A Study Of Emerging Trends and Challenges In Air-Conditioning Industry In India

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INTRODUCTION

In a 'hot' climate country like India, we have a common meaning or conventional understanding of the term 'Air-conditioning' which is 'Cooling the air'.However, Air-conditioning as per its technical definition is a ….
"Process of cooling or heating, cleaning, humidifying or dehumidifying air and distributing the air at proper velocity to achieve desired inside conditions."
Today, air-conditioning has become a 'need' of modern day life in contrast to its earlier perception as a 'luxury' 6-8 years back. Although 'air-conditioners' or the 'air-conditioning systems' are still high energy consuming devices, certain facts like increase in the purchasing power of people with the economic growth in the India , government initiatives like lowering taxes and duties ,liberalization of fiscal policies in terms of foreign direct investment (FDI) etc. has given a boost to the industry and as a result, the industry is expected to grow at Rs. 38,000 Crore by the end of 2012. (Estimate from Financial Report 2008 : Blue Star Limited).

HISTORIC PERSPECTIVE

Mr. Willis Haviland Carrier graduated from Cornell University with a Masters in Engineering and in 1902 developed the first air (temperature and humidity) conditioning machine. One Brooklyn printing plant owner was troubled due to improper humidity and heat. Fluctuations in heat and humidity in his plant caused the dimensions of the printing paper to keep altering slightly, and this was creating a misalignment of the colored inks. The new air conditioning machine created a stable environment and aligned four-color printing became possible.
Mr. W. H. Carrier is known as 'The Father of Air-conditioning'. While working in Buffalo Forge Co., he developed formulae for optimizing the application of forced draft fans, developed ratings of pipe coil heaters and set up a research laboratory. He engineered and installed the first year-round air-conditioning system, providing for the four major functions of heating, cooling, humidifying and dehumidifying.

AIR CONDITIONING INDUSTRY IN INDIA

In India, the Air-conditioning industry is approximately more than 65 years old. Earlier, most of the air-conditioning equipments were assembled and sold (till mid 1950s). Government FDI regulation policies protected the Indian companies till 1990. Very few organized players like M/s Blue Star Ltd. , M/s Voltas Ltd. were in existence in the total product range and players like M/s Amtrex Ltd. and others were in existence in the small air conditioners segment. However, post 1992 (post liberalization policies), new players from the global world entered into the Indian market, either on their own or with collaborative partnership business models.Mainly among them are the likes M/s Carrier Aircon Ltd. , M/s York Ltd. , M/s Emerson Climate Technologies etc. from USA. M/s Sanyo , M/s Toshiba , M/s Daikin and M/s Hitachi Ltd. from Japan. M/s LG Electronics and M/s Samsung Ltd. are leading global players from Korea. Other domestic players moving aggressively are like M/s Videocon Ltd. , M/s Godrej Ltd.
At present in the country, over 10 companies are competing with one another in the Indian AC market in different segments. Companies have formulated collaborative business models in various segments to ensure wide range of products in the various product segments, or service partnership models have been adopted to enrich services or collaborations have been in place for strategic tie ups in the area of designing and engineering capabilities and to achieve various economics of scale benefits.

AC INDUSTRY TERMINOLOGY AND BUSINESS PROCESSES

- **Air-conditioning 'Ton' (TR)** : Capacity of the air-conditioners or air-conditioning systems are measured in the air-conditioning 'Ton' (TR). TR stands for 'Tonnes of Refrigeration.'

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Generally, product capacity varies from 0.5 TR to 1200 TR or plus. Domestic air-conditioners of smaller capacity units vary from 0.5 to 5.0 TR capacities , Air-conditioning systems for light commercial projects vary from 5.0 TR to 500 TR capacities and Air-conditioning systems for industrial projects vary from 200 TR to 1000 TR plus.

- **'High Side' and 'Low Side' of the Project:** Air-conditioning system projects generally used to have two important dimensions. (a) Supply of main air conditioning equipment from the manufacturer, which is know as "High Side" of the project in the industry terminology while (b) The other associated work installation of the equipments, water or refrigerant piping work ,sheet metal duct work for the air transport etc. are known as "Low Side" work as per the industry terminology.

