The Art of Questioning:
Look At Your Research Topic From Multiple Perspectives

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Why this workshop?
What is this workshop all about?

Search for Answers

Ask Questions

Found Answers

Ask More Questions
What are the Learning Outcomes?

Start to use:


2. **PESTLE analysis** (Political, Economic, Social, Technology, Legal and Environment factors)

...to question and view an idea or an issue from multiple perspectives
**YES/NO**
- Do you know what is climate change?
- Is it a long spell of drought?
- Is climate change bad?

**WHAT?**
- What is climate change?
- What is the difference between climate change and global warming?

**WHERE?**
- Where does climate change happen?
- Does it happen in Singapore or globally?

**WHEN?**
- When did climate change happen?
- When did it started getting so hot?
- How often does it flood?
WHO?
Who is impacted by climate change?
Who said there is climate change?
Who is involved in climate change?

WHY?
Why does climate change happen?
Why are some people denying it?
Why should I care?

HOW?
How did climate change happen?
How does plastic waste affect the weather?
How does a drought in Australia affect us?

WHAT IF?
What if climate change is a hoax?
What if climate change is for real?
What if it stays this hot for 10 years?
What if nobody does anything?
What if I did something....
I want to find out **how to help disabled students move around independently** in NUS

- What is a disabled student?
- Who are these disabled students?
I want to find out how to help disabled students move around independently in NUS

• Where does a disabled student go?
• When do they move around?
I want to find out how to help disabled students move around independently in NUS

• How does a disabled student move around now?
• How does NUS help disabled students move around?
I want to find out **how to help disabled students move around independently in NUS**

- Why does a disabled student want to move around independently?
- Why do I want to help them?
- How can I help them?
I want to find out **how to help disabled students move around independently in NUS**

<table>
<thead>
<tr>
<th></th>
<th>Define the issues</th>
<th>Find solutions</th>
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<tr>
<td><strong>What?</strong></td>
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<td><strong>PESTLE</strong></td>
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<tr>
<td><strong>POLITICAL</strong></td>
<td>Roles governments, political lobbies play</td>
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<td><strong>ECONOMIC</strong></td>
<td>Economic growth, industry influences</td>
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<tr>
<td><strong>SOCIAL</strong></td>
<td>Education, cultural, lifestyle influences</td>
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<td><strong>TECHNOLOGY</strong></td>
<td>Advancement of technology</td>
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<tr>
<td><strong>LEGAL</strong></td>
<td>Effectiveness of legal agreements</td>
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<tr>
<td><strong>ENVIRONMENT</strong></td>
<td>How the environment is affected</td>
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I want to find out **how to help disabled students move around independently in NUS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Define the issues</th>
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</thead>
<tbody>
<tr>
<td>Political</td>
<td>NUS admin/faculty</td>
<td></td>
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<tr>
<td>Economic</td>
<td>Cost of maintaining services and facilities</td>
<td></td>
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<tr>
<td>Social</td>
<td>Awareness of community</td>
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<tr>
<td>Technology</td>
<td>Ramps, wheelchair lifts, wheelchairs</td>
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<td>Legal</td>
<td>Regulations</td>
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<td>Environment</td>
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<tr>
<td>Political</td>
<td>Government, policies, master plans, etc</td>
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<td>Government bodies, PUB, Nparks, LTA, etc</td>
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<td>Political lobbies, influences, etc</td>
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<td>PAP, Worker’s Party, Republicans, Democrats, etc</td>
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<tr>
<td>Economic</td>
<td>Economic growth, economy, inflation, etc</td>
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<td>Industries, businesses, corporations, etc</td>
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<td>Cost, expenditure, profit, loss, etc</td>
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<td>Social</td>
<td>Population, elderly, women, teens, etc</td>
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<td>Middle-income, professionals, etc</td>
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<td>Education, awareness, lifestyles, habits, etc</td>
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<td>Technology</td>
<td>Technology, devices, methods, processes</td>
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<td>Legal</td>
<td>Laws, legislation, agreement, regulation, mandatory, etc</td>
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<tr>
<td>Environment</td>
<td>Land, air, water, space, etc</td>
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Individual activity:
Read & find PESTLE factors (10min)

• Read the Water article
http://www.lib.nus.edu.sg/ilp/RUWaterArticle.docx

• Identify the PESTLE factors by highlighting them in different colors.

INCREASING SUPPLY

5 Singapore could become self-sufficient in water by 2060, a year before the water agreement with the Johor state government expires. By 2060, NEWater and desalination will be able to meet up to 85 per cent of water demand. Efforts are under way, including ramping up the purification of treated water to meet more than half of the country’s water needs. Currently, NEWater can meet 30 per cent of Singapore’s total daily demand of 430mgd.

6 Supply of desalinated water or treated seawater will also be increased. Singapore has two desalination plants that can produce water to meet almost 25 per cent of the demand. By 2030, this will go up to 30 per cent. A third desalination plant in Tuas is due to be completed next year, while the fourth desalination plant in Marina East will be built by the end of 2019.
The Republic’s success in turning its vulnerability in water into a strength within four decades has been well documented. But the drought across the Causeway is raising serious concerns. The water level in Linggiu Reservoir in Johor is rapidly falling to historic lows.

