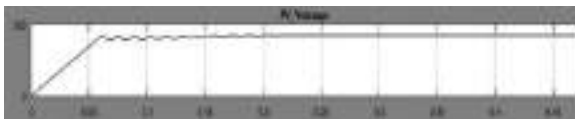


Fig. 10 PV output voltage

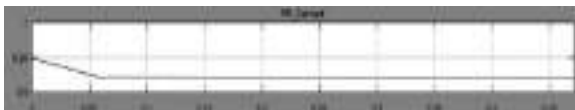


Fig. 11 PV output Current

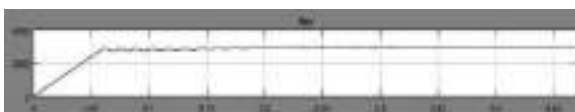


Fig. 12 PV output power

The output during optimal working conditions of solar cells with irradiant 800 provides a power output of 2900 Watts with a voltage of 400 V and a current of 6.92 A. While under these conditions, the air speed is usually low at 4 m/s with a wind turbine output.

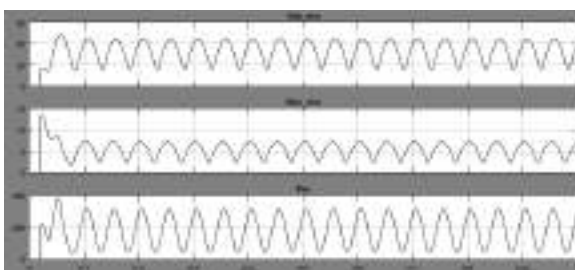


Fig. 13 Wind generator output with wind speed 4 m/s.

During this working condition, the wind turbine is only able to provide power of 283 watts with a voltage of 45 volts and a current of 6.8 amperes.

Meanwhile, in the afternoon until the morning from 16.00-08.00 the wind turbine will work more actively to supply power to the load with an output.

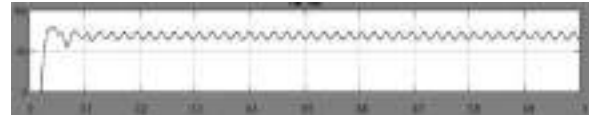


Fig. 14 Output voltage wind generator with 9 m/s wind speed.

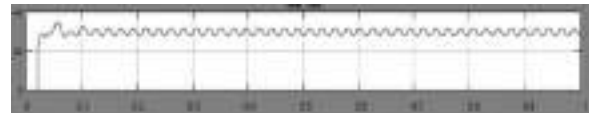


Fig. 15 Output current wind generator with 9 m/s wind speed



Fig. 16 Output power wind generator with 9 m/s wind speed

In this condition wind turbine can provide power of 2100 Watt with a voltage of 73 Volts and a current of 29 Amperes. Meanwhile, solar cells do not operate optimally (considered without the sun) so that the lack of power in this load will be assisted by the batteries used in this system.

#### IV. CONCLUSION

1. The construction of hybrid power plants (solar cells and wind turbines) on the roof of the house as an independent electricity producer can produce 67Kwh of power so that the house's electrical load of 63.05Kwh can be fulfilled properly.
2. Hybrid systems (wind turbines and solar cells) work with high compatibility so that the work of the Bi-directional battery is more as a stabilizer for the system output so that the total required battery capacity is not too large, the costs incurred for the storage system can be minimized.
3. The use of 2000W wind turbine generator and 18 300Wp solar cells in this study was the most efficient in meeting the needs of the house's electrical load considering protection factor.

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# ANALYSIS OF PHYSICAL PROPERTIES OF NATURAL RUBBER COMPOSITES USING CTAB-MODIFIED CLAY FILLER#

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**Abstract** - This study aims to compare the physical properties of natural rubber vulcanizates using clay filler and modified clay with CTAB. The processes that were followed to achieve the objectives of this research were the design of rubber formulas, mastication and milling of rubber, and testing of the physical properties of rubber vulcanization. The clay characterization and its modification using FTIR and XRD were also carried out. Characterization using FTIR and XRD showed that there was indeed a clay modification with CTAB. Torque on rheograph for modified clay with CTAB is 12.34 kg-cm higher than torque for original clay 7.05 kg-cm. Elongation at break and tensile strength for vulcanisate using CTAB-modified clay filler is lower than that using original clay but 300% modulus and hardness increase. Thus, clay modification using CTAB as a filler has a fairly good effect on the curing characteristics and physical properties of natural rubber vulcanization compared to only using original clay as a filler.

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**Keywords** - Clay, Filler, Natural Rubber, Physical Properties.

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## I. INTRODUCTION

Filler is a supporting material in the manufacture of finished rubber products. A variety of fillers have been used. Fillers are divided into reinforcing, semi reinforcing and non-reinforcing fillers. These three fillers each have their own characteristics when used as a filler. Reinforcing filler which is well known and cannot be replaced until now is carbon black. Carbon black in its production produces CO<sub>2</sub> so that many researchers and practitioners have tried to reduce its use. Researchers have paid much attention to the use of natural materials as fillers, such as clay. There are quite a lot of clay deposits in nature, one of which is found in the Bukit Asam coal mine area.

