

Company X

Territorial Expansion

Executive Summary

A brief overview of the final deliverables conducted by the project team

1. Mid-term Review Recap

A brief recap of the research carried out during the first half of the project:

- Healthcare industry
- Data privacy industry
- Competition

2. Regulations and Consumer Attitude

Evaluated existing compliances in genetic testing within Asian countries, whilst also analyzing the consumer's attitude towards genetic testing.

3. Partnerships

Proposed potential partnerships for Company X during its territorial expansion to enable a smooth transition, these partnerships entail:

- Co-distribution (Product synergy)
- Commercial (Product diversification)
- Research (Upstreaming)

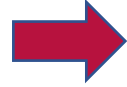
4. Final Score Card

Created a final ranking using the proposed scoring rubric, different weightages were assigned to each criteria based on relative importance:

- Regulations and Consumer Attitude (45%)
- Healthcare (25%)
- Competition (15%)
- Data Privacy (15%)

Agenda

Chapter



1. Mid-term Review Recap

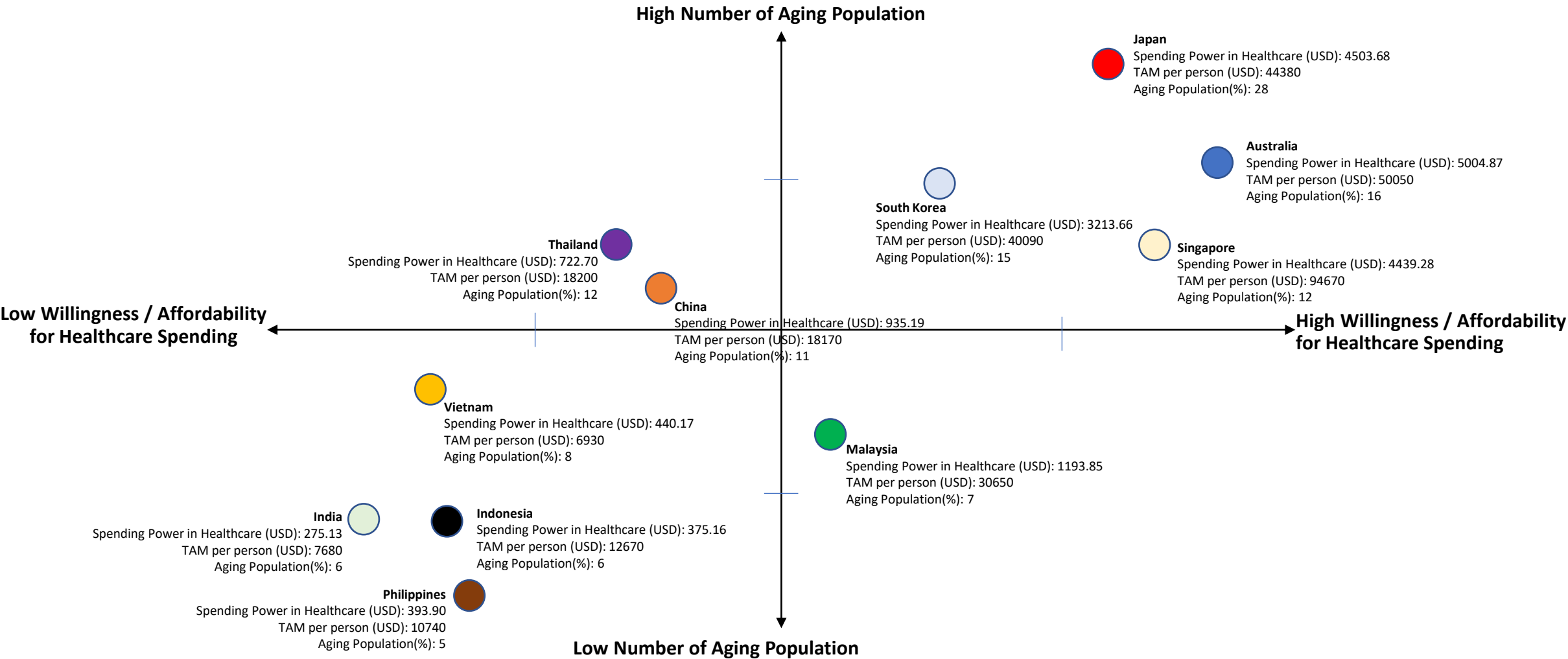
2. Regulations and Consumer Attitude

3. Partnerships

4. Final Score Card

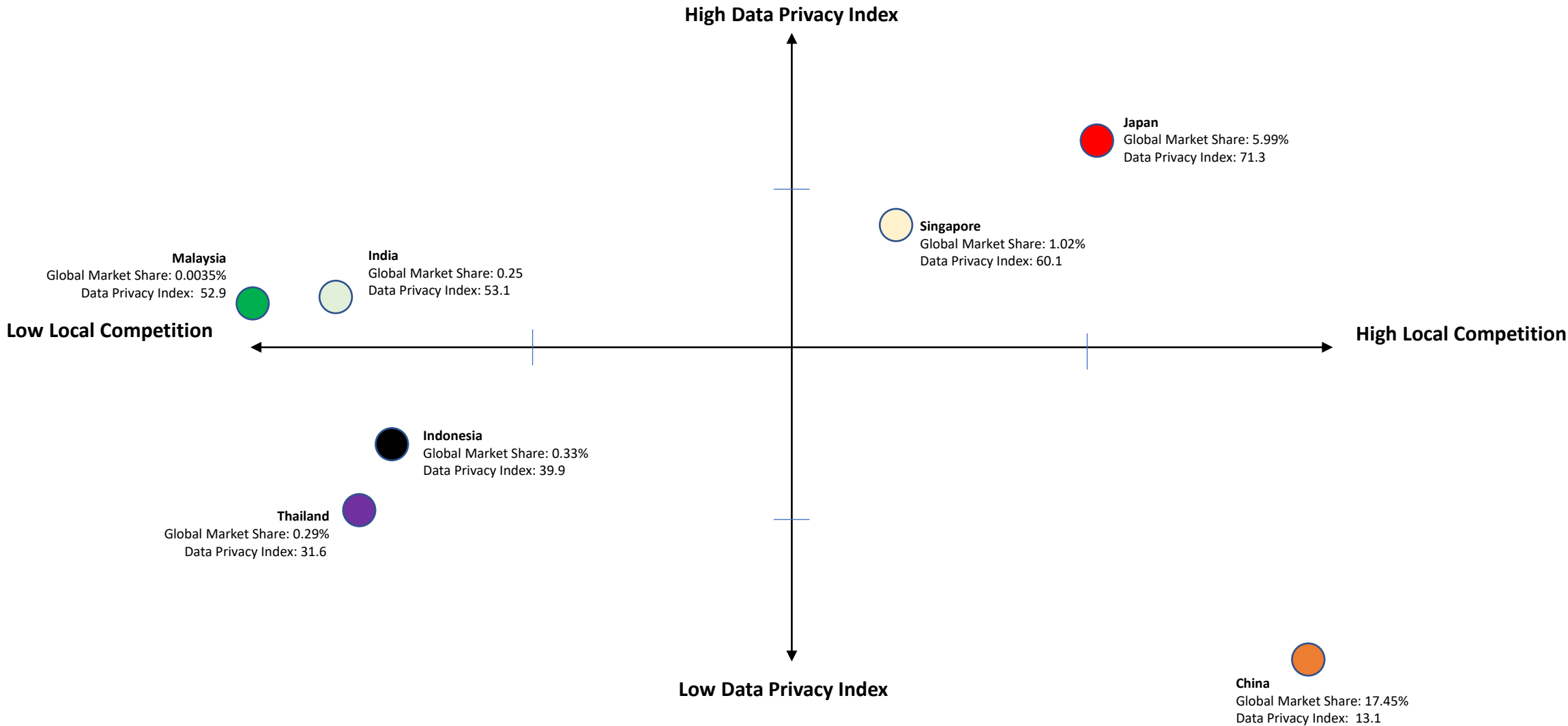
Healthcare in Asia: Market Overview

Top 3 Countries that have great markets for expansion are South Korea, Singapore and Japan.



Data Privacy & Competition in Asia

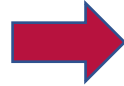
A country comparison of relative importance in data privacy vs competitors in genetic testing



Agenda

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1. Mid-term Review Recap



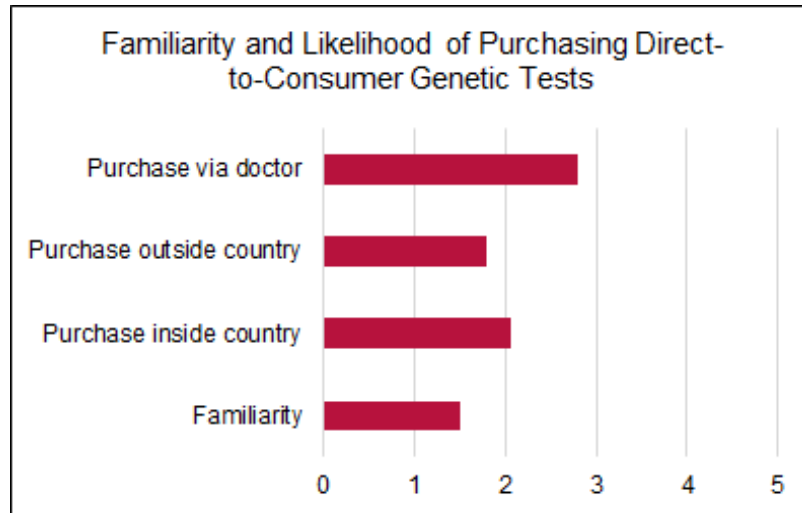
2. Regulations and Consumer Attitude

3. Partnerships

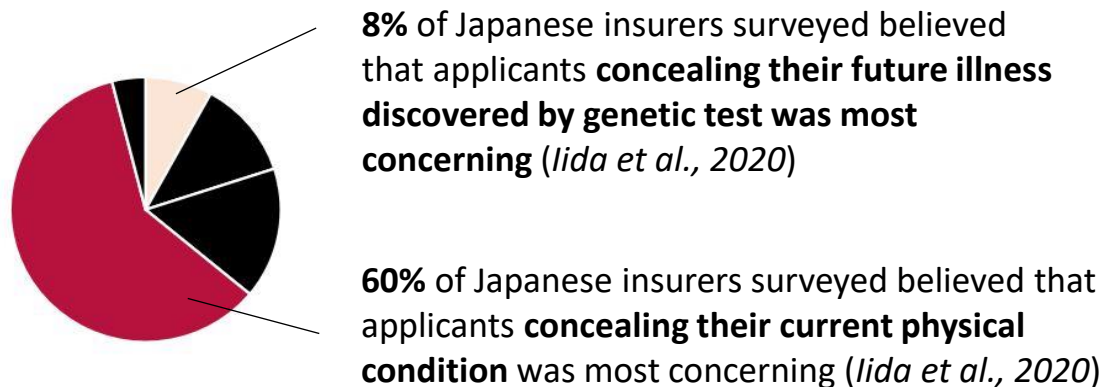
4. Final Score Card

Japan

Attitudes towards genetic testing in Japan:



Although Japanese consumers have relatively low familiarity with direct-to-consumer genetic tests, if they were to buy a kit, they would likely purchase it via a medical practitioner (*Charbonneau et al., 2019*)



Laws and Regulations in Japan

The attitude of life insurers in Japan to genetic testing is concerning as **premium differences** based on gender and age are **allowed** in Japan.

Japan lacks regulation related to oversight of direct-to-consumer genetic testing; however, DTC genetic testing companies are **not allowed to perform medical diagnosis without a certified medical practitioner**.

