Pane relief -

B2-43

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Pane Relief

Window Cleaning:
● Same as a, soldier commissioned at Indo-Pak border.
● Same as a, mason who build it.
● Same as, proposing your professors daughter, knowing that she doesn't like you.
● Same as, job security of Engineers working in IT companies.
Window washing is a tiresome and time-consuming task, but whether you want to do it or not, it has to be done rather regularly. It may be relatively easy to wash the windows of your house, but it’s a bit more challenging when you’re hanging hundreds of meters above the safety of the ground. High rise window cleaners use products that remove hard water stains, salt residue, dust, and pollen. Window cleaning methods vary right from skyliners to normal commercial and institutional premises as size matters a lot in this segment. The recent recovery is pushing many new projects in construction, hospitality, tourism, retail segments, etc. This is further creating more demand for window cleaning companies. High rise window cleaning services are used to clean the windows of hotels, condominiums, shopping malls and universities. Today, height isn’t the only challenge that window cleaners face. Many modern high-rise buildings are covered almost entirely in glass. This means that they have to clean a larger surface, which requires greater mobility. At the same time, glass-fronted buildings are also more difficult to hold on to, meaning that the safety of cleaners when working on such structures is even more questionable. The Empire State Building is a prime example of a glass-fronted skyscraper which can be a nightmare to get cleaned. That, coupled with its impressive height, makes it one of the most dangerous buildings on earth that a window cleaner could possibly work on. A lack of friction on the surface means that cleaners have no choice but to use a harness. Factors to be considered: Many factors

must be taken into account when cleaning the windows of high rise buildings. Some of the factors include the shape or design of the building, the obstacles on the property such trees and parking lots, the daily activity associated with the construction and the weather conditions. Each factor affects the amount of time that is needed to access and clean the windows. Safety : The primary safety concern is making sure the window cleaners do not fall while performing their jobs. To keep this from happening, the window cleaners are attached to two separate security lines which are anchored to the roof of the building. Each line connected to the anchors has a minimum breakage strength of 10,000 pounds. Another major concern associated with high rise window cleaning is the safety of the people and property on the ground below the window cleaners. To reduce the risk of injury and damage to the people and assets below, every piece of equipment that is used to clean the windows is attached to the people cleaning the windows. Even if the equipment were to slip out of the hands of the cleaners it will not fall to the ground. Direct access to a window obtained by egress from that window. This method is still used at the Empire State Building in New York City. The most dangerous part about being a window washer is the wind. In a Q&A with The New York Times, window cleaner Andrew Horton reveals that scaffolding and wind are a bad combination. “We have to get down off the scaffolding if the wind is above 25 m.p.h., but even 15 m.p.h. is dangerous,” Horton says. In an interview with HK Magazine, Tsang Hin-tong, a window cleaner in Hong Kong, recalled when a suspended platform broke down: “It just stopped moving. When that happens, if you’re lucky and it’s not a windy day, you can at least try to keep it stable in the air. If it’s windy, it’s very nerve-wracking. There is no way we can try to fight the wind with manpower.” The Washington Post, high-rise window washer Hernando Melendez describes how dangerous his job is: “If you don't feel scared doing this job, you can make a mistake … This is one of the most dangerous jobs, and you always have to be really awake.” There is also the risk of certain bugs that thrive at high altitudes; they irritate workers and cause quite a nuisance, which is certainly not a good thing when you’re hanging 100 stories up! When

cleaning windows, we always work from the top-down so that previously cleaned windows aren't left dirty. We also need to consider which way the wind is travelling which of course determines which face of the building we work on, and in which direction. All of this takes time, especially when having to rig up and move around the building safely. Speed is another factor to be considered when costing. When working at height we can't simply rush a job through. It's essential that we take our time and ensure all tie downs and anchor points are secure, equipment is secure and no one is at risk of injury. We also need to take into account how long it's going to take between each drop when moving to the next level. Window cleaning in the Middle East region is something totally different from other parts of the world as the cleaners have to face rough weather under scorch sun. In addition to this, they have to cope with wind waves, while hanging in the air with the support of suspended ropes tied from the roof of skyliners. window cleaners don't descend smoothly; they proceed to the next, lower floors in a fashion that appears as though they are 'dropping' through each floor one at a time. The height of a single drop – the measurement of one vertical cleaning operation from the roof to the floor below – varies according to the building in question. Accidents: Window cleaning in the Middle East region is something totally different from other parts of the world as the cleaners have to face rough weather under scorch sun. In addition to this, they have to cope with wind waves, while hanging in the air with the support of suspended ropes tied from the roof of skyliners. Window cleaning is considered the most dangerous job and several window cleaners die each year, and many are injured. Recently, four cleaners were killed in different incidents in Sharjah and Abu Dhabi, while cleaning windows at high rise buildings. Some companies not even report to the authorities concerned leaving some incidents under dark. Though some companies have adopted stringent safety measures and provided sufficient professional training to the cleaners, many companies ignore the safety features. Experts advise that window cleaners should always be attached with a lifeline to the building. If anything happens, the lifeline will save the life. In 1932 in New York, an average of one out of every two hundred window cleaners was