Clay cannot replace carbon black as a filler in rubber, including natural rubber. Because clay is a non-reinforcing filler, there are many researchers changing the active surface of the clay by modifying it. Modification of clay can be done in various ways, for example using surfactants. Surfactants consist of cationic (quaternary ammonium (quat)), anionic(sulfonate) and nonionic (polyethylene glycol (PEG)) surfactants [1]-[2]. Many scientific articles have been published, which have studied the use of cationic surfactants. One of them, for example, cetyltrimethylammonium bromide (CTAB) is used to modify the SiO<sub>2</sub> surface with the aim of expanding the absorption on the SiO<sub>2</sub> surface and is used as an absorbent for dyes. The maximum absorption of CTAB on the SiO<sub>2</sub> surface took place well at pH 8.0. There is an ionic interaction here, between the positive and negative charges of CTAB and SiO<sub>2</sub> [3]. A series of the cationic surfactants, dodecyltrimethylammonium bromide (DTAB), tetradecyltrimethylammonium bromide (TTAB) and

CTAB were evaluated the effects of the chain length of cationic surfactant on the grain size of silica nanoparticles. The results of this modification are used to evaluate the physical properties of cement [4]. The surface of silica nanoparticle was modified with CTAB, and the different experimental conditions including the amount of surfactant as well as the modification temperature has been studied [5]. Solid adsorbent made by using CTAB for surface modification of silica was applied to the absorption of carbamate pesticides [6]. Besides modified silica, organomodified kaolin is used for natural rubber filler where as the kaolin modifier is CTAB. Here, variation of cation exchange capacity is carried out and its effect on abrasion resistance, modulus, and hardness is observed [7]. CTAB is also used as a kaolin modifier where the organomodified kaolin is used as a filler in natural rubber latex. Variations in the concentration of organomodified kaolin were carried out in this study and observed through changes in the physical properties of modulus, elongation, abrasion and tensile strength [8]. Analysis of Mooney viscosity and psychomechanical properties of natural rubber using organomodified kaolin fillers with varying concentrations of organomodified kaolin has also been carried out. CTAB is used here as a clay modifier [9].

From the description above, it turns out that no researcher has compared the effect of CTAB modified clay and unmodified clay as a filler on the physical properties of natural rubber composites. Thus, the purpose of this study was to compare the physical properties of natural rubber composites before and after aging with CTAB modified clay and unmodified clay as a filler. CTAB characterization of modified clay and unmodified clay used FTIR where the FTIR spectra were used to observe the bond between clay

and clay modifier while XRD was used to characterize changes in the crystallization of clay before and after modification. The physical properties in question, macro properties of natural rubber composites due to the influence of filler modification are hardness, elongation at break, 300% modulus, and tensile strength.

## II. MATERIALS AND METHODS

### A. Materials

Local clay in the Bukit Asam coal mining area, South Sumatra, Indonesia, contains around 50.83–75.29% silica [10] with the type of clay being kaolin clay [11]. Natural rubber RSS 1 obtained from PTPN IX, Semarang, Indonesia were used in this study. The rubber chemicals were Sulfur Midas SP-325 (Miwon Chemicals Co., Ltd, Korea), TMTD Accelerator (Qingdao Ever Century Trading Co., Ltd. China), ZnO Zinkoxyd Aktiv UN 3077 and TMQ Vulkanox HS/LG (LANXESS Deutschland GmbH, Germany), stearic acid Aflux 52 (Rhein Chemie Rheinau Mannheim GmbH, Germany), and Minarex oil (Pertamina, Indonesia). Cetyltrimethylammonium bromide (CTAB) (Merck, Germany) was used as the clay modifier. All rubber chemicals and clay modifier are not treated and used directly.

### B. Clay Modification, characterization, and treatments

Modification of clay using CTAB has been carried out according to previous researchers [12]. After obtaining the modified clay CTAB, characterization was carried out using FTIR and XRD. This characterization was also carried out on the original clay.

The pretreatment of the clay and modified clay samples was carried out using powder pressed KBr pellets and an FTIR Alpha instrument (Bruker, Germany). FTIR spectra were recorded in the 500–4000  $\text{cm}^{-1}$  range.

XRD measurements were carried out using a Bruker D8 Advance X-ray diffractometer (Bruker, Germany) with  $\text{Cu } \alpha$  radiation at  $\lambda = 1.54060$ , current of 20 mA, and voltage of 40 kV. XRD patterns for the clay and modified clay samples were determined at a scan rate of 0.02  $^\circ/\text{s}$  in the  $2\theta$  range of 2–90 $^\circ$ .

### C. Natural rubber compounding

General processes for natural rubber composites are listed in Figure 1. The natural rubber formula (see table 1) which includes original clay and modified clay, rubber chemicals, and rubber is then weighed according to their respective contents in phr (parts per hundred rubber). then ground with an open two roll mill and the resulting compound was tested for its curing properties using a rheometer. The results of this test are useful for making rubber vulcanization test samples which are then tested for physical properties of natural rubber vulcanization using the standard ASTM test method.