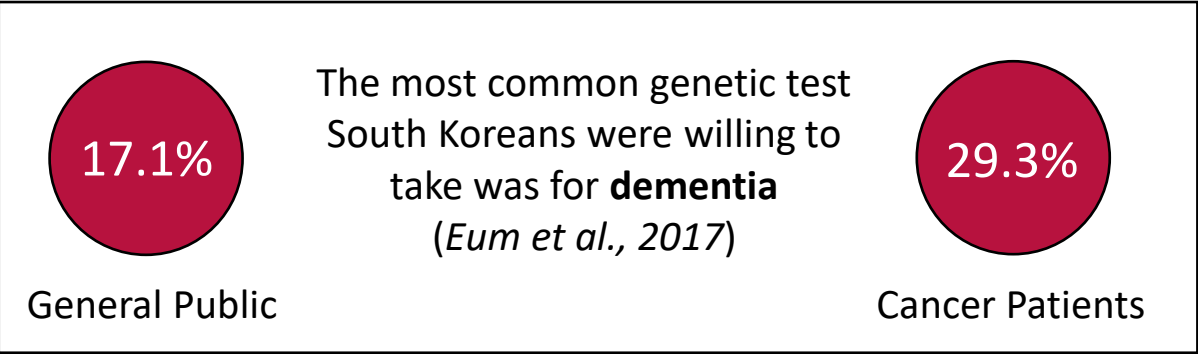
GeneLife



Genelife by Genesis Healthcare, one of Japan's biggest DTC genetic testing services, establish that they are not a medical, but rather **an informational service** on their website.

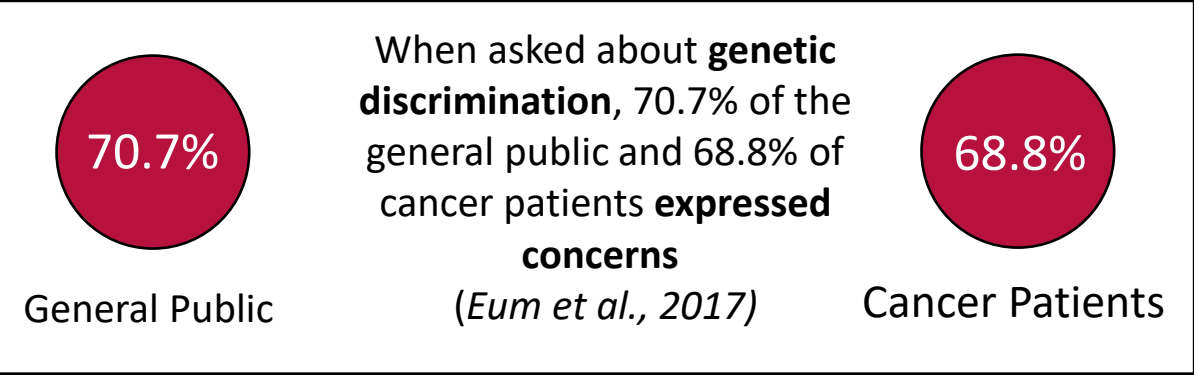
South Korea

Attitudes towards genetic testing in South Korea:



General Public:
Obesity
Gastric Cancer

Cancer Patients:
Breast/Ovarian Cancer
Gastric Cancer



Laws and Regulations in South Korea

South Korea Bioethics and Biosafety Act (BBA):

Article 25 – Restrictions on Genetic Tests	No genetic testing institution shall conduct genetic tests for the diagnosis of disease , unless it either is a medical institution or is requested by a medical institution to conduct such tests.
Article 29 – Filing and Reading Records	Genetic Testing Institutions shall file the following documents in accordance with the Ordinance of the Ministry for Health, Welfare and Family Affairs: 1.A signed consent form; 2.The results of the genetic tests; and 3.The records of providing specimens.

Malaysia

Consumer Attitude



Majority of Malaysians **demonstrated a strong intention** to adopt genetic testing.

However...

Malaysians tend to **believe in** unconfirmed data and spread **rumors** about it.



People from the **older age** group are more **reluctant** to undertake genetic tests.

Malaysians **expressed concerns** on the associated risks of genetic testing.



Regulations

If the DTC test involves whole genome testing, a statement on its implications to the following **MUST BE MADE** :

- Insurance
- Employment
- Risks to diseases
- Family relationship

Consent

Competent adult	Testing should be based on the informed consent of the individual concerned.
Child	Parents may lawfully consent on behalf of a young child.
Young person	It is unclear whether a competent minor’s refusal of testing which is clearly in his best interest would be binding.

Genetic data **SHOULD NOT** be given out to the following parties:

- Insurance Companies
- Employers
- Schools
- Government

Singapore

Consumer Attitude

Here are some of the most typical attitudes of Singaporeans towards genetic testing:

In Asia, cancer remains a taboo subject, so patients may fear **social stigmatization**



Believe that genetic information **cannot change** medical management



Familial pressure to conceal their genetic mutation from their future spouses



Concerned about the genetic **testing cost** *



*The uptake rate for testing of BRCA 1 and 2 grew from 4% to 44 % between 2004 and 2006 when the cost was reimbursed by government grant. The rate dropped to 23% after the government grant programme was discontinued in 2006.

Regulations

According to the Ministry of Health of Singapore :

CGT, LGT and CG services **shall only be provided** to consumers by licensed healthcare institutions in accordance with the Code of Practice.



CGT, LGT and CG services **shall not be offered** or provided by manufacturers or suppliers of genetic tests directly to consumers in any circumstances.



Pre and post-test genetic counselling required under **level 3 testing** for Whole genome sequencing (WGS)



CGT = clinical genetic/genomic testing services

LGT = clinical laboratory genetic/genomic testing services

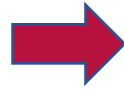
CG = clinical genetic/genomic

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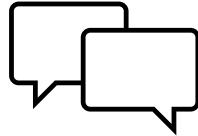
Major Barriers in X's Territorial Expansion

Common issues encountered in Asian countries



**Commercial
Awareness**

**Lack of trust
towards genetic
testing**



**Cultural and
Language Barrier**

**Tendency to stick
with a single
provider**



**Compliances and
Regulation**

**Exposure to
supply chain and
operational risk**

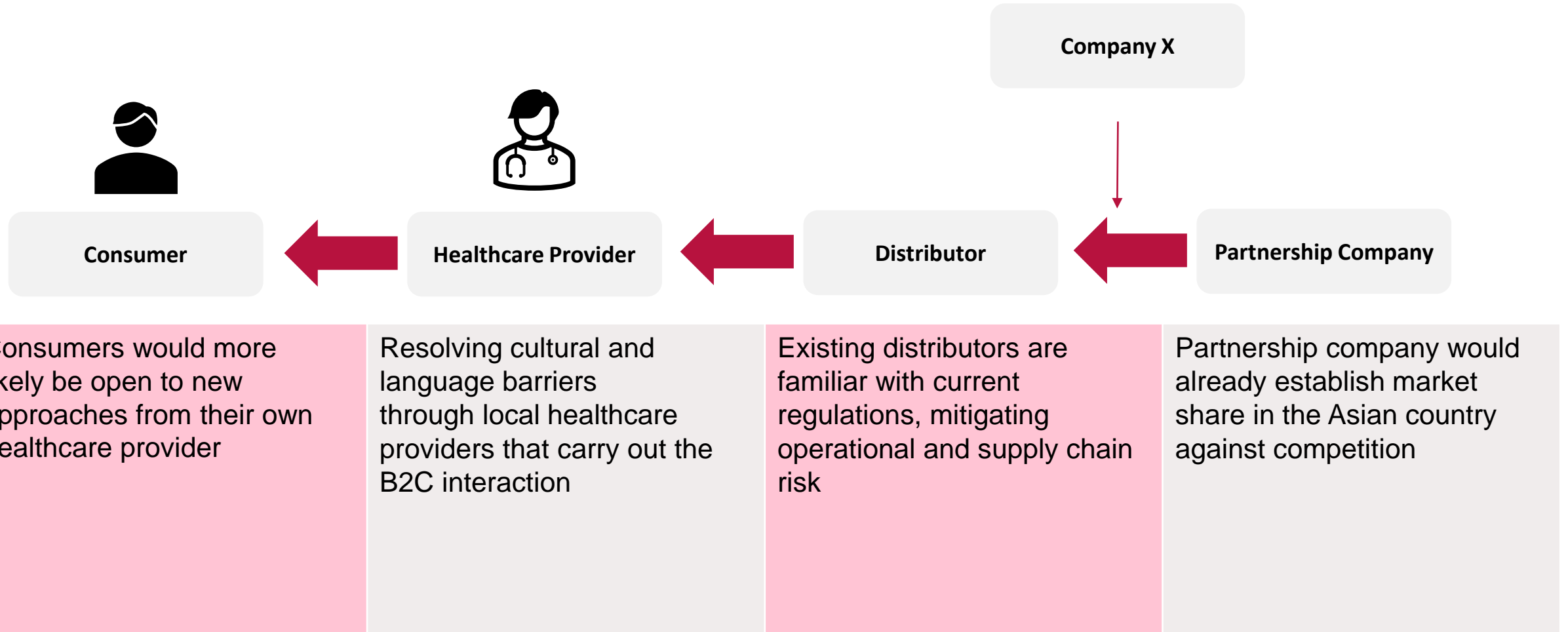


Local competition

**Lack existing
market share**


Co-distribution Partnership

How co-distribution can resolve the major barriers in territorial expansion



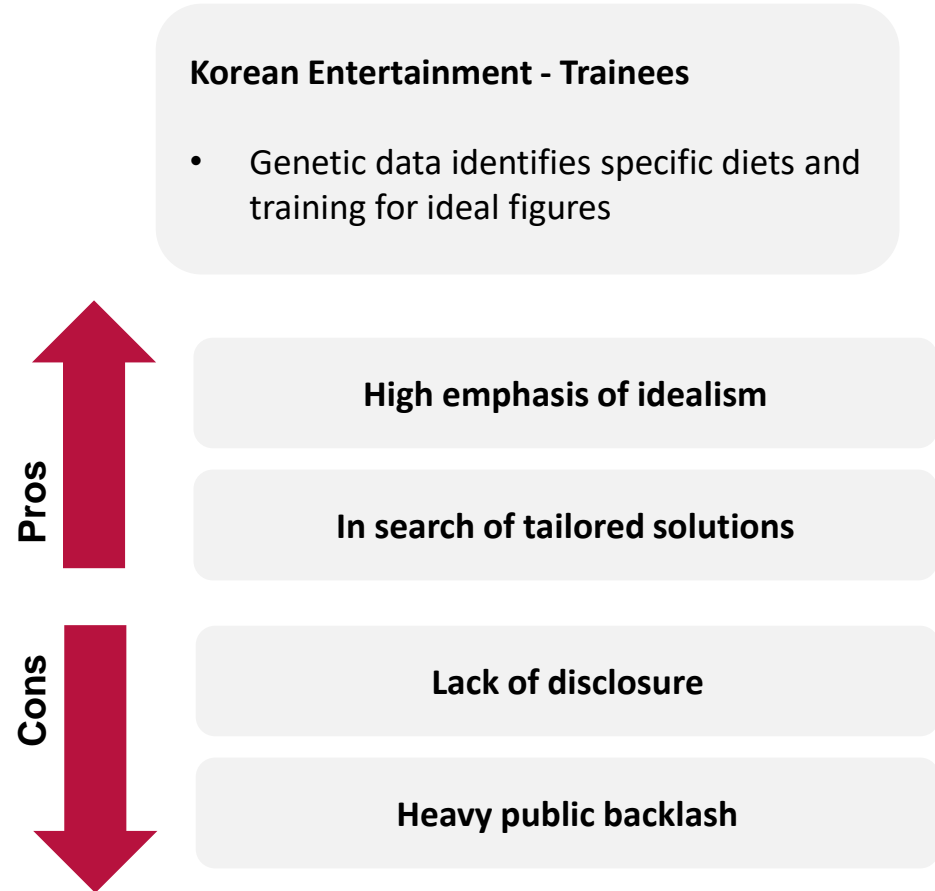
Partnership in Diabetic Care Delivery

Co-distribution with diabetic care delivery products

Company	Company Descriptions	Reason
<div>Country : Japan</div> <div> Health 2 Sync</div>	<div>Digital diabetes management platform</div> <ul style="list-style-type: none">• Linkage to care partner• Monthly reports• Recording data sync to glucose meter• Reporting analytics <div>Partnered with Novo Nordisk</div> <ul style="list-style-type: none">• Distribution to healthcare providers	<div>Genetic testing kit</div> <ul style="list-style-type: none">• Co-distribution with the premium model on Health2Sync <div>Reporting system</div> <ul style="list-style-type: none">• Genetic reporting data from company X to be integrated into the app• Access to care partner <div>Encryption Technology</div> <ul style="list-style-type: none">• Company X to provide encryption to Health2Sync• Health2Sync in search of solution for patient's data protection

Partnership in Korean Entertainment

Evaluation illustrates the cons outweigh the pros



Process Breakdown

Recruitment of trainees from global auditions

Trainees spend 2-5 years in training facilities

Tailored diets and routines are fixed for each trainee

Elimination based on benchmarks

FHE Partnership

Drug-development & clinical testing company

Why Drug-Development & Clinical Research Companies ?

