Business Development From Start to Scale

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Week - 04
Market and Competitor Analysis
Lecture - 18
Market Structures

Hi friends, welcome to the NPTEL course Business Development from Start to Scale. We are in week 4 with the theme of Market and Competitor Analysis in this lecture the 18th in the series we discuss the topic of Market Structures.

The objective of this lesson is to illustrate how product clusters create macro markets and individual product lines can create micro markets. This principle is illustrated with reference to two industries most of the information is taken from public domain websites of the companies as well as analyst and other annual report related data sources.

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So, the first of the two industries is the off highway brakes industry, it is a co-learning presentation developed by Murugesh B and IIT Madras DOMS MBA student.

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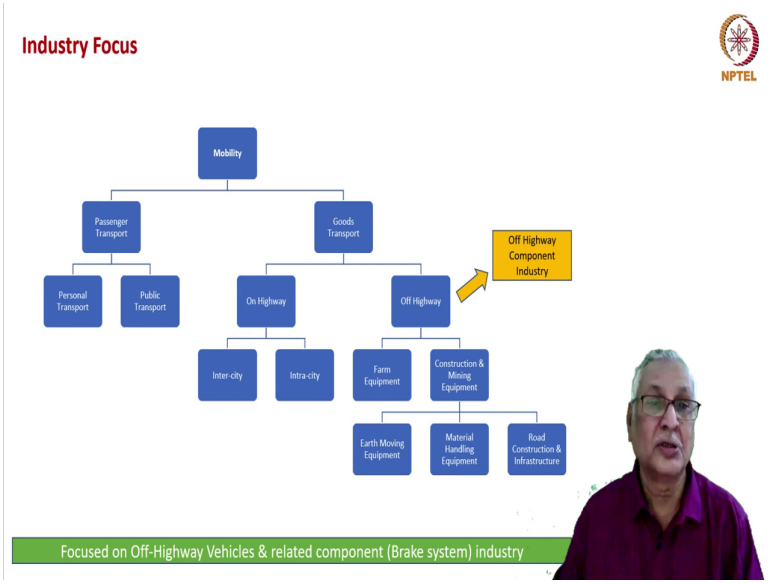

So, let us look at the industry focus, if you look at mobility as one large industry it can have passenger transport and goods transport as the two sections, passenger transport has personal transport and public transport as two subsections.

When you look at goods transport there is an on highway and there is also a off highway division. On highway again is in terms of inter-city and intra-city, off highway is in terms of farm equipment, construction and mining equipment and construction and mining equipment is further subdivided into earth moving equipment, material handling equipment and road construction and infrastructure.

So, if you look at the whole universe of mobility vehicles these are classified in terms of different transportation modes and each transportation mode is further subdivided into more

specialized transportation modes. Whatever we see on the roads regularly is the passenger transport or goods transport at the macro level.

And passenger transport is divided into what we travel personally by way of 2 wheelers and 4 wheelers or in public buses as public transport. However, when you look at goods transport the division is even more complex as I have read out, on highway means it could be within the city public transportation or between cities coach and bus transportation.

What is more complex is the off-highway transportation which comprises tractors, tillers and such other farm equipment and the infrastructure related construction and mining equipment. These again are further divided as you have seen. Out of this the brakes and other components vary in terms of the design characteristics, strength characteristics and also the overall volumes.

When you look at the passenger transport the requirements are in large numbers, the sophistication of the design is high in terms of the tolerances; however, the duty cycles are not as rigorous as in off highway component industry. The brakes or other components for off highway vehicles or less in numbers, but are expected to be much more durable in consonance with the nature of the equipment that handle off highway.

This presentation is focused on off highway vehicles and related component which is brake system and that constitutes an industry as far as this study is concerned.

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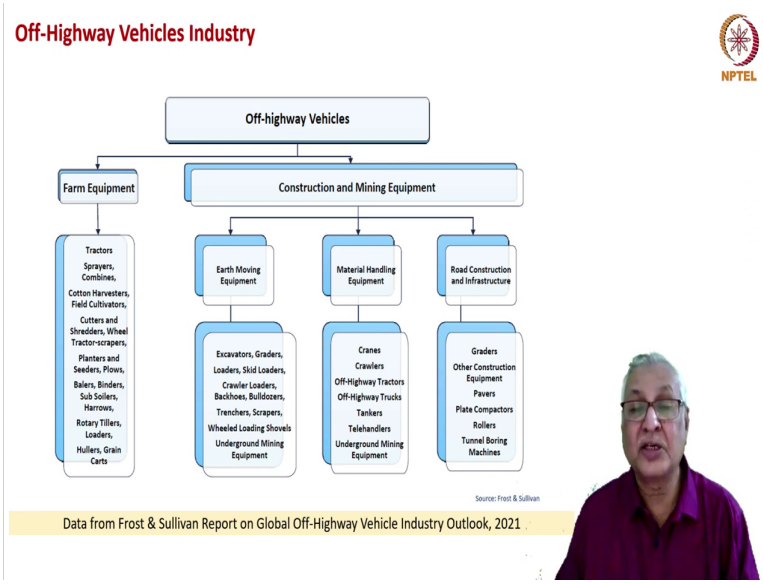

As I said each of the categories can be further subdivided, even the passenger category can be subdivided, but it cannot be as extensive in its subdivision as the off-highway vehicles. So, when you look at the farm equipment within the off-highway vehicle segment you have tractors, sprayers, combines, cotton harvesters, field cultivators, cutters and shudders, wheel tractor scrapers, planters, seeders, plows, balers, binders, sub soilers, harrows, rotary tillers, loaders, hullers and grain carts.