killed per year. On May 29, 1962, four window cleaners were killed when a scaffold fell at the Equitable Life Building. In November 2014, two window washers, Juan Lizama and Juan Lopez, were working on the World Trade Center 68 stories up when a cable got loose, flipping their scaffold from horizontal to nearly vertical. “It was definitely terrifying,” Lopez told CBS New York. Lopez and Lizama hit the emergency brakes and were rescued by firefighters after an hour and a half. Data from The International Window Cleaning Association showed that between 2010 and 2014, only one high-rise window cleaner was killed each year. That’s a big improvement compared to 1932, when an average 1 out of every 200 window cleaners in New York was killed annually. Cost: Most high rise window cleaning services are performed about twice a year on existing buildings. Newly constructed or remodeled buildings should be cleaned up to four times in their first year of existence and then twice a year after that. The sealant that is used in the windows in newly constructed and remodeled buildings can run and cause stains which may become etched into the glass and cannot be removed. Rates are typically around $85 per person, with a minumum of 2 people working at any given time (crews must work in pairs for safety reasons). High rise buildings usually involve crews of 3, which equates to roughly $1,200 minimum for a standard day of seven and a half hours. Rates vary for different building types. The higher the building, the more expensive the rate becomes. The difference for a 20-story building, as opposed to a three-story office block, for instance, won’t be the same. This is due simply to the additional safety processes and work involved. For jobs that are less than seven hours, we do a minimum charge of two workers for three hours—two men at three hours minimum at $90 per hour. Every hour after this, is billed at $85 per worker. A visual inspection is always necessary before being able to provide an accurate quote. The inspection allows us to check for things such as general access, anchor points, equipment, and so forth. In addition we need to ensure that all anchor points have been tested and certified. A simple equation might be (for examples sake) approximately five minutes to clean two windows on every floor. We factor in things like the number of windows, how many levels, and

roughly how much we can actually get done in a day. Then we simply multiply that by how many days it would take to clean. For instance, if we're requested to perform the job at night because there's too much pedestrian traffic or busy cafes below where we'll be working. Cleaning windows that are well maintained and have been cleaned within a 6 month period, then there's going to be a lot less work involved as opposed to a neglected building that requires a lot of work. We always recommend 6 monthly cleans for high rise windows, which can reduce the rates considerably. Many window cleaners only make $12 to $16 per hour, but high-rise window cleaners with years of experience can make $35 per hour. And owners of window cleaning companies can earn more money than you might think. Alexander Tzamburakis, a window cleaner in Chicago, says he makes $125,000 per year as a contractor who bids on window washing jobs at grocery stores. "The summer is the busiest time, and I work around 16 hours a day. It's tiring, but I'm happy with the salary. It lets me support my family," Tzamburakis tells CNN Money. THE MONEY ISN'T GREAT, BUT OWNERS OF WINDOW CLEANING COMPANIES CAN MAKE A LOT. Existing Tech: A typical window cleaner's equipment consists of a rope protector, a safety rope, a rope-grabbing tool, a descent mechanism, lanyard and suction cups. Where glass is found are window cleaners, and methods of access and equipment related to both access and cleaning vary nationally and regionally. If a window is not easily accessible using one type of equipment then it is advisable to combine different tools to be able to clean it properly.

• Ladders used for access must be long enough to protrude sufficiently beyond the access platform, unless other measures have been taken to ensure a firm handhold. Interlocking ladders and extension ladders must be used so that the different sections are prevented from moving relative to one another. Mobile ladders must be prevented from moving before they are stepped on. The feet of portable ladders must be prevented from slipping during use by securing the stiles at or near their upper or lower ends, by any anti-slip device or by any other arrangement of equivalent effectiveness.

o The telescopic ladder enables cleaners to reach considerably high of medium size buildings even the longest as its easily portable triple extensive mechanism will only tend to achieve a maximum reach of around 14.5 metres (approximately 47 and a half feet). However, the problem involves in this method is the temptation to over-reach when using a ladder to clean taller structures.
• Supported scaffolding — A temporary platform workers can stand on that is rests on a surface below, rather than hanging from above like suspended scaffolding.
• Suspended platform or cradle — Unlike supported scaffolding, these are not fixed to a lower surface or the ground, but rather are suspended by wire rope from above. They raise and lower the worker either by hand or with a motor.
• Aerial work platforms are elevated platforms that workers can stand on, such as a scissor lift, or cherry picker. These include: o Boatswain's chair (bosun's chair) — A single-person seat designed for controlled descent of rope. Often referred to as "rope descent systems" (RDS), these are typically anchored to a roof structure, counterweight configuration, or connecting points designed for the purpose. These are always temporarily installed for the purpose of access. However, their anchor points can be either temporary or permanent. It’s ideal for conditions of prolonged and dedicated window cleaning. The user wears a full body harness which is attached to a security line that is anchored to the roof. The bosun’s chair is used when windows cannot be reached with ladders or by using extension poles. The chair is also less obstructing and is not as noticeable to people inside and below the building as stage scaffolding. o Suspended platform — An access platform for one or more workers with manual or motor driven devices for raising and lowering via rope. Platforms may be fitted to high rise buildings or skyscrapers, or assembled from components to suit architecture and nature of work being performed. These can be either temporary or permanent. Both having their own unique governing codes and regulations. Permanent suspended platforms are called building maintenance units (BMU), or, in Europe, gondolas.

