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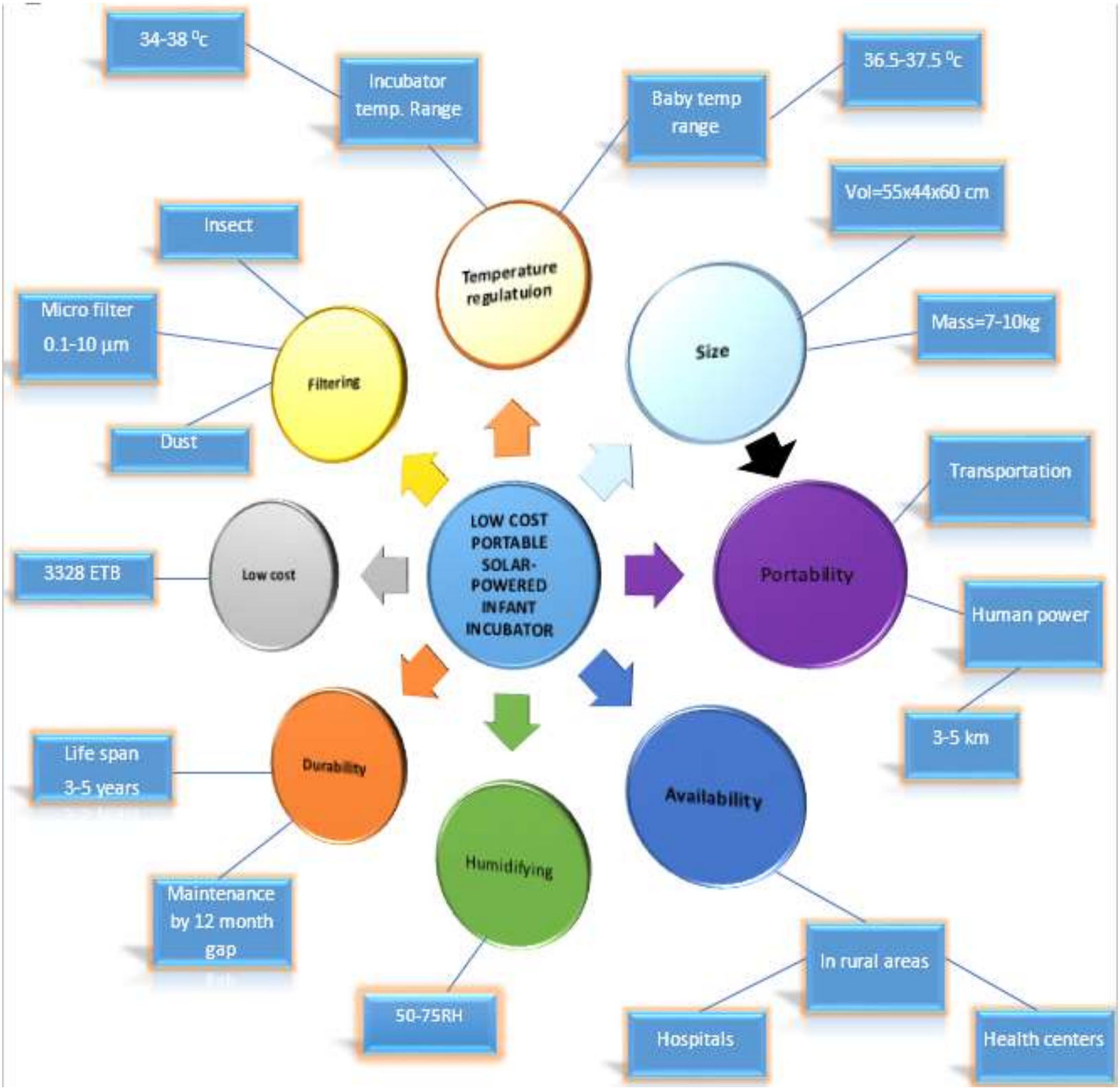
Graph Analysis- **GRAPH DESIGN SPECIFICATION**

This is my personal project to innovate "**low-cost infant incubator"** for poor families/mothers who lives rural areas and unable to afford to get a proper infant incubator for their new born baby**.**

- ✓ Who is my client? A healthcare/family that cannot to afford an expensive incubator for their new born baby.
- ✓ What specifications the device should fulfill? From Safety to size and quality.
- ✓ How to lower the price? Use cheap but safe and powerful materials.
- ✓ How to make it safe and standard? Use recognized quality and safe materials.

