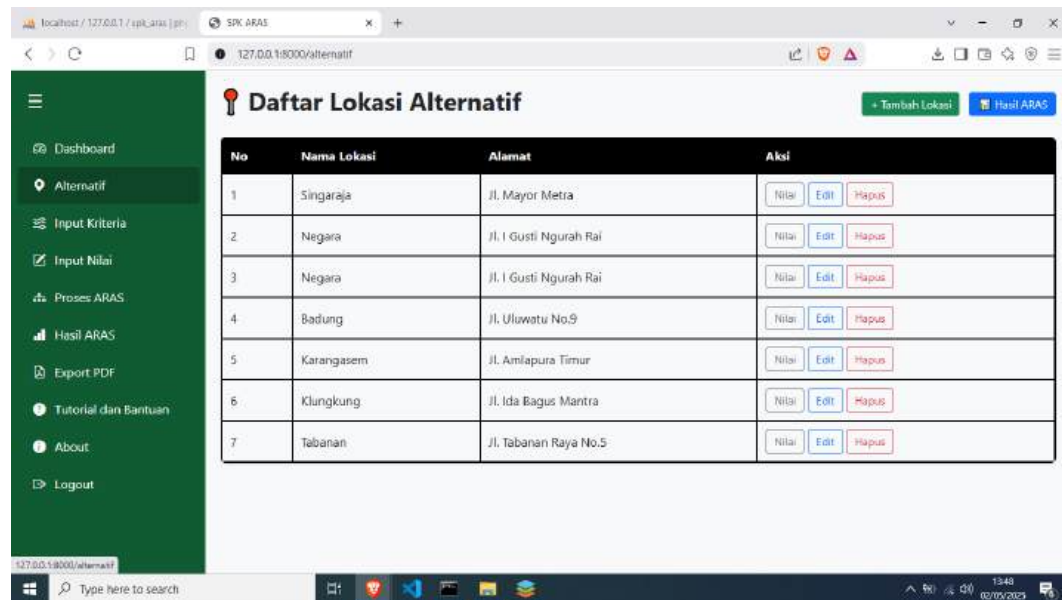


LAMPIRAN

Lampiran 1 Data Alternatif Penelitian



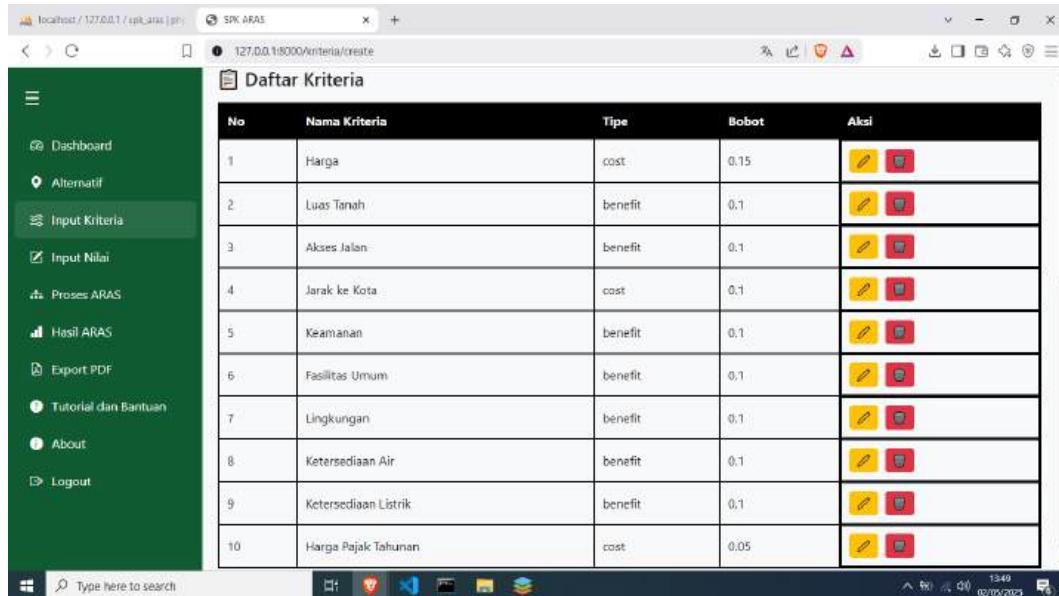
No	Nama Lokasi	Alamat	Aksi
1	Singaraja	Jl. Mayor Metra	Nilai Edit Hapus
2	Negara	Jl. I Gusti Ngurah Rai	Nilai Edit Hapus
3	Negara	Jl. I Gusti Ngurah Rai	Nilai Edit Hapus
4	Badung	Jl. Uluwatu No.9	Nilai Edit Hapus
5	Karangasem	Jl. Amlapura Timur	Nilai Edit Hapus
6	Klungkung	Jl. Ida Bagus Mantra	Nilai Edit Hapus
7	Tabanan	Jl. Tabanan Raya No.5	Nilai Edit Hapus