● ‘Boom’ is the oldest and most commonly used mechanisms historically. It consists of a scaffold that carries multiple washers and therefore allows a group to work simultaneously. Note that this is a permanent system, i.e., it is fixed on the roof of the building to be used as and when required.
● Carriage’, on the other hand, is a better alternative that is becoming increasingly popular these days. The carriage is mounted atop a rail on the roof, allowing it to move left and right over the facade. Just like a Boom, it not only holds multiple washers at a time, but also offers a clear advantage over a Boom in terms of movement.
● A Portable davit is the cheapest mechanism among these options; it also enables access to multiple areas of a facade while carrying a group of washers.
● Rope access techniques are used if certain windows or areas are difficult to access. Water-fed poles can be used to clean windows up to a certain height, as this can be quicker and more efficient than using other access methods. Cherry pickers, hydraulic platforms, and scissor lifts can also be used depending on the nature of the job, while cradles are typically used on larger, tall structures as they allow cleaners to navigate the building with ease. The Rope Access method is also known as abseiling cleaning. Rope Access is considered to be speedy and cost effective method of carrying out all types of cleaning works particularly window cleaning for high rise buildings Tools Required:
● Chamois and scrim — Chamois is used to loosen and remove dirt, followed by a buffing with scrim or cheesecloth
● Water and squeegee — Generally, chemicals are added to water, and a device such as a brush or cloth-covered handle is dipped into the resulting solution and used to scrub glass. A squeegee is then used to sluice the dirt and water mixture from the glass. Chemicals added to the solution range from dish soap and glass cleaner to Trisodium Phosphate and etching salt. In sub-freezing temperatures, anti-freezing chemicals are added to the solution to prevent it from crystallizing on the pane before it is sluiced off.
o Water-fed poles — Any of a variety of types of telescopic poles, fitted at the upper end with a brush and water jets, fed either from vehicle-borne

tanks of deionized water or by on-site production of deionized water using a domestic or commercial water outlet. The filtered water should contain a TDS (total dissolved solids) of 0 ppm(parts per million), when being used on windows .The reason for this is that if using above zero ppm water; reach and wash/waterfed pole window cleaners cannot claim to be purified water window cleaners and subsequently, a reading above 0 ppm could lead to spotting on the glass.

o The water is filtered by either a two-stage or three-stage filtration process, involving a carbon filter, and two de-ionization filters, or a carbon filter, a reverse osmosis membrane filter, and a de-ionization resin filter.

o The amount of spotting would depend entirely on what mineral composition is the water. The brush is used to agitate the debris off the window, while spraying water, and then the brush is lifted a few inches from the glass to rinse the glass with the pure water jets. Fan jets are used for hydrophobic glass, and "pencil" jets are used for hydrophilic glass. The de-ionized water is lacking in ions, so it will pull solids off the glass and dissolve the solids into the water, aiding in the cleaning process. Because there are no solids dissolved in the water, the windows dry clear without water spots.

o Water-fed poles vary in length. The longest poles are about 70 feet, and can reach up to six storeys. Water-fed cleaning is also referred to as pure water cleaning.

o Reach and Wash window cleaning equipment consists of a long pole, which also acts as an effective conduit for the transfer of water, and other cleaning liquids coupled with a detachable cleaning head. The latest Reach and Wash cleaning tools are capable of reaching over 24 metres (80 feet). The Reach and Wash method can also have the advantage of being cost effective for the customer. Reach and wash system uses pure water.

Companies Indulging in this sector:

● Netherlands-based Baudoin Wash Systems is offering modern equipment for window cleaning. The main unit of the wash system is called Aqua force pure water filtration which filters tap water by means of seven different filters to eliminate 99% of contaminates such as existing minerals,

lime, metals and bacteria to achieve pure water which is used as the only medium for cleaning. These filter units are available in permanent as well as mobile units in filtration capacities ranging from 100 to 2000 liters per hour.

● IPC High Pure is a range of products being offered from the US-based IPC Eagle in the Middle East region. The IPC High Pure range includes Green Tube GTO, GTE, High Pure HPO, HPB, HPE, HPG, in addition to modular poles, telescopic poles and speed brush. The extendable pole of this cleaning system enables glass and façade cleaning up to 14 meters in heights. IPC High Pure and Green Tube range machines come with HPO 4 stage purification system, electric pump water hardness meter and filter set with 30mt flexible hose. The HighPure is a water purifier with four filter stages. Sediment filter would remove all solid particles larger than five micron. Active carbon filter remove chlorine, which otherwise damage the reverse osmosis membrane. The overall system will ensure the osmotic deionized water produced is 100 per cent pure.

● HighPure machines are supplied with filter set including sediment filter, active carbon filter, reverse osmosis membrance, deionizing resin catridge. The 30-metre hose to take the pure water with flow regulation valve will also be provided along with the equipment. There would be another hose to facilitate the waste water to flow from the reverse osmosis membrane.