And what is common amongst all of these they are all agricultural equipment of different types and for different kinds of agricultural use and probably also for different types of field conditions. When you look at the construction and mining equipment, they are broadly going to fall under three classes.

The first is the earth moving equipment; excavators, graders, loaders, skid loaders, backhoes, bulldozers, trenches, scrapers, wheel loading shovels, underground mining equipment these all fall under earth moving equipment. The purpose of these earth moving equipments are to take away the earth from the construction sites or non-construction sites move them and put them under required usage conditions in other sites.

The second classification is the material handling equipment; these are cranes, crawlers, off-highway tractors, off-highway trucks, tankers, telehandlers, underground mining equipment and so on. They move very robust, very weighty construction equipment or the components thereof from one place to another place. These are the material handling equipment also within the construction site they undertake the handling of materials from point A to point B.

Then we have road construction and other infrastructure equipment; these are graders, other construction equipment, pavers that is which make the road surface very smooth, plate compactors, rollers, tunnel boring machines and so on. Tunnel boring machines are important in construction of metro rails and could even be important for the hyper loop kind of infrastructure development which Elon Musk is proposing.

This data has been sourced from Frost and Sullivan report on global off highway vehicle industry outlook 2021. What this chart telling illustrates is that there could be a macro market based around off highway vehicles; however, each product line and in some cases even each product could constitute a micro market and the development of market structures is dependent on the product hierarchy that we may encounter in each product cluster.

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So, this firm Carlisle Brake and Friction is a specialist in the development of brake items and frictional items for the highway equipment, they also provide hydraulic solutions. This company is a leading global solutions provider of high performance and severe duty cycle brake, clutch and transmission applications which are suitable for a wide range of markets.

There is a combined R and D and testing capability, there is global manufacturing capability and as group of subject matter experts. Therefore, the products are in terms of highly engineered precision braking systems very durable along with transmission and hydraulic actuation products.

The company has 80 plus years of experience in the highly demanding off-highway brake system solutions. It is also a preferred partner with many OEMs in the specialty applications such as energy, military, railways and aviation. So, two things come out of this one the

overall focus on the off-highway situation and the kind of customized solutions that are offered for each product line.

And thirdly collaborative business development along with domain organizations as well as individual vehicle organizations.

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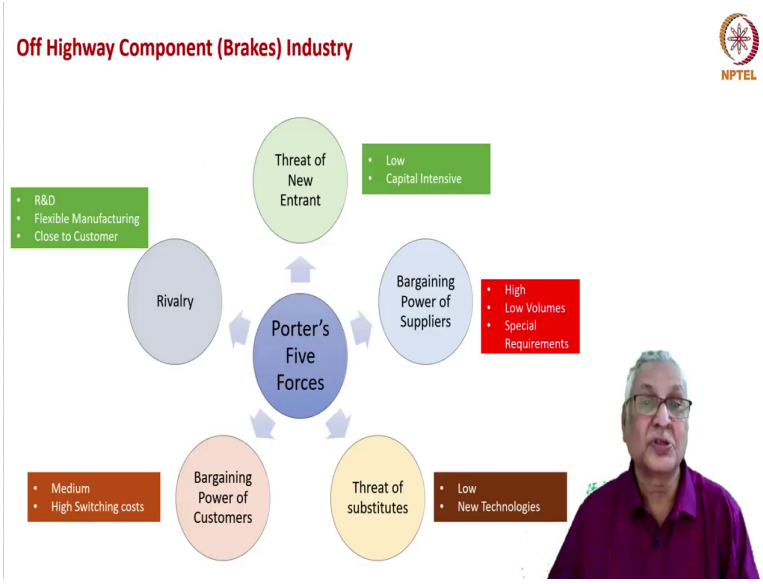

So, the off-highway component brakes industry is also subject to the five forces; the threat of new entrant is generally low because the whole industry is capital intensive and the volumes are not too high therefore, only those companies which can afford a capital-intensive entry even for low volumes can sustain themselves with new entries. And those established companies gain this as their entry barrier against the new competition.

The bargaining power of suppliers that is the brake offering is very high, because the volumes are low and the requirements are special. As far as the threat of substitutes is concerned, one may see that the overall design profile of the vehicles tends to be standard and rather unvaried over the years that is there is no great technological obsolescence or there is no great rapid technological evolution in the off-highway industry.

Therefore, the threat of substitutes is rather low and new technologies come more as improvements rather than disruptive technologies. The bargaining power of customers is medium and the switching costs are very high because spare parts occupy a central place in the overall operating cost of the half highway vehicle.

As far as the rivalry is concerned R and D dictates the level of rivalry, flexible manufacturing dictates the level of rivalry and the proximity to the customer moderates the level of rivalry. There could be still some kind of new development such as clean engine off highway vehicles, but that seems to be on a longer term horizon.