MARKET SIZE AND SEGMENT ANALYSIS

In 2007-08, the estimated market size was close to Rs.9000 Crore (Source : Financial Reports of leading players like M/s Blue Star Ltd. and M/s Voltas Ltd.). Of this, the market for central and Industrial air-conditioning was around Rs.5000 Crores and the market for the domestic air conditioners like window air conditioners and split air conditioners was around Rs. 4000 Crore. (Fig .1) Industry has reported high growth over the last few years due to the growth in infrastructure, power, service industry, IT industry etc. in the Indian Market. The market has been estimated by leading industry players and business analysts to reach around Rs. 38000 Crore in next five years time in India. (Post global economic crisis recession estimate.)

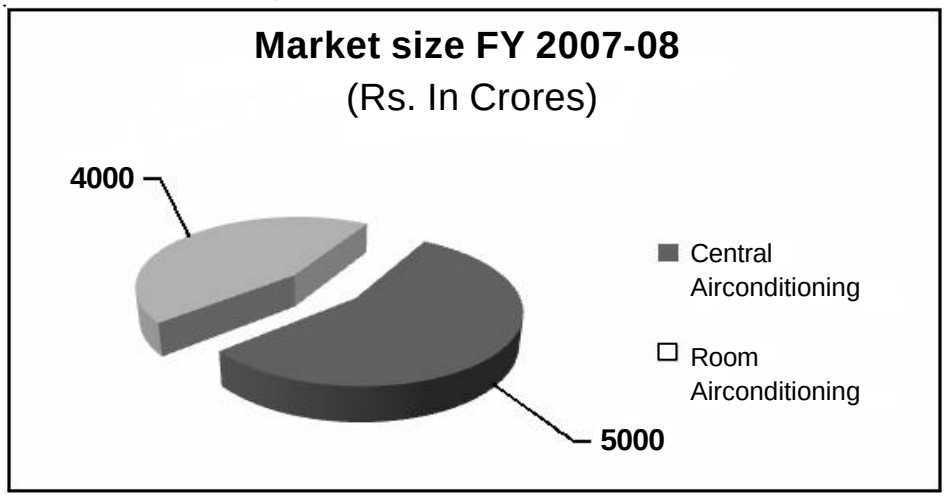

Figure 1: Overall Market Size of the Air-conditioning Industry in India.

(Source: Financial Report, M/s Blue Star Ltd.)

PRODUCT SEGMENTATION AND COMPETITION ANALYSIS

Air-conditioning has two major segments: Room Air-conditioning (RAC) and Central Air-conditioning (CAC).

Room air-conditioning typically signifies air-conditioning for domestic and light commercial applications, wherein, each room is air-conditioned by separate small AC units. The size of such air conditioners used to be 0.5 Tr to 5.0 Tr.

Commercial and Central air-conditioning is air-conditioning of bigger and multiple areas with controls at single point.

CAC is further branched product wise: Direct expansion (Dx) systems and Chiller Systems. Dx systems include PAC(Packaged and Ductable Split systems) and VRF (Variable Refrigerant Flow) systems. (These are the systems normally used for the commercial air-conditioning projects.)

Chillers make use of refrigerants and water to air-condition the areas.

Figure 2 represents the data of various companies present in the Room Air conditioners markets and their relative position in terms of the number of product units sold. Data represents that the total market of India was 2220500 units and the Korean giant of consumer durables M/s L.G. Electronics clearly dominated the market with 600000 units by keeping its next rival and an Indian brand M/s Voltas with a sale of nearly 325000 units. Late Korean entrant and a global competitor, M/s Samsung could manage the third place with a sale of near about 300000 units.

Others small players in RAC market include Daikin, Fujitsu General, Fedders International, Kenstar, TCL etc.