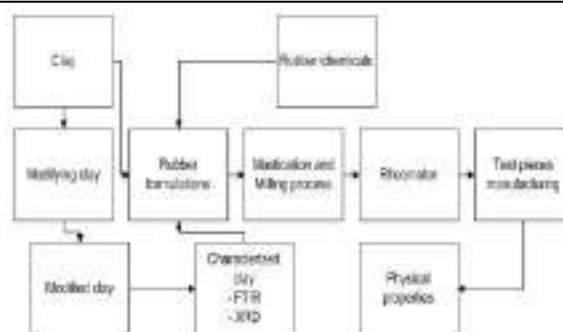


Figure 1 General processes for natural rubber compounding until natural rubber vulcanizates and its characteristics

## III. RESULTS AND DISCUSSION

### A. FTIR spectra analysis

The characterization of clay and CTAB-Modified clay using FTIR spectra analysis can be seen in Figure 2. According to Madejova in 2003 [13], kaolinite with mostly Al containing in octahedral position has four absorption bands in 3 OH stretching. This OH group is located between the tetrahedral and octahedral sheet which has an absorption of about 3620  $\text{cm}^{-1}$  or an absorption of 3625  $\text{cm}^{-1}$  in this study. Another OH group is on the octahedral surface and forms weak hydrogen bonds with the Si–O–Si bonded oxygen on the lower surface of the next layer. Absorption at 3695  $\text{cm}^{-1}$  is associated with phase symmetric stretching vibration which in this observation is at 3697  $\text{cm}^{-1}$ , two weak absorptions at 3669 and 3653  $\text{cm}^{-1}$  are associated with plane stretching vibration. Figure 2 also shows the spectra of the FTIR characterization results with patterns and absorption peaks that are almost the same as those of Madejova's characterization. The results of another study published by Belachew and Hinsene in 2020 [14] showed that for kaolin, the absorption peaks were at 3700, 3670, 3650 and 3620  $\text{cm}^{-1}$  due to the inner OH attached to Al or O. These peaks also contained in the curve in Figure 2.

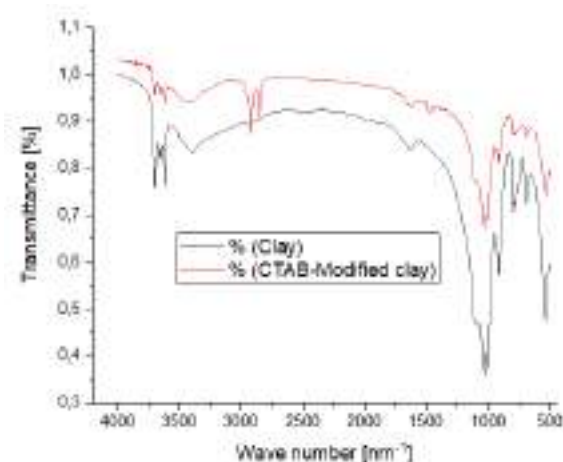
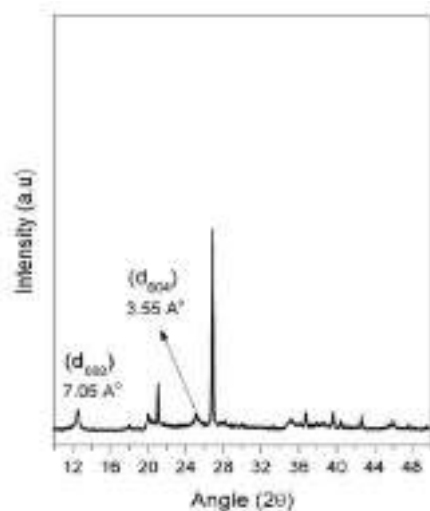


Figure 2. FTIR spectra analysis of clay and CTAB-modified clay (kaolin clay). The black line shows the FTIR spectra of original clay and the red line is the FTIR spectra of CTAB-modified clay

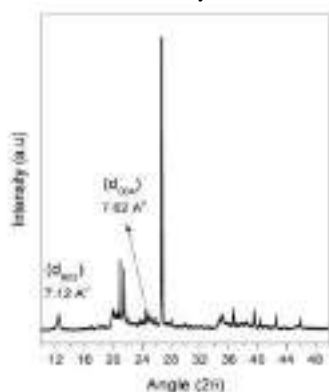
In Figure 2, precisely on the CTAB-Modified clay (kaolin) curve, a new peak was detected around the wave number of  $3010\text{ cm}^{-1}$  caused by the  $\text{CH}_3\text{-N}$  stretching vibration. This peak was also analyzed by Zenasni et. al [15]. Symmetrical and asymmetrical strain vibrations of the aliphatic chain methyl ( $\text{CH}_3$ ) and methylene ( $\text{CH}_2$ ) of the surfactant showed stronger absorption at wave numbers  $2850\text{ cm}^{-1}$  and  $2920\text{ cm}^{-1}$  [14]-16]. Observations in this study were at the absorption of  $2851\text{ cm}^{-1}$  and  $2953\text{ cm}^{-1}$ . The absorption peak at wave number  $1396\text{ cm}^{-1}$  or at  $1404\text{ cm}^{-1}$  in Figure 2 appears from the C-N bond of the organic modifier, which is a feature of the surfactant molecular bond between silicates [15].