Gambar L.1
Data Alternatif Penelitian

Lampiran 2 Data Kriteria dan Bobot

Kode	Nama Kriteria	Bobot	Jenis
K1	Harga	0.15	Cost
K2	Luas Tanah	0.10	Benefit
K3	Akses Jalan	0.10	Benefit
K4	Jarak ke Kota	0.10	Cost
K5	Keamanan	0.10	Benefit
K6	Fasilitas Umum	0.10	Benefit
K7	Lingkungan	0.10	Benefit
K8	Ketersediaan Air	0.10	Benefit
K9	Ketersediaan Listrik	0.10	Benefit
K10	Harga Pajak Tahunan	0.05	Cost

Tabel L.1
Tabel Kriteria dan Bobot

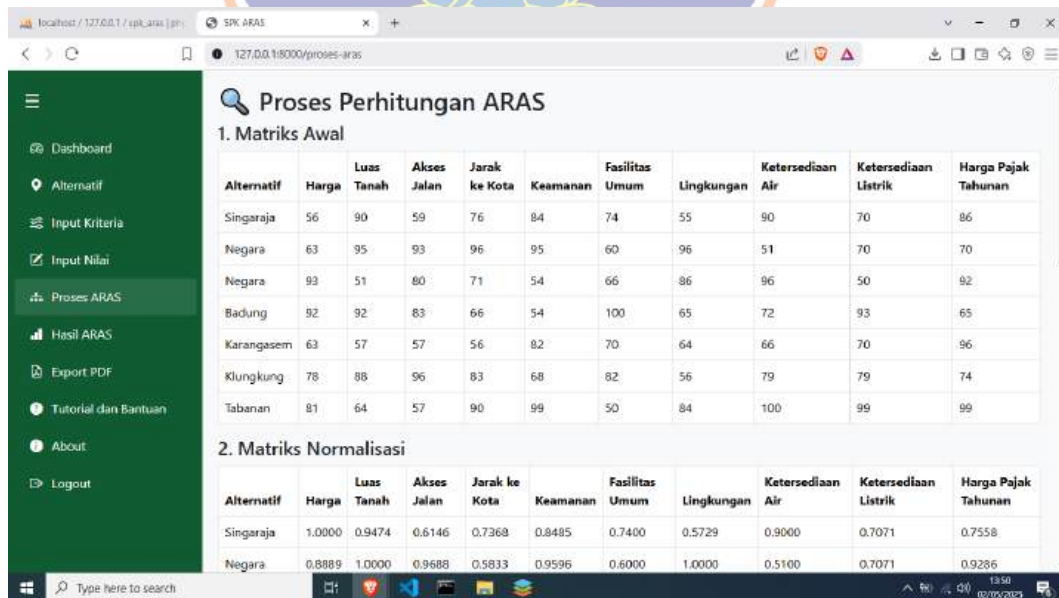


The screenshot shows a web application titled 'Daftar Kriteria'. On the left is a green sidebar with navigation links: Dashboard, Alternatif, Input Kriteria (selected), Input Nilai, Proses ARAS, Hasil ARAS, Export PDF, Tutorial dan Bantuan, About, and Logout. The main content area displays a table with 5 columns: No, Nama Kriteria, Tipe, Bobot, and Aksi. The table lists 10 criteria with their respective types and weights. Each row has edit and delete icons in the 'Aksi' column.

No	Nama Kriteria	Tipe	Bobot	Aksi
1	Harga	cost	0.15	[edit] [delete]
2	Luas Tanah	benefit	0.1	[edit] [delete]
3	Akses Jalan	benefit	0.1	[edit] [delete]
4	Jarak ke Kota	cost	0.1	[edit] [delete]
5	Keamanan	benefit	0.1	[edit] [delete]
6	Fasilitas Umum	benefit	0.1	[edit] [delete]
7	Lingkungan	benefit	0.1	[edit] [delete]
8	Ketersediaan Air	benefit	0.1	[edit] [delete]
9	Ketersediaan Listrik	benefit	0.1	[edit] [delete]
10	Harga Pajak Tahunan	cost	0.05	[edit] [delete]

Gambar L.2
Data Kriteria dan Bobot

Lampiran 3 Hasil Perhitungan *ARAS*



The screenshot shows a web application titled 'Proses Perhitungan ARAS'. The sidebar is identical to the previous image. The main content area displays two tables. The first table, '1. Matriks Awal', shows raw data for 8 alternatives across 10 criteria. The second table, '2. Matriks Normalisasi', shows the normalized values for the same data.