2007-08 MARKET POSITION OF COMPANIES

RAC MARKET SHARE 2007-08

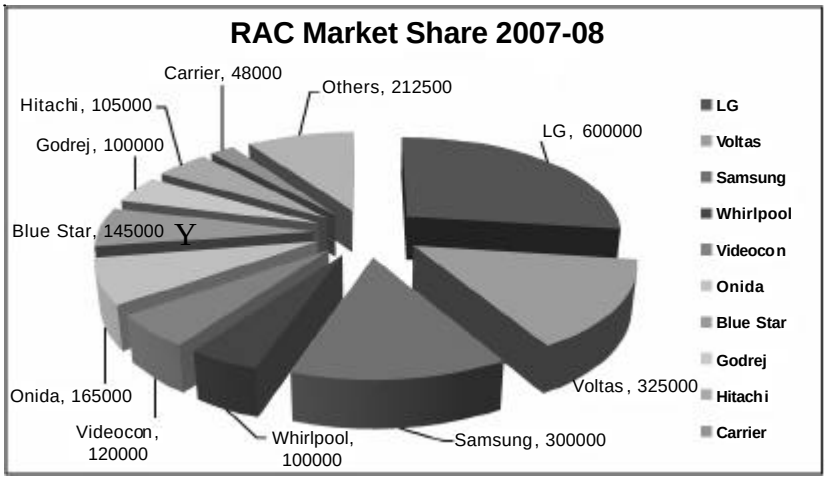

Figure 2: Competitor Analysis for RAC (Indian Market) for FY 2007-08

*(**Source:** JARN, Japan Air Conditioning, Heating and Refrigeration News, 2008)*

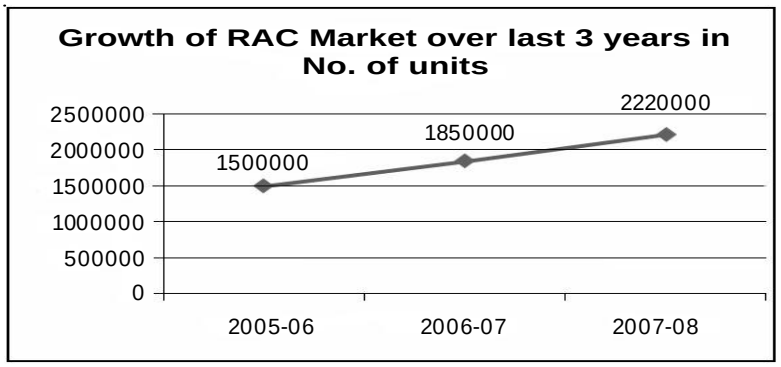

Figure 3: RAC Market Growth rate trend for last 3 years in Indian Market.

*(**Source:** JARN, Japan Air Conditioning, Heating and Refrigeration News, 2006, 2007 and 2008)*

Figure 3 (above) clearly shows how the market for RACs has grown by leaps and bounds in the last 3 years. The market size, which was 150000 units in FY 2005-06 has grown to 2220000 units by end of FY 2007-08. Growth engines for this are demand for light commercial segments, more income in domestic customers and perception of air-conditioners as a need rather than as a luxury.

PAC MARKET SHARE 2007-08

Rules for the game are altogether different in PAC and RAC markets. While RAC depends upon competitive pricing and heavy advertising; PACs quality, project execution capabilities and after sales service support plays a major role in decision making.

The table 1 below shows that from last 3 years, only 5 brands were the major players and the ranking remained the same. M/s Blue Star, M/s Carrier and M/s Voltas together serve around 70-80% of the market.

RANKING OF PAC PLAYERS 2005-06, 2006-07, 2007-08

BRAND	MARKET POSITION
Blue Star	No. 1
Carrier	No. 2
Voltas	No. 3
LG	No. 4
Hitachi	No. 5

Table 1 : Market Position of Major Players in PAC (Indian Market)

*(**Source :** JARN, Japan Air Conditioning, Heating and Refrigeration News, May 2006, 2007 and 2008)*

PAC market has also grown with similar rates as RAC market, though the market size of PAC is smaller than RAC. Air-conditioning has become an inevitable part of any commercial establishment. The rapid growth of Manufacturing, IT and infrastructure has fuelled high demand for Central air-conditioning.

