

CHART 3-1: PROJECT COMPONENTS

Human component

- **Visitors**
 - Tourists
 - Students
 - VIP
- **Worker**
 - maintainer
 - vendors
 - Guides
 - Botanists
 - Administration



The icon shows a group of five stylized human figures in black, with one larger figure in the center and four smaller figures around it, representing a group of people.

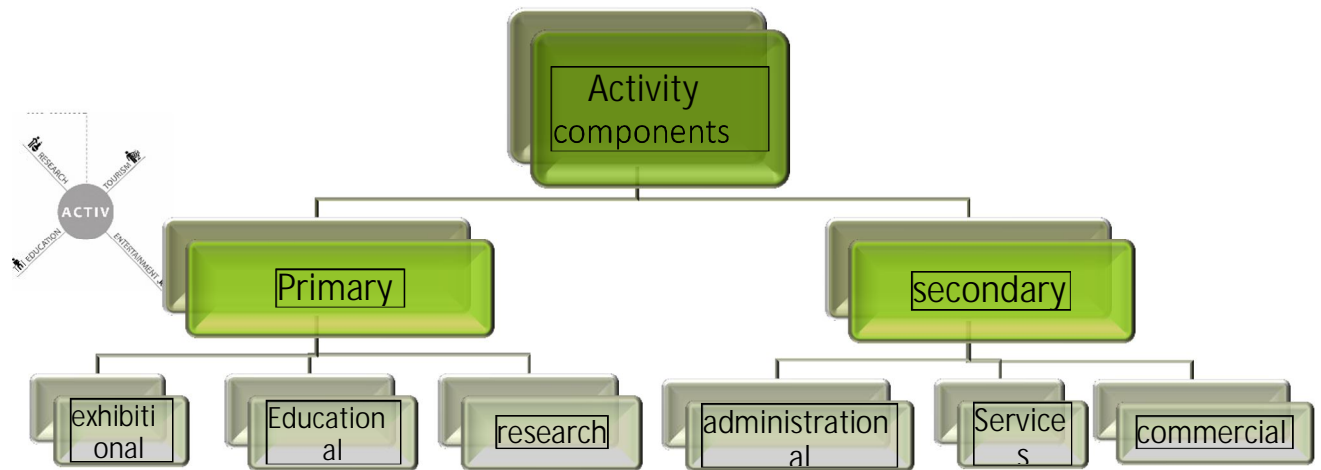


CHART 3-2: ACTIVITY COMPONENTS



Exhibition

- Desert climate plants exhibit
- Tropical climate plantsexhibit
- Mediterranean climate plants exhibit
- Temperate climate plants exhibit
- Polar climate plants exhibit
- General exhibit
- Special exhibit



Educational

- Giving lectures
- Holding eco-conferences
- Storing biome information
- Storing DNA specimen samples
- Educating about ecology
- Educating about Eco-friendly practices
- Researching reproduction of endangered plant



research

- Research and Development
 - Modern research
 - Crops Research
- green biotechnology research
 - Tech plant cells and tissues
 - Gene techniques
- Land and Water Research