1. Matriks Awal

Alternatif	Harga	Luas Tanah	Akses Jalan	Jarak ke Kota	Keamanan	Fasilitas Umum	Lingkungan	Ketersediaan Air	Ketersediaan Listrik	Harga Pajak Tahunan
Singaraja	56	90	59	76	84	74	55	90	70	86
Negara	63	95	93	96	95	60	96	51	70	70
Negara	93	51	80	71	54	66	86	96	50	92
Badung	92	92	83	66	54	100	65	72	93	65
Karangasem	63	57	57	56	82	70	64	66	70	96
Klungkung	78	88	56	83	68	82	56	79	79	74
Tabanan	81	64	57	90	99	50	84	100	99	99

2. Matriks Normalisasi

Alternatif	Harga	Luas Tanah	Akses Jalan	Jarak ke Kota	Keamanan	Fasilitas Umum	Lingkungan	Ketersediaan Air	Ketersediaan Listrik	Harga Pajak Tahunan
Singaraja	1.0000	0.9474	0.6146	0.7368	0.8485	0.7400	0.5729	0.9000	0.7071	0.7558
Negara	0.8889	1.0000	0.9688	0.5833	0.9596	0.6000	1.0000	0.5100	0.7071	0.9286

Gambar L.3
Hasil Perhitungan *ARAS*

2. Matriks Normalisasi

Alternatif	Harga	Luas Tanah	Akses Jalan	Jarak ke Kota	Keamanan	Fasilitas Umum	Lingkungan	Ketersediaan Air	Ketersediaan Listrik	Harga Pajak Tahunan
Singaraja	1.0000	0.9474	0.6146	0.7368	0.8485	0.7400	0.5729	0.9000	0.7071	0.7558
Negara	0.8889	1.0000	0.9688	0.5833	0.9596	0.6000	1.0000	0.5100	0.7071	0.9286
Negara	0.6022	0.5368	0.8333	0.7887	0.5455	0.6600	0.8958	0.9600	0.5051	0.7065
Badung	0.6087	0.9684	0.8646	0.8485	0.5455	1.0000	0.6771	0.7200	0.9394	1.0000
Karangasem	0.8889	0.6000	0.5938	1.0000	0.8283	0.7000	0.6667	0.6600	0.7071	0.6771
Klungkung	0.7179	0.9263	1.0000	0.6747	0.8869	0.8200	0.5833	0.7900	0.7980	0.8784
Tabanan	0.6914	0.6737	0.5938	0.6222	1.0000	0.5000	0.8750	1.0000	1.0000	0.6566

3. Matriks Normalisasi Terbobot

Alternatif	Harga	Luas Tanah	Akses Jalan	Jarak ke Kota	Keamanan	Fasilitas Umum	Lingkungan	Ketersediaan Air	Ketersediaan Listrik	Harga Pajak Tahunan
Singaraja	0.1500	0.0947	0.0615	0.0737	0.0848	0.0740	0.0573	0.0900	0.0707	0.0378
Negara	0.1333	0.1000	0.0969	0.0583	0.0960	0.0600	0.1000	0.0510	0.0707	0.0464

Gambar L.4
Hasil Perhitungan ARAS

3. Matriks Normalisasi Terbobot

Alternatif	Harga	Luas Tanah	Akses Jalan	Jarak ke Kota	Keamanan	Fasilitas Umum	Lingkungan	Ketersediaan Air	Ketersediaan Listrik	Harga Pajak Tahunan
Singaraja	0.1500	0.0947	0.0615	0.0737	0.0848	0.0740	0.0573	0.0900	0.0707	0.0378
Negara	0.1333	0.1000	0.0969	0.0583	0.0960	0.0600	0.1000	0.0510	0.0707	0.0464
Negara	0.0903	0.0537	0.0833	0.0789	0.0545	0.0660	0.0896	0.0960	0.0505	0.0353
Badung	0.0913	0.0988	0.0865	0.0848	0.0545	0.1000	0.0677	0.0720	0.0939	0.0500
Karangasem	0.1333	0.0600	0.0594	0.1000	0.0828	0.0700	0.0667	0.0660	0.0707	0.0339
Klungkung	0.1077	0.0926	0.1000	0.0675	0.0687	0.0820	0.0583	0.0790	0.0798	0.0439
Tabanan	0.1037	0.0674	0.0594	0.0622	0.1000	0.0500	0.0875	0.1000	0.1000	0.0328

