Benchmarking warehouses for FMCG industries by assigning significant weights to various benchmarking parameters using AHP

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ABSTRACT

Warehouse has always been an important component of the supply chain . The following work emphasizes on more than hundred and a fifty parameters which should be considered while benchmarking and finalizing a warehouse by an a FMCG company. Basically these parameters should be kept into focus while benchmarking the warehouses so that a perfect warehouse can finally be selected. The research will discuss at length about numerous parameters that have been researched upon, and their significance on the selection criteria. These parameters have been classified under thirteen Categories of macro parameters namely location, property, financial, equipment's, premises, infrastructural, strength, amenities, safety and security, facilities, legal, environmental and accessibility. These categories include all the parameters that were observed while researching about the FMCG industry with respect to this case study, through various websites ,telephonic interviews with warehouse owners over phone and through discussions with the industrial experts in the FMCG domain. The developed approach determines the significance of each macro parameter by rating them on a scale on 1-9 and evaluating their weightages. These parameters are generally never witnessed in any previous work in this field but are of great importance as they make up an essential portion of the micro level. The outcome of this case study is to briefly state the significance of each factor on the warehouse which ultimately impacts the supply chain of any product in question . For the methodology a part analytic hierarchy process (AHP) has been used .The weightages that have been assigned to each parameters have been calculated using the pairwise decision matrix which ultimately was used to calculate the criteria weights

Introduction

The Indian warehousing sector is highly fragmented . While selecting a warehouse for any product either for storage or manufacturing , it is very essential to judge the warehouse on as many parameters as possible , although it is not possible to select the warehouse full filling all those judging parameters . Both manufacturing and the warehousing sectors are complimentary to each other , the former being the major occupier of the latter

Because of the ever growing modernization and evolution it has become very essential for the traditional retailers to expand warehouse space for their growing e-commerce operations so that they can meet the consumers' last-mile delivery expectations in a more responsive manner. Since the demand in the metropolitan areas is growing stronger each day , the companies are facing rigorous competition   due to stiffer inventory levels . The companies face the challenge of investing in new facilities that allow for quick and affordable access to major markets. As the market is shifting towards a distribution model that is more regional allowing retailers to meet delivery demands therefore it altogether becomes more significant at this time. In order to continue serving the customers satisfactorily the onus is on the companies to stay ahead of the curve , and to achieve this it becomes more important for them to invest in the warehouses as the warehousing capacity will continue to tighten in the coming days .Every firm wants to achieve competitive advantage which is possible only when all the strategic as well as non-strategic decisions go well . The fundamental requirement of a modern business is the warehouse as it is the first enabler of the supply chain where the most important activities are carried out .It is the focal point of procurement, manufacturing and distribution services which collectively contribute to the economic growth of the business . Therefore the supreme focus of any warehouse and industrial operators should always be on amplifying quality spaces and satisfying the infrastructural standards to meet the end-goals of modern businesses. Apart from the infrastructural parameters there are various service parameters which need to be upgraded in order to make the warehouse be able to cater to all types of industry requirements without overlooking the security and safety measures.

LITERATURE REVIEW:

The application of multi criteria decision making method is found in a wide area depending upon the various types of the decision making problems that are encountered during the course of problem solving. TOPSIS method, which chooses the best alternative by maximizing the distance from the negative ideal point and minimizing the distance from the positive ideal point , has chosen as the best alternative base. TOPSIS , can be applied to areas such as evaluation of the parameters with the use of financial investment decisions (Kim, Park, & Yoon,1997) and financial ratios (Deng, Yeh, & Willis, 2000; Feng & Wang, 2001) . It can also be applied to problems such as flexible manufacturing systems (Agrawal, Kohli, & Gupta, 1991) and selection of production processes (Chau & Park, 1995; Park & Wu, 1995) within the scope of operation management. Similarly, ELECTRE methods (Electre I, IS, II, III, IV,A) choose the best alternative by means of pairwise comparison of all alternatives . Have been used within the decision problems such as factory location and production center selection (Lopez & Gonzalez, 2003)