Currently, water from Johor River helps to meet half of Singapore’s water needs. Under the 1962 Water Agreement between Singapore and the Johor state government — which expires in 2061 — Singapore can draw up to 250 million gallons of water per day (mgd) from the river.

**HOW CLIMATE CHANGE COULD AFFECT WATER SUPPLY**

Climate change could affect the intensity and frequency of rainfall, where dry spells get drier and wet seasons wetter. Rising temperatures would also mean more water evaporating, thus affecting the water levels in the Linggiu Reservoir as well as Singapore’s water-catchment areas.

As the weather becomes warmer, water temperatures will also rise in tandem. This could lead to the thermal stratification of water, which prevents the mixing of waters, resulting in the accumulation of chemical pollutants and potentially causing algal bloom. Heavier rainfall will also lead to greater runoffs that can carry with them chemical and biological pollutants or suspended particles. All of these could lower the quality of water collected in local catchments, making it more costly for Singapore to treat surface water.
INCREASING SUPPLY

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Singapore also collects rainwater through a network of drains, canals, rivers and stormwater collection ponds before it is channelled to the 17 reservoirs across the island for storage. The country’s water-catchment areas currently take up two-thirds of the island, and PUB hopes to expand this to 90 per cent by 2060.

PUB is currently looking into other desalination technologies, including electrodeionisation. It is also studying biomimetic and biomimicry techniques.

More water could be collected from local catchments by expanding or deepening the current reservoirs. Harvesting rainwater directly, such as on roofs, could be used for non-portable purposes.
DO MORE TO REDUCE DEMAND

Instead of looking for new sources of water supply, Singapore should do much more to reduce demand. Last year, Singapore’s per capita domestic water consumption inched up to 151 litres per day, from the 150 litres in 2014. The Government’s target is to reduce the figure to 140 litres by 2030. But this is too conservative. Singapore should strive for a target of between 110 and 115 litres per day.

To reduce water consumption, a suggestion was to raise water prices. The price has remained the same since 2000.

Currently, households pay about S$1.93 per cubic metre, including Goods and Services Tax (GST), for those using 40 cubic metres of water or less per month. Majority of Singaporeans haven’t got a clue what their water bill is because it’s so little.

With more extreme weather, greater energy will be used to produce more NEWater and desalinated water. Somebody’s got to pay for that. Prices should reflect the scarcity of water, such as factoring in the cost of building and operating new desalination plants.

PUB has been trying to improve conservation of water through education. In the past 15 years, those efforts are no longer enough to convince people to reduce consumption.
Changes in water prices would not make a big difference in consumer behaviour. The price elasticity of water is very, very low, so you need to increase the price very drastically for people to use less water. Water bills make up a very small proportion of the average Singaporean household income. A slight reduction in consumption would only affect a household’s water bill by 50 cents or a dollar. Most people won’t be bothered although that raising the price of water would have a “psychological effect” on people.

PUB is always very careful in letting people have the confidence that Singapore can handle any bad situation. But the Government should also prepare Singaporeans, who are always very much in a comfort zone for the worst-case scenario. Indeed, when the worst-case scenario strikes, Singaporeans’ behaviour and water-consumption habits could be brought to a test.
Solutions to Water Security

Environment
- Catchment areas
  - New Reservoirs 90% catchment areas by 2060
- Harvest rainwater on roofs
- Biomimicry/biotechnology
- Electrodeionisation

Technology
- Newwater
  - Desalinated water
    - 4 plants in 2019
  - 30% of demand
    - 25% of demand
    - 30% in 2030?

Social
- Failure of campaigns
- 60% of demand

Economic
- Costly to treat H2O
- Cost of building operating
- 150 litres/day

Legal
- Water agreement expires 2061

Political
- Johor govt
- PUB
- Target: 110 litres/day

Other
- PUB
- Low Water Bill
- Current $P $1.93
- 40c per water
- P - reflect scarcity?
<table>
<thead>
<tr>
<th>QUESTIONING THE TEXT</th>
<th>SEARCHING FOR ANSWERS</th>
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<tbody>
<tr>
<td>Social factors notes from the article</td>
<td>Source to search in</td>
</tr>
<tr>
<td>1. Education campaigns are not effective in get people to conserve water.</td>
<td>Searches</td>
</tr>
<tr>
<td>When was the last water rationing in Singapore?</td>
<td>Answer &amp; source</td>
</tr>
<tr>
<td>Water rationing Singapore</td>
<td>“water rationing” and Singapore Limit to Singapore news sources</td>
</tr>
<tr>
<td>What will happen if we impose water rationing again?</td>
<td>Water rationing started in 1964. No nation-wide water rationing exercise since.</td>
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WORKSHOPS SCHEDULE
j.mp/RU_ABOUT

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