Pharmaceutical companies handle large amounts of patient and healthcare data :

- New drug test results
- Patient data related to clinical trials
- Sensitive information related to production processes
- Patentable research
- Documentation sent to manufacturing

Covid-19 open up opportunity:

1. Attacks on the biotech and pharmaceutical industry had increased by 50% between 2019 and 2020

- *BlueVoyant report*


Partnership in Drug-Development

Fully Homomorphic Encryption

Company	Company Descriptions	Reason
<p>Country : Japan</p> 	<p>A drug discovery-based pharmaceutical company. Delivers value through innovative products and services.</p> <p>Focuses on :</p> <ul style="list-style-type: none">• Innovation skill - in house drug discovery• Alliances and collaboration - build win-win partnership• Expertise in infectious disease - long term engagement in R&D	<p>Hit by cyberattack during Covid-19</p> <ul style="list-style-type: none">• Suffer from data breach• import licenses for medical equipment and employee residency permits were released on the "dark web"



Partnership in Clinical Research

Fully Homomorphic Encryption

Company	Company Descriptions	Reason
<p>Country : Japan</p> 	<p>A Contract Research Organization (CRO) who provides medical research related services mainly to pharmaceuticals and medical organizations.</p> <p>Focuses on:</p> <ul style="list-style-type: none">• Clinical Testing• Strategy & Regulatory Consulting• Development & Manufacturing• Site & Patient Support	<p>Potential opportunity</p> <ul style="list-style-type: none">• Huge amount of data collected <p>Currently delegating the handling of personal data to the external vendors</p> <ul style="list-style-type: none">• Company X to sell their Fully Homomorphic Encryption Technology

Partnership with health and beauty retailers

Personalised product recommendation

Similar companies	Company Descriptions
<div>Country : United Kingdom</div> <div></div> <div>Country: Hong Kong</div> <div></div>	<div>International health and beauty retailer.</div> <div>Products such as :</div> <ul style="list-style-type: none">• Health related (Test-kits)• General items such as dust-mite pillows/ sunglasses• Supplements such as Vitamins

Process Breakdown

Company X report analysis shows that patient has eczema

Under actions and advices, can expand to general daily advices

E.g. eczema triggered/ further aggravated by dustmites


Advice: Wash/ Get new anti-dustmites pillow

Link partnered company's website's product link e.g. anti-dustmite pillows


Product Line Expansion

Beauty product expansion


Benefits




Some consumers are more drawn towards a certain group of products
e.g. especially those who struggle with certain symptoms




Assist consumers to take preventive measures
E.g. If patient has Bloom Syndrome, Company X can report on which countries have higher UV exposure, suggestions could range from broad brimmed hats and UV blocking sunglasses



Suitable for consumer groups in beauty centric countries such as Korea





More partnership opportunities could imply more marketing strategies



Convenient – stop trial and error cycle for suitable products


Product line Expansion

Providing beauty – related diagnosis

Similar products	Example of partnerships
<div><div></div><div><p>Company: HelloGene</p><p>GeneStyle Nutrition</p><p>Tests can be used to determine an individual's genetic characteristics of nutrients that affect nine key health indicators, including energy efficiency, antioxidation and immune function.</p><p>Nutrients generate energy in your body, facilitate your metabolism, and cause disease if there are scarcity or lack of balance.</p><p>We recommend this test for those who are tired or incapable of eating well, who are suffering from chronic pain, often fail in their diets, or who are suffering from stress and overwork.</p><p>[Test Service Item]</p><p>Energy efficiency, vascular health, detoxification with antioxidant, eye health, mood balance, brain health, immune function, bone joint health, male / female health</p><p>[Features of Test Result Sheet]</p><p>By checking the genetic properties of 24 nutrients, including vitamins and minerals, we can find out exactly what nutrients your DNA wants and suggest a diet.</p><p>Contact us</p></div></div>	<div><ul style="list-style-type: none">• Nutrition – focused companies• Grocery stores• Fruit retailers<div></div></div>


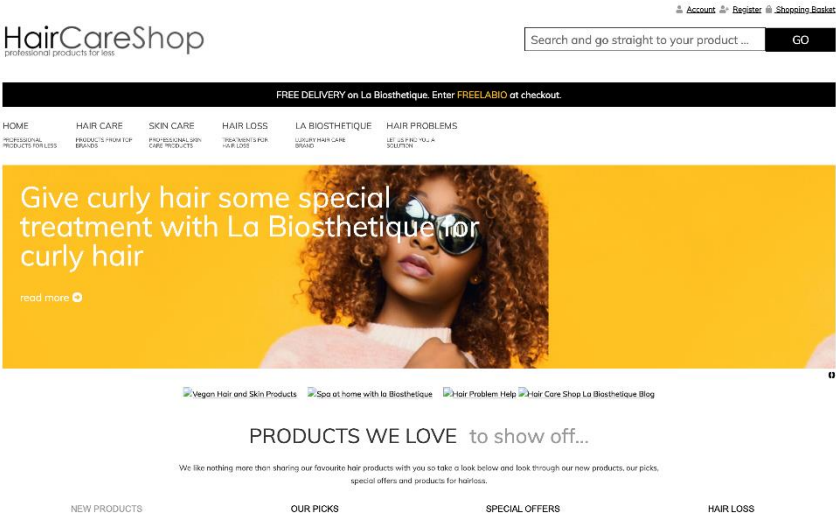
Product line Expansion

Providing beauty – related diagnosis

Similar products	Example of partnerships
<div><div></div><div><p>Company: HelloGene</p><p>GeneStyle Medifit</p><p>GeneStyle-MediFit is a nutritional and obesity genetic test recommended by family medicine specialists from Theragen Bio.</p><p>There are many genetic tests for nutrition and obesity, but there are not many useful tests that doctors recognize.</p><p>You can find obesity genes trying to watch your weight, and you can find answers to the nutritional management solutions you need.</p><p>[Test Service Item]</p><p>Appetite control, Carbohydrate metabolism, Stress, Lipometabolism, Burning Energy, Inflammation</p><p>[Recommended Solutions]</p><p>Diet, exercise, medicine, health functional food elements</p><p>[Features of Test Result Sheet]</p><p>It is a highly recommended Genetic Test for your successful obesity and nutrition management.</p><p>Contact us</p></div></div>	<div><ul style="list-style-type: none">GymWorkout clothingsWorkout diet plansVirtual gym memberships<div><div>MYPROTEIN</div><div><div>Search for a product</div><div>Account</div><div>Insert</div></div><div><div>Nutrition</div><div>Clothing & Accessories</div><div>Bars & Snacks</div><div>Vitamins</div><div>Vegan</div><div>Pro</div><div>Gaming</div><div>Goal Selector</div><div>Blog</div></div><div><div>Free UK delivery over £40</div><div>World's No.1 Online Sports Nutrition Brand</div><div>Download our app for exclusive offers</div></div><div><div>MAY SALE NOW ON</div><div>PLUS EXTRA 25% OFF USE CODE: EXTRA</div></div><div><div>MAY SALE NOW ON</div><div>EXTRA 25% OFF</div><div>USE CODE: <u>EXTRA</u></div><div>SHOP NOW</div></div><div><div>PROTEINS</div><div>CLOTHING</div><div>BARS & SNACKS</div><div>VITAMINS</div><div>CREATINE</div><div>VEGAN</div></div></div></div>



Product line Expansion

Providing beauty – related diagnosis

Similar products	Example of partnerships
<div><div></div><div><div>Company: HelloGene</div><div><div>GeneStyle Hair Loss</div><p>GeneStyle Hair Los has been developed based on the major papers related to hair loss It is highly accurate because it uses 19 types of genetic markers for male and female hair loss and round hair loss.</p><div><div>[Test Service Items]</div><p>Skin elasticity, suppression of wrinkle formation, protection from pigmentation, protection from sun exposure, prevention of oxidation stress, suppression of skin sensitivity and inflammation</p><div><div>[Features of Test Result Sheet]</div><p>It can predict how aging will develop by grasping the genetic strengths and weaknesses of an individual’s skin. Choose GeneStyle Skin if you want individually optimized beauty advice, not common information!</p><div>Contact us</div></div></div></div></div></div>	<div><div><div><div><ul style="list-style-type: none">• Salons• Beauty clinics• Haircare retailers</div></div><div></div></div></div>

Product line Expansion

Providing beauty – related diagnosis

Similar products	Example of partnerships
<div></div> <div><p>Company: HelloGene</p><p>GeneStyle Skin</p><p>Your skin type is a combination of inherent skin characteristics and environmental factors you have experienced so far. Therefore, if you decide to manage your skin type based only on current skin characteristics, it may be effective in the short term, but there is a limit in long-term improvement. GeneStyle Skin informs you of your inherent skin characteristics and an effective skincare solution for a long time by examining DNA related to your skin.</p><p>[Test Service Items]</p><p>Skin elasticity, suppression of wrinkle formation, protection from pigmentation, protection from sun exposure, prevention of oxidation stress, suppression of skin sensitivity and inflammation</p><p>[Features of Test Result Sheet]</p><p>It can predict how aging will develop by grasping the genetic strengths and weaknesses of an individual's skin.</p><p>Choose GeneStyle Skin if you want individually optimized beauty advice, not common information!</p><p>Contact us</p></div>	<div><ul style="list-style-type: none">• Dermatologists• Facial beauty clinic• Skincare retailers</div> <div></div>


Relevant diseases

Top diseases in each countries and relevant tests that Company X offers

Country	Diseases	Reports offered	Not offered
South Korea	<ul style="list-style-type: none"> • Cancer • Obesity • Smoking & Air pollution • Alcohol • Chronic diseases • Suicide 	<ul style="list-style-type: none"> • 6 cancer types report • 8 blood related disorders • 11 lung related disorders • 11 liver related disorders 	<ul style="list-style-type: none"> • Depression • Chronic diseases
Japan	<ul style="list-style-type: none"> • Cancer • Heart & Ischemic diseases • Alzheimer's diseases • Mental Health Issues • Cease blood flow to brain 	<ul style="list-style-type: none"> • 6 cancer types report • 9 heart related disorders • 8 blood related disorders • 44 brain motor related disorders 	<ul style="list-style-type: none"> • Depression
Singapore	<ul style="list-style-type: none"> • Asthma • COPD • Diabetes • High blood pressure • Lipid disorders 	<ul style="list-style-type: none"> • 46 hereditary conditions • 11 lung related disorders • Type II diabetes • 9 heart related disorders • 23 gut related disorders 	

Mayo Clinic

Brief overview of functionalities of mayo clinic




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Patient & Visitor Guide

Contact Us

COVID-19 vaccine & information

BasicsIn-depthResources

Causes

Definition

Causes

When to see a doctor

Products and services

The Mayo Clinic Diet

What is your weight-loss goal?

5-10 lbs

11-25 lbs

25+ lbs

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Causes

By Mayo Clinic Staff

Your headache symptoms can help your doctor determine its cause and the appropriate treatment. Most headaches aren't the result of a serious illness, but some may result from a life-threatening condition requiring emergency care.

Headaches are generally classified by cause:

Primary headaches

A primary headache is caused by overactivity of or problems with pain-sensitive structures in your head. A primary headache isn't a symptom of an underlying disease.

Chemical activity in your brain, the nerves or blood vessels surrounding your skull, or the muscles of your head and neck (or some combination of these factors) can play a role in primary headaches. Some people may also carry genes that make them more likely to develop such headaches.