Bibliography:

https://www.scienceabc.com/humans/clean-skyscrapers-windows-washers-equipment-height-bosunchair-boom-carriage.html
https://allcleanservices.co.uk/2017/08/01/window-cleaning-for-high-rise-buildings/
https://www.offyourwall.com.au/blog/how-much-does-high-rise-window-cleaning-cost/
https://www.cleanmiddleeast.ae/articles/564/window-cleaning-a-high-rise-business-deal.html
https://en.wikipedia.org/wiki/Window_cleaner
http://mentalfloss.com/article/79507/13-behind-scenes-secrets-professional-window-washers
http://www.sixthtone.com/news/1458/risky-business-china%20s-window-cleaners
https://www.quora.com/Janitorial-Work-How-dangerous-is-it-being-a-window-cleaner-on-a-skyscraper

KEY WORDS

1) Frequency of cleaning
2) shape and design of building
3) mobility
4) friction
5) weather conditions
6) Time period of cleaning
7) security line strength
8) Absolute weight hanging
9) Scaffolding stability
10) windspeed
11) bug and bird disturbances
12) vertical drop per step
13) cleaning cost per sq. feet
14) efficiency of cleaner per day.
15) Handhold grip of tools.
16) cleansing agent and water property
17) Corner accesibility
18) Height
19) Type of glass
20) geometrical obstrades (can parks inbetween)
21) shape of suspended platform
22) adhesive strength
23) injuries per year.
24) night work / skeleton work
25) water consumption.

* exploiting constraints.
* adapting to the conditions (env) (shape) as an advantage

KEY ELEMENTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Outdegree
1.FREQUENCY OF CLEANING		0	0	0	1	1	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	1	0	0	1	8
2.SHAPE AND DESIGN OF BUILDING	0		1	1	0	1	0	0	0	0	1	0	1	1	0	0	1	1	1	1	0	0	1	0	1	12
3.MOBILITY	0	1		1	1	0	0	0	0	1	0	1	0	1	0	0	1	0	0	1	1	1	0	1	0	11
4.FRICTION	0	1	1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	4
5.WEATHER CONDITIONS	1	0	1	0		1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	9
6.TIME PERIOD OF CLEANING	1	1	0	0	1		0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	6
7.SECURITY LINE STRENGTH	0	0	0	0	0	0		1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
8.ABSOLUTE WEIGHT HANGING	0	0	0	0	0	0	1		1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3
9.SCAFFOLDING STABILITY	0	0	0	0	0	0	0	1		1	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	5
10.WIND SPEED	0	0	1	0	1	1	1	0	1		0	0	1	1	1	0	0	1	0	0	0	0	1	1	0	11
11.BUG AND BIRD DISTURBANCES	1	1	0	0	0	0	0	0	0	0		0	0	1	0	0	0	1	0	1	0	0	0	0	0	5
12.VERTICAL DROP PER STEP	0	0	1	0	0	0	0	0	0	0	0		0	0	0	0	1	0	0	0	0	0	0	1	0	3
13.CLEANING COST PER SQUARE FEET	0	1	0	0	1	0	0	0	0	1	0	0		0	0	0	1	0	0	0	1	0	0	1	1	7
14.EFFECIENCY OF CLEANER PER DAY	1	1	1	0	1	1	0	0	0	1	1	0	0		0	0	0	0	0	0	0	0	0	0	0	7
15.HANDHOLD GRIP OF TOOLS	0	0	0	0	0	0	0	0	0	1	0	0	0	0		0	0	0	0	0	0	0	0	0	0	1
16.CLEANSING AGENT AND WATER PROPERTY	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	1	0	0	1	0	0	1	4
17.CORNER ACCESSIBILITY	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0		0	0	1	0	0	0	0	0	5
18.HEIGHT	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0		0	0	0	0	0	0	1	5
19.TYPE OF GLASS	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0		0	0	1	0	0	1	6
20.GEOMETRICAL OBSTACLES(CAR PARKS IN BETWEEN)	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0		0	0	1	0	0	5
21.SHAPE OF SUSPENDED PLATFORM	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		0	0	0	0	2
22.ADHESIVE STRENGTH	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0		1	0	1	8
23.INJURIES PER YEAR	0	1	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1		1	0	8
24.NIGHT WORK/SKELETON WORK	0	0	1	0	1	1	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1		0	7
25.WATER CONSUMPTION	1	1	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0	0	1	0	0		8
Indegree	8	12	11	4	9	6	2	3	5	11	5	3	7	7	1	4	5	5	6	5	2	8	8	7	8	
Total degree	16	24	22	8	18	12	4	6	10	22	10	6	14	14	2	8	10	10	12	10	4	16	16	14	16	

INFERENCE:

FACTORS THAT CANNOT BE CONTROLLED:

1.SHAPE AND DESIGN OF A BUILDING
2.MOBILITY
3/.WEATHER CONDITIONS
4.WIND SPEED

FACTORS THAT CAN BE CONTROLLED:

1.FREQUENCY OF CLEANING
2.ADHESIVE STRENGTH
3.INJURIES PER YEAR
4.WATER CONSUMPTION

Considering the factors that cannot be controlled and making it as a positive factor for the progression of our problem.