The Analytic Hierarchy Process (AHP) which uses both mathematics and psychology is one of the extensively used MCDM method . It compares the judgements in a pairwise manner with each other and thereby represents the dominance of one factor over another . This dominance is with respect to the property that the factors share . It is flexible enough to be integrated with multiple multiple techniques such as Linear Programming, Quality Function Deployment, and Fuzzy Logic and therefore it can be used to measure the intangible factors . because its flexibility allows it to be integrated with Advocating the effectiveness of relative judgements, Saaty(2008) describes the four steps of the AHP as follows:

1. The first step is to define the problem that about which the decision is to be made
2. This will be followed by the creation of a decision hierarchy.
3. Constructing the pairwise comparison matrix based on the research problem.
4. Lastly, the criteria under comparison are weighed using the priorities derived from the above steps.

THE BENCHMARKING PARAMETERS :

Approximately 164 parameters were explored and analyzed during the study The parameters have been broadly classified under eleven categories . The discuss about each category based on what I observed while consolidating these parameters . The discussion is built around the observations from the discussions and telephonic interviews with the warehouse vendors and the industrial experts .

LOCATION PARAMETERS :

The success and efficiency of a warehouse depends upon the ideal location of the warehouse .The location is the major deciding factor in how economical and profitable the supply chain will be .According to this study the firms consider it mandatory to give utmost importance to deciding the perfect location for establishing a warehouse from a pool of various location alternatives present before them. Therefore the amount of investment that is done in setting up and developing a warehouse always follows a strong analysis which is majority of times directed towards finding out the most optimal locations amongst the various location alternatives present. The parameters with respect to location are – country , state ,city ,latitude ,longitude, pin code, landmark , is inside the city or on the outskirts

Whether the warehouse that the company is looking for is in the same country as its previous warehouses or is it thinking in direction of expanding its business and therefore is aiming to procure a warehouse in a foreign country . Foreign country here implies a country where there are no existing operations of the organization in picture . It is comparatively easier to find a warehouse in ones native country but when it comes to a foreign land then the hindrance .The exact location of the warehouse in terms of longitude and latitude matters for competition and local demographics ,sustainability , accessibility , cost , environment and also leaves room for improvement and growth (Sang un Kang ,2018) .Whether the warehouse is inside the city or on the outskirts plays an important role in the transportation activities that are carried out . If the warehouse is a distribution center then the aim is to make it as near to the customers as possible to reduce the transit time . For this it is preferable that the ware house should be inside the main city . On the other hand if the warehouse is to be used for manufacturing

purpose then it should be far from the city so that the waste produced does not harm the residential areas and also the aim is that the raw material should reach the manufacturing place in less time .

PROPERTY PARAMETERS:

All the parameters related to the warehouse in terms of its current state . when a particular company irrespective of its domain searches for a warehouse then they look out for these initial level information about the warehouse so that the decision making becomes easier for them . construction year , under construction ,available from (date) ,is ready to move ? ,is plinth ready? : is shed ready? , is flooring ready? ,no. of floors ? , ,has basement?

As told by the experts if they want a warehouse on an urgent basis then ready to move serves the purpose . In this case the can see the warehouse before selecting it and pay only for what they see .But ready to move is not very pocket friendly. Therefore if the cost is the major deciding factor and time is not a constraint then under constructed buildings are preferred . As stated by the article the difference in cost between the two can vary anywhere between 10-30% .

The year in which the warehouse was constructed plays an role while selecting a warehouse as it suggests how technically accomplished the warehouse would be . The standard plinth height is 450 mm as was found during the research . So it is the presence of basement at a store house ensures temperature control as the temperature at the basement is comparatively lower , better security , additional space of .

FINANCIAL PARAMETERS: actual rent/sq ft , expected rent/sq ft , rent free period in days , deposit amount ,

The ultimate goal of each organization is to minimize cost and maximize profits . This goal can be achieved only when they are able to reduce the fixed cost . The major fixed cost of a warehouse is the rent that is paid on the per square feet basis . So to reduce this cost the major focus is on selecting a warehouse with the minimum possible rent without compromising on the location . Rent free period is the first step in this direction as , before renting a warehouse if the company wants to access the space to make any improvements , deliver equipment's , install systems or do any other related work , then they are not liable to pay rent for that duration .

