

PRODUCT WATMAN

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INTRODUCTION :

Our product is a water management and conservation device . The primary feature of this product is to determine the minimal amount of water to be used for day to day task by users(multiple).Determine the frequency of usage of water on a day to day basis and to be computed to respond in case overflow or leak. Simultaneously take necessary action to conserve water in various scenarios .

The product accomplishes this by accumulating data , analysing it and predict outcome of usage on nth day. If any irregular pattern is matched then take action accordingly.

This task is done by implementing product hardware in living society where large amount of water is being used on a daily routine.

The product will include 2 physical sensors (pressure ,water flow) , a machine for computation(depends on location) internet connection (if not already available) , alarm and an operator (the user himself or the water supplier) .

The installation will be done by our team during which all appropriate parts will be provided by us ,including the workforce . After a nominal time period the product will start functioning properly.

Exercise 2.2:

Is our product concept a good or a service ?

Our product concept is a good since all physical hardware will have to be bought separately , and installed together. The installation will require human force which will be paid off by profit.

Industry and sector it belongs to :

The product idea belongs to manufacturing sector and ISIC (International Standards Industrial Classification) for industries . Since product is based on water management , for which each country has their own laws.

Exercise 2.3:

10 firms in our product/industry (5 Indian, 5 global) and their ownership:

INDIAN:

Pristine Engineers :

Pvt Ltd.

Helps in managing and optimizing water resources.

Water Aid India :

Not declared

Improves water management, hygiene, and sanitation.

Greenishora Solutions:

Pvt Ltd.

Conservation of water and water waste reduction.

Sigma Pollution Control Equipments :

Pvt Ltd.

Water management and pollution control.

Saurabh Enterprises :

Pvt Ltd.

Water treatment company.

GLOBAL:

Conservation Minnesota :

Public ltd. company

Partner For Water Conservation :

General partnership.

Project wet :

NGO.

Water Conservation Services:

Pvt ltd.

Ownership Models:**Partnership:****Pros:**

- Taxation are simple.
- Employees are hired easily.
- Because these employees can be given a share of business .
- Easy to establish.

Cons:

- Limited ability to raise capital.
- Profit must be shared among the proprietors.

Proprietorship:**Pros:**

- Simple | easy to set up.
- Complete authority.
- Earned income may be offset from losses from other sources.

Cons:

- Unlimited liability and responsible for all debt.
- Hiring employees is difficult as ownership is not shared.

Limited liability company(LLC):**Pros:**

- Limited liability for partners.
- No limit on number of shareholders.
- Any member can be involved with its operation.

Cons:

- Higher regulatory and filing requirements then a sole partnership or proprietorship.

Exercise 2.4 :

10 promising startups (5 Indian, 5 global) in your area:

Indian Startups :

1. SmarterHomes

Helping families save water.

2. Farm Again

Offering autonomous agriculture practice to farmers.

3. Simply Smart Technologies

Helping residents to keep a check on water consumption.

4. We got

Measuring and managing water in homes.

5. Uravu labs

Sourcing drinking water from air.

Global Startups :

1. Water Smart

2. Pluto AI

3. Imagine H2O

4. Island Water Technologies

5. Veldi Softcom

Exercise 3.1: List the key market players for your product / company.

Customers : Societies, Institutes, Large organisation.

Suppliers(Hardware) : water flow sensor & pressure detecting sensor will be bought from chinton engineers(Ahmedabad).

Suppliers(Software) : cloud service(by microsoft or google).

Competitors :

1. Smarter homes(helping families save water).
2. Simply smart technologies(helping residents keep tabs on consumption).
3. We got : measuring & managing water in every home.

Regulatory Bodies : states have the exclusive power to regulate water supplies, irrigation and canals, drainage and embankments, water shortage, hydropower & fisheries.

The water sector in india has always been plagued by multiple challenges such as inefficient use of water resources, conflicts between various categories of water users,

inadequacy of funds to complete resources development projects.

IRA(Independent Regulatory Agencies) were first introduced in india at the insistence of the World Bank and other international financial institution(IFI) to insulate india's water sector from unnecessary government interventions & ensure its autonomy.

1.MWRRRA(Maharashtra water resources regulatory authority act, 2005).

Similarly MWRRRA model governance of water resources has been emulated by various states such as andhra pradesh, arunachal pradesh, uttar pradesh, kerala, jammu & kashmir and gujarat.

Industry Body :

Indian water work association is an industry body of professionals concerned and connected with water supply for municipal, industrial, agricultural uses and treatment and disposal of wastewater.

Its objective is to stimulate and promote the development of science,technology etc. in managing water. It provides a common platform for persons and organisations working in this sector to exchange views, share ideas and information about new technologies for improving and upgrading the services.

Water Today pvt. Ltd helps clients communicate their values, product and brand information to their customers and the industry.

MEMs & Sensors Industry Group connects and foster growth of MEMs and sensors supply network in established and emerging marker. It helps companies in and around the MEMs and sensors industry to make meaningful business connections and informed decisions.

IEEE Sensors Council focuses on theory, design, fabrication, manufacturing and application of devices for sensing with emphasis on electronics, physics and reliability aspects of sensors, it also sponsors well recognised, international conferences and publications.