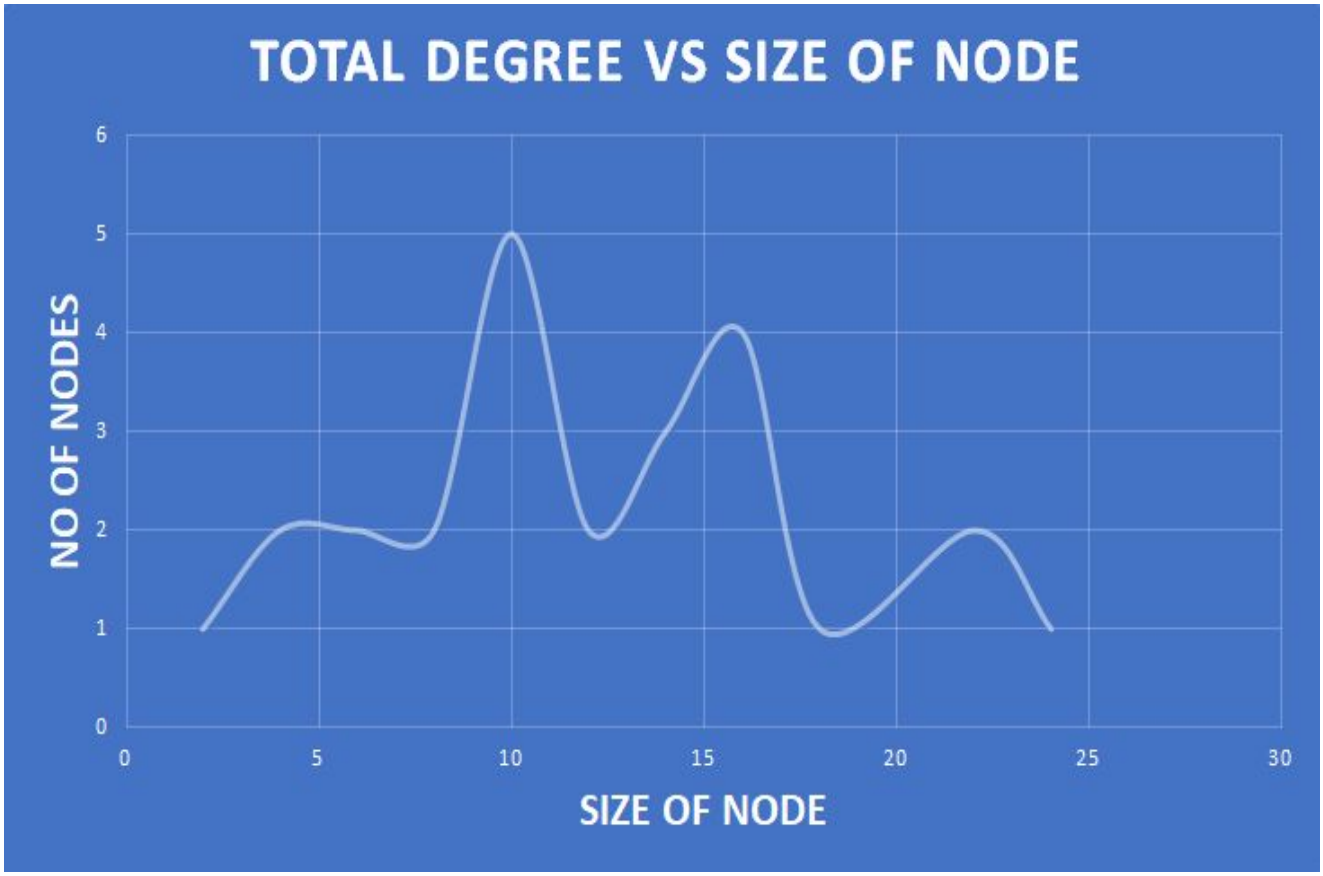
Example: SHAPE AND DESIGN OF A BUILDING AND MOBILITY

How do you clean this kind of building?

Our machine should be able to detect the shape of each sector of the building and it should be able to clean it accordingly.This machine should also move to nook and corner of this complex structure.

THINK OF CLEANING THE TALL BUILDING IN THIS KIND OF WEATHER CONDITION?

Our machines should be able to withstand any kind of climate .



INFERENCE FROM THE ABOVE GRAPH:

THE GREATEST TOTAL NUMBER OF RELATIONS(IN-DEGREE AND OUT-DEGREE) IS FOUND TO BE 24 AND TOP 8 NODES OCCUR ABOVE 16.

FROM THE ABOVE GRAPH WE INFER THAT THERE IS NO BIASNESS OR INCOMPLETENESS.

TOTAL NO. OF NODES=25=TOTAL NO. OF KEYWORDS

HENCE THE ABOVE MATRIX IS COMPLETE.