INFRASTRUCTURAL PARAMETERS:

warehouse type, center height , clear/side height , no. of docks , dock height , dock width , plinth height , entries , exits , roof type, no. of columns , is cross docking available?

Various studies have found out that the energy intensities of different buildings vary between type of the building, size of the building and the climate zone . The warehouse are of three types namely RCC , PEB, asbestos sheet , Tin shed . RCC or the reinforced cement concrete is the preferably used type of warehouse as it requires minimum maintenance and can endure high temperature without loss of structural integrity . On the other hand PEB is the pre-engineered building which is mostly made of the steel beams and technically more advanced , but are expensive in terms of maintenance . The number of docks in the warehouse vary with respect to the size of the warehouse . If the goods are warehouse is used

Cross-docking can be advantageous as compared to the traditional methods of distribution centers as it ensures cost reduction, shorter delivery lead time and storage space reduction and give a firm competitive advantage to the companies (Van Belle, Valckenaers, and Cattrysse 2012).Cross docking has been successfully implemented and currently being used by various companies such as Home Depot , FedEx, and Wal-Mart(Yin and Chuang 2016) .

EQUIPMENTS PARAMETERS: dock levelers , ramp (running , triangle , rectangle) , Pallets available? Max weight per pallet? Max pallet weight? (kg) , pallet type(wood , plastic ,metal) .

It can evidently be derived from one of the papers that states that due to the frequent receipt and shipment activities a majority of the warehouses and plant locations have the provision for multiple docks for loading and unloading purposes (Jan Van Belle, Paul Valckenaers, Dirk Cattrysse ,Cross-docking ,2012). These docks fulfill the functional requirements when equipped with equipment's like dock levelers and ramps. (Vladimír Koči ,2019) Pallet is defined as a platform which is horizontal in shape and is used for the assembly , stacking, storage, handling, and transportation of many goods. The pallets ensure the safe handling and transportation of cargo to shorter as well as longer distances . The delicate goods apart from requiring a good packaging need to be palletized in order to maximize the chances of safe transit . The focus of the industry

is on shipping the palletized load at all the levels of the supply chain .To achieve this, usage of standard trucks needs to be encouraged that can accommodate different sizes of this palletized load without wasting any volume capacity of the carriers.

PARAMETERS FOR AMENITIES: electricity board power available ? EB power phase (1,2,3) ,power capacity (KVA),ventilation(natural , mechanical) , generator , generator capacity ,manufacture year of generator ,generator brand , is there a DG floor? , connected load, count of boards(light, dbs, switch) , number of electric connection ,number of lights ,

The storage of different classes of Dangerous Goods should be in compliance with international segregation and storage guidelines. It ensures safety of dangerous goods like radioactive , inflammable , pressurized gas containers, compressed liquified and dissolved gases, explosives etc.

STRENGTH PARAMETERS: carpet area, built up area ,entry width , floor strength (MT/sqm) ,floor type (epoxy, concrete , no flooring , tiles), floor condition (smooth , cracked), is insulation available? Insulation type ,is mezzanine available?(no of levels , area ,height , weight capacity) , loading area percentage(%) ,

Mezzanine surfaces are the elevated platforms that are constructed/installed between the ceiling and the floor . Mostly they are made up of steel or some other composite materials. Mezzanine construction materials can impact biomechanical exposures in the lower extremity(Steven A. Lavender, Jay P. Mehta, W. Gary Allred ,2013). Long and continuous standing at work is correlated with the discomforts of lower extremity (Chandrasekaran 2003; Hou and Shiao, 2006). This indicates towards early retirement of the workers (Rice et al., 2011). Cham and Redfern in their research showed that the surface on which one stands is indicative of the level of discomfort one faces. Specially "softer" surfaces are associated with less subjectively measured discomfort than harder surfaces (Redfern and Cham, 2000).

WORKERS FACILITES' PARAMETERS: is canopy available(length),is canopy on each dock available?, office area , internet connection? speed of internet(MBPS), is security available? , is

security cabin available? vehicle lift available?(capacity) , material lift available?(capacity) , is driver room available? driver room area , labor shelter available ? distance , min temp, max temp , telecom network availability(good , average, bad) , nearest telecom tower(kms) , is fiber connectivity available , toilet available , no of toilets , separate toilets? , is warehouse racked? , racking level , is water supply available , water tank capacity , is drinking water availble , RO water available? , borewell available? available ?