The most common primary headaches are:

- Cluster headache
- Migraine
- Migraine with aura
- Tension headache
- Trigeminal autonomic cephalalgia (TAC), such as cluster headache and paroxysmal hemicrania

A few headache patterns also are generally considered types of primary headache, but are less common. These headaches have distinct features, such as an unusual duration or pain associated with a certain activity.

Although generally considered primary, each could be a symptom of an underlying disease. They include:

- Chronic daily headaches (for example, chronic migraine, chronic tension-type headache, or hemicranias continua)
- Cough headaches
- Exercise headaches
- Sex headaches

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ANSWERS YOU NEED

INFOSYMPTOMSQUESTIONSCONDITIONSDetailSTREATMENT

WebMD Symptom Checker WITH BODY MAP

Identify possible conditions and treatment related to your symptoms.

This tool does not provide medical advice. See additional information

Age

19

Gender

Male

Female

Continue

Mayo Clinic/ Web MD/ Healthline

Benefits



Strategic breakthrough into the asian market



Normalize genetic testing



Digital healthcare

Process Breakdown

Partner with established healthcare provider



Build a website like Mayo Clinic

Enter only when established

Option for consumers to order genetic testing kits online

Can visit healthcare provider if needed

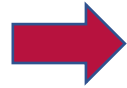
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4. Final Score Card

Breakdown of Healthcare Criteria

Each country is scored by each project associate and averaged, does not tell the full story

Final Scoring Card

illustrative

	Japan	Singapore	South Korea	Malaysia
Spending power	4	4.5	3	2.5
Total available market	4	5	3.5	2.5
Ageing population	4.5	2	3	0.5
Average	4.2	3.8	3.2	1.8

Breakdown of Competition Criteria

Each country is scored by each project associate and averaged, does not tell the full story

Final Scoring Card

illustrative

	Japan	Singapore	South Korea	Malaysia
Relevance	4	2	2.5	4.5
Market share	1	3.5	3	4.5
Average	2.5	2.8	2.8	4.5

Breakdown of Final Score Card

Each country is scored by each project associate and averaged, does not tell the full story

Final Scoring Card

illustrative

	Japan	Singapore	South Korea	Malaysia
Regulations and consumer attitude (45%)	4	3	3	3
Healthcare (25%)	4.2	3.8	3.2	1.8
Competition (15%)	2.5	2.8	2.8	4.5
Data privacy (15%)	3	4	3	3
Average	3.7	3.3	3.0	2.9

Thank you!

Appendix

South Korea (cont.)

Table 3.6. Genetic test items that can be conducted directly by a genetic testing institution (outside of medical institutions), 2018	
Direct to consumer tests allowed in Korea showing what the DTC tests for, the number of genes included in the test, and the individual genes	
Test Item (Number of Genes)	Gene
BMI(3)	FTO, MC4R, BDNF
Concentration of triglycerides(8)	GCKR, DOCK7, ANGPTL3, BAZ1B, TBL2, MLXIPL, LOC105375745, TRIB1
Cholesterol(8)	CELSR2, SORT1, HMGCR, ABO, ABCA1, MYL2, LIPG, CETP
Blood sugar(8)	CDKN2A/B, G6PC2, GCK, GCKR, GLIS3, MTNR1B, DGKB-TMEM195, SLC30A8
Blood pressure(8)	NPR3, ATP2B1, NT5C2, CSK, HECTD4, GUCY1A3, CYP17A1, FGF5
Pigmentation(2)	OCA2, MC1R
Hair loss(3)	chr20p11(rs1160312, rs2180439), IL2RA, HLA-DQB1
Hair thickness(1)	EDAR
Skin aging(1)	AGER
Skin elasticity(1)	MMP1
Vitamin C concentration(1)	SLC23A1(SVCT1)
Caffeine metabolism(2)	AHR, CYP1A1-CYP1A2
Source: Information supplied to the OECD by the Korean Authorities.	

The table on the left shows the genes that can be tested outside of medical institutions in South Korea.



Most of these involve physical appearance and features as well as basic health parameters such as cholesterol and blood sugar.

Categorisation of genetic tests by Singapore's Ministry of Health

Levels of Genetic Test	Examples of tests
Level 1	<ul style="list-style-type: none"> • Biochemical genetic tests • Haemoglobin electrophoresis for detecting haemoglobinopathies • Tissue typing for transplant • Blood typing; work up for transfusion reactions
Level 2	Genetic tests carried out on tumour(s), cancer , and/or cancer associated tissues or bodily fluids with the primary purpose of detecting somatic variants that are limited to that cancer/tumour
Level 3	<p>Tests that predominantly investigate variants that are invariably/almost certainly germline, and where these variants have risks of identifying a hereditary cancer syndrome . This includes:</p> <ul style="list-style-type: none"> • Whole exome sequencing (WES) for germline genetic variants/changes • Whole genome sequencing (WGS) for germline genetic variants/changes

Partnership in Drug-Development

Fully Homomorphic Encryption

Company	Company Descriptions	Reason
<p>Country : South Korea</p> 	<p>Pharmaceutical company that engages in R&D, manufacture and sale of pharmaceutical products.</p>	<p>Potential attacks</p> <ul style="list-style-type: none">• Hanmi has been notified of phishing emails and BEC (Businesss Email Compromise) attacks, pretending to be Hanmi's officer asking for personal information <p>Potential Opportunity</p> <ul style="list-style-type: none">• Currently employs subcontractor company for their security service• Company X to sell Fully Homomorphic Encryption
<p>Country Singapore</p> 	<p>Singapore's largest group of healthcare institutions with network of acute hospitals, national specialty centres, community hospitals and polyclinics. It also has an Academic Medical Centre that drives the convergence of clinical care, education and research.</p>	<p>Hit by cyberattack</p> <ul style="list-style-type: none">• 1.5 million SingHealth patients and records of outpatient dispensed medicines were stolen with important personal data• Information on Prime Minister Lee Hsien Loong was specifically targeted

Mid-Term Slides

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1. Healthcare in Asia

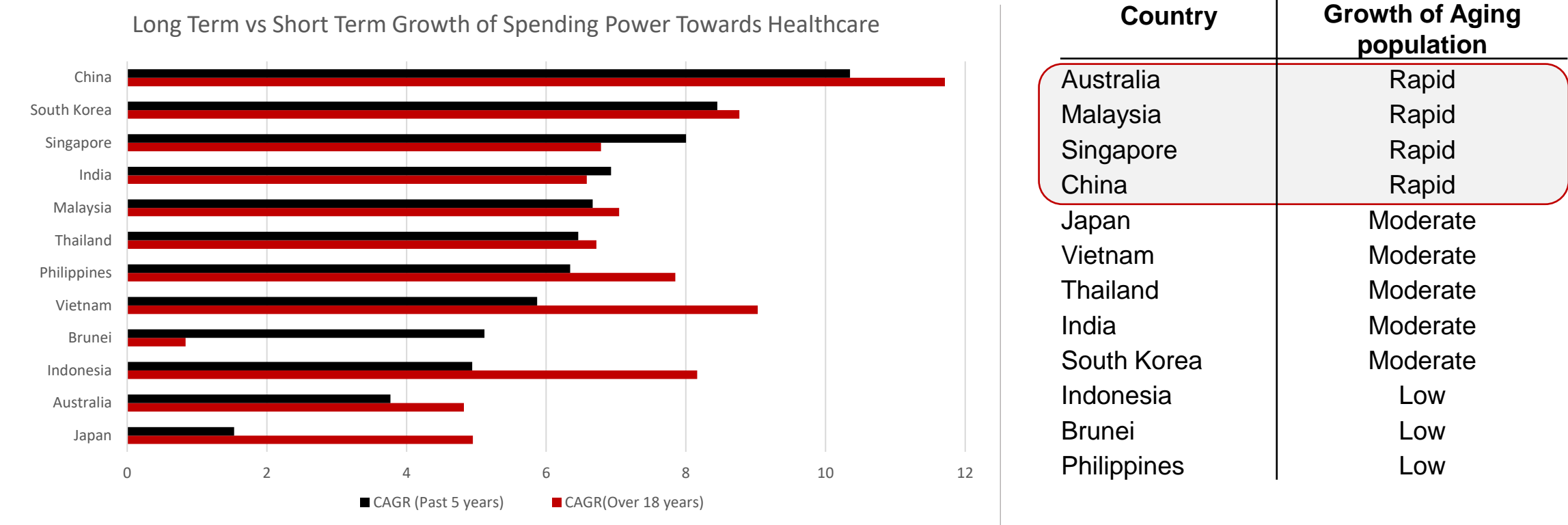
2. Data Privacy in Asia

3. Competitors in Genetic Testing

4. Competitors in Encryption Technology

Healthcare in Asia: Market Overview





Growing spending power and aging population depicts the strong potential healthcare in the country.



- The top 3 markets with the most potential in near term will be China, South Korea, and Singapore.
- Aging population is growing rapidly in Australia, Malaysia, Singapore and China, further justifies the potential spending for healthcare.





Trends in Asia Healthcare

We evaluated trends outside of expenditures that would potentially impact the healthcare sector in Asia

Trends	Key takeaways	Example
<div><p>Cyber Security Risks</p></div>	<ul style="list-style-type: none">• Heavy cyber incidents with flat responses from governments• Focus on root of cyber-attack, lack of enforcing cyber regulations	<p>Singapore was hit by a large-scale cyber incident</p> <ul style="list-style-type: none">• HIV registry was stolen from 14000 patients and leaked online
<div><p>System and Operation Improvements</p></div>	<ul style="list-style-type: none">• Governments have clear focus on driving cost efficiencies• Heavy investments in digital solutions to overcome system barriers	<p>DXC Technology partnered with the city of Guiyang, China</p> <ul style="list-style-type: none">• Sharing of data and resources lowered cost of operating businesses
<div><p>Increasing Life Expectancy</p></div>	<ul style="list-style-type: none">• Growing life expectancy in Asia Pacific• Ageing population expected to surpass a quarter of Asia's population	<p>Japan and South Korea to achieve the highest elderly population by 2028</p> <ul style="list-style-type: none">• Japan (31.4%)• South Korea (17.1%)
<div><p>Payor Provider Relationship</p></div>	<ul style="list-style-type: none">• Shift away from singular fee-for-service models• Promoting digital package-based models	<p>Private insurers in Singapore partner with healthcare providers for digital care delivery</p> <ul style="list-style-type: none">• Establish packaged lower customary rates

Impact of Covid-19 on Healthcare Systems in Asia

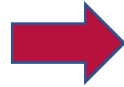
The aftermath of a pandemic has heavily impacted the healthcare systems in Asia, both short and long term

	Short Term Impact	Long Term Impact
 Provider	<ul style="list-style-type: none">Restricting mobilityLower footfall	<ul style="list-style-type: none">New focus on health monitoringGreater coordination with governments
 Payor	<ul style="list-style-type: none">Spike in underwriting losesWithdrawal of non-pandemic coverages	<ul style="list-style-type: none">Digital care delivery
 Life Sciences	<ul style="list-style-type: none">Supply chain disruptions	<ul style="list-style-type: none">Develop mechanism for pooling of resources
 Government	<ul style="list-style-type: none">Public access to testing and affordable careActing as a coordinator (multi-task force approach)	<ul style="list-style-type: none">Policies around privacy during outbreakPopulation health studies to monitor health in real time