STAKEHOLDERS:

1.THE COMPANY THAT PROVIDES THE SERVICE

2.LABOUR WORKING FOR THE SERVICING COMPANY

3.THE COMPANY THAT NEED THE CLEANING SERVICE

4.PUBLIC PEOPLE UNDER WORKING AREA

SERVICE PROVIDER

RESPONSIBILITIES:

@TRAINING OF CLEANERS WITH REQUIRED TECHNICAL SKILLS

@MINIMUM USAGE OF TIME TO EXECUTE THE ENTIRE CLEANING WITHOUT EXCEEDING THE STIPULATED TIME PERIOD

@ATTENTION TO QUALITY TO SATISFY CLIENT'S REQUIREMENTS

@SAFETY OF CLEANERS

@MAXIMUM PROFIT ATTAINABLE

@PROPER PROVISION OF QUALITY GRADED EQUIPMENTS

@PROVIDING WORKERS WITH REQUIRED EQUIPMENTS TO PREVENT DISTRACTIONS

NEED:

@PROFIT

@SAFETY OF WORKERS

@SATISFACTION OF CLIENTS

HIGH RISE BUILDING CLEANERS:

RESPONSIBILITIES:

@MINIMUM USAGE OF TIME WITH MAXIMUM EFFICIENCY

@PROPER ATTENTION TO HANDLING OF TOOLS PROVIDED BY THE SERVICE PROVIDER

@RETURN OF UNUSED EQUIPMENTS

NEED:

@CONSOLIDATED AND FACED REQUEST FOR EQUIPMENT

@KNOWLEDGE OF REQUIRED SKILL SET FOR SATISFYING THE CLIENT

CLIENT:

RESPONSIBILITY:

@PROPER USAGE OF RESOURCES PROVIDED

@CHOOSING OF BEST PROVIDER BASED ON THE NEED

MAIN REQUIREMENTS OF THE CLIENT:

1.QUALITY: THE TIME QUOTED FOR NEXT CLEANING SESSION

2.COST: MINIMUM COST FOR MAXIMUM QUALITY

3.EFFICIENCY OF THE PROVIDER: TIME TAKEN FOR ONE CLEANING SESSION

PEOPLE WORKING UNDER THE AREA/PASSERBY:

RESPONSIBILITY:

CUSTOMERS OF THE SHOP MUST NOT GET HINDERED BY THE SERVICE PROVIDED BY THE COMPANY

NEED:

1.SAFETY OF BOTH INFRASTRUCTURE (SMALL SCALE SHOPS LIKE CHAI STALL) AND PEOPLE WHO ARE WORKING UNDER THIS INFSTRUCTURES

ALTERABLES:

1.RESOURCE PROCUREMENT

2. RESOURCE DISTRIBUTION/ALLOCATION

3. RESOURCE UTILIZATION

4.DATABASE MANAGEMENT OF PAST SERVICES

5.RECRUITING YOUNG AND EXPENDABLE HUMANS

6.CONDUCT TRAINING SESSIONS DURING OFF SEASONS

7.RELOCATION OF SHOPS AND PEOPLES

8.LOCAL PURCHASE

9.COMPUTERISED DATABASE MANAGEMENT ON LABOURERS

10.STREAMLINING OF SYSTEM AND PROCEDURES

13.GUIDELINE ON CONTRACTS

14.BUDGETS

CONSTRAINTS:

1.•Shortage of alternate sources of suppliers

2.•Limited supply of water

3.•Maintenance of equipments

4.•Untimely change in demand of service

5.•Availability of equipments under leese

6.•Shortage of skilled man power

7.•Non-availability of spares and inventory status

8.•Verbal communication between workers at heights

9.•Inconveniences to people and operational difficulties due to maximum load taken up during extreme weather conditions

10.•Location

11.• Non standardized nature of equipment /defects.

12.• Distraction of the workers

SNAC Matrix:

Stakeholders	Needs	Alterables	Constraints
Service provider	1.Profit	1..BUDGETS 2.LOCAL PURCHASE 3. RESOURCE UTILIZATION 4.GUIDELINE ON CONTRACTS	1.Maintenance of equipments . 2.Shortage of alternate sources of suppliers 3.Shortage of skilled man power 4.Untimely change in demand of service
	2.Safety of workers	1.CONDUCT TRAINING SESSIONS DURING OFF SEASONS 2.STREAMLINING OF SYSTEM AND PROCEDURES 3.GUIDELINE ON CONTRACTS	1.Non standardized nature of equipment /defects. 2.Distraction of the workers 3.Non-availability of spares and inventory status
	3.Satisfaction of client	1. RESOURCE UTILIZATION 2.RECRUITING YOUNG AND EXPENDABLE HUMANS 3.BUDGETS	1.Shortage of alternate sources of suppliers 2.Shortage of skilled man power 3.Non standardized nature of equipment /defects. 4.Distraction of the workers
Cleaner	1.CONSOLIDATED AND FACED REQUEST FOR EQUIPMENT	1.RESOURCE PROCUREMENT 2. RESOURCE DISTRIBUTION/ALLOCATION 3.LOCAL PURCHASE 4.BUDGETS	1.Availability of equipments under leese 2.Non standardized nature of equipment /defects. 3.Maintenance of equipments
	2.KNOWLEDGE OF REQUIRED SKILL SET	1.CONDUCT TRAINING SESSIONS DURING OFF	1.Shortage of skilled man power