Because for these kinds of new clean energy options to be successful high volume viability is required which this industry does not offer in the immediate scale. Already the vehicles are priced high and if you want to have low volume energy efficient or clean energy alternatives the prices will only go up further.

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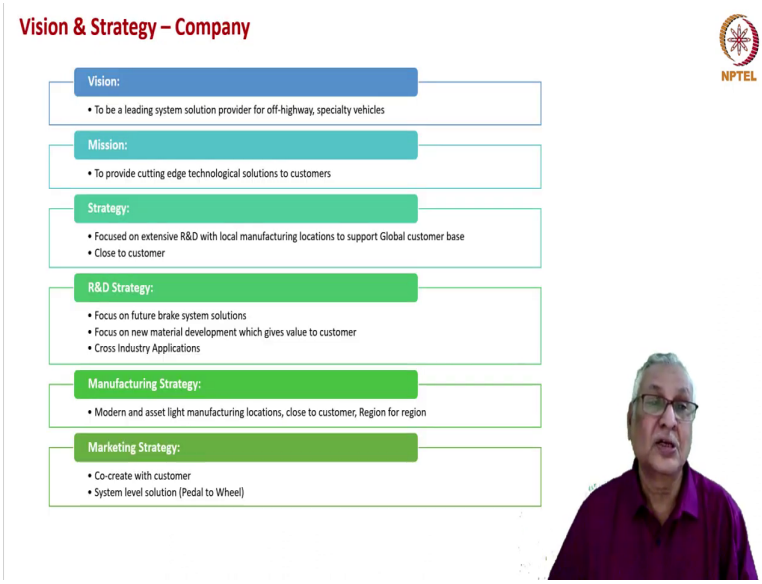

The vision and strategy of the company were as follows; the vision is to be a leading system solution provider for off highway specialty vehicles. The vision is very focused and it is as good as the off high specialty vehicle industry moving forward. The mission is to provide cutting edge technological solutions to customers.

Strategy focused on extensive R and D with local manufacturing location to support global customer base. Note this; the company has decided to outsource as well as offshore manufacturing to support global customer base and the idea is to be close to the customer mainly because the equipment are so heavy that it does not make much sense to keep moving components and vehicles from geography to geography.

The other component which is very important is the R and D strategy, the focus is on futuristic brake system solutions, focus on new material development which gives value to

the customer and cross industry applications that is if one type of brake system is applicable for more than one type of vehicles in this off highway application then that would be synergistic in terms of the R and D strategy.

Manufacturing is in terms of modern and asset light manufacturing locations close to customer region by region and the marketing strategy is to co create with customers the kind of earth moving equipment or the off-highway equipment that are required and generally the solution is not in terms of vehicle, but in terms of system level solution.

A coal mine may require different kinds of tractive power different kinds of mobility parameters compared to an iron-ore equipment or a road construction equipment. The marketing strategy has to be customized to each application.

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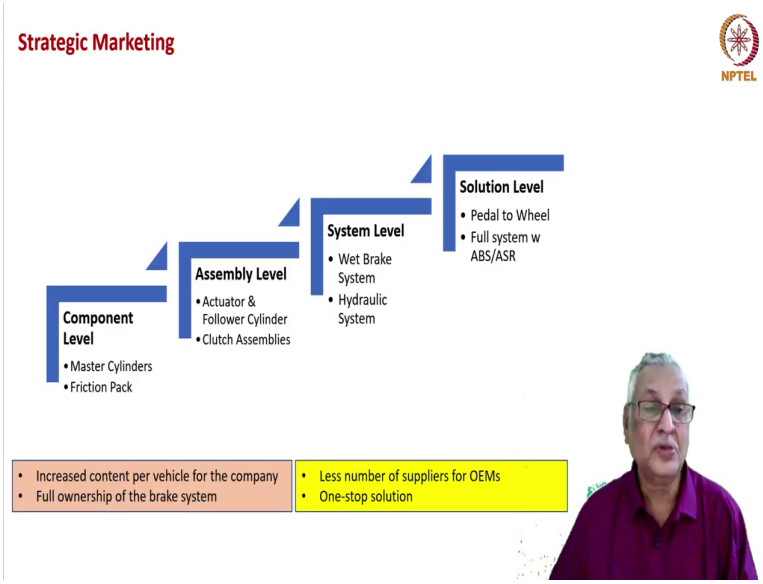

In this situation strategic marketing plays a very big role at the component level master cylinders and friction packs are the ones which are positioned as the key differentiators. At the assembly level actuators and follower cylinders as well as clutch assemblies are positioned.

At system level the type of brake system whether it is the wet brake system or the hydraulic system is positioned and at the solution level pedal to wheel or full system with ABS ASR are positioned. This indicates that marketing and business development in this industry is not just marketing as commonly understood in an FMCG industry or a consumer electronics industry.

It is much more techno economic in terms of conveying the technical features and getting the buying. If a company has increased content per vehicle and it provides full ownership of the brake system then it automatically leads to less number of suppliers for the OEMs and the OEMs also prefer one stop solution.