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1. Healthcare in Asia



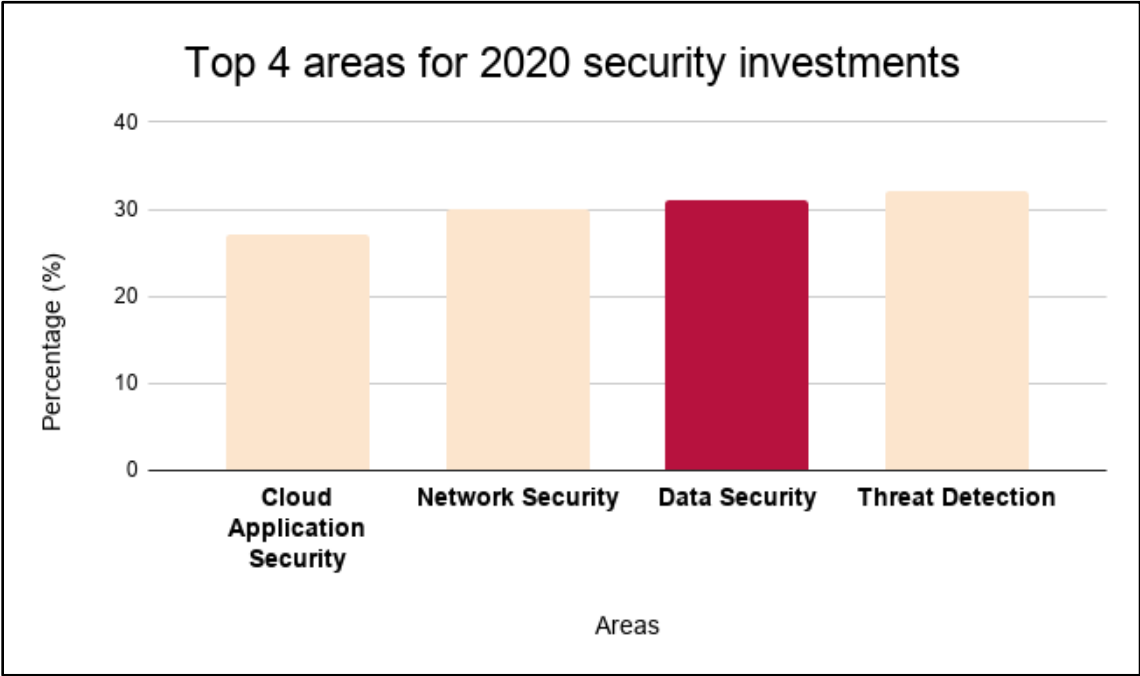
2. Data Privacy in Asia

3. Competitors in Genetic Testing

4. Competitors in Encryption Technology

Global Spending on Data Security

Tech organizations are most likely to increase cybersecurity spending, while the rest will keep cybersecurity budgets flat.

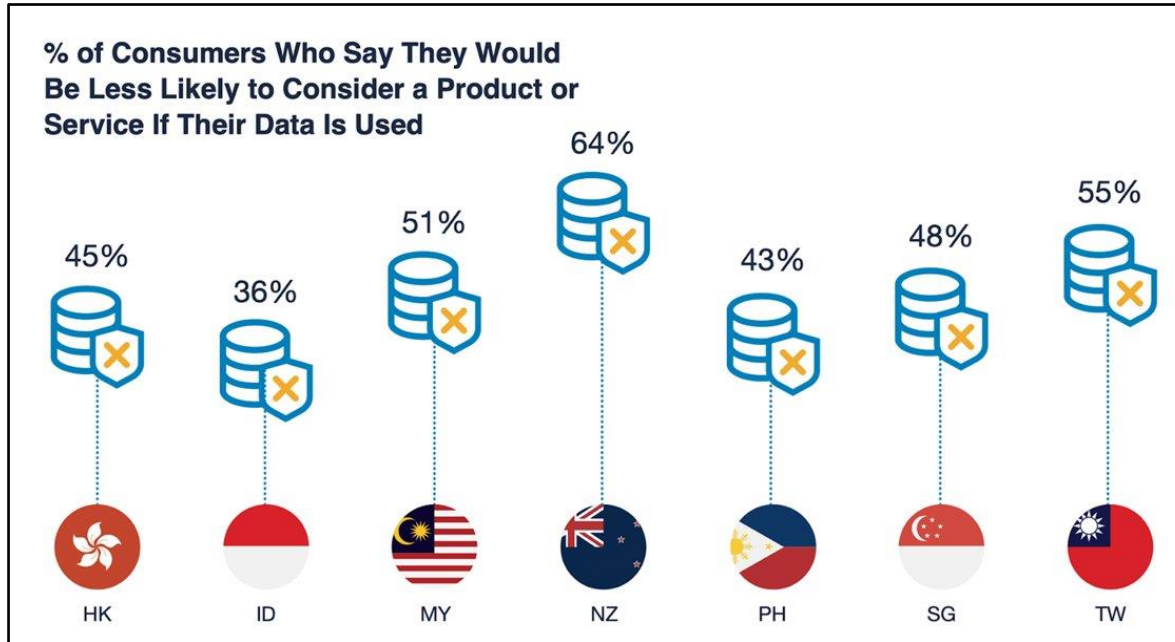


Worldwide Security Spending by Segment, 2019-2020
(Millions of U.S. Dollars)

Segment	Amount (in million)	Percentage
Data Security	2852	2.2%
Infrastructure Protection	17483	14.2%
Network Security Equipment	11694	9.5%
Security Services	64270	52.2%
Others	26935	21.9%
TOTAL	123234	100%

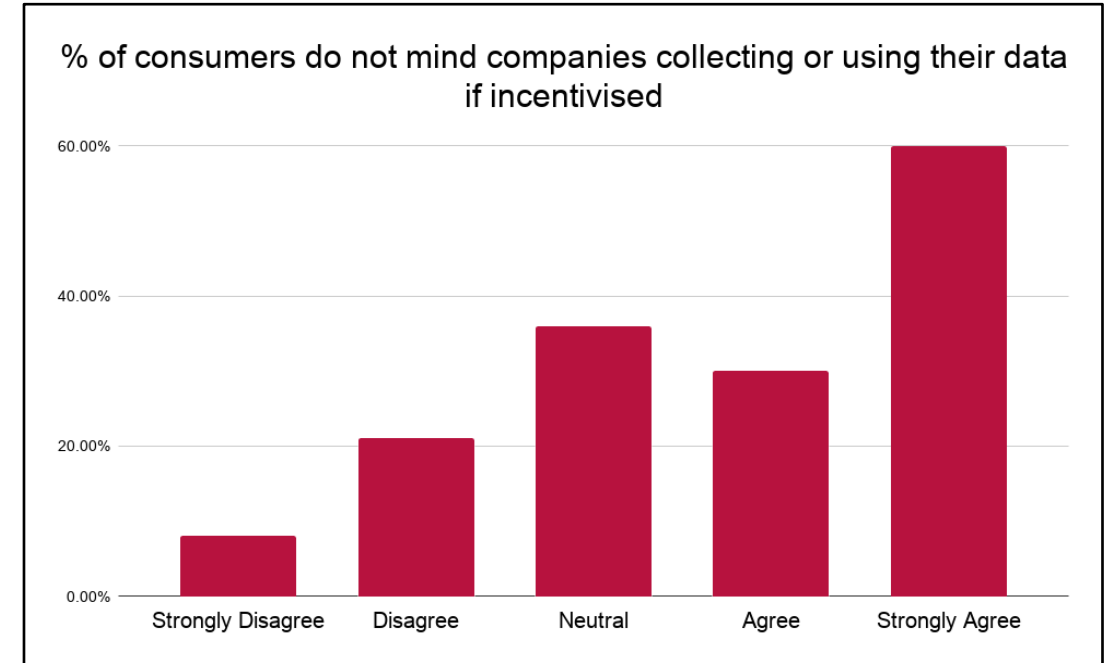
- Data security was ranked 2nd in the top 4 areas of security investments in 2020 at **31%** .
- Data Security made up **2.2%** of the worldwide security spending 2019-2020 at 2.85 billion dollars.

Relative Importance of Data Privacy in Asia



- In New Zealand, close to two-thirds of consumers say they would be less likely to consider a product if their data was used, while in Indonesia it is barely over a third.

- This is a very large difference and again stresses the need to have localized strategies and perhaps customized solutions.



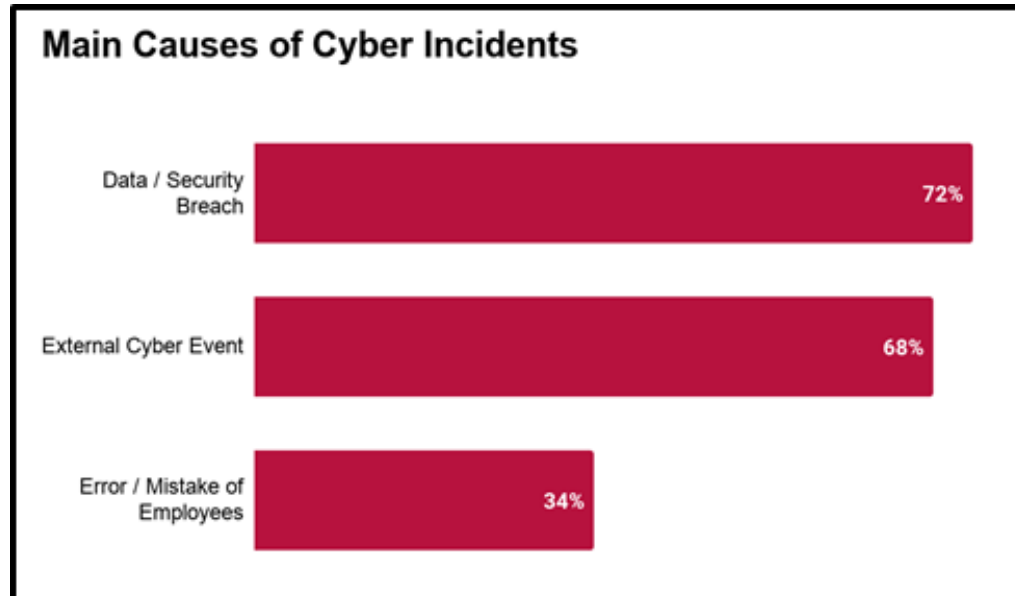
- 29% disagree with this principle. Over one-third are undecided.

- Moving further away from a direct benefit to consumers, there is a greater likelihood that use of the data for that purpose would prevent adoption of a service.

Impact of Covid

Evaluated the impact of covid in data security

Cyber incidents ranked 3rd in Allianz Risk Barometer 2021.



<div>\$3.86M</div> <div>Global Average Total Cost of a Data Breach in 2020</div>		
<div>\$7.13M</div> <div>Healthcare has the highest industry average cost.</div>	<div>\$150</div> <div>Customer PII data has the highest cost per record.</div>	<div>\$137 thousand</div> <div>Remote work impact on the average cost of a data breach</div>

Asia Internet Privacy Index 2021

Rank	Country	Privacy Score
17	Japan	71.3
31	Singapore	60.1
34	India	53.1
34	Malaysia	52.9
44	Hong Kong	46.9
56	Indonesia	39.9
59	Sri Lanka	38.7
74	Philippines	33.6
77	Thailand	31.6
99	Myanmar	22.6
107	Vietnam	17.3
108	Cambodia	15.6
110	China	13.1

The higher the score, the more protected the information is

Calculations based on :

1. Press freedom
2. Existence of data privacy laws
3. Democracy Index
4. Freedom of opinion and expression
5. Freedom from arbitrary interference with privacy
6. Cybercrime Legislation Worldwide

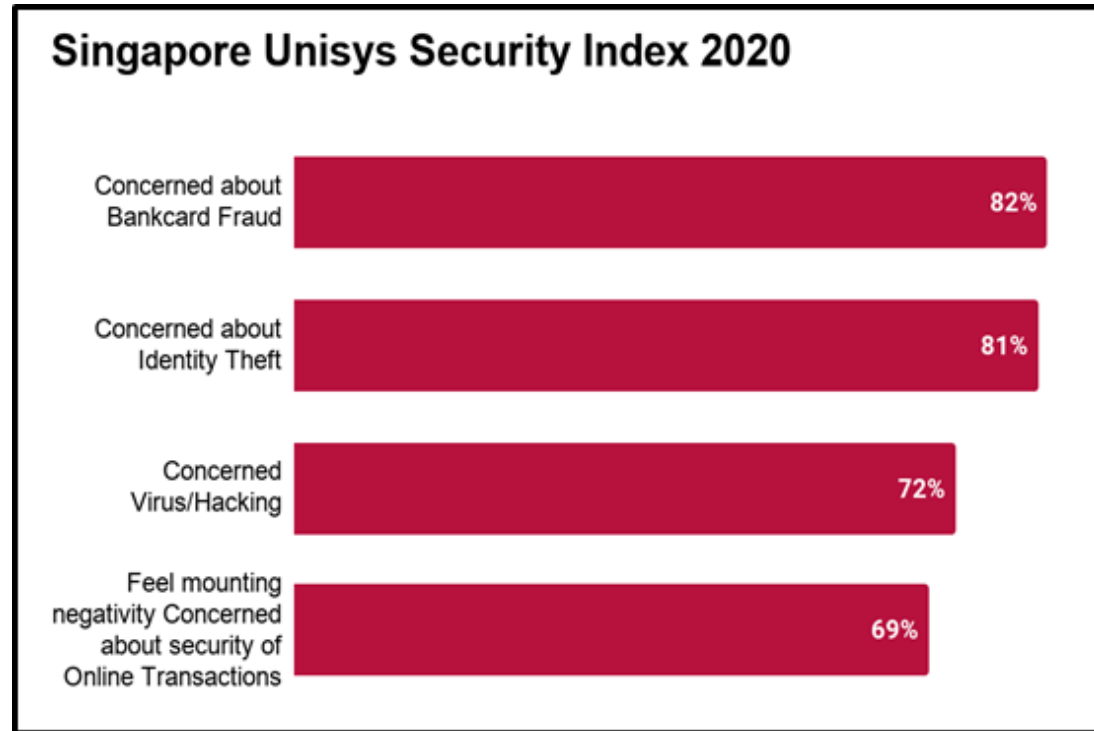
Actions Taken

1. First cyber defense drills organized by the Japanese government with ASEAN, US and Europe
2. ASEAN
 - governments have issued various guidelines mandating the private and public sector to upgrade their security infrastructure
 - mature organizations are investing in threat intelligence platforms

However, ASEAN is still not spending enough on cybersecurity.