Financial Analyst / Investors

- MAIT(Manufacturers association for information technology) - It offers a wide range of programs and services to members and as well as entire ICT industry across the country. These initiatives include organising conferences, seminars, training sessions and workshops, policy representation, domestic & international marketing support, networking opportunities and many other industry directed services. MAIT works in multiple areas for public advocacy : component trading hub, state IT policies, import/export policy, GST, SME, innovation & startup, industry 4.0. IOT devices, smart cities solution and standards amongst others.
- NASSCOM(National Association of Software and Services Companies)

Exercise 3.2: Analyze competitive forces for your product-industry.

Five forces in the water management industry:

1. Seller Power

- Numbers of suppliers will be around 50-60. choices for pipes and valves(src justdial.com)
- Chip supplier around 10 companies : Finole industries - small scale, Stevensons wafer-small scale, Singer velves - medium scale etc.
- Bandwidth supplier
- Uniqueness - detecting human presence and influence in leak totally machine learning based algorithm
- Small size of supplier
- Low cost of substitution
- High cost of replacement

2. Buyer Power

- Small size of buyers/orders as there are a limited amount of customer base these include government institutes, hostels, hotels etc. which need high amount of water supply and requires keen observation to prevent wastage
- Low ability of substitute because there are not much specialized water management companies and there is not much awareness but definitely need is there.
- High cost of substitute
- Low ability to replace(specially in chennai). There are only around 20 companies all deploying dissimilar methods

3. Threats of new entrants(High)

- High time investment and cost of entry such high intensive installation need more capital even a two storey building will need approximates 60k-70k as installation.
- High specialist knowledge is required specially in our ML and AI algorithmic approach
- Sensors and installation cost high so it is not easy
- Some technology protection

4. Threats of substitute

- High cost of substitution
- Not many product options
- Difficult to find new companies

5. Internal Rivalry

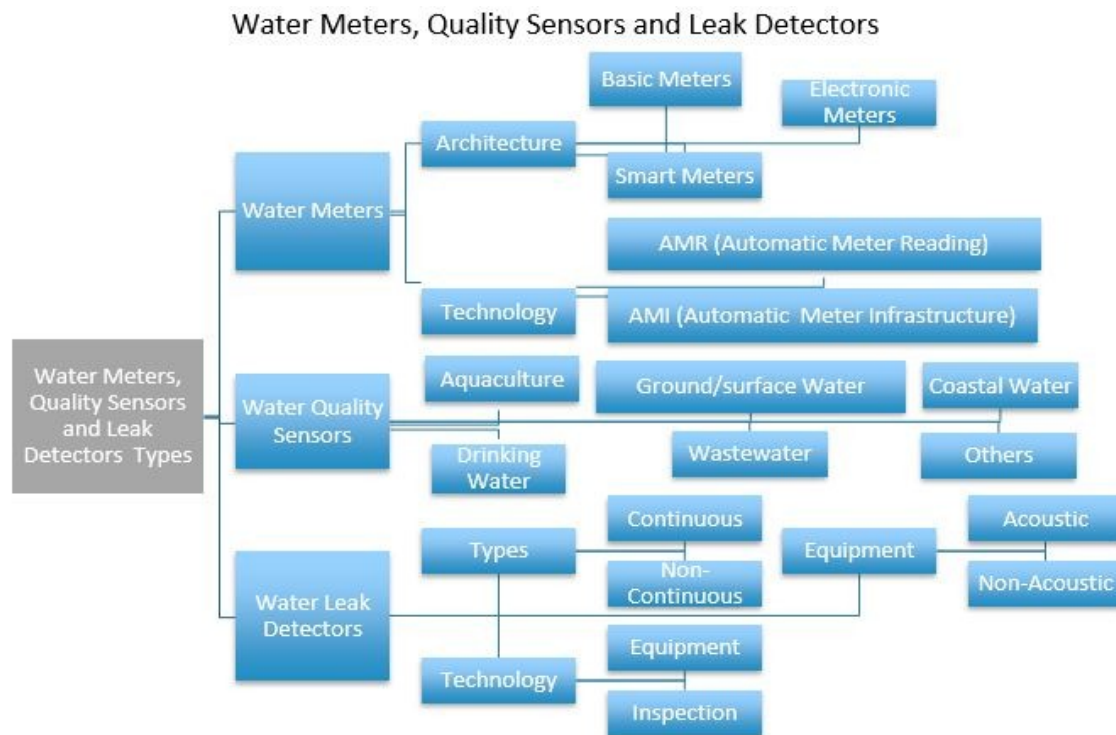
- More competitive rivalry due to less awareness and less market
- Strong customer loyalty
- Expertise driven
- Very high cost of exiting market
- Low switch cost

Industry Analysis

Industry Insights

- The global market for water meters reached nearly \$4.0 billion in 2017 and should reach \$5.1 billion by 2022, at a compound annual growth rate (CAGR) of 5.3% for the period of 2017-2022.
- Basic water meters market reached nearly \$1.6 billion in 2017 and should reach \$2.1 billion by 2022 at a CAGR of 5.6% through 2022.
- Smart water meters market reached \$1.3 billion in 2017 and should reach nearly \$1.7 billion by 2022 at a CAGR of 5.2% through 2022.

Water meters, water quality sensors and leak detectors are the primary equipment used for conserving water. A water meter is used to measure the volume of water obtained from a source. Water quality sensors will help in segregating the water based on its quality. Leak detectors are used to prevent water leaks in the pipeline transporting the water.