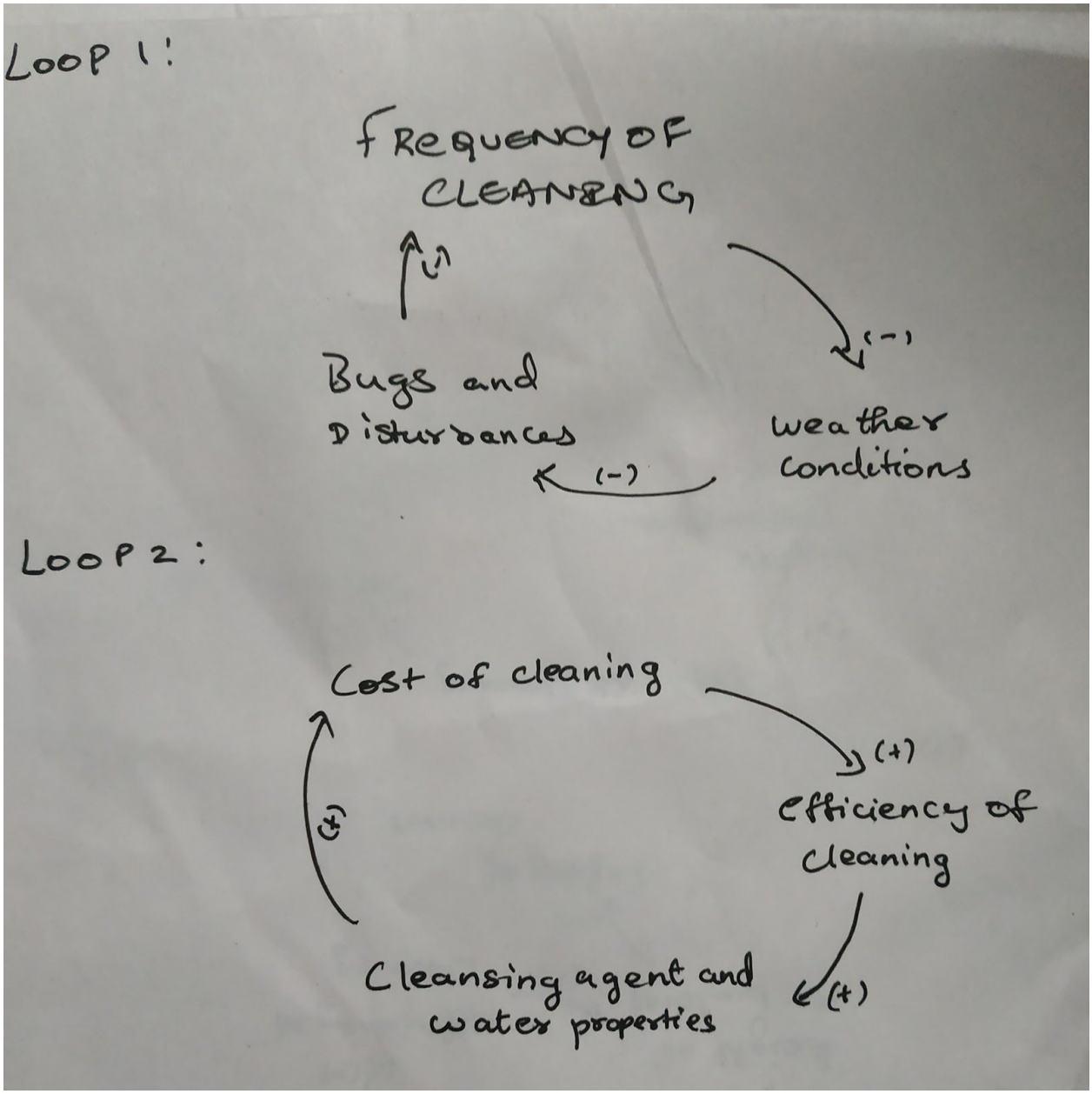
	FOR SATISFYING THE CLIENT	SEASONS 2.RECRUITING YOUNG AND EXPENDABLE HUMANS	2.Distraction of the workers.
Client	1.QUALITY	1.STREAMLINING OF SYSTEM AND PROCEDURES 2CONDUCT TRAINING SESSIONS DURING OFF SEASONS 3.DATABASE MANAGEMENT OF PAST SERVICES	1.Shortage of skilled man power 2.Verbal communication between workers at heights
	2.COST	1..BUDGETS 2.LOCAL PURCHASE 3. RESOURCE UTILIZATION	1.Maintenance of equipments . 2.Shortage of alternate sources of suppliers 3.Shortage of skilled man power
	3.EFFICIENCY	1.RESOURCE UTILIZATION 2.DATABASE MANAGEMENT OF PAST SERVICES 3.CONDUCT TRAINING SESSIONS DURING OFF SEASONS 4.COMPUTERISED DATABASE MANAGEMENT ON LABOURERS	1.Limited supply of water 2.Shortage of skilled man power 3.Verbal communication between workers at heights 4.Non standardized nature of equipment /defects.
PEOPLE WORKING UNDER THE AREA/PASSERBY:	1.SAFETY	1.CONDUCT TRAINING SESSIONS DURING OFF SEASONS 2.RELOCATION OF SHOPS AND PEOPLES 3.STREAMLINING OF SYSTEM AND PROCEDURES	1.Shortage of skilled man power 2.Inconveniences to people and operational difficulties due to maximum load taken up during extreme weather conditions 3.Location 4.Distraction of the workers