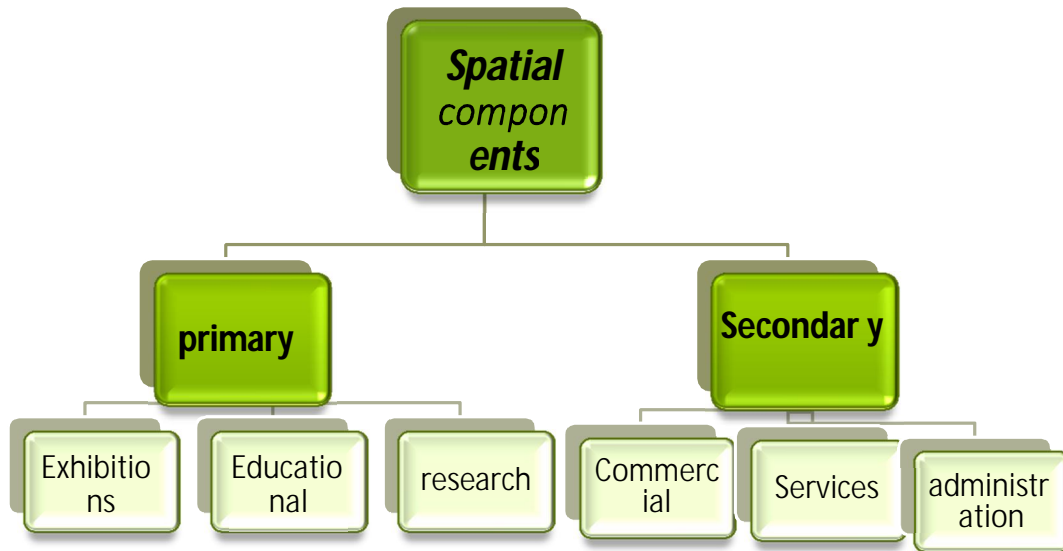


CHART 3-3: SPATIAL COMPONENTS



Exhibitions

- Tropical plants exhibition
- Desert plants exhibition
- Mediterranean plants exhibition
- Temperate plants exhibition
- Polar plants exhibition
- service



research

- Research and Development Department
 - Modern research
 - Crops Research
- Department of green biotechnology research
 - Tech plant cells and tissues
 - Gene techniques
- Land and Water Research department
- Department of Plant Protection Research
- services



Educational

- lecture halls
- conference hall
- library
- specimen archive
- 4d cinema
- Workshops
- research facility



Tourists in Sudan: -

in Tourists	0202	0200	0200	0200	0202
Sudan	126030	203122	241312	300562	552322

TABLE 3-1: TOURISTS IN SUDAN

Assuming 25% of tourists will visit the project


= $1071830 \times 25\% = 267957$ per year

= **730**  **visitors per day**

Sudan's population will reach 41000000 by 2025\ if 5% of them visited the project

each year = 2050000 visitors per year = 5300 visitors per day 5300+

730= **6030 visitors per day**

 **restrooms:** 3 per 100 people. $6030 \div 100 \times 3 = 180$ people Area = $180 \times 1.8 =$ **325 sqm**

 **Refreshment stands:** each stand 4 sqm, each


exhibit has 2 stands so $2 \times 4 \times 4 =$ **32sqm**

 **Cafes & restaurants** 25% of visitors = 1507 1 m per visitor = **1507 sqm**

 **Souvenir shops** 5 shops 40 sqm each = **200 sqm**


 **Mosque:** for 15% of visitors = $904 \times 1 =$ **904 sqm Total area = 2976 sqm**

Employee facilities:

*  **Workshops:**

(Gardening, water & electricity, Waste

management, general) **2** of each = 8 (30 seat) workshops, each one 150 sqm $8 \times 150 =$ **1200 sqm**

 *Shops: $9 \times 100 = 900$ sqm

Research facility: 310

AREA STUDY: -

Zone name	Total area
Exhibitions	11653m ²
Research	2837,5 m ²
Educational	5217m ²
Commercial	2837,5 m ²
Administrational	500m ²
Total site area	47815m²