#### B. Diffraction pattern analysis

The diffraction pattern from XRD for clay and CTAB-modified clay fillers is shown in Figure 3. From this image, there are changes in d-spacing clay and CTAB-modified clay.  $d_{002}$  for clay is  $7.05\text{ \AA}$  and  $d_{004}$  is  $3.55\text{ \AA}$  while  $d_{002}$  for CTAB-modified clay is  $7.12\text{ \AA}$  and  $d_{004}$  is  $7.62\text{ \AA}$ . The lattice parameter for clay is  $a= 5.19$ ,  $b= 8.83$  and  $c= 14.48$  while for CTAB-modified clay, the lattice parameter value is  $a= 5.21$ ,  $b= 8.87$  and  $c= 14.59$



A. Clay



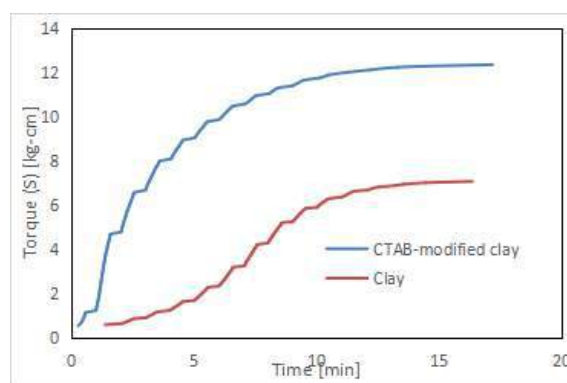
B. CTAB-modified clay

**Figure 3.** XRD patterns for original clay and CTAB-modified clay. 3.a shows the diffraction pattern of clay filler and 3.b is the diffraction pattern of CTAB-modified clay.

Belachew and Hinsene (2020) reported that between two samples of kaolin clay and CTAB-modified kaolin clay did not produce different diffraction patterns. There is a slight difference in the d spacing of kaolin clay which changes from  $d_{001} = 7.14531\text{ \AA}$  to  $d_{001} = 7.14763\text{ \AA}$  for CTAB-modified kaolin clay at an angle of  $2\theta = 12.3735$  [14].

#### C. Curing characteristics of natural rubber compound

The results of the natural rubber compound rheometer test using CTAB-modified clay and unmodified clay filler can be seen in Figure 4. The curves listed in the figure reveal that the vulcanization reaction that occurs in the compound using CTAB-modified clay filler increases sharply compared to using filler unmodified clay. The absorption of CTAB on the clay surface causes the clay surface to be more active so that the modified clay is able to become a better filler than the original clay. Filler can also cause stiffness in rubber vulcanization in addition to the vulcanization reaction. The movement of the rubber molecules cannot be free and is restrained by the filler surface so that the flexibility of the rubber vulcanization decreases and causes an increase in stiffness. This stiffness results in high torque on the vulcanized rubber [17]. In contrast to the compound that uses unmodified clay filler, the stiffness that occurs in rubber vulcanization is only caused by the vulcanization reaction and is less affected by the presence of filler. Here unmodified clay can not function well as a filler. The intermolecular network of rubber or a three-dimensional network between sulfur rubber molecules of rubber molecules formed only due to the vulcanization reaction causes the stiffness of the rubber vulcanization to increase [18].



**Figure 4.** Comparison of the stiffness properties of natural rubber vulcanizates observed through torsion between natural rubber composites using CTAB modified clay and original clay fillers using a rheometer

#### D. The effect of filler on the physical properties of natural rubber vulcanizates Hardness and elongation at break

The relationship between hardness and elongation at break of natural rubber vulcanization with filler clay and modified clay is shown in Figure 5.

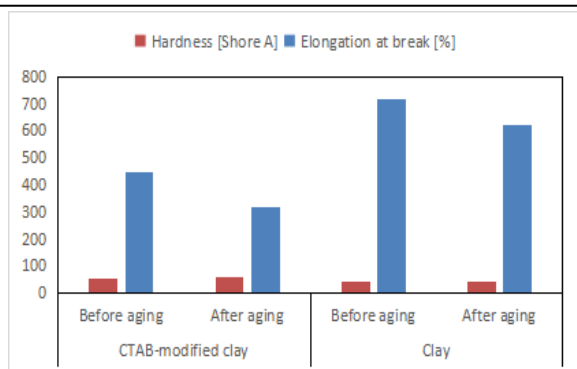


Figure 5. Comparison between hardness and elongation at break of natural rubber vulcanizates observed before and after aging using CTAB modified clay and clay filler

Figure 5 shows that the hardness of natural rubber vulcanization increased after the aging process was carried out either by using CTAB-modified clay or by using unmodified clay filler or original clay filler. This shows that here the vulcanization reaction is still occurring. The formation of a three-dimensional network between rubber molecules sulfur rubber molecules that occurs due to the vulcanization reaction causes an increase in stiffness. This rigidity contributes to an increase in hardness. Hardness for rubber vulcanization using CTAB-modified clay also showed higher hardness than the hardness with unmodified clay filler. The success of surface modification of clay filler using CTAB as a modifier can be identified through the absorption of rubber molecules on its surface. The more rubber molecules adsorbed on the surface of the filler causes an increase in the bound rubber [19]. The increase in bound rubber affects the physical properties of rubber vulcanization, including hardness. High rubber bound can cause increased hardness. The elongation at break in Figure 5 shows a decrease after aging using either CTAB-Modified clay or unmodified clay as filler. This change in elongation at break is caused by an increase in hardness. This increase results in a decrease in elongation at break. The elongation at break that uses unmodified clay filler is higher than the elongation at break of vulcanized rubber that uses CTAB-modified clay as filler. This impact is the opposite of hardness. High hardness with CTAB-modified clay but low elongation at break and vice versa. Here it turns out that unmodified clay does not function well as a filler compared to CTAB-modified clay. Ionic interaction, between the positive charge of CTAB and negative charge of clay [3] causes the surface of CTAB-modified clay filler to be able to absorb rubber molecules on its surface and this means that CTAB-modified clay filler functions as a better filler than the original clay.