Singapore

Holds the highest level of concern about security.



During Covid-19

They are willing to sacrifice some level of privacy.

87%

supported strict surveillance of those who need to be quarantined.

Behavioural Changes

Loss of trust in government as data are not used only for covid tracking purposes.

22%

Have shown outbursts of anger

23%

Can't concentrate doing work at hand when they are under surveillance

67%

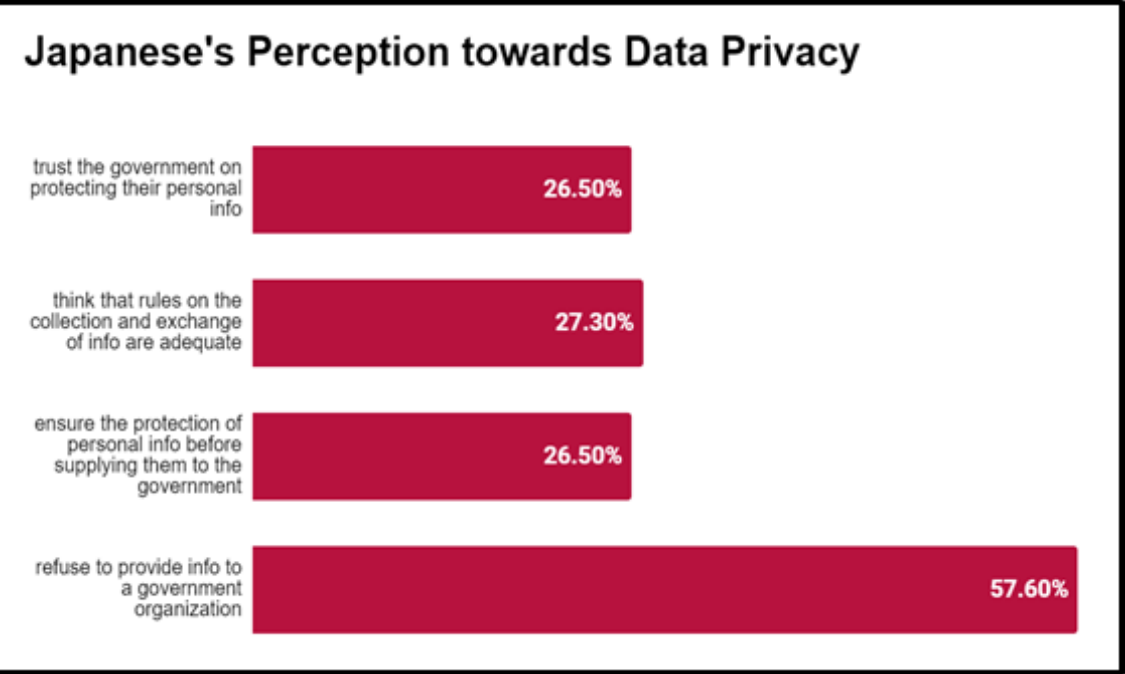
Supported tracking without consent

69%

Agreed to CCTV monitoring during circuit breaker

Japan

Shows concern on data privacy but mainly due to the government’s incapability to protect their information.



Japan ranked 27th among the 63 nations listed according to the World Digital Competitiveness Ranking.

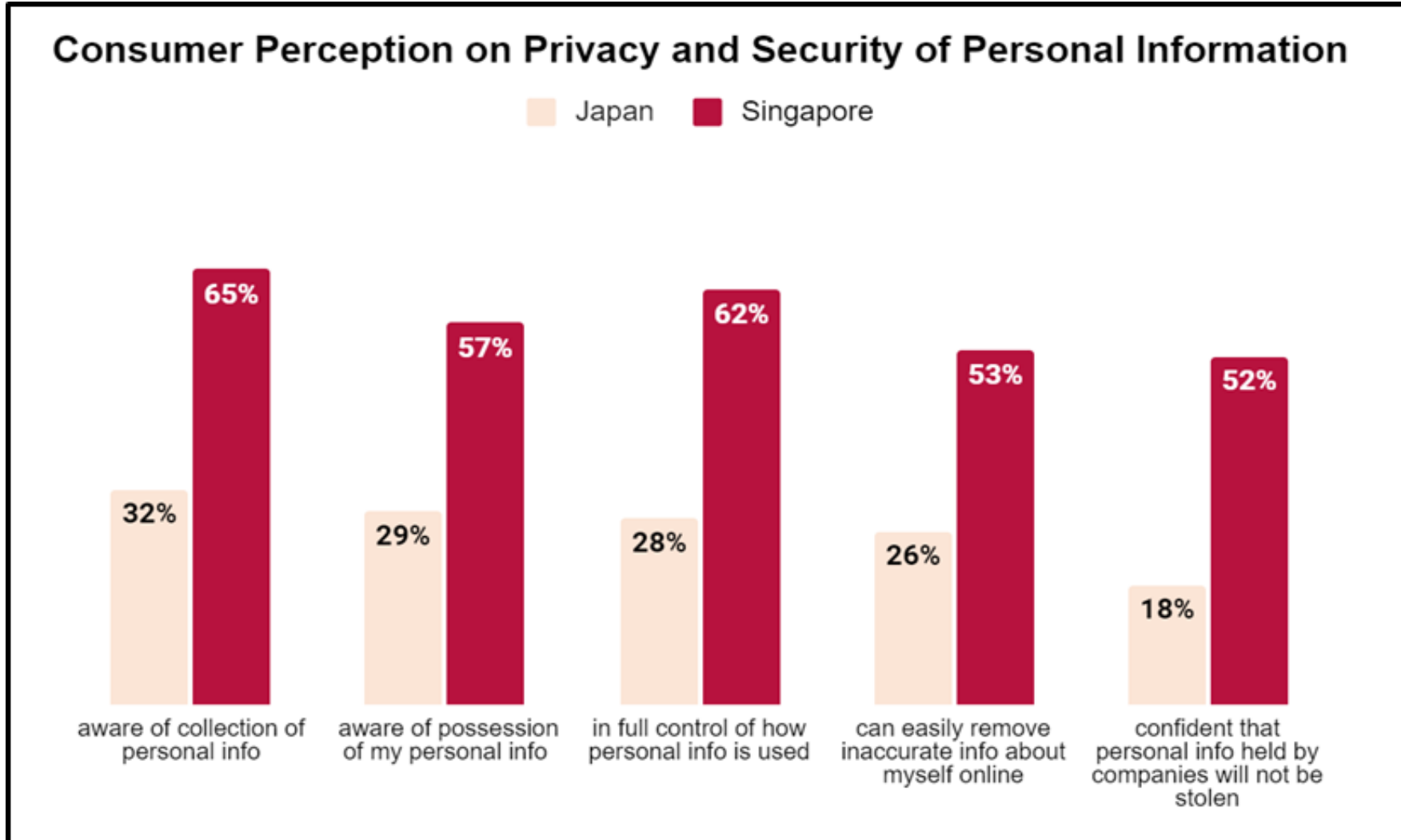
However, Japan was at the bottom for the use of big data.

Impact of Covid-19 Pandemic

Weakness	<div>1. Inability of the government to effectively use its data and cooperate with local municipalities</div> <div>2. Covid-19 cluster response team manually type in data and organize it before being able to analyze it</div>
Way Forward	<div>1. Draft rules that will be the foundation for data utilization</div> <div>2. Participate in global data rule-making</div> <div>3. Collaboration between government and private firms to provide services that people can truly benefit from</div>

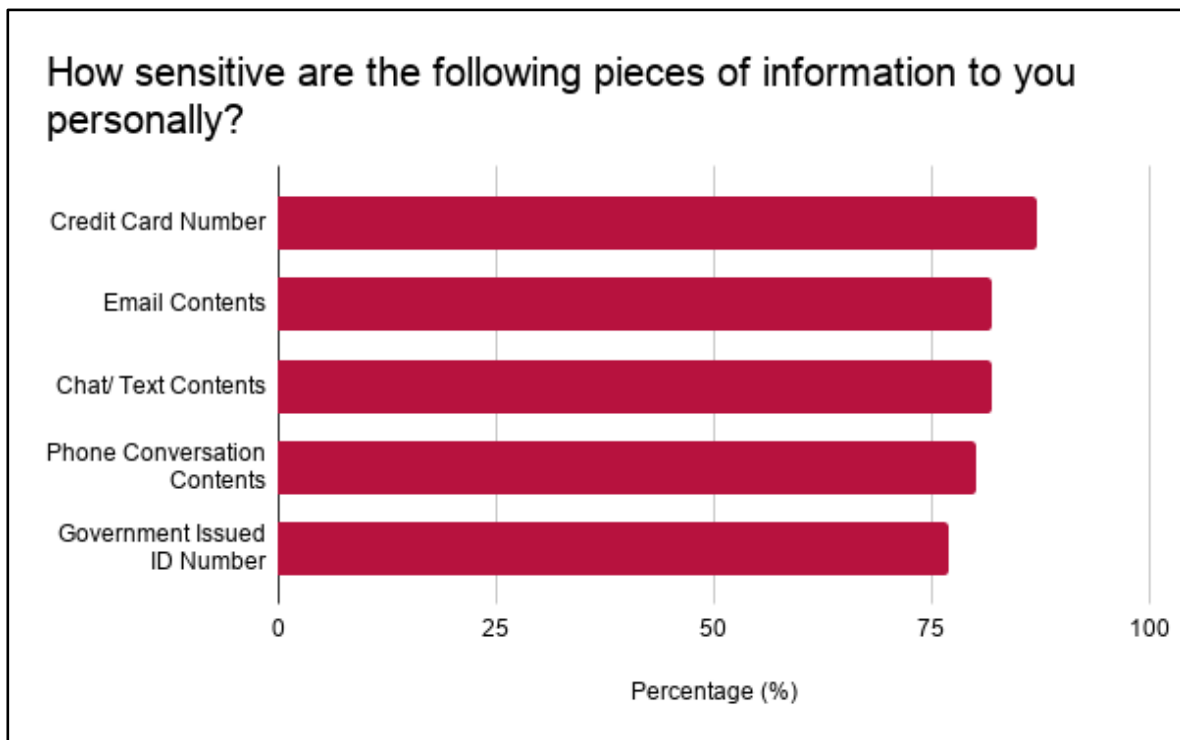
Japan vs Singapore

Singaporeans are more privacy-conscious compared to Japanese.