There is an increase in water stress levels across the globe due to the growing demand for water and a shortage of supply. Due to increasing awareness to save water (reduce wastage of water), the use of water leak detectors is rising around the world. Technological advancement in water leak detectors in commercial and industrial sectors for detection of distilled water, power backups, and precise leakage location detection are expected to boost the market throughout the forecast period. R&D teams of many companies are working hard to understand the challenges that can arise while using leakage detectors.

The global water leak detector market is expected to grow significantly in the near

future. The rapid expansion of the construction industry and increasing investment in infrastructure development are the key factors driving the global market. Governments' enactment of stringent regulations for green buildings in order to tackle environmental issues has prompted building owners to decrease wastage of water by detecting leakages in water supply by using devices, such as, water leak detectors, water leak alarm, and water sensors, which is boosting the water leak detector market. Use of water leak detectors is increasing in commercial and industrial sectors owing to high risk arising from water leakage to a number of businesses. Industrial sector needs continuous monitoring and cannot afford even the slightest defects in water leak detection systems, thus propelling the growth of the market. Asia Pacific is anticipated to be a prominent water leak detector market and is expected to expand at a rapid pace during the forecast period. Expansion of the water leak detector market in the region can be attributed to the rising investment in the real estate sector, especially in China and India. In North America and Europe, increasing adoption of advanced water leak detectors are expected to drive the water leak detector market.

The global water leak detector **market can be segmented** based on product type, technology, application, and region.

Based on product type, the water leak detector market can be divided into active water leak detector and passive water leak detector.

On the **basis of technology**, the water leak detector market can be classified into conventional water leak detector and smart water leak detector.

In terms of application, the water leak detector market can be segregated into commercial, residential, and industrial.

Based on region, the global water leak detector market can be divided into North America, Europe, Asia Pacific, Middle East & Africa, and South America.

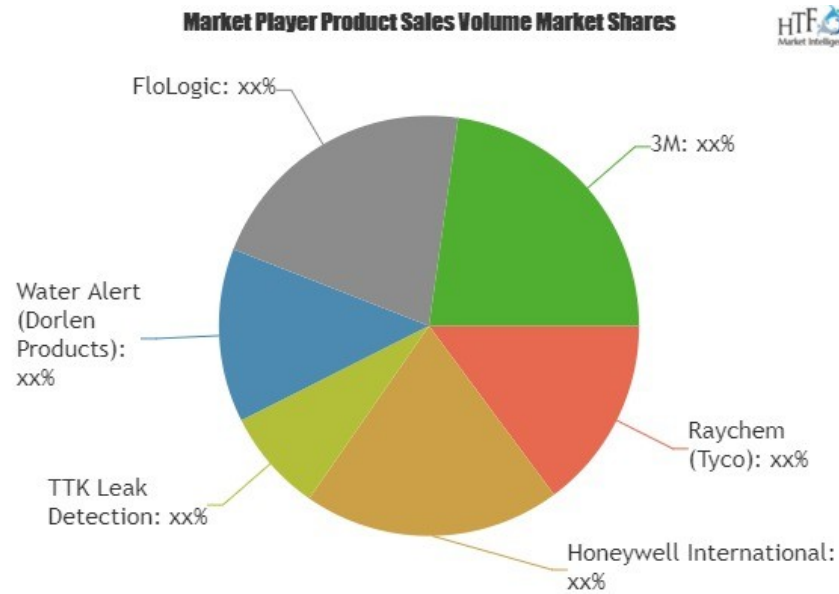
Global revenue of Water Leakage Detector Systems was valued at 499.08 million USD in 2017, and the global revenue of Water Leakage Detector Systems is forecast to reach 641.22 million USD by the end of 2022.

Asia-Pacific is the largest consumption region of Water Leakage Detector Systems, with a consumption market share nearly 40.20% in 2017. The second place is Europe; following Asia-Pacific with the consumption market share over 24.76% in 2017.

The major players in global Water Leakage Detector Systems market include:

- Raychem (Tyco)
- TTK Leak Detection
- TATSUTA
- Waxman Consumer Products Group
- Aqualeak Detection
- RLE Technologies
- Envirotech Alarms
- Dorlen Products
- Honeywell

- Siemens



<https://www.transparencymarketresearch.com/water-leak-detector-market.html>

<https://www.giiresearch.com/report/qyr601421-global-water-leakage-detector-systems-sales-market.html>

<https://www.bccresearch.com/market-research/environment/water-meters-water-quality-sensors-and-water-leak-detection-global-markets.html>

Asia Pacific Water Pipeline Leak Detection System Market: Country Analysis

Figure : Asia Pacific Water Pipeline Leak Detection System Market, By Country, 2012-2016 (% of Total)

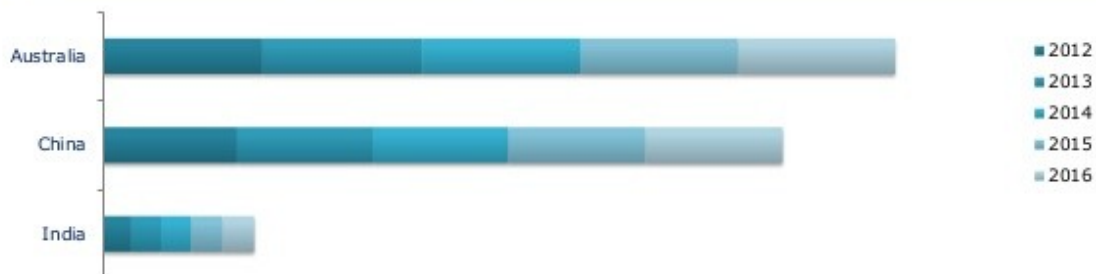


Figure : Asia Pacific Water Pipeline Leak Detection System Market, By Country, 2017-2022 (% of Total)



Source: Azoth Analytics Estimates

Inference:

The global water leak detector market is expected to grow significantly in the near future. The rapid expansion of the construction industry and increasing investment in infrastructure development are the key factors driving the global market.