#### Tensile strength and modulus 300%

Figure 6 shows the relationship curve between tensile strength and modulus of 300% observed for aging and before aging.

From Figure 6, the tensile strength decreased considerably for both vulcanizates using CTAB modified clay and unmodified clay filler from before aging to after aging. The greatest decrease in tensile strength occurred in rubber vulcanization using CTAB modified clay compared to unmodified clay filler. This is because CTAB modified clay is more able to function as a filler. Stiffness increases due to better filler function [17]. Besides the effect of the filler, the vulcanization reaction still occurs when the aging process is carried out. The vulcanization reaction also contributes to the stiffness of rubber vulcanization [18].

Something else happens where the modulus increases by 300% with the aging process. This occurred in both rubber vulcanizations using both CTAB modified clay and clay fillers. The 300% modulus is directly proportional to tensile strength and inversely related to elongation at break. Figure 6 shows that the elongation at break of vulcanization using unmodified clay filler is higher than vulcanization using CTAB-modified clay filler.

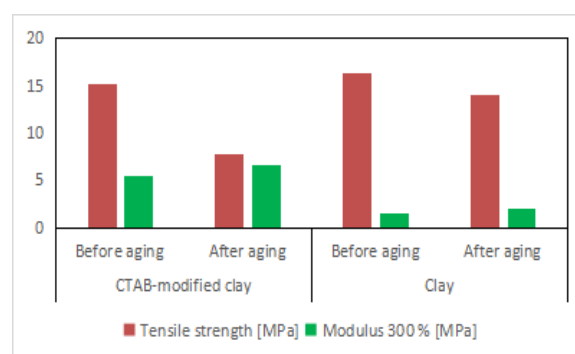


Figure 6. Comparison between tensile strength and modulus of 300% natural rubber vulcanizates observed before and after aging using CTAB modified clay and clay filler

## IV. CONCLUSION

The conclusions obtained from this study are as follows:

1. Modification of clay using CTAB as a modifier has been successfully carried out and has been proven by the results of FTIR spectra analysis and diffraction pattern of XRD.
2. The curing characteristics of the two natural rubber compounds using CTAB-modified clay as filler resulted in a much higher torque of 12.34 kg-cm compared to 7.05 kg-cm of original clay.
3. Comparison of the physical properties between natural rubber vulcanized filled with original clay and CTAB modified clay shows very different properties. Elongation at break and tensile strength for natural rubber vulcanized using CTAB-modified clay as filler is lower than that using original clay but the modulus is 300% and hardness is increased.

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# A PATTERN OF BRAND BETRAYAL: THE DISCONNECTION BETWEEN BRAND IDENTITY AND AESTHETICS

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**Abstract** - This paper intends to elucidate the pattern of brand betrayal. The disconnection between brand identity and aesthetics is what we recognized as the failure of brand moral obligation, thus we call brand betrayal. An illustration is made from three brands Nokia, Blackberry, and HTC to corroborate this framework, and the result of stock prices is shown. The author revitalizes the notion of brand identity and aesthetics as a part of brand life, and thus recognize as such by consumers. The two concepts speak to consumers in a united way. When they are dispersed, discordance between brand identity and aesthetics, consumers react vigorously.

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**Keywords** - Brand identity, Visual Identity, Aesthetics, Brand Betrayal, Disconnection, Nokia, Blackberry, HTC.

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Every brand comes into the business with a specific purpose, and it wants to stand for that purpose: that is its identity. This identity is expressed in a different way, among which the aesthetics are the perfect materialization of it (Schmitt and Simonson, 1997). The disconnection between identity and aesthetics is what we conceptualize by a pattern of brand betrayal because brand identity has failed to its moral duty.

Researchers have emphasized the necessity of a brand having an identity (Balmer, 2012; de Chernatory and Cottam, 2006; Kapferer, 2008; Melewar, 2003). Brand identity refers to what the brand is, what value it stands for. The quest of expressing the identity has been emphasized with the visual identity. For instance, Van den Bosch et al. (2005) has pointed that logo, typography, color, slogan all those visual elements are part of brand identity. Visual identity is the face of the brand (Phillips et al. 2014), and is the path for distinctiveness: the use of visual elements makes the brand to be noticeable (Balmer and Gray, 2000).

Complementary to identity is the aesthetics, from which a brand can benefit. For example the beauty of packaging as a motivator to impress consumers (Orth and Malkewitz, 2008; Berkowitz, 1987), the importance of good product shape (Bloch, 1995; Folkes and Matta, 2004), and the impact of a color combination (Garber et al. 2000). Thus brand identity and aesthetics become fundamentally related. The noticeably broken bond is perceived as betrayal.