Therefore, in this focused area to be as comprehensive as possible in terms of technology and cost competitiveness would drive business development.

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Let us go to the semiconductor process control solution again this is an IIT Madras doms project student credits are Muki V. S. Nithya Ramamoorthy and Srinivas Kanala information is again sourced from the publicly available website information.

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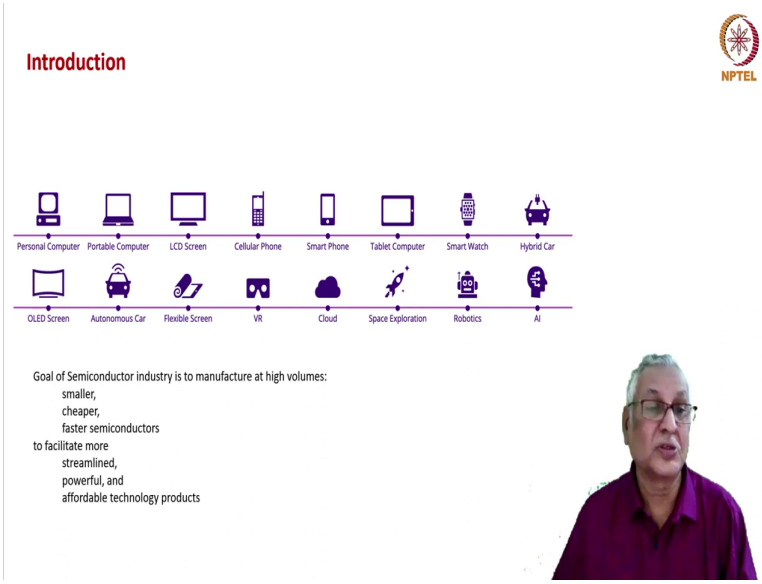

As we know the computing devices are multifarious today, personal computer, portable computer, LCD screen, cellular phone, smartphone, tablet computer, smart watch, hybrid car or some of the devices or equipment which require semiconductors. But in terms of the operation of certain accessories as well semiconductors are required the OLED screen, autonomous car, flexible screen, virtual reality, cloud, space exploration, robotics, AI.

What is to be noted is the semiconductor or the chip is the heart of any computing device as well as the connectivity with the accessories and the connectivity of this system with the storage facilities either server based or remote cloud based. In such a situation we can understand the ubiquitous nature of the semiconductor industry, it is there in every product, it is going to be there in every household product even to a greater degree.

Sensor systems also require semiconductors to operate, the goal of semiconductor industry in this context is to manufacture at very high volumes: smaller, cheaper and faster semiconductors and this strategy is required to facilitate more streamlined, more powerful and more affordable technology products.

We have seen during the COVID times that there has been a significant shift towards computing devices, telecommunication devices and sensors, as a result of which the semiconductors which traditionally used to go to vehicles have faced a serious supply roadblock and this has in turn affected the output of those kinds of products.

Semiconductor may be one item in terms of the overall technical characteristic or the design feature, but in terms of how a semiconductor powers different products and therefore, different industries is really multifarious. We need to understand this positioning of semiconductor technology to appreciate better how business development for semiconductors could take place.

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KLA Tensor Corporation is a provider of process control and yield management solutions for semiconductor and related non electronics industry. They develop and manufacture process control and process enabling solutions that accelerate the electronic devices. Here we are not talking about the chip per se if a chip has to be done.

We require the foundry for the chip, we require the manufacture of the chip and finally, the coding of the chip. There are several instruments which are involved in this process defect inspectors, nanoindenters, optical profilers, sheet resistance mappers, stylus profilers, thin film reflectometers. So, this is very sophisticated technology in terms of design and manufacturing.

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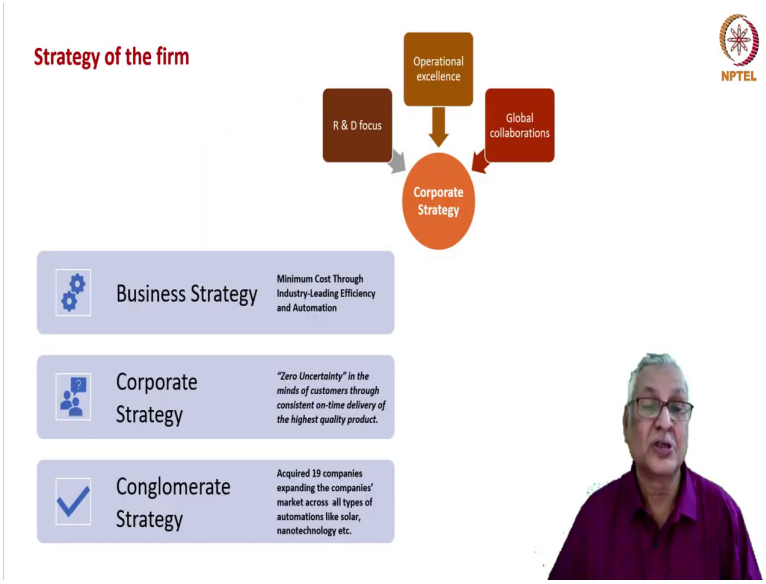

So, in this the strategy of the firm has to be accordingly developed semiconductors being a highly competitive industry, the business strategy must aim at minimum cost through industry leading, efficiency and automation. The corporate strategy that is the next higher level of strategy must look at 'zero uncertainty' in the minds of customers and the customers are the businesses which deal with computers.