4. Nilai Optimal (Si)

Alternatif	Skor Akhir
Singaraja	0.7845
Negara	0.8126

Gambar L.5
Hasil Perhitungan ARAS

The screenshot shows the SPK ARAS web application. The sidebar menu includes: Dashboard, Alternatif, Input Kriteria, Input Nilai, Proses ARAS (highlighted), Hasil ARAS, Export PDF, Tutorial dan Bantuan, About, and Logout. The main content area displays a table of fuzzy inference results for the 'Proses ARAS' step. The table has 11 columns representing different criteria and their values for various alternatives. Below the table, the '4. Nilai Optimal (S_i)' section shows the final scores for each alternative.

Alternatif	Skor Akhir
Singaraja	0.7945
Negara	0.8126
Negara	0.6982
Badung	0.7976
Karangasem	0.7428
Klungkung	0.7795
Tabanan	0.7630

Gambar L.6
Hasil Perhitungan ARAS

Lampiran 4 *Black Box Testing*

No	Fitur Diuji	Langkah Pengujian	Hasil yang Diharapkan	Status
1	Login	Masukkan <i>Username</i> dan <i>Password</i> yang benar	Pengguna diarahkan ke <i>Dashboard</i>	Berhasil
2	Login	Masukkan <i>Username</i> yang salah dan <i>Password</i> benar, memberikan pesan kesalahan	Muncul pesan kesalahan " <i>Username salah</i> "	Berhasil
3	Login	Masukkan <i>Username</i> benar dan <i>Password</i> salah, memberikan pesan kesalahan	Muncul pesan kesalahan " <i>Password salah</i> "	Berhasil
4	Input Kriteria	Tambahkan kriteria baru dengan nama unik dan bobot valid	Kriteria berhasil ditambahkan dan muncul di daftar	Berhasil

5	<i>Input Kriteria</i>	Coba tambahkan kriteria tanpa nama atau bobot, sistem menolak dan memberi notifikasi	Sistem menampilkan pesan validasi <i>Input</i>	Berhasil
6	Proses <i>ARAS</i>	<i>Input</i> semua alternatif dan kriteria, lalu lakukan proses perhitungan	Sistem menghasilkan peringkat lokasi dengan perhitungan <i>ARAS</i>	Berhasil
7	<i>Input Nilai</i>	<i>Input</i> nilai untuk semua kriteria menggunakan angka valid	Nilai tersimpan dan ditampilkan dengan benar	Berhasil

Lampiran 5 Source Code

web.PHP

```
<?PHP

use Illuminate\Support\Facades\Route;
use App\Http\Controllers\AuthController;
use App\Http\Controllers\AlternatifController;
use App\Http\Controllers\KriteriaController;
use App\Http\Controllers\NilaiAlternatifController;
use App\Http\Controllers\ARASController;
use App\Http\Controllers\LaporanController;

Route::get('/', function () {
    return view('welcome');
});

Route::get('/Login', [AuthController::class, 'index'])->name('Login');
Route::post('/Login', [AuthController::class, 'Login']);
Route::get('/Logout', [AuthController::class, 'Logout']);

Route::middleware(['auth'])->group(function () {
```



```

Route::resource('alternatif', AlternatifController::class);

Route::resource('kriteria', KriteriaController::class);

Route::resource('nilai', NilaiAlternatifController::class);

Route::get('/ARAS', [ARASController::class, 'index']);
Route::get('/hasil', [ARASController::class, 'hasil']);

Route::get('/laporan/PDF', [LaporanController::class, 'PDF']);

});

```

Model Alternatif

```

<?PHP

namespace App\Models;

use Illuminate\Database\Eloquent\Model;

class Alternatif extends Model
{
    protected $table = 'alternatifs';

    protected $fillable = [
        'nama_lokasi',
        'alamat'
    ];

    public function nilai()
    {
        return $this->hasMany(NilaiAlternatif::class);
    }
}

```

Model Kriteria

```
<?PHP

namespace App\Models;

use Illuminate\Database\Eloquent\Model;

class Kriteria extends Model
{
    protected $table = 'kriterias';

    protected $fillable = [
        'nama_kriteria',
        'bobot',
        'jenis'
    ];

    public function nilai()
    {
        return $this->hasMany(NilaiAlternatif::class);
    }
}
```