Asia Pacific is anticipated to be a prominent water leak detector market and is expected to expand at a rapid pace during the forecast period. Expansion of the water leak detector market in the region can be attributed to the rising investment in the real estate sector, especially in China and India.

Due to increasing awareness to save water (reduce wastage of water), the use of water

leak detectors is rising around the world. Therefore we can expect a huge demand for this product in a country like India.

Exercise 4.1. : Define your industry & firm value chain and identify your advantages & scope

SUPPLIER VALUE CHAIN :

Our product will require sensors(water flow sensor , Pressure sensor) ,It industry Support (for website and app management) , cloud management (for recording data and analysing on a daily basis) , Alarm. Different parts will be supplied by various sellers depending on the quality of service the end customer demands .

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Standards for sensor (Measurement of pipes ,water flow and pressure rating):

PG100-30 Pressure Gauge, 2.5", SS, 30 psi
PG100-60 Pressure Gauge, 2.5", SS, 60 psi
PG100-100 Pressure Gauge, 2.5", SS,100 psi
G100-160 Pressure Gauge, 2.5", SS,160 psi
PG100-200 Pressure Gauge, 2.5", SS, 200 psi
PG200-15 Process Gauge, 4.5", 15 psi
PG200-60 Process Gauge, 4.5", 60 psi
PG250-15 Process Altitude Gauge, 4.5", 15 psi
G250-60 Process Altitude Gauge, 4.5", 60 psi
G250-160 Process Altitude Gauge, 4.5", 160 psi

Source : http://www.globalw.com/PriceList/GWI_Price_List.pdf

Our requirement will depend on floor on which the product is being deployed.Since different floor at different will have different pressure rating.

IT Industry support

Response after product has shown output can be provided using website or app developed and send to end customer . If the product detects leakage then alarm has been rung or valve closed the flow of water (depends on condition). This information will be logged to keep as a record . This continuous service will require it support for maintaining and updating depending on data user will input (if error is detected).

Cloud dependency :

If the product is deployed in well bandwidth available place then all computations and processing can take place at cloud centre which can send and receive basic commands for overriding (in case the product takes an action which the user does not want).This dependency will reduce deployment cost but induces chance of failure (cases when internet fails) .

System on place deployment :

If the product is deployment at place which lacks basic bandwidth then the place will have an isolated system build on location . The machine will be used for computing the usage of water at that place and analyse itself . Since the cloud usage is not being done

the training might be slow and not accurate (time consuming). But once trained the data will suffice to take action according to leakage or water usage being done . Since the machine is located on location itself thus there will be no need for error control as regularly as in cloud solution because if machine takes an action or notification which is not correct it can be controlled by the user there using basic interface.

Since basic website and app will also input user response which will help in error checking and improve the system efficiency.Regular check usage will require servers and multiple machine for computations which can be provided almost any major companies (Amazon,Google,Microsoft). This will make the deployment costly but on long term usage will provide solution worth its value.

https://www.dellemc.com/hi-in/cloud/hybrid-cloud-computing/index.htm?mkwid=s&pcrid=341518679508&pkw=+cloud%20+services&pmt=b&pdv=c&VEN1=s~341518679508~9012nt7863~c&VEN2=b~+cloud%20+services&dgsc=st&dgseg=emc&acd=10599248815234140&VEN1=s~341518679508~9012nt7863~c&ST=%2Bcloud+%2Bservices&qclid=EAlaIQobChMI-6Ht_LWr5AIVkYRwCh2uxwFHEAAYASAAEgKUX_D_BwE&pdv=c&mid=9012nt7863&VEN2=b%7E%2Bcloud+%2Bservices&dgsc=st&dgseg=csg&cid=248815&lid=23414&acd=10599248815234140#scroll=off (cloud cost)

OPERATIONS .

Analysing :: Initially product when is deployed an initial set of time will be reserved for training and predicting of usage . The model will determine the parameters to which when exceeded necessary action will have to be taken . The cumulative points when no usage takes place , necessary water flow required to optimise the usage . Such parameters will have to be calculated. The initial training will depend on data gained from flow of water and pressure taken from the sensors . After training model will detect human presence (user or wastage) ,leakage .If the detection is inaccurate backpropagation will be followed (correct incorrect data on the basis of accurate one) .

Assembling :: Deployment will require workforce initially . Placement of water flow sensor and pressure sensor to an already established system will be a tedious task . If a constructing society has opt for this product then assembling will be easy . In either case setting up cloud based solution will be easy . The user will have to learn some basic operations like how to notify in case of error ,physically restarting valve(when leakage is detected and valve is closed to prevent water wastage), manual override in case of false alarm . Notification will be easy and will help in monitor water usage log.