Which deal with automobiles through consistent on-time delivery of the highest quality product. And the highest level the conglomerate strategy is one of acquiring as many companies as possible to ensure that the companies cover a large market across all types of automations like solar, nanotechnology etcetera.

We have seen earlier that the semiconductor by name could be one, but the applications it powers are several and each of the chips that powers each of these special applications would

in itself be special therefore, there are companies which are specialized in different types of chips for different types of industries.

Here the business development approach comes up as one of acquiring companies to be able to broad base the product and manufacturing capability across the various industrial verticals. The corporate strategy is in terms of the R and D focus, operational excellence and global collaborations only when all these three are combined the strategy of a semiconductor firm can be comprehensive and fruitful.

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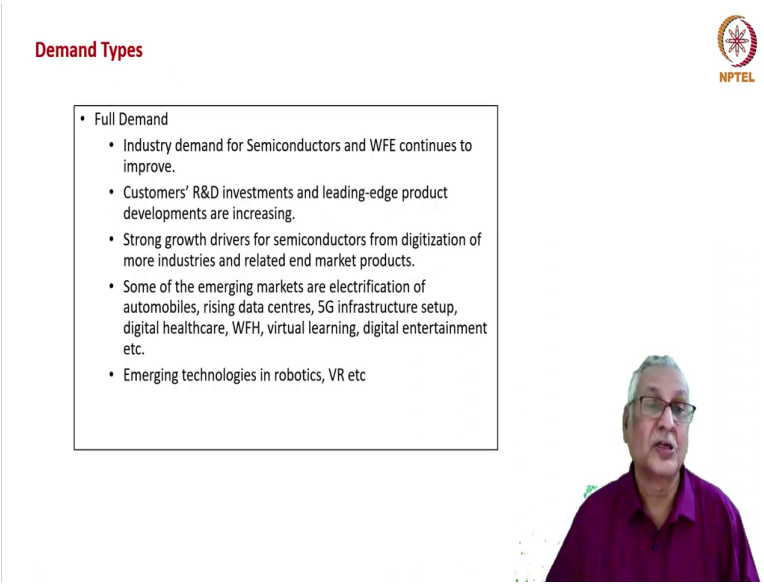

So, what are the demand types that are experienced by the semiconductor industry? The types of demand has been mentioned by me in an earlier lecture from something as negative demand to something as over full demand I have mentioned. So, as far as the semiconductor

industry is concerned it is encountering or it is facing a full demand situation the industry demand for semiconductors is only going to continue to improve.

And the customers R and D investments and leading-edge product developments are only increasing. There are strong growth drivers for semiconductors from digitization of more industries and related end market products, every interface in fact, can have a semiconductor going forward.

Every agricultural action, every mechanical action and every service action would have semiconductors in their activity platforms. Some of the emerging markets for semiconductors are electrification of automobiles, automation of automobiles, rising data centers, 5 G infrastructure setup, digital healthcare, work from home, virtual learning, digital entertainment etcetera.

There are also emerging technologies in robotics, virtual reality etcetera which will demand high use of semiconductors, gamification or the use of games in mainstream industries or the educational and learning industries is going to give a further philip to the use of semiconductors in such industries.

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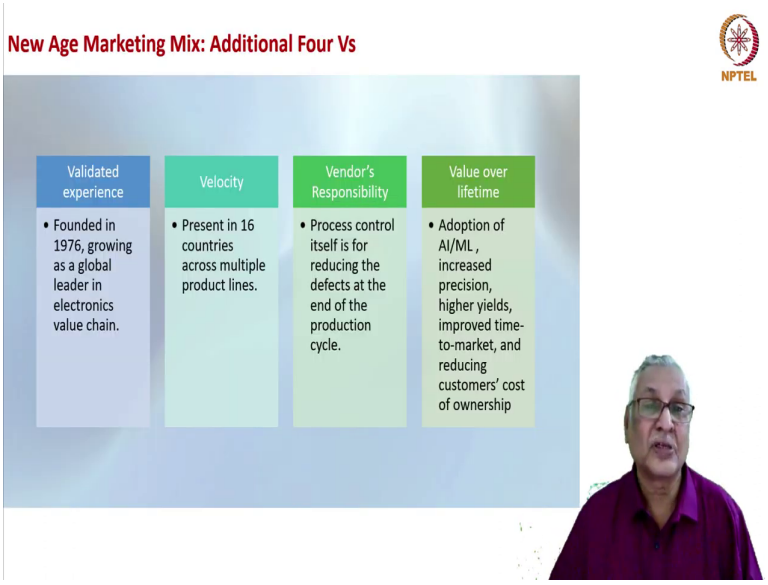

We have seen earlier the new age marketing mix which I referred to these are the additional 4 Vs, we need to have not only the 4 Ps which we talked about earlier in terms of product, place, promotion, pricing. We need to have these 4 Vs validated experience in the case of this company it was founded in 1976, along with the growing use of chips and it has grown over these past several years as a global leader in electronics value chain.