Considerably, the pattern of brand betrayal is the breach of a relationship between a brand and its customers. The relationship occurs when the brand stance to keep its moral obligation through its identity and aesthetics as the realization of its identity. Once a brand does not stand on its promise, its aesthetics do not reflect the identity, the brand breaks its moral obligation, and then the betrayal occurs (Finkel et al. 2002). Parmentier and Fisher (2015) recognized

betrayal as the contravention of the norms that consumers consider important. In this present study is the aesthetics of the brand.

In this paper, the author interprets the pattern of betrayal of three leading mobile communication brands Nokia, Blackberry, and HTC as their aesthetics failed to reflect their identity, thus leading to consumers' disapproval. We took a longitudinal study of the three brands that once were recognized as a top successful brand, but dropped from their pedestal, even though, they are still in the market but no more as the most influential brand.

This paper commences by presenting what visual brand identity is, and what brand aesthetics is, and their substantial link before digging into the case studies.

## **Brand identity and Aesthetics terminologies**

The concept of brand identity (BI) has increasingly prevailed in the marketing literature while it cannot be disassociated with the concept of the brand itself, the basis of its nature. What is a brand, then? A brand is a social contract between a well-known source and a consumer. The well-known source promises to deliver a service, or a quality product, or anything else that responds to consumer needs. For example (Aaker, 2014) defines a brand as the seller's promise to customers. Kotler (2003) conceptualizes it as "any label that carries meaning and associations" (p.8). In that sense, anything can be branded, from Coca-Cola to cities such as New York, London, or Taipei, because these names conjure meanings that are attached to them and trigger some emotional experience.

Although brand identity is set to express the exclusive nature of the brand (Aaker, 1996) it is the pre-requisite of the market. Brand uniqueness is also what differentiates one brand from the others (Wilkinson and Balmer, 1996; Albert and Whetten, 1985).



Differentiation is a compelling aspect for a brand and its survival. Thus Howard Schultz (CEO of Starbucks) stated that you have to stand for something unique that makes the consumer recognize you.

Visual is the ultimate language of the brand (Schroeder, 2005; Birkight and Stadler, 1986). Everything we know about a brand comes to us through visual representation. For example, logos and other design elements are visually displayed to make a distinction. Academics in the marketing field are more and more exploring the effect of visuals on consumers. Visual help recognition and remembrance over text concluded Pieters and Wedel (2004).

## METHODOLOGY

In this research, we have adopted for the longitudinal data analysis. Because it presents well the situation of the brands during a period, from 2008 to 2018.

### Nokia

The Finnish brand got into the communication business with the purpose of 'Connecting people' as its mission, and the endeavor to create a new world of transforming the big planet into a small village, as its vision. For some time, Nokia stand for what it come to business, winning the ticket for the best brand in 2008, with a brand value estimated at 35,942 million USD. Nokia, also holds almost 40% of the mobile market share, with products referred to as the most reliable in the market. But once competitors arise, Nokia failed to keep the pace. Mostly, its Symbian Operating System was almost shut off to other Apps, the changing need of the customers. The brand vanished for lacking innovation, thus consumers felt betrayed. Also, the decision to associate with Windows Phone has destroyed their brand identity (Annual report 2012). The financial operation also reveal the downfall; at the top Nokia share worth 23, 73 Euro in January 2008, and it was down to 5, 06 Euro in December 2018. (Fig. 1).

### Blackberry

The Canadian-based brand was once the leading innovative brand in the telecommunication sector. Blackberry features itself as the world's leading provider mobility solution. And envision itself as the securing connection for the future that can be trusted. The brand introduce in 2000, a smartphone with a push email button, allowing a user to receive and send an email. This device captures everyone's attention, and has become the iconic brand of a government official to celebrities'. Nevertheless, due to product malfunctioning, products not meeting consumers' expectations, user experience less favorable compare to competing brands in the market. This harms the Blackberry brand (Annual report 2013). The emergence of the 'Apps economy', by freelancer developers, which fueled widespread adoption of

iPhone and Android-based smartphone, was missed by the brand. Rather, blackberry continue to focus on security issues, which was their differentiation portion. Again consumers take shift quickly to more convenient commodities, but brand managers' response was too slow. Consequently, the innovative brand was dethroned. The company was not able to convince Blackberry developers to develop an additional application for their products (Annual report 2013). The financial report bears witness to this. (Fig. 2).

### HTC

HTC is the Taiwanese base mobile telecommunication brand that was the flag bearer of the Android Operating System. HTC surprised the world by getting in the club of the 100 best global brands, by introducing some cut-edge technology such as aluminum case, ultra pixels, boom sound, Zoe camera. Etc. HTC is devoted to giving consumers high-quality products; its mission stands 'serving society and making life better. The brand always puts consumers at the center of its projects (2014 HTC Annual report). But for several years HTC has definitely struggled to keep the pace of a high-end smartphone brand. This is due to the dissociation between its brand identity and aesthetics. Several times, the brand has to change its mission and vision.

The dissonance became more visible, and consumers hardly can differentiate HTC products from others. Secondly, the intense competition in the industry, especially the eagerness of new entrants has pushed the brand to lose its steadiness up to forget its brand identity. Back in 2011, the year HTC has been at the apogee of its earning, making the headline of any business news, topping Apple Inc. in the US by retaining 24% of the market share and being listed among the three major players in the industry.