Vietnam

87% of the respondents chose credit card numbers as the most sensitive personal information



This isn't too surprising given that it's directly tied to one's personal finances and credit card data breaches has occurred too frequently.

Previous Cases

An airline's website was **hacked** compromising the personal information of

410
thousand
clients

The information includes :



names



addresses



birth dates

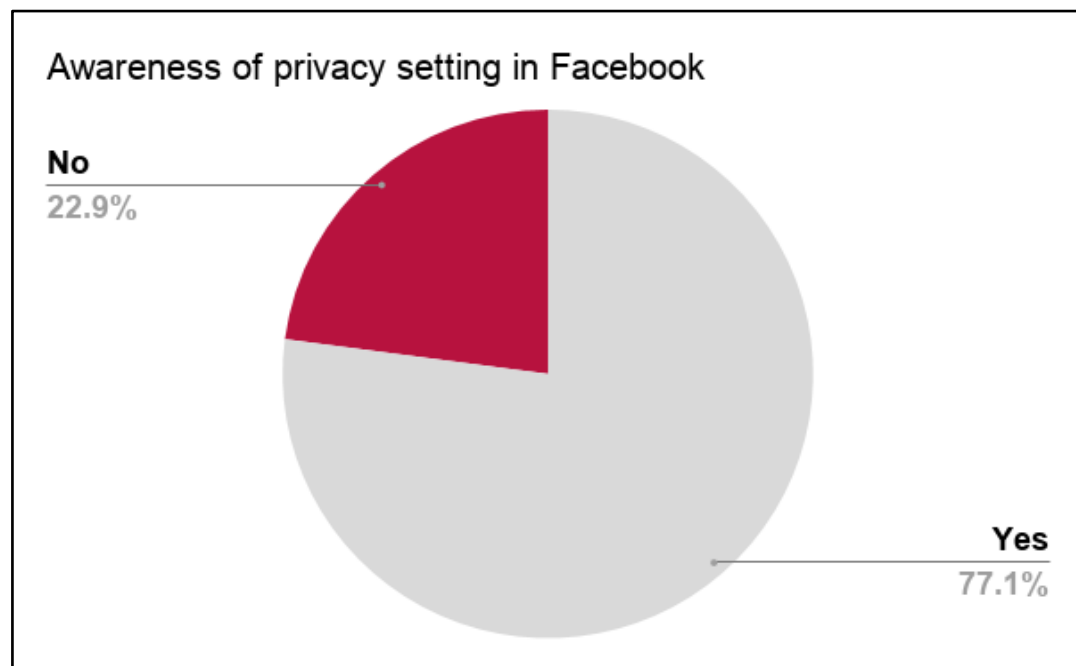
Considerations

In 2018, Vietnam enacted the Law on Cybersecurity, which increases the power granted to the State to investigate users and censor content published online by individuals.

Foreign service providers operating in Vietnam that collect and process the personal data of Vietnamese citizens are required to maintain a physical office and store the data in Vietnam.

Hong Kong

The figure above shows that a strong majority (77%) of Facebook account users are aware of the privacy setting.



Younger and better educated respondents were much more likely to be aware of, to have checked and to have changed the privacy settings in Facebook.

During Covid-19

16%

of Hong Kong employees have subsequently been able to work from home as a result of Covid-19

Data privacy issues arise if employees are required to work on their employer's documents outside an employer's premises.



Employers should be aware of the risk of being in breach of the Personal Data (Privacy) Ordinance ("PDPO") as documents may contain personal data.



What can employers do ?



Remote access to data through end-to-end encryption



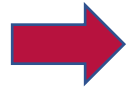
Setting out clear policies on the handling of data

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1. Healthcare in Asia

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3. Competitors in Genetic Testing

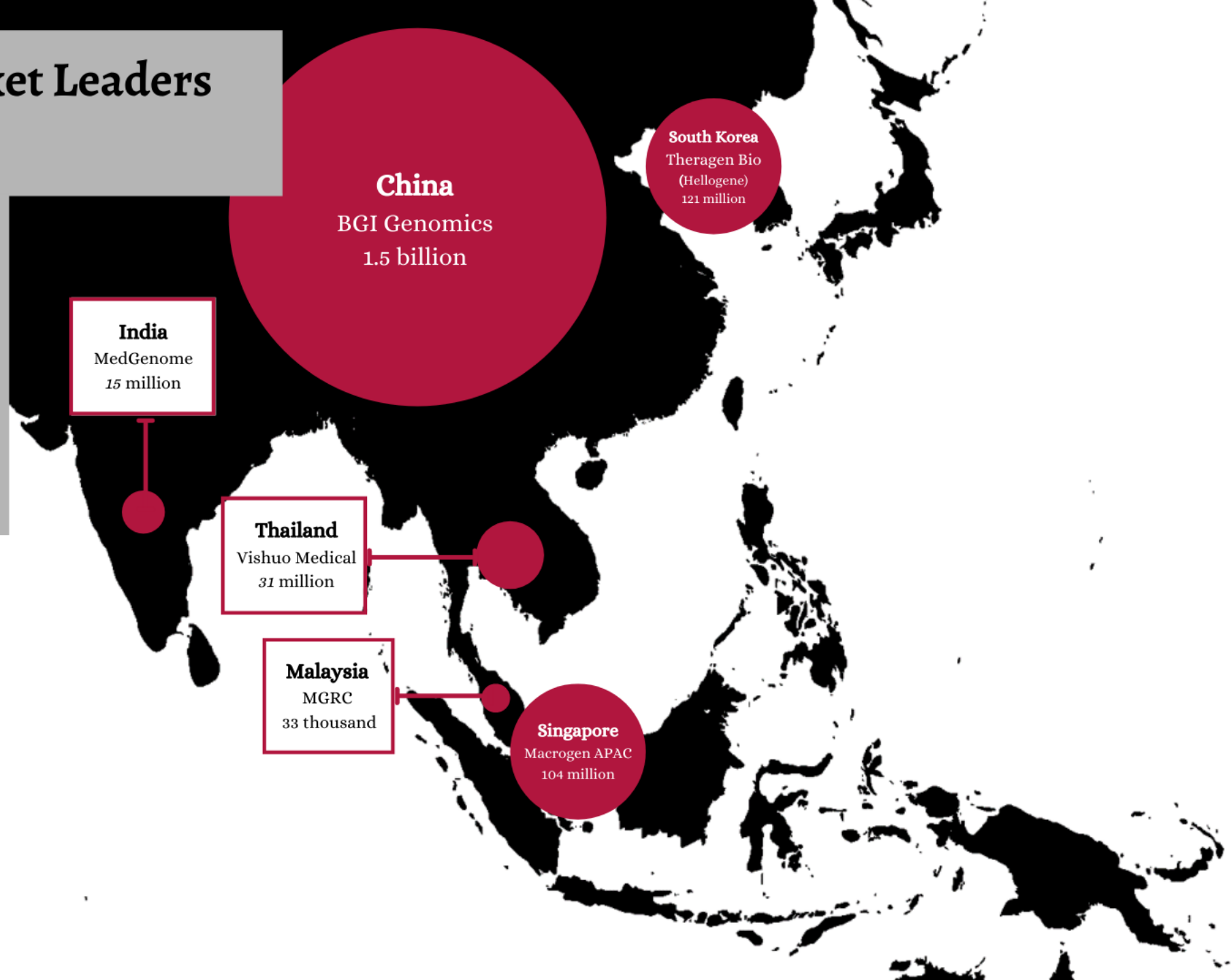
4. Competitors in Encryption Technology

Genetic Testing Market Leaders in Asia

All numerical values are
annual revenues in USD

- Provides whole genome sequencing
- Provides generic genetic testing
(whole exome sequencing)

The diameter of the circles are
representative of revenue.