TABLE 3-2: AREA STUDY

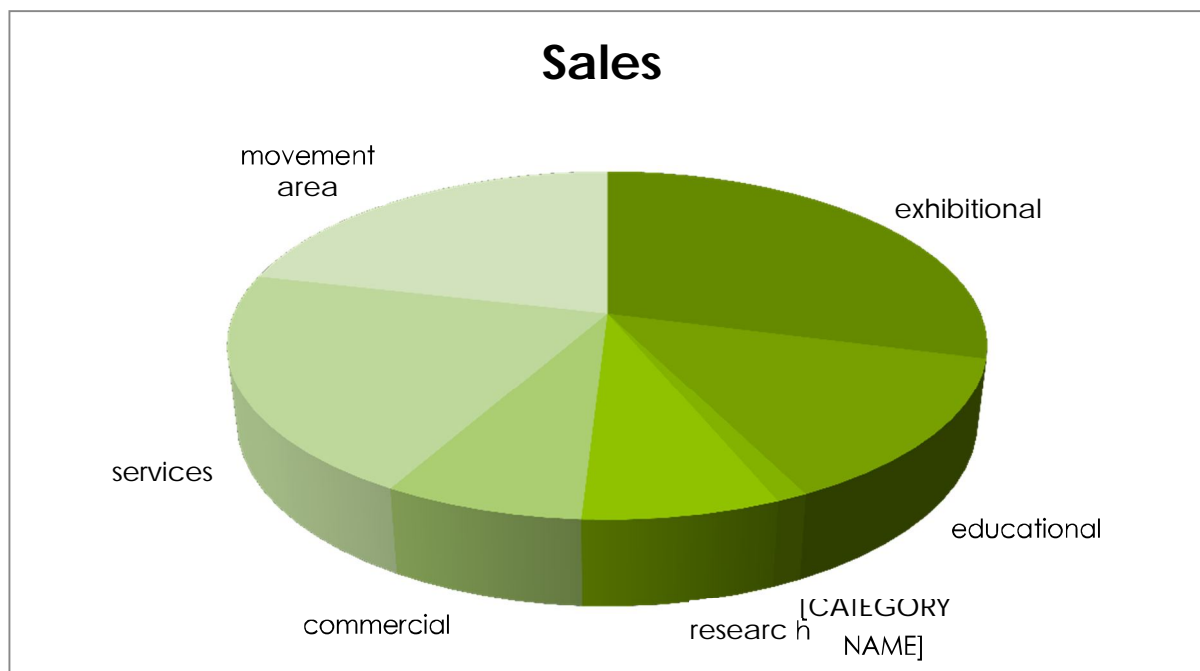


CHART 3-4: AREA STUDY

Khartoum State Climate Data: -

	Avg. Min Temp	Avg. Max Temp	Avg. Rain (mm)	Relative Humidity (%)
January	16	32	0	21
February	17	34	0	16
March	19	37	0	13.0
April	23	40	1	13
May	26	42	5	14
June	27	42	7	18
July	26	38	48	31
August	25	36	72	42
September	25	38	27	30
October	25	40	4	20
November	21	36	0	21
December	17	33	0	23

TABLE 3-3: Khartoum State Climate Data

Comparative Weather Analysis: -

To control the indoor environment, we must know the worst possible outside environment then designs a system able to achieve stability even in that condition:

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Solar Radiation Chart:

Max solar irradiance 2500 kwh/m² min solar irradiance 600 kwh/m²

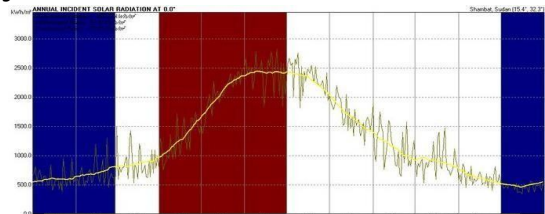


FIGURE 3-1: Solar Radiation

Biome	Averages in each biome					Khartoum Comparison					
	Temperature		Avg. Rad.	Day light hour	Rain fall	Temperature		Radiation		Day light	Rain
	max	min				Max	Min	Max	Min	Avg	Max
						42	16	2500	1600	3664	0.75
	37.5	12.5	2170	3250	300-850	-4.5	-3.5	-329	1570	-414	778
polar	10	-25	1000	2800	-	-5.5	0.5	-	-600	-864	-
temperate	30	19	1800	2800	0.75-2.00	-3.5	3	-700	200	-864	0.75
tropical	34	16	2200.	2700	1.25-6.00	-11	-3.5	-300	600	-964	2.25

TABLE 3-4: CLIMATE Comparative

Optimum Orientation: -

Depending on the amount of irradiance required each biome will be orientated towards the red side if more irradiance is needed and to the yellow if less is desired.

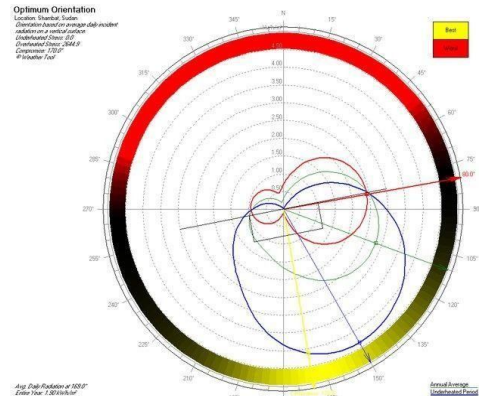


FIGURE 3-2: Optimum Orientation

Prevailing Winds: -

wind is need to remove hot air from the greenhouses, the most frequent winds blow at 45°NE with speeds from 10-20k.