Second; velocity is it going to be a single product, single country company or it is going to be a multi-product, multi country company, the velocity of growth has been very high and the company being present in 16 countries across multiple product lines illustrates that. Then the third one is the vendors responsibility; process control itself is for reducing the defects at the end of the production cycle these semiconductor is known by the quality of the process control.

And the value over lifetime depends on the kind of applications for which the semiconductor can be used and this could include adoption of artificial intelligence and machine learning, precision, higher yields, improved time-to-market and reducing customers cost of ownership.

So, these are the 4 Vs that are relevant for a technology-oriented company such as the company we are discussing in the field of semiconductors.

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So, how do we develop marketing strategies and plans for such a company, marketing as we know derives its strengths from its basic concept of marketing that is position a product where demand is there or create demand where the product is available through appropriate communication and achieve holistic business management.

There are four aspects of marketing which even a semiconductor company needs to do relationship marketing particularly because all the customers or big businesses and big industries. Second integrated marketing because it is not just selling it is techno economic selling and marketing that is involved in marketing the semiconductors.

Third internal marketing because right from the raw material sourcing to the making of the final chip and the delivery the entire organization has to be aligned with the rigor that the end user industry expects from the semiconductors. And the fourth is the performance marketing, performance of marketing division by itself and also marketing leveraging the high performance of the semiconductors for marketing the products.

So, how do we achieve the right mix in such a situation? We need to have customer product profitability analysis; you need to have SWOT analysis and you need to have opportunity and threat matrix.

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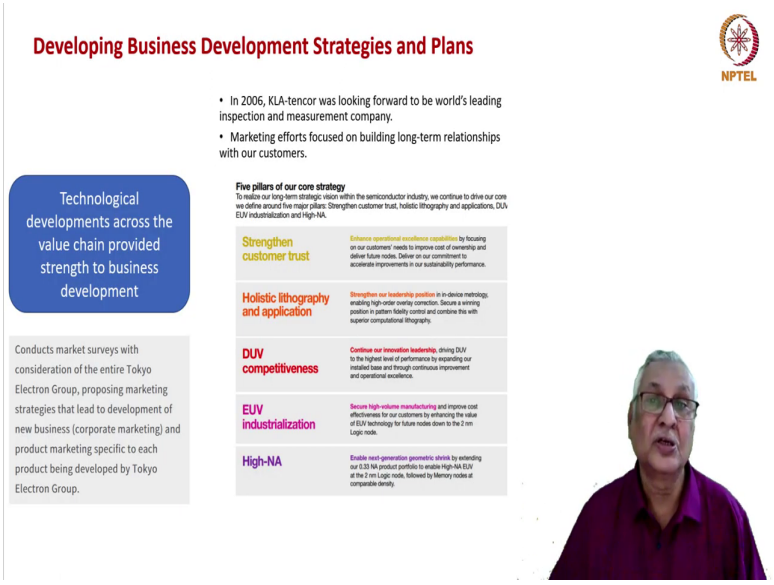

How do we develop business strategies and business development strategies and plans for those kinds of products? In 2006 KLA tencor was looking forward to be the world's leading inspection and measurement company. Marketing efforts focused on building long term relationships with the customers.

This is extracted from their website as the five pillars of the core strategy when you relate it to any industry you will find that there is going to be some similarity in some area, but the technical nature is very much prominent in this kind of industry. The first is to strengthen customer trust and how do you do that enhance operational excellence capabilities and by improving the cost of ownership and delivering the future nodes for the customers.

Customers can believe that there would be continuous upgradation of the semiconductors and they will be effectively utilized for their new generation products. Second holistic lithography

and application that is strengthen the leadership position of the company in in device metrology, metrology means measurement sophisticated measurement is called metrology, enabling high order orderly correction.

Securing a winning position in pattern fidelity control and combining it with superior computational lithography, lithography is the core of preparation of the semiconductor. Then, DUV competitiveness continuing the innovation leadership driving, DUV to the highest level of performance by expanding the installed base and through continuous improvement and operational excellence.

Then the EUV industrialization secure high volume manufacturing and improve cost effectiveness for our customers by enhancing the value of EUV technology for future nodes down to the 2 nanometer logic node. High-NA enable next generation geometric shrink by extending the 0.33 NA product portfolio to enable high NA EUV at the 2 nanometer logic node followed by memory nodes at comparable density.

I am deliberately not explaining or expanding these abbreviations because I want you to get a dip into the technology and the technical nature of business development in companies such as these. I would request you to refer through Google these terms and try to get an appreciation of what this means in terms of the overall semiconductor industry.

The key point therefore, is that technological developments across the entire value chain provided strength to business development in this case. The company conducts market service with consideration of the entire Tokyo Electron Group, proposing marketing strategies that lead to development of new business which is corporate marketing and product marketing which is specific to the products being developed by the Tokyo Electronic Group.

So, you can see that this company is part of a group and it is a part of the conglomerate of called Tokyo Electron Group.

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So, when you are wanting to develop these marketing strategies you got to focus on six foundations one you need technology innovation, you need a creative business strategy because the business strategy must be based on the evolution of the end product industries.