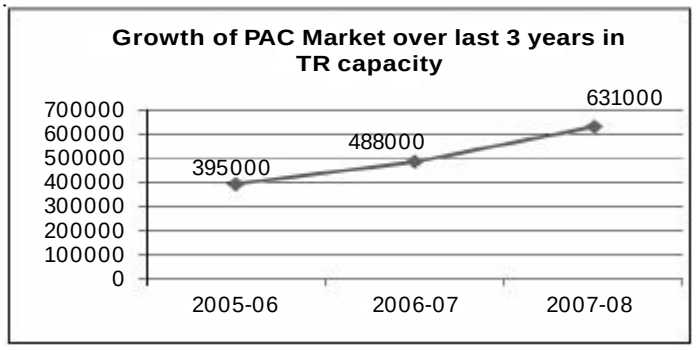

Figure 4 : Commercial Air-conditioning system (PAC) market growth rate trend in last 3 years in Indian Market.
*(**Source:** JARN, Japan Air Conditioning, Heating and Refrigeration News, May 2006, 2007 and 2008)*

MARKET GROWTH RATE IN VARIOUS PRODUCT SEGMENTS

Data analysis from the year 2004-2008 shows that Room air conditioners market has grown from Rs. 2200 Crore in from the year 2004-05 to Rs. 4000 Crore in 2007-08 while Central Air conditioning market has grown from Rs. 2200 Crore to Rs. 5000 Crore in the same time frame. Both the markets have promising growth rates, however, growth in the industries like I.T, Retail, Infrastructure sector and service sector has attributed to the high growth of Central Air conditioning market. A pictorial view in Figure 5 (below) shows how Central Air-conditioning demand increased faster as compared to RACs.

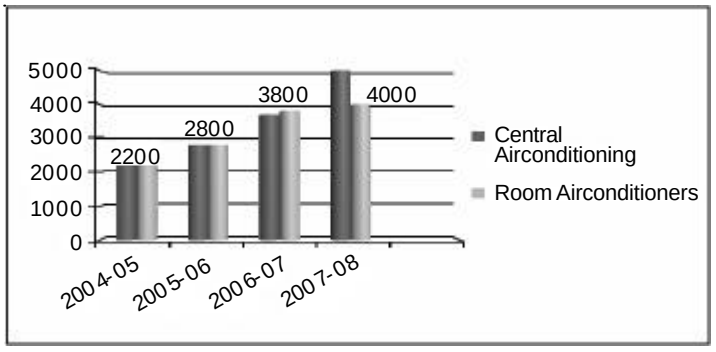

Figure 5: Market Growth rate and behaviour in various segments.
*(**Source:** JARN, Japan Air Conditioning, Heating and Refrigeration News)*

BEHAVIOUR OF CATEGORY

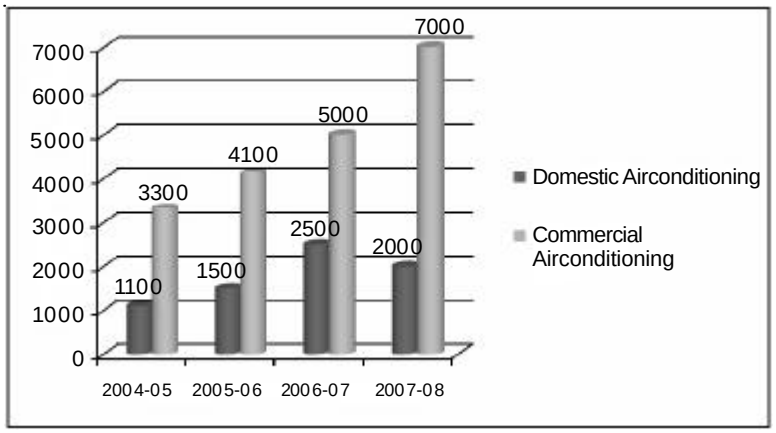

Figure 6: Trends in Various Market Segments
*(**Source:** JARN, Japan Air Conditioning, Heating and Refrigeration News)*