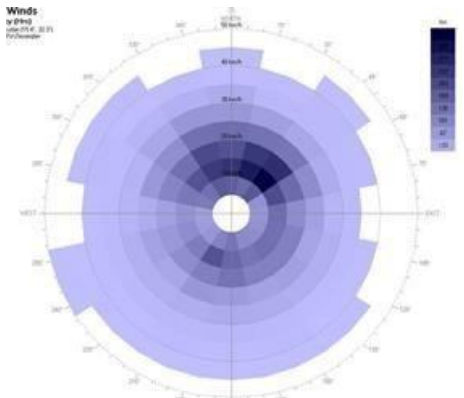


FIGURE 3-3: WIND ROSE

Optimum Orientation: -

from the climate analysis to reduce the need for mechanic cooling and heating during the summer and winter, the optimum orientation for each exhibit is as shown in the table.

climate	angle
Mediterranean climate	120°
Polar climate	150°
Temperate climate	90°
Tropical climate	60°

TABLE 3-5: Optimum Orientation

All angle written in the table are from the north



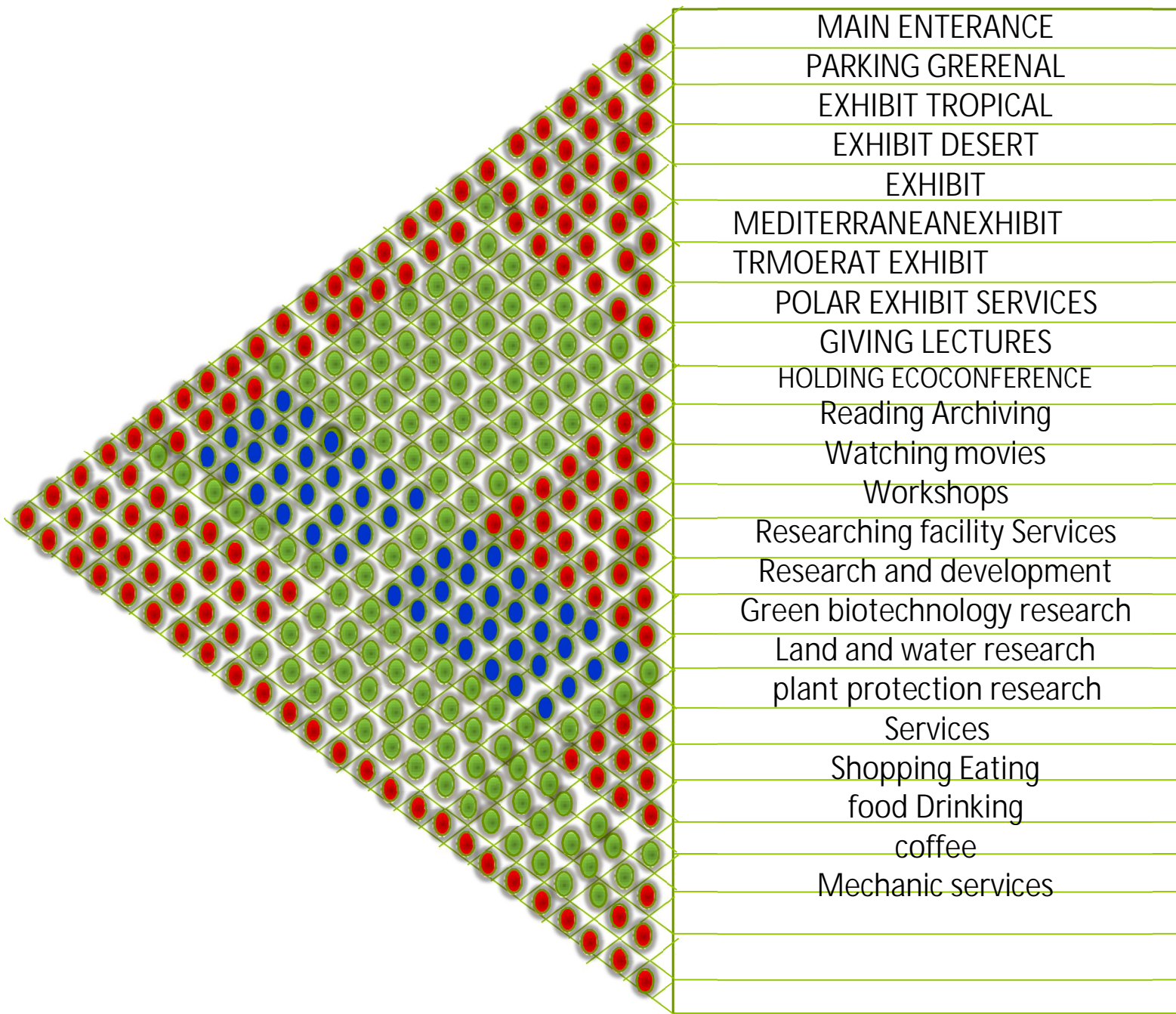


CHART 3-5: FUNCTIONAL RALATIONS

Circulation Charts: -

General Circulation Chart: -

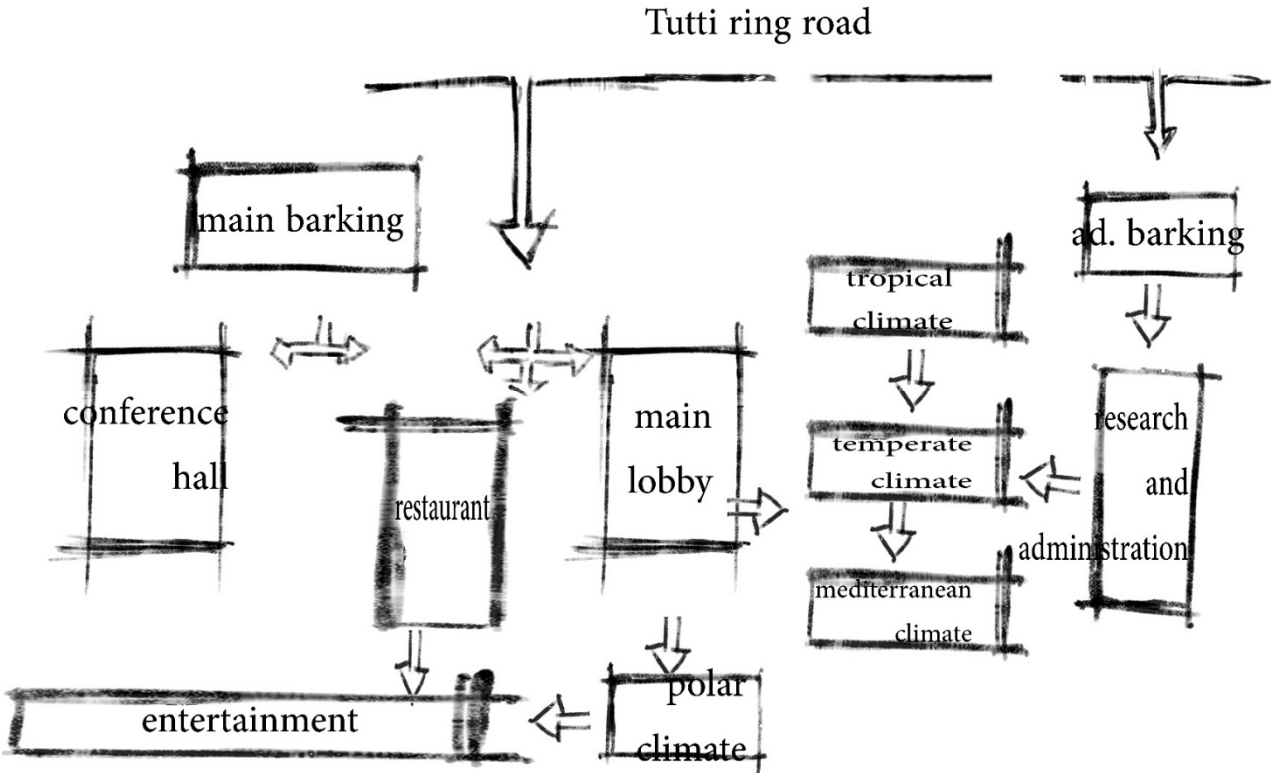


CHART 3-6: Circulation Charts

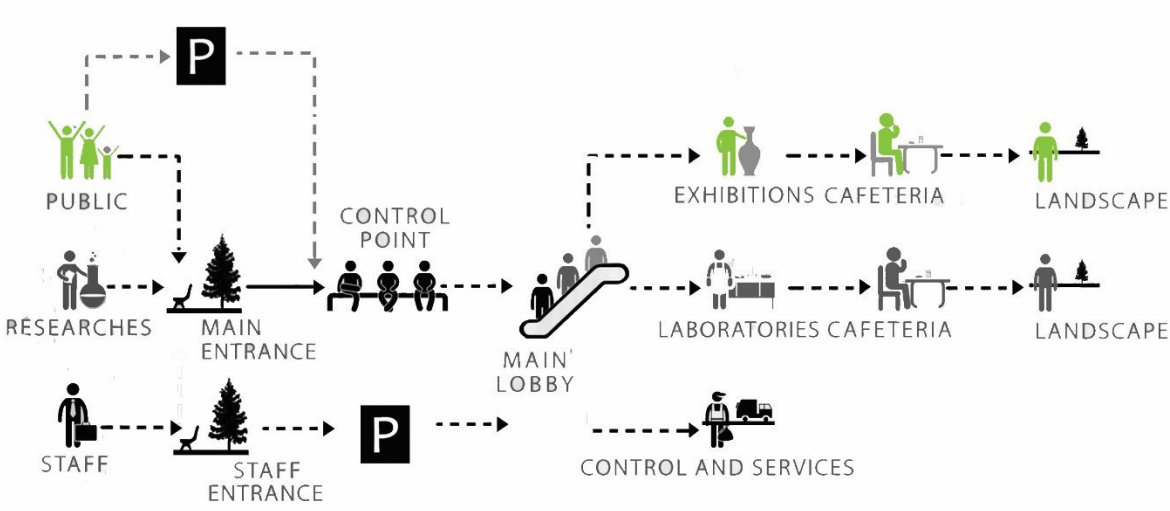


CHART 3-7: Users Movement

Bubbles Relations Diagram: -

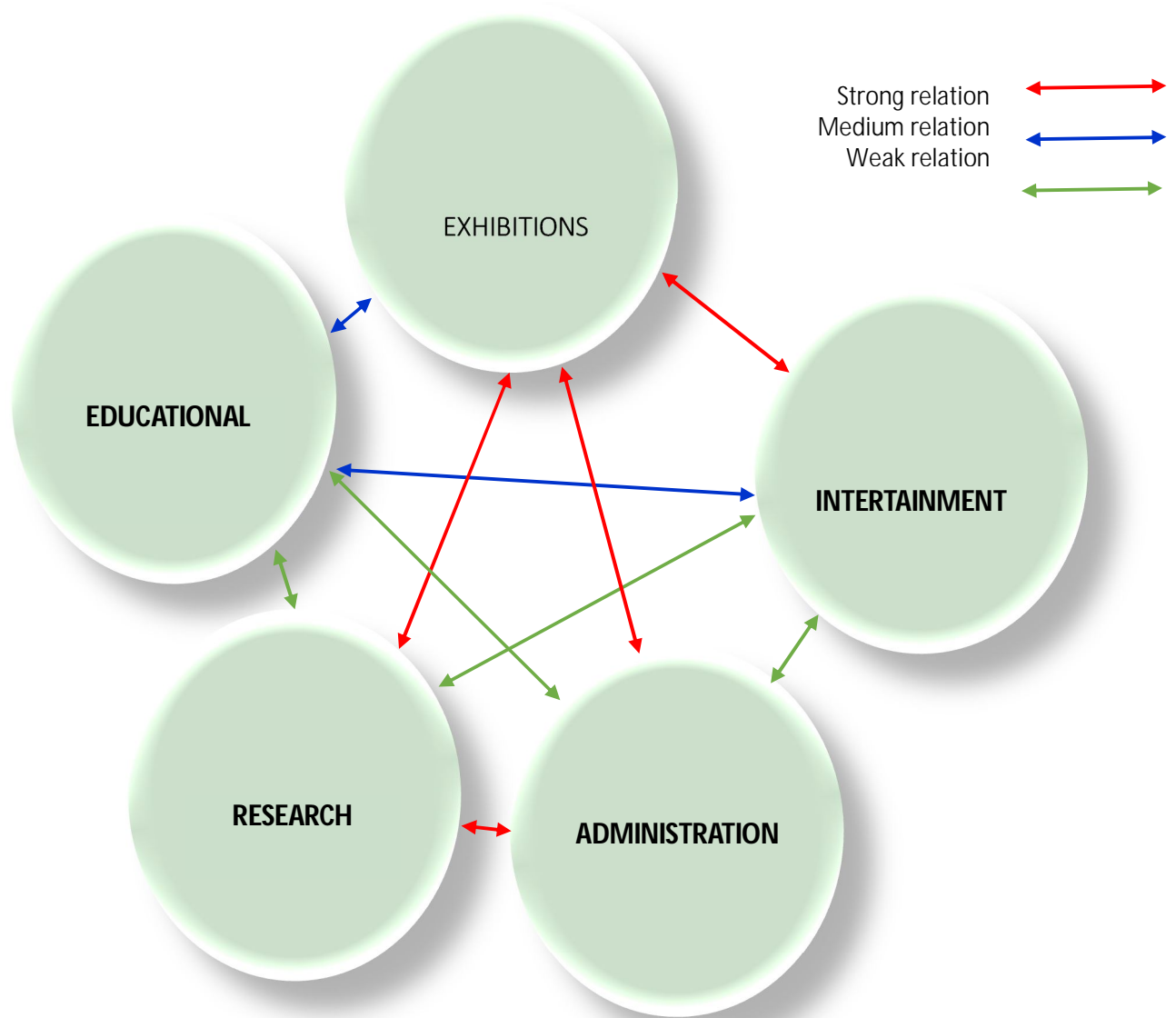