All three brands have portrayed the pattern of failure by not keeping their promise, they betrayed consumers who at one point trusted these brands; their aesthetics could no more reflect the brand identity.

## ANALYSIS AND DISCUSSION

At first, the three brands, Nokia, Blackberry, and HTC surprise the world and were listed among the 100 most valuable brands ranked by Interbrand. Although they are still in the business, but no more as a brand model in the industry by failing to keep their differentiation. Differentiation has been recognized as the foundation of the marketing theory (Levitt, 1980; MacMillan and McGrath, 1997). Through differentiation, a brand can lower direct competition, by presenting different characteristics that attract consumers (Lancaster, 1984). Differentiation makes the brand to be exclusive, desirable, valuable, therefore create loyalty. And so, a brand can ask for a premium price, make a profit and

lower the marketing costs (Sharp and Dawes, 2001). The best understanding of differentiation and where we agree upon is the assertion made by Selden and Colvin (2004): “differentiation is knowing your customer and their needs.

Haig (2003) has pointed three symptoms that trace to brand failure, and these symptoms are concurrent to the three brands: brand amnesia, brand paranoia, and brand irrelevance.

#### Brand amnesia:

It recalls the state of a brand that has forgotten its identity. In the words of Aaker (1996), it is a brand that has lost its uniqueness. The three brands have forgotten what they stand for; their identity has vanished, leading away to an aesthetics that does not correlate to its principal.

#### Brand paranoia:

Reminiscence state of a brand that duplicates its competitors. For example, the launch of the HTC A9 (2015) made consumers confused because the phone looks like an Apple phone. The visual HTC identity occurred as a visual Apple identity, and HTC lovers could not recognize HTC language in that design.

#### Brand irrelevance:

The fact of high competition and market evolving may put the brand at risk of becoming insignificant. The three brands suffered irrelevancy by losing value proposition to their consumers, thus making the brand obsolete. Their financial situation struggled to present a positive result.

The visual brand identity and aesthetics are not merely cosmetic makeup: making a brand appear beautiful. In a reality, it can mean loss when the two do not convey the same message. For instance, an identity that is swinging may be problematic for the brand itself and its consumer. For example, in a consecutive year, HTC has changed its identity from: “Quietly brilliant” to “Pursuit of brilliance”. Making it difficult either for the brand or for the customer.

We can conclude that brand as a whole is an interplay structure: identity is linked to aesthetics, vision is linked to communication and everything is interconnected. An identity is brand DNA, any attempt to depart from your DNA can destroy the brand.

In our research, we have chosen Nokia, Blackberry, and HTC brands as a study unit. The research can be extended to other industries, but we believe that the principle may be the same: your identity is your DNA and is interrelated to another part of your business. Your visual identity is surely related to the aesthetics of your brand, and its vision to your communication. Any separation does not help the brand. There is an urgent need of recognizing that identity and aesthetics are still imperative in our time.

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# REGIONAL GEOPOLITICS IN THE COMMUNITY OF PORTUGUESE-SPEAKING COUNTRIES

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**Abstract** - The Community of Portuguese-Speaking Countries (CPLP) was established in 1996 and currently has nine members states with regional integration on four continents and bathed by three oceans. Defense, and in particular maritime security, cooperation is one of their main areas of support. Most members are in the Atlantic, with Portugal in Europe, Brazil in South America and five countries in Africa (Cape Verde, Guinea-Bissau, Sao Tome and Principe, Equatorial Guinea and Angola). The sixth African member (Mozambique) is bathed by the Indian Ocean and the only Asian member (East Timor) is in the Pacific area. Regional integrations of member states into diverse geopolitical spaces (European Union, Mercosur, Economic Community of West African States, Economic Community of Central African States, and Southern African Development Community) co-exist with their participation in the community of countries of Portuguese language. The aim of this paper is to analyze the place of CPLP in the geopolitics of the member states. Using a qualitative research methodology it appears that regional insertion is more valued than cooperation in the Lusophone space. East Timor is the only exception for now, as it awaits its admission to the Association of Southeast Asian Nations (ASEAN).

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**Keywords** - Regional Geopolitics, Multilateralism, Cooperation, Portuguese-Speaking Countries.

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# A PARAMETRIC SEISMIC PERFORMANCE ANALYSIS OF REINFORCED CONCRETE BUILDING UNDER VARIOUS SOIL CONDITIONS BY CONSIDERING SOIL-STRUCTURE INTERACTION

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## **Abstract -**

In this paper, the seismic response of a reinforced concrete structure under different soil conditions considering soil-structure interaction (SSI) is investigated. For this purpose, the dynamic analysis was carried out for 6-storey reinforced concrete building which is founded on three different types of soils, and two different types of foundation, with and without soil interaction. The local soil conditions and the characteristics of input motion are important parameters for the numerical simulation and seismic analysis. The analysis was performed for three different cases: Fixed base without considering SSI and flexible base by considering SSI in dense and soft soil conditions. Kobe (Japan, 1995) earthquake record were used as input motion in the seismic and response spectrum analysis. Two-dimensional finite element model of the soil-structure system established with Mohr-Coulomb failure criterion under plane-strain conditions and a 2D version of Plaxis software has been performed in numerical analysis. In the present paper, nonlinear time history analysis was carried out in order to investigate the influence of different soil conditions. The analysis is compared for its parameters such as storey displacements and accelerations. The numerical analysis under different soil conditions demonstrated that, the acceleration and displacements for each soil type change according to its mechanical properties. In general, it is seen that the displacements increase values are increasing from hard rock to soft soil. Furthermore, more conclusions were carried out according to the obtained results and important findings are outlined.