Figure 4 (above) indicates that commercial air conditioning market has grown from Rs.3300 Crore to Rs. 7000 Crore in the last four years while domestic air conditioners market has grown only from Rs.1100 crore to Rs.2000 Crore which clearly indicates that the institutional usage of the air conditioners have increased at significantly faster rate than the domestic usage.

KEY GROWTH DRIVERS OF THE AC INDUSTRY

The AC industry is dominated by various market segments and product segments in India as mentioned earlier. Industry players are operating under intense competitive rivalry. For being successful and for sustainable operation in the Industry in India, the following are the key growth drivers of the Industry:

(1) Product Range

As we have seen, Air-conditioning products are ranging between 0.5 TR to 1200 TR (and more) and different product segments have a different market. Wide product range can have clear competitive advantage for the players to operate in the industry.

However, managing business in each product range has a distinct requirement of strategic business models, resource capabilities, distribution channels, sub vendors, and marketing activities. For e.g., High ended project execution needs a separate engineering and planning department, skill and requires more of engineering people while business of the room air conditioners require a distribution network and more of the retailing skills.

(2) Technology

Like many other engineering industries, Air conditioning industry is also driven by the innovation management. Since the entry barrier in copying the technology is low (less than 2 to 3 years), technology innovations and range has been dominating as one of the important key growth drivers. Companies operating with the wide range of products and having innovation in technology have always headed the growth.

Major innovations in the industry evolve around three major factors:

(a) Energy Consumption (b) Environment Friendliness (c) Customer Comforts

(a) Energy Consumption

Energy cost is a major cost of concern for using air conditioners either by an individual or by the institutions. Air conditioners are still one among the highest energy consuming device. Majority of the air conditioning innovation targets towards the lower energy consuming products. Bureau of Energy Efficiency (BEE) rates the products on the ground of the electricity consumption – they give star ratings to the various air conditioners, starting from one star to five star ratings based on the electricity consumption. Product innovation with lower energy consumption remains an important selling aspect and marketing communication for the companies.

(b) Environment Friendliness

Air conditioning industry at present is using the refrigerant gas which is known as *CFC, Chlorofluorocarbon, CFC (R12), Hydro chlorofluorocarbon HCFC (R22).*

During the literature review on various technical aspects of air-conditioning journals, it is found that the fundamental and the most important reason for global warming is ozone depletion and the most important reason for the ozone depletion is the usage of CFC and HCFC refrigerants. Thus, the industry is mainly responsible for the global warming and ozone depletion. Alternative refrigerant gases with lower ozone depletion potential are (R 134a) already available in the market, however, the product technology has changed accordingly and inventions on the products are now around the same.

(c) Customer Comforts and Aesthetics

Customer comfort is another area of industry focus and industries are trying to innovate electro-mechanical devices using more of the electronic engineering modifications and synchronizing it with mechanical operations to make it more user friendly and comfortable for the customer. For e.g, introduction of air conditioners with remote controls, adding more features to the remote controller, inverter driven air conditioners, programmable air-conditioning systems etc. (Entire system of over 1000 tonnes capacity can be operated with a laptop from anywhere.)

Architects and Interior designers have always remained major influencers for air-conditioning industry. Location and outer look of air-conditioners have always remained concerns for them to integrate it better with interior designs. Air-conditioning industry players specifically focus and innovate around the outer look of the air-conditioning devices.

(3) Skilled and Semi-skilled Techno-Managerial Human Resource

Products and projects of AC industry demand for the semiskilled engineering human resource and skilled engineering management. Engineering and Management skilled labor is needed for products and project business of the industry. Availability of the appropriate human resource is the key competitive growth driver of the industry. India has a strong base of nation wide I.T.I and Engineering colleges and has adequate supply of the engineering human force. However, increased competitive rivalry has been putting constant pressure on the cost side, and entry of newer players provide an opportunity to experienced employees. AC industry in the gulf countries has also attracted quite a large amount of engineering force of the AC industry in the last decade.