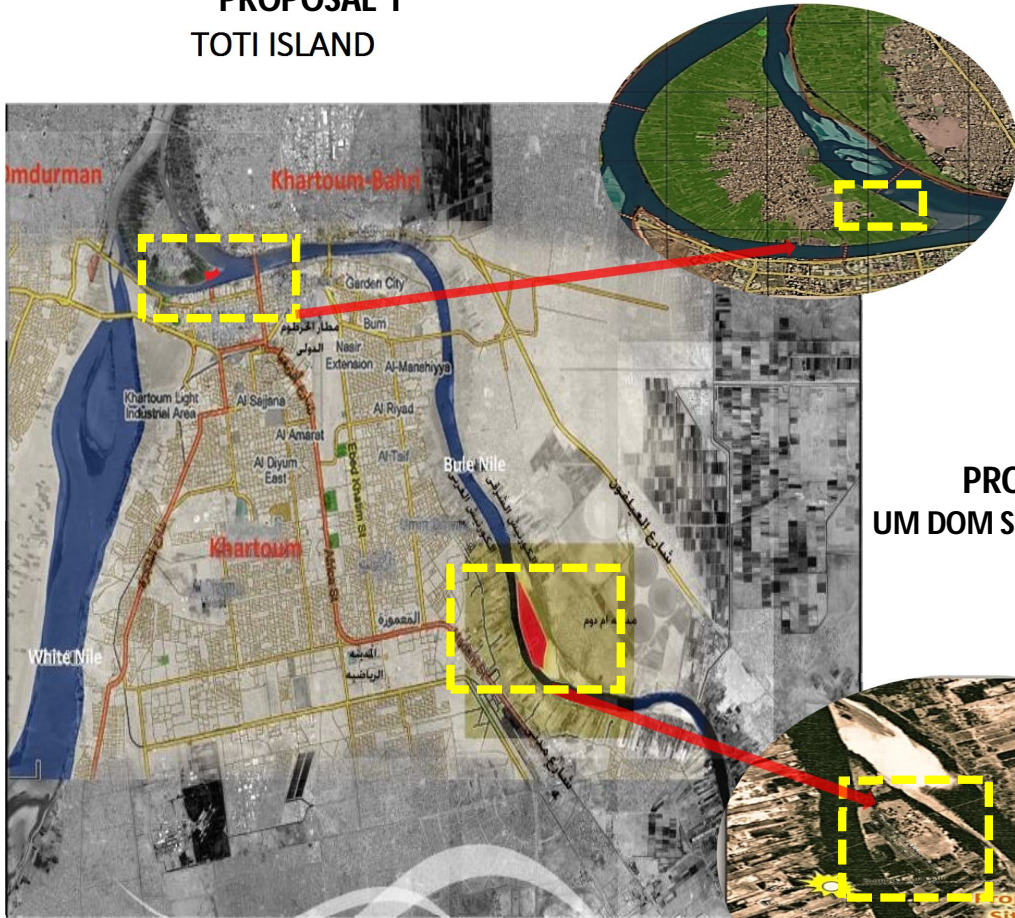


CHART 3-8: Bubbles Relations Diagram

SITE SELECTION

**PROPOSAL 1
TOTI ISLAND**



**PROPOSAL 2
UM DOM SMART ISLAND**

FIGURE 3-4: PRPOSAL SITES LOCATION



FIGURE3-5: SITE LOCATION A

The site is located in the east of the Nile in Sudan Smart (according to plan for the future) to the island of alligator now

10.00 HICTARES
DISTANCE FROM CITY
CENTER :10 km



FIGURE3-6: SITE LOCATION B

Currently it can be reached through a large Totti Khartoum by public transport from the naval station, and according to plan for the future by a Tutti bridge Marine Tutti bridge Omdurman

5.00 HICTARES
DISTANCE FROM CITY
CENTER: 3.5 km

Nile river	north	Neighborhoods
Nile river	south	
Nile river	east	
Investment land_farm	west	