Servicing :: On any regular use of water the rate and time will be taken as input and determined whether water flow vs time is appropriate according to parameters set . If true then it will be registered as valid input and if not then action will be taken if the usage is high and flowing water pressure has reduced suddenly . On the basis of further

computation human presence will be detected to determine whether the usage is being done by human or leak due to overflowing tap (refer to flow diagram below). In case of correction manual override will take place when the output is not accurate.

OUTBOUND LOGISTICS.

The product when shipped most further servicing will independent of location .Since maximum servicing will be done through server connection . Servicing of website and web app will be handled by it group and algorithm will be implemented by the deployment team which will correct the algorithm in case of failure . This correction will not require any workspace to be present on location of product (in case of cloud dependency).

Another necessary servicing will be required for parts and sensors placed at product since the sensors and valves have been in continuous water flow . The durability will wear off through time . The rate will depend on different location which will determine the water quality (more salt will corrode the sensor at a faster rate).

In case of system malfunction of product ,A management team will be present which will be responsible for handling equipment malfunction at the location itself. The team will handle product repair and also perform regular checkups for various devices present .

Although a fail safe will be present which will not input data in case of any part failure but it will also result in noise data being generated which will produce wrong prediction for water usage and for cumulative points.

MARKETING AND SALES

1. Standard advertisement in our product case may not work . The installation is to be approved by the management of society therefore advertisement is to be done directly to them.
2. Our biggest consumer is government itself. If the product is approved by water resource department of any state as an essential requirement for large complex , as a result the product demand will increase.
3. Sales commission can be given to pipes ,taps , water tanks company for advertisement or a portion of revenue will be given for each product they sell.

ADVANTAGES and UNIQUE FEATURES

Since current deployment by our team differs from existing products in some aspects. Most of the current products focus on water conservation and recycling. Our product has these features along with preventing leakages. Leakage water is one of the loose ends during water conservation. Since an estimate can be given how much one leaky tap or pipe can waste water , but the number of such defects cannot be estimated.

Source . <http://www.newindianexpress.com/cities/hyderabad/2018/mar/21/leaky-tap-costs-15-litres-of-water-a-day-1790082.html>

This small feature give us an edge over others existing solution . Our product conserves water simultaneously using multiples ways (both optimising use and preventing leaks).

Detecting human presence is another feature which give us an edge over other implementation . Since taking action requires to know the reason for leak or reason for overuse of water . The reason might be overflowing bucket left(human error) or broken pipe or many more (given in above flow chart image) .Determining human presence is a tedious task without violating their privacy thus designing algorithm becomes difficult using minimum number of sensors (2 types in our case). Accomplishing this gives an advantage to our product.

Arising crisis of water also makes our product timing viable . Since shortage of water in major metropolitan cities makes our product in demand. Since left resources if not used judiciously may lead to catastrophic results. Thus this crisis is a blessing in disguise for our product.

//SWOT ANALYSIS



CONCLUSION OF SWOT ANALYSIS

Our marketing strategy needs improvement .Since our product is not an inexpensive product and demands power and effort to be installed and run for due course of time and then again repeat the procedure once product life cycle finishes . The consumer might not get the product in the first place or bear responsibility for wise usage of water.

The working and cost of our product is also highly dependent on many factors ,electricity , gpu costs ,cloud computation ,water tax and many more. Though theoretically our product does generate profit (refer Exercise 4.2) .Practicality in usage also varies the amount of water saved ,

area of deployment which will affect electricity cost and many other factors , which might result in consumers to not look towards the product . Thus our job is to ensure the cost vs service ratio to be lowest.

Exercise 4.2. : Formulate your business strategy

COST ANALYSIS:

Urban Population daily demands 150-200 litres of water(during summer) per head for regular usage for a day.Current rate of water supply for 1 kl lorry in chennai is about 89 Rs avg. (The rate depends on location and amount of water) . That adds total cost for a family of four about 3970 - 5300 rs per month

Source . <https://dfw.chennaietrowater.in/#/index> , <http://indiaenvironmentportal.org.in/files/Water%20consumption%20patterns.pdf>

Cities	Per Household		Per Capita	
	Mean	Std Deviation	Mean	Std Deviation
Delhi	377.7	256.8	78.0	49.9
Mumbai	406.8	158.6	90.4	32.6
Kolkata	443.2	233.6	115.6	64.9
Hyderabad	391.8	172.0	96.2	43.8
Kanpur	383.7	286.2	77.1	58.2
Ahmedabad	410.9	224.1	95.0	54.6
Madurai	363.1	182.1	88.2	44.4
Total	398.3	220.20	91.56	51.51

Computation Charges:

If an isolated machine is opted as an option for estimating use and predicting water flow . Initial cost of 150,000 ₹ (consisting dedicated asics) will be required for an

establishment with members about 1000 people living and 40000 ltrs of water used per daily basis with storage capacity required additionally (250 TB) for a span of 3 years. The raw data processing will demand electricity bill to run 500W-1500W machine (depending on number of people) . Quarterly servicing would also be required for the product as sensors might damage due this continuous processing . Maintenance of website and app will also require cost which will depend on the number of users , location and season of use (water usage differs according to season). This model is not as effective as cloud based solution but even if our solution save 12.2 litre of water in 12000 litre daily consumption we gain all installation charges back within a span of three years . Though above model will be failure for a small amount of people , since the cost of electricity and computation will be more compared to product cost for a large establishment.