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**Keywords -** RC Building, Seismic Response, Plaxis 2D, Finite Element Method, Soil-Structure Interaction.

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# THE SUCCESS FACTORS OF EFFECTIVE RISK MANAGEMENT IN A CLOUD COMPUTING SYSTEM

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## Abstract -

Cloud computing has become an emerging economic model that provides a flexible and scalable infrastructure for efficient business processing using big data. With the increase of cloud computing use, the importance of the proper risk management framework has increased across industries, as cloud computing carries a number of risk issues, such as confidentiality, third-party and security and privacy concerns. The necessity of building capabilities for managing related risks is especially pronounced in the corporates, who would like to take an advantage of cloud computing services. Risk management framework for cloud computing has been studied in the context of standard and framework in general, but empirical research on the success factors for managing risk in cloud computing has almost not yet been conducted.

The aim of this paper is to evaluate existing literature in developing an effective risk management framework incorporating key success factors, necessary steps, and processes and empirically examine the key success factors for managing associated risks in a cloud ecosystem. Based on an intensive literature review and on extended theoretical analysis as well as on preliminary empirical evidence, this paper presents a theoretical framework propose specific cause and effect relations key success factors as the independent variable and corporate value as the dependent variable. Furthermore, empirical study in German publicly traded corporates based on questionnaire, structured interviews and case study will be conducted to collect empirical data for demonstrating the relationship between success factors and risk management framework for cloud computing. As such, the research will develop conceptual and empirical explanation on the key success factors for managing risk in the cloud computing ecosystem and shall help to shape the future of an effectively enterprise risk management framework to protect and enhance corporate value.

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**Keywords** - Risk Management Framework, Risk Governance, Digital Risk, Third-Party Risk, Digital Business Ecosystem, Cloud Computing System.

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# CHARACTERISATION OF THERMALLY ACTIVATED RECYCLED CEMENT AND MORTARS AT HIGH TEMPERATURE

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**Abstract** - The necessity to reduce the overall energy consumption in building construction leads to extensive renovation projects and to demolition/reconstruction programmes. Accordingly, it is necessary to select of environment-friendly construction materials to reduce waste generation. The recycling of waste cementitious materials is one suitable option for sustainable development.

A lot of studies showed the recycled concrete aggregates (RCAs) possibility of use. Nevertheless, a lot of studies have investigated the recycled coarse aggregates and the study of recycled cementitious materials still incomplete. Recent reviews have highlighted that the partial replacement of recycled cement and recycled fine aggregate had not significant effect on the physical and mechanical properties of mortars.

First, the properties of recycled cement powder and recycled sand were investigated. The particle size (50 and 80  $\mu\text{m}$ ), dehydration temperature (105 and 500°C), and chemical composition were studied via SEM, XRD and TG/DTG/DSC analyse as well as initial and final setting time tests. Second, different recycled cement and recycled sand mortars were produced to study the workability and shrinkage properties. The mechanical, microstructural, and physical properties of recycled mortars at ambient and high temperatures (200 and 500°C) were also studied.

TG/DTG/DSC and XRD analysis of RC powders and RS chemical composition is influenced by the particle size (0/80  $\mu\text{m}$  or 0/2mm). The minutest particle size of 0/80  $\mu\text{m}$  presents a large number of chemical elements from the reference cement (such as ettringite, and portlandite), when the RS only had quartz and albite inclusions. The RC powder has more hydrates than recycled sand of 0/2 mm.

The RC dehydrating method is efficient in increasing the cement reactivity according to SEM analysis, TG/DSC analysis, and thermal response.

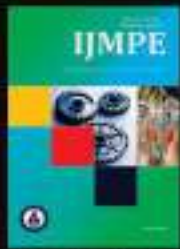
Between the room temperature and 200°C, the residual compressive and flexural strength of RM decreases gradually. Beyond 200 °C the residual mechanical strength loses up to 50% of its initial values, which are consistent with the findings for total porosity.

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**Keywords** - High Temperatures, Mechanical Properties, Physicochemical Properties, Recycled Mortar

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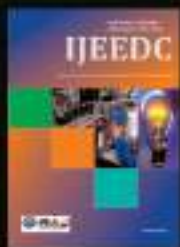
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Dengan ini menyatakan **bersedia bekerjasama dengan** Pelaksana Kegiatan Program Penelitian Terapan Unggulan Perguruan Tinggi (PTUPT) yang berjudul MODIFIKASI TANAH LIAT UNTUK BAHAN PENGISI KARET ALAM berikut:

Nama ketua Tim Pengusul PTUPT : Dr. Ir. Abu Hasan, MSi.

guna menerapkan IPTEKS.

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Demikian Surat Pernyataan ini dibuat dengan penuh kesadaran dan tanggung jawab tanpa ada unsur pemaksaan di dalam pembuatannya untuk dapat digunakan sebagaimana mestinya.

Tanjung Enim, 26 Oktober 2020

Yang membuat pernyataan,

(Handono)