All of the above factors have resulted in the increase in attrition rate of the human resource in the industry.

(4) Supply Chain and Distribution Relations

On time completion of the project execution and delivery of the goods and services has been an important dimension in AC industry in today's market context. For being competitive in engineering project business, a company needs to be competitive in execution of the project which also needs electro-mechanical supplies and installation. (In the industry specific terms, use for the same is "Low-Side work.") for e.g. supply and installation of pump sets, cooling towers etc. A vendor relation for the same (either for the supply of the equipments or contracting labor) plays an important role for the successful and in time project execution activities. Supply of core air-conditioning equipment (which is termed as "High-side") used to be the key responsibility of the company. An efficient dealer network or supply chain logistic of the company is the utmost important growth driver in the extremely competitive market.

(5) Customer Satisfaction

Various product segment industries have different B2B (Business to Business) or B2C (Business to Consumers) business models. Like for domestic air conditioners, for household usage (ranging from 0.5 tonnes to 5.0 tonnes), normally companies use B2B relationship and sell the product to the dealers only, using the push strategy.

For air-conditioning projects of high value orders, normally, companies operate with B2C relationships – keeping capital investments in mind. Normally, they used to be the direct marketing activities of the companies.

In all the market segments, since the industry has over 7-10 players to compete with one another, good relations with the customers or a repeat business always gives a mileage over competition.

SWOT ANALYSIS OF THE INDUSTRY.

After remaining fragmented or un-organized industry for many years with lots of small players, now the AC industry has been recognized as a growing sector. Government initiative in lowering stage wise excise duty from 32% to 14.48% (Now 10% as in a recessional crisis) on the branded goods has helped the industry in being an organized industry. Brief SWOT analysis for the Industry in India is done here.

STRENGTHS	WEAKNESSES
• The Industry has been growing at an approx. average of 25% over last 5 years. • At present, the Industry is valued at approx. Rs. 9000 Crore, which is expected to grow to Rs. 38,000 Crore by 2012. • Due to the hot and humid climate in India, the AC industry has high growth potential. • Adequate availability of technical semi-skilled and skilled human resources are available in India. • Easy availability of raw-material.	• Intensive competitive rivalry has been putting pressure on contribution margins. • High duties and taxes on the products results in high manufacturing costs. • Delivery time in the supply of equipment such as high ended chillers or technology products. • Transportation cost and time. • High cost of electricity has been a major hurdle in the demand growth of domestic air conditioners in India.
OPPORTUNITIES	**THREATS**
• Infrastructure growth rate like growth of airports, railway stations (metro stations), IT parks, Power stations and Telecom industry will generate huge demand for the industry. • Growth in service sector like Retail, IT and Banking sector and customer expectation for better ambience will be an opportunity for the Industry. • Growth in retail cold chain business will help the industry to sustain in recessional economy too.	• Globally changing technology and change in environmental laws globally. • Dumping of goods from the foreign markets like China. • Attrition of the Human Capital and migration to Gulf countries. • Heart of the system is "Compressor Technology". India is dependant on the collaboration for the compressor technology.

FIVE FORCES ANALYSIS (MICHEL PORTER'S MODEL)

(a) Entry Barrier

AC industry has a promising growth rate, however, the entry barrier in the industry is high. Capital investments are needed in manufacturing and engineering plants. One who wants to enter this industry also needs a wide and advanced range of products, Technology innovations etc. The capacity building in manufacturing, research and development required high capital investment. Besides, it is also difficult to develop a nation wide logistic and supply chain, skilled human resource for the project management, engineering design and installation capabilities, nation wide sales and service network or distribution network. Over ten established 'Brands' in the Industry also create entry barriers for the new entrant.