Genetic Testing Market Leaders in Asia

All numerical values are
annual revenues in USD

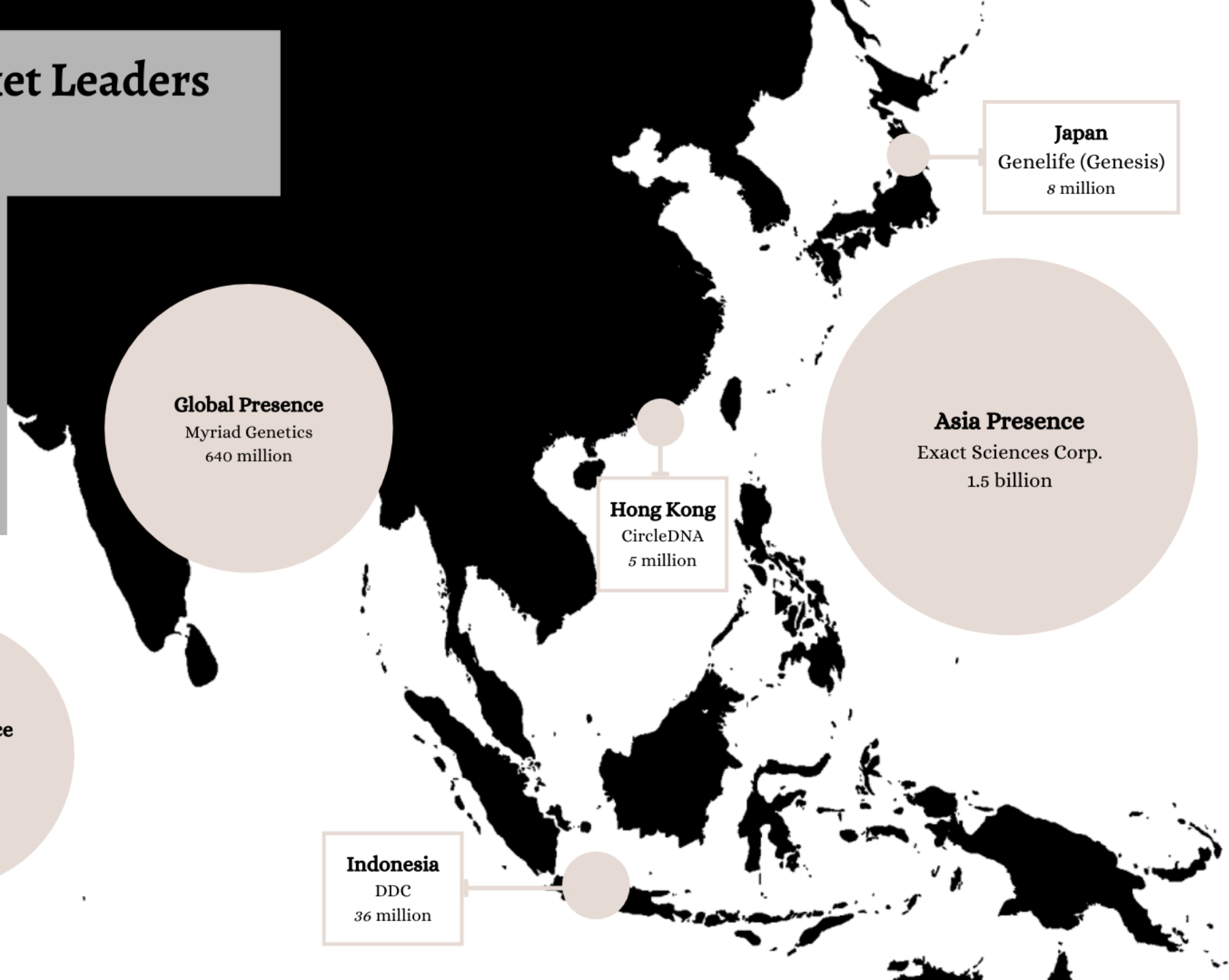


Provides whole genome sequencing

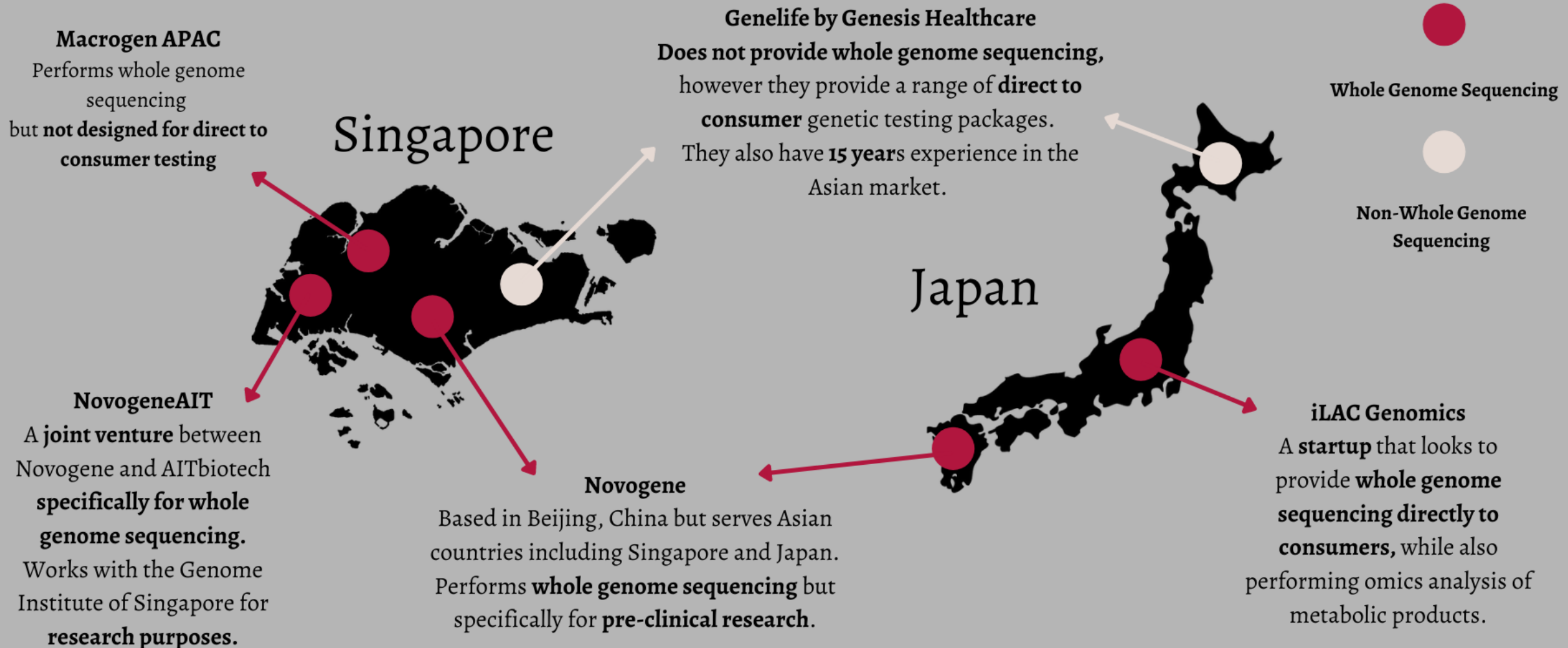


Provides generic genetic testing
(whole exome sequencing)

The diameter of the circles are
representative of revenue.



A deeper look into competitors in Singapore and Japan





Performs omics analysis of metabolic products on top of whole genome sequencing



New reports based on new data/discoveries are generated for users every week.

**The Unique
Selling Points
of Genetic Testing
Competitors
in Asia**



Genetic testing kits tailored for specific purposes e.g. skin health, beauty or health fitness.



Wellness app where customers can access their results, get lifestyle related articles and personal/nutritional recommendations.

Genebanking services:

When a customer gets cancer later in life, the healthy and varied cancer genes can be compared to tailor treatment plans.

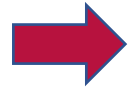
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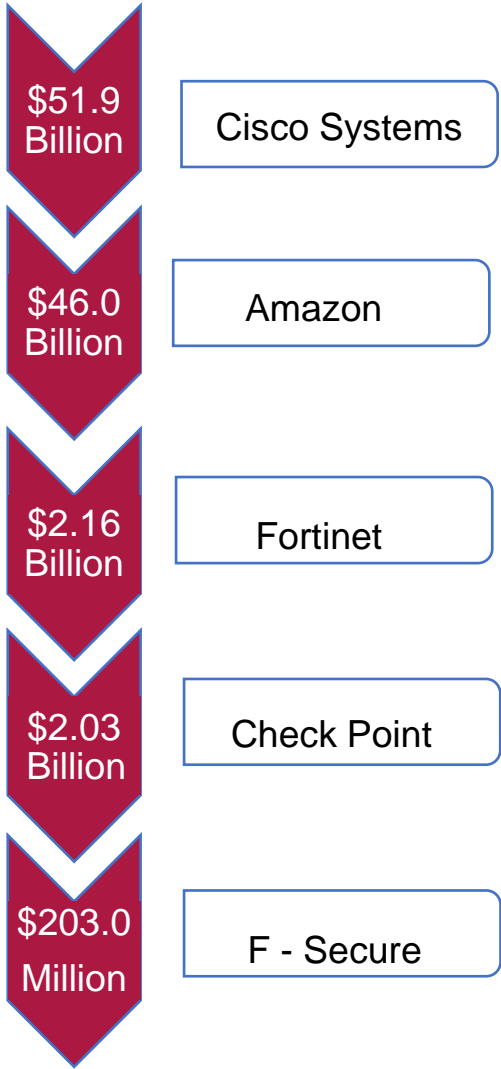
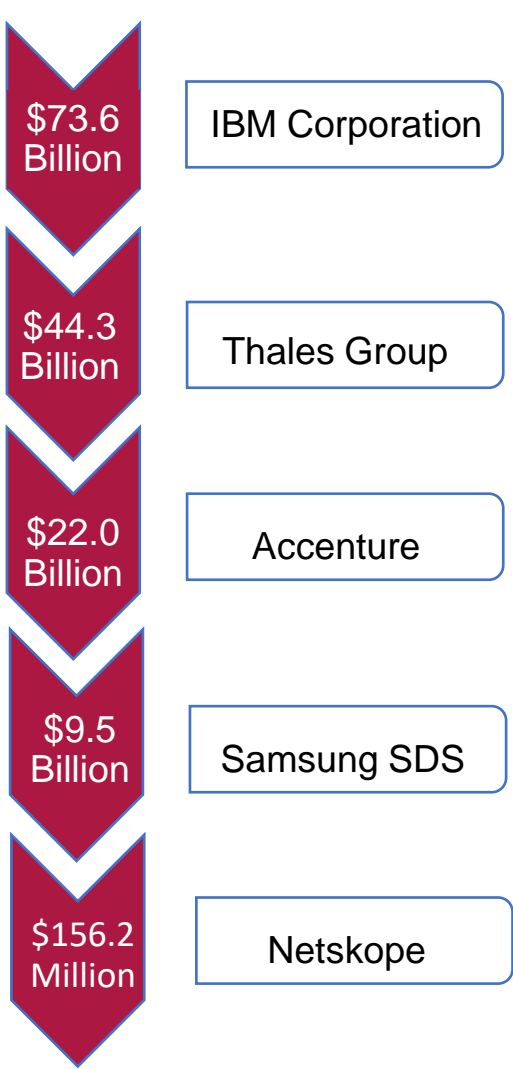


4. Competitors in Encryption Technology

Competitive Landscape: Encryption Technology

Market Leaders for Technology companies who offer homomorphic technology and non-homomorphic technology

Technology Market Leaders who adopt homomorphic encryption



Technology Market Leaders

- Key Takeaways:
1. The market leaders for technology providers are not in Asia, meaning it might be worthwhile providing the technology to Asia market
 2. Market Leaders who provide Homomorphic Technology tend to have a higher revenue, indicating that they have the ability to cut prices when needed to secure their market position

Homomorphic technology

We have analyzed the use cases of homomorphic technology with the following industries

Industries	Description	Key Takeaways
Healthcare	Healthcare providers tend to have a large amount of data. However, they are unable to fully utilize the data due to compliant reasons and its sensitive nature.	The technology has allowed healthcare providers to expand their businesses, and garner value from their data.
Financial Institutions	Financial institutions have compliance and regulations to follow since their data tend to be sensitive	There are 2 main uses in the financial industries – improving predictive models and computations.
Solutions and Services	With an increasing usage of cloud apps such as Microsoft Office 365 etc, there has been a concern on security and data visibility	We can tackle non-tech corporations or businesses that use cloud services to help them better innovate, understand and develop their businesses.
Government related	There has been a lot of news on government adopting the technology. However, limited cases have been released	Approaching government for this technology is feasible. However, it is suspected that governments will only trust big public companies

Healthcare

Used cases of homomorphic technology in Healthcare

Augmented Heart Disease Analysis

Healthcare provider wants to facilitate prognosis of disease through **increased private data utilization**

Homecare providers for Cloud Adoption

Healthcare organizations want to **embrace cloud** across their organization

Clinical Trials Selection and Matching

Clinical trials need sufficiently large sample sizes to be viable, so researchers need **access to large patient populations** to recruit candidates that meet the eligibility criteria

Benefits



Increased sample size improves model performance



Incremental feature set enables new predictive insights



Compliance such as HIPAA & GDPR for sharing of data are well maintained even outside of organizational firewalls



Descriptive textual features such as plain text are able to be leveraged and utilized in efficient and accurate model training

Financial predictive modelling

Used cases of homomorphic technology in Finance

Consumer Credit Modelling

A large multinational financial institution wants to **improve its consumer credit models** by accessing more data.

Fraud Data Collection

A large multinational financial services firm wants to **improve their fraud detection and risk models** by accessing more data.

Cross-Border Privacy Compliance

A large European bank wants to **improve its customer marketing models** by leveraging sensitive data across multiple restricted jurisdictions.

Benefits



Improvement in prospective customer targeting



Improved predictive accuracy



Increased model performance, which reduces volume and time in manual review process



Predictive features can be identified and joined across distributed, private datasets without moving or revealing the underlying sensitive data

Financial Computations

Used cases of homomorphic technology in Finance

Feature Aggregation Across Private Datasets

A large Singaporean bank wants to **improve their models** (credit scoring, risk, marketing) by accessing more data

Double-Blind Trade Matching

Financial institutions want to **find trading partners** in OTC markets through private matching in which **no unnecessary trade positions are leaked to the broader market.**

Uncleared Margin Rules

Financial institutions want to privately compute on institutional client assets visible to them, as well as assets the client holds away from the bank to **calculate initial margin more efficiently.**

Benefits



Optimizes the collateral requirements



No position leakage; cryptographically secure



Institutional clients are able to protect their sensitive, individual security position data



Bank adds value by freeing up capital for institutional client and potentially driving more trading revenue

Services

Used cases of homomorphic technology in Service

Analysis on data: 1

Leading international manufacturer and supplier of electronic components want to have **more control of their data**.

Analysis on data: 2

Global provider of solutions and services for research, analytics and data management want to have **full visibility of sharing, actions on the data**

Analysis CSA

Largest standards development organization in north America, **conducting research and developing standard** for a broad range of tech and functional areas.

Benefits



Ability to discover and control data



Enforce compliance with industry regulations like GDPR



Accelerated adoption of more cloud services such as Microsoft One Drive etc



Improve the ease and speed of sharing information – across multiple branches and business partners

Services in rare industries

Used cases of homomorphic technology in Service

Human Resources Attrition Analysis

Companies want to be able to proactively **identify at-risk and high performers**, enabling targeted investment opportunities

Smart Transportation - Cloud based scooters

Smart electric scooters and charging infrastructure **rely on multiple public clouds** and cloud services

Business advisors and legal counsel

Want to be able to adopt other applications such as Office365 to boost productivity but **worried of security and unwanted complexity and added costs**

Benefits



Individual PII, departmental and jurisdictional attribute level privacy preserved



Discover data insights while exceeding compliance

Government sector

Used cases of homomorphic technology in Government



Predictive Maintenance for Distributed Fleets

A large defense contractor needs to monitor the performance of its fleets in order to **improve usage analysis**

Benefits



Improve uptime



Reduce operational costs



Delivers to operational value to fleet managers



Improve usage analysis

Upcoming Objectives

After the mid-term review, the project team will focus on the following deliverables

1. Potential partnerships

2. Finetuning current reporting process

3. Compliances with setting up new territorial operation

4. Finalizing score card