TABLE 3-6: SITE A Neighborhoods

Nile river	north	Neighborhoods
Nile river	south	
Nile river	east	
Investment land_farm	west	

TABLE 3-7: SITE B Neighborhoods

Benchmark	%	Tutti island site	Eltomsah island site
The nearest area of the project	15%	10%	13%
Site job	15%	13%	12%
Neighborhoods	8%	5%	7%
Accessibility	10%	5%	9%
The dimension of the city center	7%	4%	6%
Availability of infrastructure services	10%	8%	10%
Panoramic	20%	19%	20%
Cultural monuments	15%	0	15%
	100	64%	92%

TABLE 3-8: SITE COMPARATIVE

GENERAL SITE: -

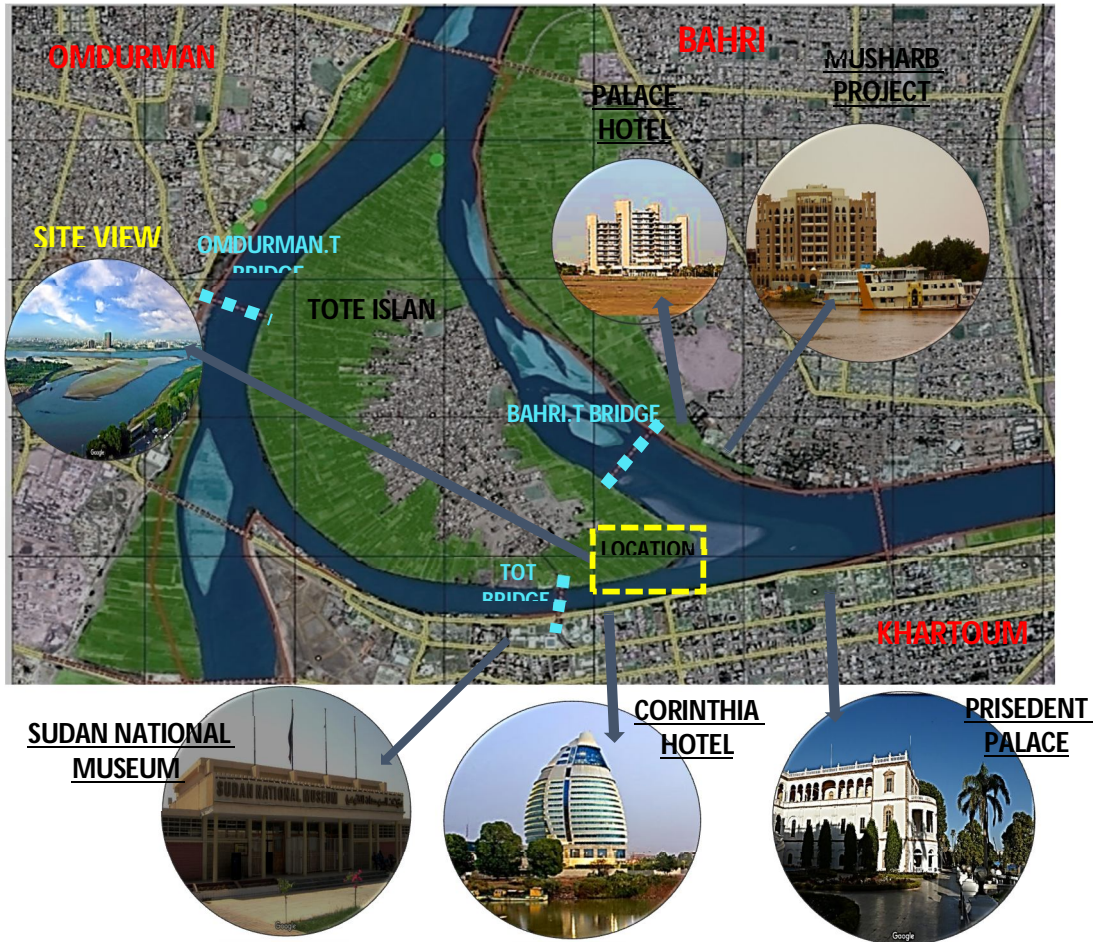


FIGURE 3-7: GENARAL SITE LOCATION

- Distance from city center: - 3 kilo meters
- total area: -4 HICTARES

Accessibleness: Currently the site can be accessed by public transport from the Arab market station either by future planning for the island Totti can access the site of bahri bridge Totti and Omdurman bridge Totti.



FIGURE 3-8: CHOSEN SITE LOCATION