End-to-End (Design to Execution to Service) Capabilities in AC industry creates high competitive advantage for the industry players and creates entry barriers for the others.

(b) Competitive Rivalry

The industry has over ten national and international brands in all its product segments, which creates intense competition in most of its segments and competitive rivalry is very high. High competitive rivalry has reduced the contribution margin for the manufacturers in each segment and all the players are adopting dynamic marketing strategies to attract and build the customer base.

(c) Bargaining Power of Buyers

Since the industry has extreme competition in all the segments and there are more than 8 players in all the segments, buyers are always at the benefit and they have high buying power over the supplier. The Industry is completely driven by the buyers, however, certain product differentiations, technological advancements and service differentiations have given an upper edge to some of the players in the industry in a particular market.

(d) Bargaining Power of Suppliers

Bargaining power of the supplier is naturally low since the industry has a high demand and mostly, all the players are mass scale manufacturers, but it is important to note that commonly used components in manufacturing of air conditioners are metals like galvanized / mild steel sheets, copper tubes. Project execution also uses metals like mild steel pipes for water circulation. Prices for such metals are controlled and fluctuate internationally and have an impact on the entire market. The heart of the air-conditioning equipment is compressor technology, certain suppliers who have technology advantage and expertise in manufacturing enjoy high buying power globally.

(e) Threat of Substitutes

Only a substitute for the HVAC industry is a " Vapor Absorption System" (VAM) which is an environmental friendly technology suitable for the high ended projects. However, due to certain distinct disadvantages, the technology has not yet affected badly to the "Direct Expansion" (DX) type compression systems. As a part of the long term business strategy, many leading players have started developing both the technologies in house or they are in collaboration for the dual options.

LATEST MARKET TRENDS

- **Green Movement**

  As the Green movement is spreading its wings, more and more players are emphasizing on Non CFC refrigerants with Zero Ozone Depletion potential.

  Most of the companies dealing in chillers and VRF products are providing products with Green gas like R134A and R410.

  In smaller products- like Packaged and Ductable Air-conditioners, the movement is yet to gain momentum. Looking at the future and demands (from Industrial customers who are conscious of the environment), some companies have taken lead and started providing products with CFC free R407C refrigerant.

  RAC being a more price sensitive segment; nobody is emphasizing on non CFC refrigerants in these products; though some players do provide RACs with CFC free refrigerants.

- **Attractiveness To Manpower**

  Air-conditioning industry in India has always been less attractive as compared to other industries in terms of growth opportunities and remuneration. Though industry has improved a lot; they need to take measures like better opportunities, competitive remuneration which will fetch better managerial and technical pool to the industry.

➢ **Big-size Contractors**

In contrast to companies executing the whole job with low-side work, many big contractors have risen to the opportunities in Central Air-conditioning. Big contractors like M/s Sterling and Wilson, M/s Suvidha, M/s Patel Airtemp, M/s Flaktwood etc. have capabilities of executing multicrore projects. Because of lower overhead ex penses, these contractors are cost effective and fast. Many new players in the market are resorting to selling their equipment to such contractors.

CONCLUSION

1) Air-conditioning industry has a huge growth potential, taking cognizance of higher push on Infrastructure development in India.
2) There many players in the market to fulfill the demand, but the required techno-managerial talent pool has become a scarce commodity. Also, the research focus of this industry is lesser as compared to other industries. With some measures, the industry needs to attract new talent.
3) Due to the mutual exclusivity in the skill sets and capabilities, players will opt for various collaborative business models and strategic partnership in the areas of product range, technology and project management and execution skills. For example, recently, USA icon M/s Carrier has formed a strategic tie up with Japanese giant M/s Toshiba air conditioners for the Indian market – The business model will help the Japanese players in having established supply chain network and project execution teams of M/s Carrier network and M/s Carrier Aircon will get benefited for the green product technology developed by M/s Toshiba.
4) Players with differentiated and wide range of products, technological advancement in the products, Project man agement skills , Supply chain network and after sales service network can certainly create the leadership position and can dominate.

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