Model Nilai Alternatif

```
<?PHP

namespace App\Models;

use Illuminate\Database\Eloquent\Model;

class NilaiAlternatif extends Model
{
    protected $table = 'nilai_alternatifs';

    protected $fillable = [
        'alternatif_id',
```

```

        'kriteria_id',
        'nilai'
    ];

    public function alternatif()
    {
        return $this->belongsTo(Alternatif::class);
    }

    public function kriteria()
    {
        return $this->belongsTo(Kriteria::class);
    }
}

```

Controller Perhitungan *ARAS*

```

<?PHP

namespace App\Http\Controllers;

use App\Models\Alternatif;
use App\Models\Kriteria;
use App\Models\NilaiAlternatif;

class ARASController extends Controller
{
    public function hasil()
    {
        $alternatif = Alternatif::all();
        $kriteria = Kriteria::all();

        $normalisasi = [];
        $Ranking = [];

        foreach ($kriteria as $k) {

```



```

$nilai = NilaiAlternatif::where('kriteria_id',$k->id)-
>pluck('nilai');

if($k->jenis == 'benefit'){

    $total = $nilai->sum();

    foreach($alternatif as $a){

        $n = NilaiAlternatif::where([
            'alternatif_id'=>$a->id,
            'kriteria_id'=>$k->id
        ]->first();

        $normalisasi[$a->id][$k->id] =
            ($n->nilai / $total) * $k->bobot;
    }
}else{

    $inverse = $nilai->map(function($v){
        return 1/$v;
    });

    $total = $inverse->sum();

    foreach($alternatif as $a){

        $n = NilaiAlternatif::where([
            'alternatif_id'=>$a->id,
            'kriteria_id'=>$k->id
        ]->first();

        $normalisasi[$a->id][$k->id] =
            ((1/$n->nilai)/$total) * $k->bobot;
    }
}

```

```

    }
}

foreach($alternatif as $a){

    $Ranking[$a->id] = array_sum($normalisasi[$a->id]);

}

arsort($Ranking);

return view('hasil',compact(
    'Ranking',
    'alternatif',
    'normalisasi'
));
}
}

```

Blade Hasil *Ranking*

```
<table class="table table-bordered">
```

```
<thead>
```

```
<tr>
```

```
<th>Ranking</th>
```

```
<th>Alternatif</th>
```

```
<th>Nilai</th>
```

```
</tr>
```

```
</thead>
```

```
<tbody>
```

```
@PHP
```

```
$no=1;
```

```

@endPHP

@foreach($Ranking as $id=>$nilai)

<tr>

<td>{{ $no++ }}</td>

<td>
{{ $alternatif->find($id)->nama_lokasi }}
</td>

<td>
{{ number_format($nilai,4) }}
</td>

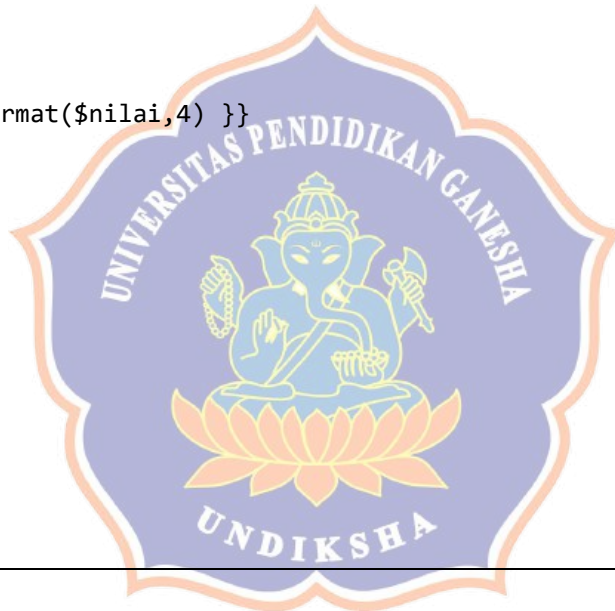
</tr>

@endforeach

</tbody>

</table>

```



Export PDF

```

public function PDF()
{
    $Ranking = Ranking::all();

    $PDF = PDF::loadView(
        'laporan.PDF',
        compact('Ranking')
    );

    return $PDF->download('laporan.PDF');
}

```

Fungsi Proses Perhitungan *ARAS*

```
public function prosesARAS()  
{  
  $alternatif = Alternatif::all();  
  $kriteria = Kriteria::all();  
  
  // proses normalisasi  
  
  // proses pembobotan  
  
  // proses Ranking  
  
  return view('hasil', compact('Ranking'));  
}
```