Since in warehousing facilities the functional aspects are taken care of in the design phase itself therefore it should be kept in mind that it becomes very difficult to make any changes later on . in the future. So the facilities like vehicle lift , material lift , labor shelter ,etc. to make the work of the Laboure's easier should be planned well in advance . (Bin Jianga,∗,Huaqing Wangb,Linda Larsenc,Fengyu Baod,Zhigang Lie,Mathew Pryor)"Sweatshop" manufacturing factories have so much to contribute to the stress and anxiety of the workers in developing or underdeveloped . For this they have always been critisized too.These psychological problems like stress and anxiety are the results of extremely tight schedules of the workers , increasing workloads, and rigid management systems (Harnois, Gabriel , World Health Organization , & International Labor Organization, 2000 ; La Montagne et al., 2014).

PREMISES PARAMETERS: Open storage available , is parking available?(area) ,is permanent parking available ?,is expansion possible ? is it a shared occupancy ? shared % area, empty space.

The parking at the warehouse should meet the demands of the 24x7 commute of the carriers depending upon the distribution activities .In case the warehouse space is a shared occupancy the resources of the warehouse should be utilized in a sustainable manner by each of the occupant company so that the operations of other occupants are not hindered.

SAFETY AND SECURITY PARAMETERS: drainage available , no of fire hydrants ,fire extinguisher Type(water , co2, foam ,DCP) , overhead sprinkler available, as fire alarm available? , no of fire extinguisher , no of wet riser

, is boundary wall constructed? , type of boundary wall (wired fence , bricked) , height of boundary wall , no of security guards , CCTV? , is gated compound?,

According to the Operational Health and Safety Administration (OHSA) in the United States the forklifts lead to about as many as 85,000 accidents which can be categorized as fatal accidents and 34,900 accidents which can be categorized as accidents with serious injuries every year . Of this 85,000 almost 73% of the accidents are related to traffic issues like breaking the signal, overtaking, driving on the wrong side, etc., while the rest can be categorized as being from other causes listed as operational mistakes (Railsback and Ziernicki, 2008). Warehouse safety is highly influenced by the warehouse operations (De et al., 2011). Many studies have been conducted which focus on identifying the causes of accidents in a warehouse .These studies have come up with various solutions to improve the safety (De et al., 2011; Boehning, 2014; Trab., 2015; Hofstra et al., 2018).

Legal parameters : Is CAD layout available , is fire not available? is property tax bill available? is electricity bill available ? , is land conversion certificate available ? , Is trade license available ? , Is tax paid receipt available? ,is property card available? Is encumbrance certificate available? Is FSSAI approved? , ss occupancy certificate available? , lease period , lockin period ,

ENVIRONMENTAL PARAMETERS : rain water harvesting available? transparent roof sheet , is there any water body nearby? Is there any water body problem? , is there a chemical industry nearby?, distance from residential area , is there a seepage of the roof? is there a sunlight roof?

Because of the ever growing demand there is constant pressure on businesses and governments to pay more attention towards the environmental and resource consequences, they need to focus on the sustainable utilization of the ever-increasing production, distribution and consumption of agro-based products.

EASE OF ACCESSIBILITY PARAMETERS :
Is standalone warehouse? , approached road (tar , concrete , muddy) , road condition (good , average , bad) , approached road has dividers ? Distance from divider , Approach road width, Approach road traffic conditions (heavy , light) , traffic time from , traffic time to , possible to add any docks? Is there any bridge ? type (road ,lane), capacity(tons) , Is there a gas pipeline nearby? , , Is there a water pipeline nearby? Is there any high tension wire nearby ? , Are electrical fixations available?, Is there a toll between the city and warehouse?, 40ft Vehicle movement area available , Compound area type(tar , concrete, bricks ,soil) , Condition of compound area(good , avg ,bad) , , Is there any union issue? , Is this a riot prone area? , Any constraint in 24*7 Operations , Is there a transport union issue , Entry restrictions from , Entry restrictions to , Is truck dock space available? Can truck move freely? Is there any parking obstruction , Height of parking obstruction , Parking area condition , Height of premise restriction ,

METHODOLOGY:

STEP 1: The exhaustive list of 164 parameters were grouped under thirteen macro parameters as explained above . These parameters capture the information of warehouses significant for the FMCG sector in terms of location ,finance,property,infrastructure,equipments,amenities,premises,workers facilities, safety & security, environment , legal and ease of accessibility.