You need to have a unique business model which takes into account the capital intensity of this type of product and the high-volume nature of the end product demand, you are required to have operational excellence for high throughput as also for high assurance to the customer that the supply chain will meet the demand requirements of the customers.

High degree of customer connect is required because the semiconductor has to be tailor made to the end product and end product has to utilize the full potential of the semiconductor and

quality focus needs no mention at all. So, it is the technology that is at the core of marketing strategy or business development strategy for this kind of company.

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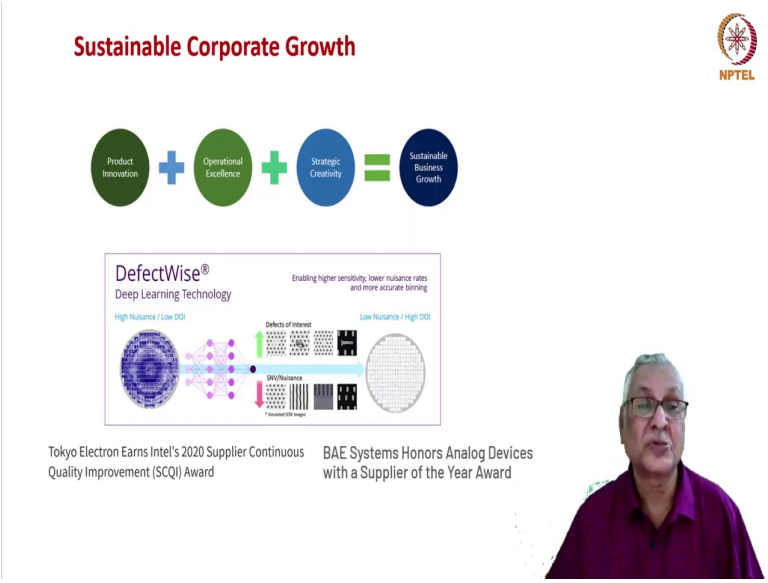

So, how does sustainable corporate growth come, it comes through product innovation plus operational excellence plus strategic creativity these three together provide sustainable business growth for a company such as this, because of this focus on technology because of this focus on eliminating defects through deep learning technology, ensuring higher sensitivity, lower nuisance rates and more accurate binning the group has been able to earn higher level of awards.

In 2020 Tokyo Electron and Intel's 2020 Supplier Continuous Quality Improvement SCQI Award, BAE Systems honors Analog Devices with a Supplier of the Year Award. So, this is

part of the semiconductor ecosystem in terms of the process control solutions which help the chip manufacturers develop their chips and manufacture their chips.

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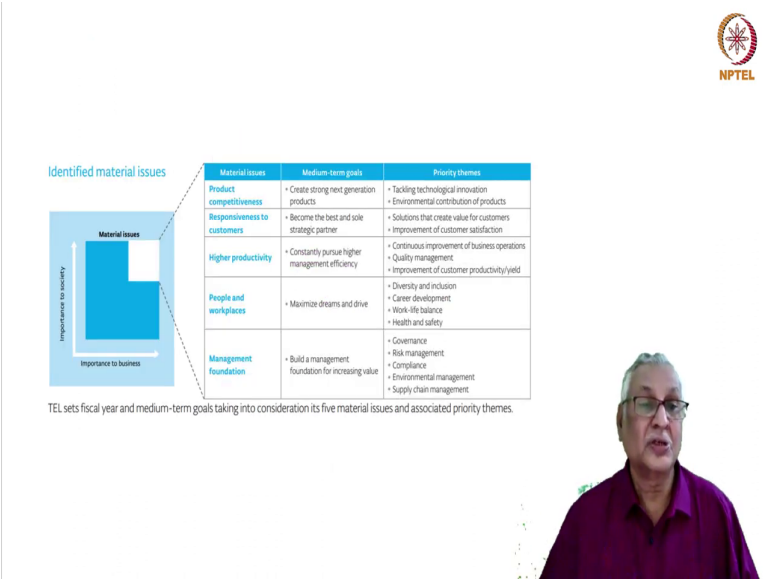

So, there could be material issues in any industry and it is the strategy of the company that needs to understand the material issues and then eliminate them as we go forward in our business strategy. There are two dimensions to the material issues one importance to the business and importance to the society.

In the case of this particular Tokyo group there are five types of material issues the first is product competitiveness, second is responsiveness to customers, third is higher productivity, fourth is people and workplaces and fifth is management foundation. You will understand or appreciate from these material issues that a company has to be on the top of these material

issues and make sure that they do not act as roadblocks in terms of developing the businesses further.

In each of these material issues there will be medium term goals and there will be priority themes. In respect of the product competitiveness the medium-term goal is one of creating a strong next generation product, lineup and the priority themes are technological innovation and the environmental sensitivity of product specification as well as the manufacturing process.

The second material issue relates to responsiveness to customers, you have to be the best and soul strategic partner which means you need to create solutions that create value for customers and you need to improve the customer satisfaction. The third is higher productivity constantly pursue higher management efficacy which means you need to have continuous improvement or kaizen in the business operations.