Cloud based solution :

Considering the same sample data given above for the same amount of consumers not including electricity cost and servicing cost can be done 80000 rs for same data and storage.

Source <https://aws.amazon.com/free/>

sc_channel=PS&sc_campaign=acquisition_IN&sc_publisher=google&sc_medium=cloud_computing_nb&sc_content=cloud_computing_bmm&sc_detail=%2Bcloud%20%2Bcomputation&sc_category=cloud_computing&sc_segment=188903754703&sc_matchtype=b&sc_country=IN&s_kwcid=AL!4422!3!188903754703!b!g!!%2Bcloud%20%2Bcomputation&ef_id=EA!a!QobChMI1cyQmub15AIVmh0rCh1yGQ6UEAAYAiAAEgL19vD_BwE:G:s&all-free-tier.sort-by=item.additionalFields.SortRank&all-free-tier.sort-order=asc&awsf.Free%20Tier%20Categories=categories%23compute%7Ccategories%23databases%7Ccategories%23ai-ml%7Ccategories%23iot

This solution will provide the prediction slower than above model but won't effect our implementation for the usage . This will also make easy to correct algorithm in case of error. This model demands a high bandwidth existing internet connection or a local server.

MARKETING STRATEGY

Advertisement will be done through existing pipes and water supplier companies that will distribute and promote our product for some percentage of product revenue .

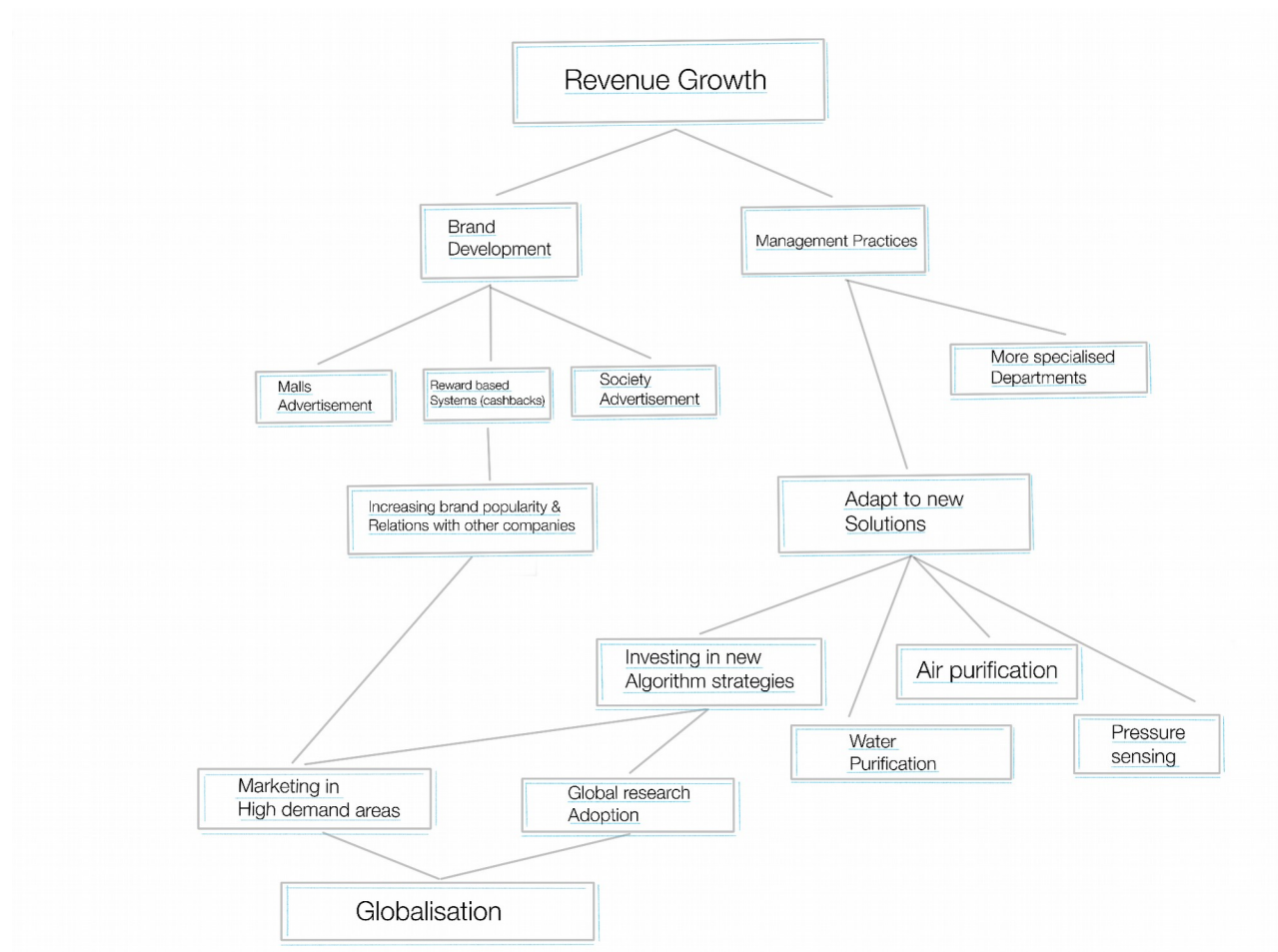
Direct advertisement within malls ,apartments, colleges , living complex will also help in advertising .Since once implemented in large complex , everybody will be able to use it thus reducing individual usage cost and increasing overall profit.