STEP 2 : In this step the pairwise comparison matrix of 13*13 was developed . For making the comparisons ratings were given to each parameter using the nine pointer Saaty rating scale

INTENSITY OF IMPORTANCE	DEFINITION
1	Equal importance
2	weak
3	Moderate importance
4	Moderate plus
5	Strong importance
6	Strong plus

7	Very Strong or demonstrated importance
8	Very , very strong
9	Extreme importance
Reciprocals of above	If activity i has one of the above nonzero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i.

Table 1. The 1-9 Scale and the Index Scale in the AHP

PAIRWISE COMPARISON MATRIX

Attributes	LOCATION	FINANCIAL	PROPERTY	INFRASTRUCTURE	STRENGTH	EQUIPMENTS	AMENITIES	PREMISES	WORKERS FACILITIES	SAFETY & SECURITY	ENVIRONMENTAL	LEGAL	EASE OF ACCESSIBILITY
LOCATION	1.000	2.000	9.000	3.000	3.000	8.000	7.000	8.000	5.000	3.000	9.000	6.000	4.000
FINANCIAL	0.500	1.000	5.000	2.000	2.000	4.000	3.000	4.000	3.000	2.000	5.000	3.000	4.000
PROPERTY	0.111	0.200	1.000	0.330	0.330	0.880	0.770	0.880	0.550	0.330	0.990	0.660	0.440
INFRATSRUCTURE	0.333	0.500	3.030	1.000	1.300	2.667	2.333	2.667	1.667	1.400	3.000	2.000	1.333
STRENGTH	3.000	0.500	3.030	1.000	1.000	2.667	2.333	2.667	1.667	1.200	3.000	2.000	1.333
EQUIPMENTS	0.125	0.250	1.136	0.375	0.375	1.000	0.875	1.800	0.625	0.375	1.125	0.750	0.500
AMENITIES	0.143	0.333	1.299	0.429	0.429	1.143	1.000	1.143	0.714	0.429	1.286	0.857	0.571
PREMISES	0.125	0.250	1.136	0.375	0.375	0.556	0.875	1.000	0.625	0.375	1.125	0.750	0.500
WORKERS FACILITIES'	0.200	0.333	1.818	0.600	0.600	1.600	1.400	1.600	1.000	0.600	1.800	1.200	0.800
SAFETY AND SECURITY	0.333	0.500	3.030	0.714	0.833	2.667	2.333	2.667	1.667	1.000	3.000	2.000	1.333
ENVIRONMENTAL	0.111	0.200	1.010	0.333	0.333	0.889	0.778	0.889	0.556	0.333	1.000	0.667	0.444
LEGAL	0.167	0.333	1.500	0.500	0.500	1.333	1.167	1.333	0.833	1.500	1.500	1.000	0.667
EASE OF ACCESSIBILITY	0.250	0.250	2.250	0.750	0.750	2.000	1.750	2.000	0.750	2.250	2.250	1.500	1.000
SUM	6.398	6.650	34.241	11.406	11.825	29.401	25.614	30.645	18.653	14.792	34.076	22.384	16.923

STEP 3: After each parameter is compared with all the other twelve parameters ratings were assigned in each cell as shown in fig. To make the ratings comparable each value was normalized by dividing it with the sum of each column . The mathematical sum of each row , i.e. each criteria will give the overall criteria weight. As calculated in the table below 25.2% weightage has been given to the location parameter which is the highest among all . This means that when an FMCG company will select a warehouse then their decision will be based upon the fact that location should be given the highest priority. Similarly the matrix suggests that according to the research the companies give least importance to parameters like property and environment .