GRAPH ANALYSIS OBJECTIVE & SPECIFICATION TREE (Nodes and Edges)

Graph Fig.1: Nodes (Properties)



Graph Fig.2: Nodes (Properties) with Edges (Specification)

The specification has done by client interview. The specification is as shown below

A. *Temperature regulation*
   - ❖ Body temperature specification
     - ✓ The normal range of body temperature: 36.5^0c-37.5^0c.
     - ✓ Moderate Hypothermia: 36^0c -36.5^0c.
     - ✓ Hypothermia: <36^0c.
     - ✓ Hyperthermia: >37.5^0c.
   - ❖ Our device specification
     - ✓ The device is designed to operate at the normal temperature range of 36.5^0c -37.5^0c.

B. Humidifying
   - ✓ If the humidity <50RH, >75%RH we use water for humidification to moist the dry air.
   - ✓ Normal humidity range 50-75%RH.

C. *Solar Capability*
   - ✓ In optimal sunlight, the solar panel charges the 8 Ah lithium ion battery in 4-5 hours. Thus, approximately 1.8 Ah is acquired per hour of sunlight.

D. *Size*
   - ✓ Height of incubator-55cm
   - ✓ Width of incubator-40cm
   - ✓ Length of incubator-60cm
   - ✓ Volume –(55x40x60)cm^3

E. *Portability*
   - ✓ The estimated weight of our device7-10 kg
   - ✓ Can be handled by average person, the person may travel up to 5km by carrying the device.

F. *Cost Effectiveness*
   - ✓ The average estimated cost is 3328 ETB ($118.85).so the device is so cost effective. But the average cost of currently existing infant incubator is $5000. Cost estimation described at the end [B]. We will use the campus provided resources and cover others cost by finding sponsor or by the group members.

G. *Availability*
   - ✓ We will try how to distribute the device in rural/remote areas, as we know there is no transportation for deliverance of the incubator in the area, so we will use human power to deliver the device because of the device portable that is easy to handle. We can also use traditional transportation (like horse, donkey etc.), or may be bicycle, motor, Bajaj.

H. *Micro filter*
   - ✓ Filters particles ranges from 0.1-10 micrometer, separates macromolecules of molecular weight < 100,000 g/mol.

I. *Durability*
   - ✓ It operates effectively 3-4 years based on the raw materials we used
   - ✓ General maintenance done by 12 months gap, costs 100 ETB. Cleaning done by per day in order to sustain baby's life.

PAIR WISE COMPARISON CHART

	Cost	Temp Regulation	Portable	Durable	Available	Size	Filtering	humidify	Total	Rank
Cost	-	0.4	0.55	0.7	0.5	0.6	0.5	0.45	3.7	4
Temp Regulation	0.6	-	0.6	0.72	0.55	0.65	0.57	0.5	4.19	1
Portable	0.45	0.4	-	0.6	0.58	0.59	0.56	0.6	3.76	3
Durable	0.3	0.28	0.4	-	0.45	0.5	0.4	0.3	2.63	8
Available	0.5	0.45	0.42	0.55	-	0.6	0.5	0.48	3.5	6
Size	0.4	0.35	0.41	0.5	0.4	-	0.3	0.4	2.76	7
Filtering	0.5	0.43	0.44	0.6	0.5	0.7	-	0.49	3.66	5
Humidify	0.55	0.5	0.42	0.7	0.52	0.6	0.55	-	3.8	2

Table 1 Pair Wise Comparison Chart

From the above comparison table temperature regulation gets the first priority followed by humidifying, portability, cost, filtering, availability, size, finally by durability.

FUNCTIONAL GRAPH DIAGRAM