Reward base system will also help increase the popularity of product . Once installed reward will be offered on the basis of amount of water saved , which will compel others to do the same , which will result in less processing thus result as a profit for us.

Tie ups with existing digital vendors or malls will also help increase the popularity . Cashbacks and discount can be given if the consumer uses the product . Promotion within mall can be done as well to adopt this product as a representative of eco friendly establishment thus promoting their own name as well.

Adoption of the product within a society will also increase competition among members to gain most reward thus promoting the usage of product itself.

BUSINESS STRATEGY



Exercise 5.1. : What principles of organisation are relevant for your product /startup

Knowledge & Competence Principle (Redundant Hierarchy Test)

Redundant hierarchy test helps point out design malfunctioning or weakness, alerting managers to the need either to eliminate the layer or to define the responsibilities, skills, management processes and leadership style that is needed to make the layer a positive influence on performance.

Harmandeep singh will be our chief executive officer. He will be also handling marketing and sales for our product watman. Responsibility for handling relation between advertisement sources and other companies cut is also to be handled by him.

There will a department responsible for handling the web development and app development part for our product which will show the water uses in it and feedback of our product customers .The department will also handle user feedback translation and convey it to machine learning algorithm engineer. During time of startup this task was handled by our group member Amar .Maintaining feedback from user and providing them interactive UI for regular usage of consumer.

Machine learning algorithm engineer will handle algorithm corrections and improve upon efficiency . Here the link of communication between machine learning engineer and web developer department is important as the corrections will be only efficient if accurate feedback is provided to engineer on time .

Another department will be working for the cloud computing and web services like amazon web services which will be useful for the storage of data of each home and it will be useful for the real time monitoring of water. This computations and data storage will require database server and cloud computation . Local systems may be provided depending on the location of deployment. Data from sensor input sent through product to cloud will process it and provide output.In our group member Parth will handle local system processing.

The hierarchy among our member will require a department handling web and machine

algorithm handling to be overlooked which is currently done by Harman who also manages overlooking the entire team .Though no task shared is redundant our team lacks various departments for looking the above task in detail.

Co-ordination Principle (Difficult Links Test)

Coordination between the machine learning engineer and cloud computing manager will be essential and required for our product to function . The amount of data handled and computation power required by cloud is to be decided between ml engineer and cloud manager to result in an effective cost vs efficiency in algorithm processing .

Between web developer and manager (also responsible for providing feedback to different sectors and ml engineer will also be required . Since any corrections will require ml engineer to intervene and correct the existing algorithm to provide appropriate outcomes to user . Coordination between marketing sales department and cloud engineer will be important as they combine will determine the cost required for product (considering factors water tax , online cloud computation cost requirement ,local bandwidth cost). Since inexpensive cost is an important factor thus it is required for the to decide like factors like amount of cloud processing , data storage capacity.

A manager is also required to handle labour and installation process . Overlooking this task will also require material department as selection for sensor require opinion according to water quality and usage scenarios.

Control and Commitment Principle (Accountability Test)

The Team, who is working on the web development and app development will be responsible for any malfunctioning of our product. All the feedback from the individual will be given through the mobile application or web application and then it is the

responsibility of web team to spread this feedback .

After taking appropriate action instantly some actions will have to be taken to ensure no further mistakes. Since our product is not a convenient one and few inconveniences will result in consumers being ignorant to it.

Suppose feedback is “data reading is not accurate”. Then this feedback will be given to the team who is working on the machine learning algorithm as well as to the team who is working on the cloud computing to check whether there is problem with the cloud computation or algorithm is not working properly. After the result from this entire link coordination will be evaluated to ensure future smooth functioning.

Specialization Principles

Division of work according to specifications .In our organization we have some need of specializations which are as follows :

Cloud computing :

-> Cloud computing is the on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user. The term is generally used to describe data centers available to many users over the Internet. Large clouds, predominant today, often have functions distributed over multiple locations from central servers. If the connection to the user is relatively close, it may be designated an edge server.

Clouds may be limited to a single organization (enterprise clouds), or be available to many organizations (public cloud).

For our case we will need cloud computing as we won't be having this much space and computation power on a local machine on site.

Deployment model - (Private cloud) Private cloud is cloud infrastructure operated solely for a single organization, whether managed internally or by a third party, and hosted either internally or externally.[62] Undertaking a private cloud project requires significant engagement to virtualize the business environment, and requires the organization to reevaluate decisions about existing resources.

Cloud computing relies on sharing of resources to achieve coherence and economies of scale.

Data collection and analysis :

-> Data collection is the process of gathering and measuring information on targeted variables in an established system, which then enables one to answer relevant questions and evaluate outcomes. Data collection is a component of research in all fields of study including physical and social sciences, humanities,[2] and business. While methods vary by discipline, the emphasis on ensuring accurate and honest collection remains the same. The goal for all data collection is to capture quality evidence that allows analysis to lead to the formulation of convincing and credible answers to the questions that have been posed.

We will be collecting data at intervals and feed it as test data and some part as train data to our algorithm which will predict the leakage according to anomalies.