NORMALIZATION MATRIX:

Attributes	LOCATION	FINANCIAL	PROPERTY	INFRASTRUCTURE	STRENGTH	EQUIPMENTS	AMENITIES	PREMISES	WORKERS FACILITIES	SAFETY & SECURITY	ENVIRONMENTAL	LEGAL	EASE OF ACCESSIBILITY	Criteria weights
LOCATION	0.156	0.301	0.263	0.263	0.254	0.272	0.273	0.261	0.268	0.203	0.264	0.268	0.236	0.252
FINANCIAL	0.078	0.150	0.146	0.175	0.169	0.136	0.117	0.131	0.161	0.135	0.147	0.134	0.236	0.147
PROPERTY	0.017	0.030	0.029	0.029	0.028	0.030	0.030	0.029	0.029	0.022	0.029	0.029	0.026	0.028
INFRATSRUCTURE	0.052	0.075	0.089	0.088	0.110	0.091	0.091	0.087	0.089	0.095	0.088	0.089	0.079	0.086
STRENGTH	0.469	0.075	0.089	0.088	0.085	0.091	0.091	0.087	0.089	0.081	0.088	0.089	0.079	0.115
EQUIPMENTS	0.020	0.038	0.033	0.033	0.032	0.034	0.034	0.059	0.034	0.025	0.033	0.034	0.030	0.034
AMENITIES	0.022	0.050	0.038	0.038	0.036	0.039	0.039	0.037	0.038	0.029	0.038	0.038	0.034	0.037
PREMISES	0.020	0.038	0.033	0.033	0.032	0.019	0.034	0.033	0.034	0.025	0.033	0.034	0.030	0.030
WORKERS FACILITIES'	0.031	0.050	0.053	0.053	0.051	0.054	0.055	0.052	0.054	0.041	0.053	0.054	0.047	0.050
SAFETY AND SECURITY	0.052	0.075	0.089	0.063	0.070	0.091	0.091	0.087	0.089	0.068	0.088	0.089	0.079	0.079
ENVIRONMENTAL	0.017	0.030	0.030	0.029	0.028	0.030	0.030	0.029	0.030	0.023	0.029	0.030	0.026	0.028
LEGAL	0.026	0.050	0.044	0.044	0.042	0.045	0.046	0.044	0.045	0.101	0.044	0.045	0.039	0.047
EASE OF ACCESSIBILITY	0.039	0.038	0.066	0.066	0.063	0.068	0.068	0.065	0.040	0.152	0.066	0.067	0.059	0.066

STEP 4: After the criteria weights have been calculated , to verify whether the parameters maintain consistency among themselves or not it is important to calculate the consistency ratio (C.I.) .In order to find this the first step is to find the weighted sum value of each criteria .

WEIGHTED SUM:

Formula used :

Location
=0.252+0.295+.248+0.259+0.345+0.269+0.257+0.243+0.249+0.238+0.250+0.284+0.265=3.454
Financial:0.126+0.147+0.138+0.173+0.231+0.134+0.110+0.122+0.149+0.159+0.139+0.142 +0.264 = 2.034

Similarly the weighted sums will be calculated for each criteria .