Summary of stakeholder assessment

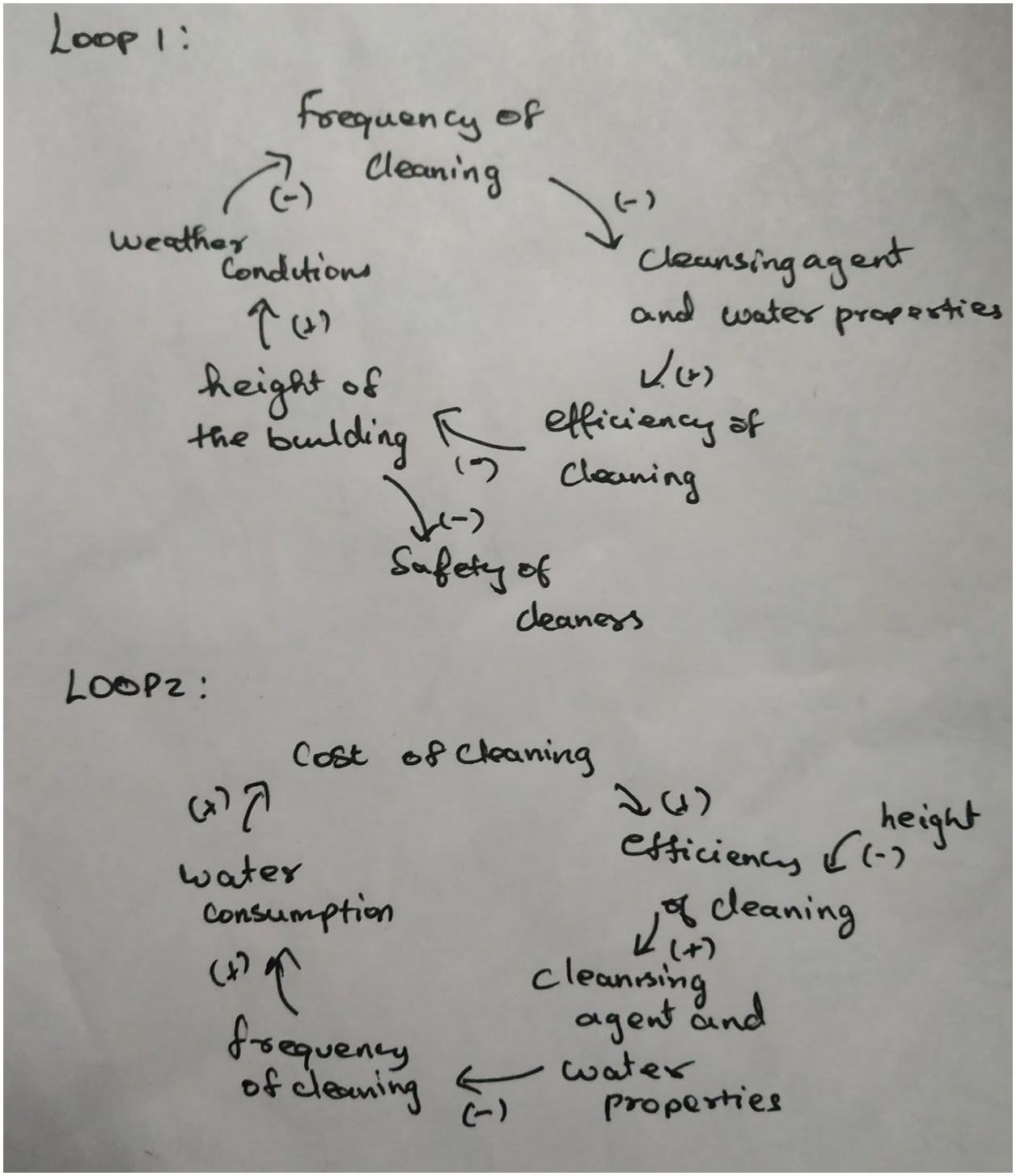
About 70 percent of objectives were related to resource management and safety processes indicating their criticality in overall improvement

FEEDBACK ANALYSIS:

FOR SIMULATION PLEASE CLICK THE PLAY BUTTON CLICK ON ALL THE BALLOONS
LINK: https://bit.ly/325JoLe



INFERENCE (from the above two loops):
The factors in the above two loops make the system unstable.



INFERENCE (from the above two loops):
All the factors which make the system unstable gets balanced in the above two self-balancing loops except the factor- bugs and disturbances.

A leverage point is a place in the system's structure: – where micro changes can result in macro results. –

when an intervention can be applied A low leverage point—small level of intervention or change force results in a small change in the behavior of the system. Often used to address intermediate causes of a problem

A high leverage point—small level of intervention/change force, causes a large change in the system's behavior. Used to resolve root causes.

SPECIFIC PARAMETERS THAT NEED TO BE ADDRESSED:

1.height of the building

2.complexity and shape of the building

3.weather conditions

4.cleansing agent and water properties

5.water consumption

NOTE:This result has been obtained from simulation that has been generated in the feedback loop.

INFERENCE:

From the above feedback analysis,we come to a conclusion that the major affecting factors of our problems arise to be from any effects in height of the building,water consumption,complexity and shape of the building,weather conditions,cleansing agent and water properties.