Data manipulation :

-> That is to refine data (collected) as there may be many situations where data may not be in the form of what we want to feed to our algorithm so data cleaning is required (we will cover this specialization under Data collection only)

Machine Learning :

-> Machine Learning is the field of study that gives computers the capability to learn without being explicitly programmed. ML is one of the most exciting technologies that one would have ever come across. As it is evident from the name, it gives the computer that which makes it more similar to humans: The ability to learn. Machine learning is actively being used today, perhaps in many more places than one would expect. That is a specialization that requires designing of algorithms and predicting the output variables on basis of predictors.

Advertisement and awareness :

-> Advertising is a marketing communication that employs an openly sponsored, non-personal message to promote or sell a product, service or idea. Sponsors of advertising are typically businesses wishing to promote their products or services. Advertising is differentiated from public relations in that an advertiser pays for and has control over the message. It differs from personal selling in that the message is non-personal, i.e., not directed to a particular individual. Advertising is communicated through various mass media, including traditional media such as newspapers, magazines, television, radio, outdoor advertising or direct mail; and new media such as search results, blogs, social media, websites or text messages. The actual presentation of the message in a medium is referred to as an advertisement, or "ad" or advert for short.

Management :

-> Management (or managing) is the administration of an organization, whether it is a

business, a not-for-profit organization, or government body. Management includes the activities of setting the strategy of an organization and coordinating the efforts of its employees (or volunteers) to accomplish its objectives through the application of available resources, such as financial, natural, technological, and human resources. The term "management" may also refer to those people who manage an organization. This is also a special skill and is vital for any organization.

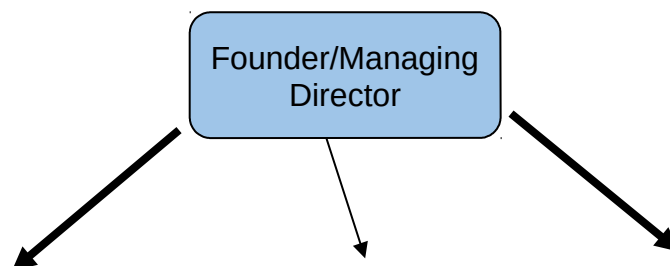
web/App development :

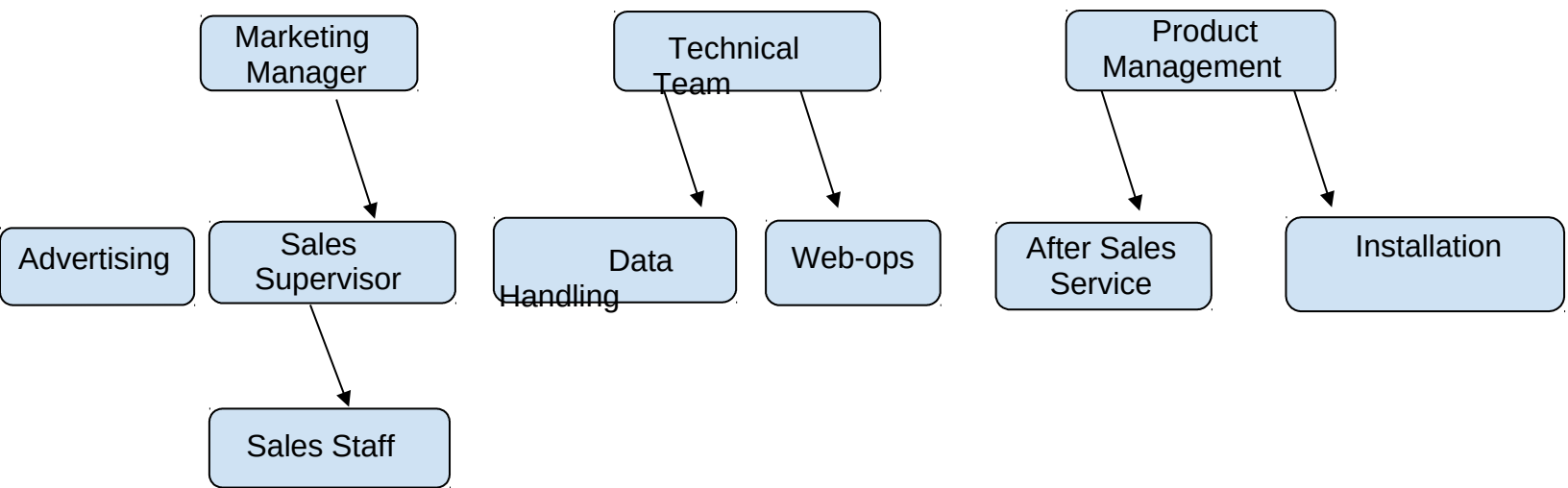
-> Web development is the work involved in developing a web site for the Internet (World Wide Web) or an intranet (a private network).[1] Web development can range from developing a simple single static page of plain text to complex web-based internet applications (web apps), electronic businesses, and social network services. A more comprehensive list of tasks to which web development commonly refers, may include web engineering, web design, web content development, client liaison, client-side/server-side scripting, web server and network security configuration, and e-commerce development. We would need a specialized team to take care of our website and application ,feedbacks and complaints.

hardware installer :

-> We would need skilled team of plumbers and other mechanics to install all the sensors ,to adjust the piping and for post services.

Exercise 5.2 Define your organisation structure.





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