Attributes	LOCATION	FINANCIAL	PROPERTY	INFRASTRUCTURE	STRENGTH	EQUIPMENTS	AMENITIES	PREMISES	WORKERS FACILITIES	SAFETY & SECURITY	ENVIRONMENTAL	LEGAL	EASE OF ACCESSIBILITY	weighted sum value
LOCATION	0.252	0.295	0.248	0.259	0.346	0.269	0.257	0.243	0.249	0.238	0.250	0.284	0.264	3.454
FINANCIAL	0.126	0.147	0.138	0.173	0.231	0.134	0.110	0.122	0.149	0.159	0.139	0.142	0.264	2.034
PROPERTY	0.028	0.029	0.028	0.028	0.038	0.030	0.028	0.027	0.027	0.026	0.028	0.031	0.029	0.378
INFRATSRUCTURE	0.084	0.074	0.084	0.086	0.150	0.090	0.086	0.081	0.083	0.111	0.083	0.095	0.088	1.194
STRENGTH	0.757	0.074	0.084	0.086	0.115	0.090	0.086	0.081	0.083	0.095	0.083	0.095	0.088	1.817
EQUIPMENTS	0.032	0.037	0.031	0.032	0.043	0.034	0.032	0.055	0.031	0.030	0.031	0.035	0.033	0.456
AMENITIES	0.036	0.049	0.036	0.037	0.049	0.038	0.037	0.035	0.036	0.034	0.036	0.041	0.038	0.501
PREMISES	0.032	0.037	0.031	0.032	0.043	0.019	0.032	0.030	0.031	0.030	0.031	0.035	0.033	0.417
WORKERS FACILITIES'	0.050	0.049	0.050	0.052	0.069	0.054	0.051	0.049	0.050	0.048	0.050	0.057	0.053	0.681
SAFETY AND SECURITY	0.084	0.074	0.084	0.062	0.096	0.090	0.086	0.081	0.083	0.079	0.083	0.095	0.088	1.084
ENVIRONMENTAL	0.028	0.029	0.028	0.029	0.038	0.030	0.029	0.027	0.028	0.026	0.028	0.032	0.029	0.381
LEGAL	0.042	0.049	0.041	0.043	0.058	0.045	0.043	0.041	0.041	0.119	0.042	0.047	0.044	0.655
EASE OF ACCESSIBILITY	0.063	0.037	0.062	0.065	0.087	0.067	0.064	0.061	0.037	0.178	0.063	0.071	0.066	0.921
SUM	3.732	0.980	0.944	0.985	1.365	0.988	0.939	0.932	0.928	1.173	0.948	1.058	1.116	

STEP 5: Next lambda max will be calculated using the average of the ratios of Wi:Ci

Criteria weights	weighted sum value	wi/Ci
0.252	3.454	13.680
0.147	2.034	13.800
0.028	0.378	13.690
0.086	1.194	13.829
0.115	1.817	15.743
0.034	0.456	13.586
0.037	0.501	13.665
0.030	0.417	13.711
0.050	0.681	13.693
0.079	1.084	13.667
0.028	0.381	13.687
0.047	0.655	13.852
0.066	0.921	13.957

Lambda max = $\sum(Wi/Ci)$ = 13.889

Consistency index(C.I.) = (lambda-n) / (n-1)
C.I. = (13.889-13) /12 = 0.0741013
Random index is the random value which varies with the number of parameters .In this research since the number of parameters are thirteen , therefore the random index value will be 1.56 .
Random Index (R.I.)= 1.56
Now the consistency ratio will be calculated using the formula
Consistency ratio (C.R.) = C.I./R.I.
0.0741013/1.56=0.0475009
Since the consistency index is less that 0.1 it means that the decisions taken during the research for assigning significant weights to different parameters have been consistent and no corrective measures are required in this direction .

CONCLUSION:
Since the demand for FMCG is very seasonal, therefore it is important for the manufacturers to be flexible and capable enough of producing different goods with varying compositions .So to improve the productivity development the major drivers like warehousing and logistics should be improved. Since warehouse plays an important role in the logistics strategy and in its building and maintaining good relationships between supply chain partners therefore judging a warehouse on various parameters becomes altogether more important before selection . The research concludes that all the possible parameters on which a warehouse can be benchmarked are as many as 164 which can be sub categorized under location , finance, strength, equipment's, safety security, Infrastructure, premises, amenities, workers' facilities, environment, legal and ease of accessibility . For the FMCG industry each criterion is of different importance with respect to the other criteria . This has been proved by calculating the criteria weights for each parameter . These criteria weights were calculated using the ratings that were assigned to each parameter in the comparison matrix . The assignment of ratings was based on the feedback from the experts of the FMCG interviews , the warehouse owners as well as the previous research papers . It can finally be concluded that the FMCG industries give top most priority to the location of the warehouse as the criteria weight is 25.2% according to this work , which is the highest among all the parameters . The second most important parameter is finance , the criteria weight for which is 14.7% .The third most important parameter is strength with 11.5% . Infrastructure with 8.6% is fourth ,safety and security with 7.9% is fifth while ease of accessibility with 6.6% is the sixth most important parameter. Legal with 4.7% is seventh ,amenities with 3.7% is eighth , equipment's with 3.4% is ninth ,premises with 3% is tenth . The lowest importance has been given to environmental and property parameters with 2.8% each .

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