You need to have high level of quality management and you have to aim at continuous improvements in customer productivity yield. It is not only your yield in your factory, but you have to ensure yield improvement in the customer's factories. People and workplaces, maximize dreams and drive of people, you should have diversity and inclusion, you should assure career development.

You should enable work life balance and you should protect the health and safety of the employees. And in terms of the management foundation you need to build a management foundation for increasing value that covers governance, risk management, compliance, environmental management and supply chain management.

You will notice from this that while two of the material issues are entirely technical and customer centric, one issue is internally oriented in terms of higher operational excellence and higher productivity, two or in terms of the higher order, ESG concerns, environmental empathy, social responsibility and corporate governance.

So, these five material issues covering technology, covering customer centricity, covering people and organization as well as the guiding principles of management, dictate even in a highly technology intensive industry the path forward that could be adopted by any company in any industry.

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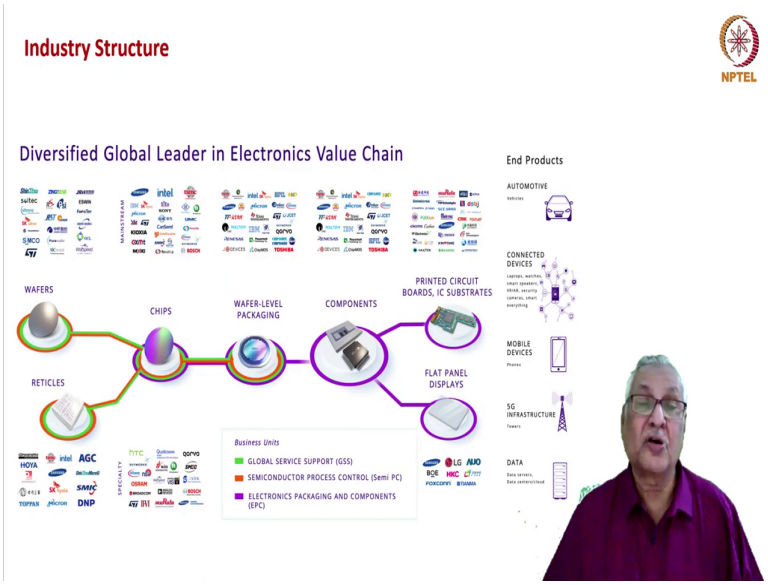

So, how would the industry structure look like in this kind of electronics value chain? The industry starts with the wafers and reticles these combine to form the chips, then you have wafer level packaging and then they become components and the components become either printed circuit boards and IC substrates or they become flat panel displays.

And the end products are automotive vehicles, connected devices such as laptops, watches, smart speakers, VRAR, security cameras, smart everything or anything, mobile devices such

as phones 5 G infrastructure, towers, data-based products such as data servers and data centers cloud.

What you will see from here is that in each of these product and sub product categories we have got companies which are world leaders in their own right whether it is the Intel, Sony, Samsung, BPIL, Toshiba, Hoya, Valka you will find that every name you can relate to in terms of technological leadership in end products is involved with this company.

So, the business units are in terms of global service support, semiconductor process control and electronics packaging and components. The company is able to offer these three types of services through each three business unit. So, that it can be a player in the global electronics value chain which is of the highest sophistication.

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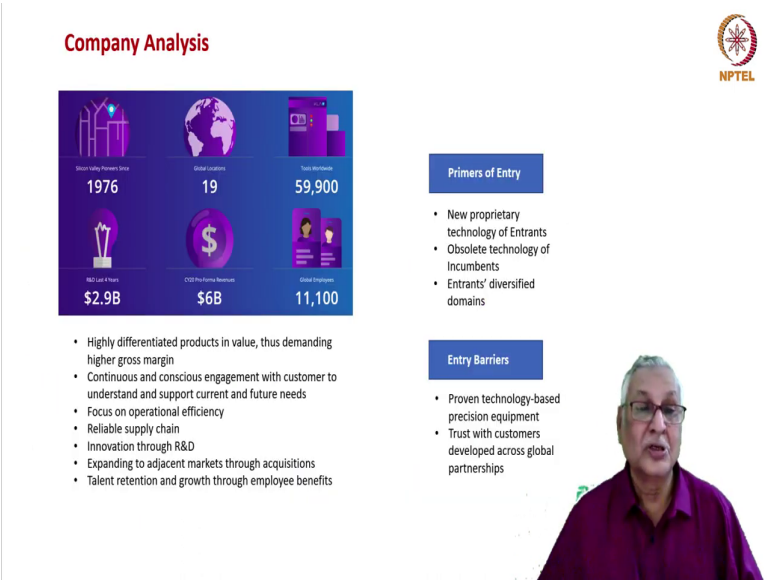

So, how do you analyze this kind of company when have you pioneered? How many locations you have globally? What is the kind of worldwide force you have? What is the R and D spent over the last 4 years or 5 years? What are the pro forma revenues and what is the kind of global entries?

So, when you look at the model of this company it serves as a role model for any company which would like to operate in the technology industry. Highly differentiated products in value, thus demanding higher gross margin, continuous and conscious engagement with customer to understand and support current and future needs in an area where technology is changing very rapidly and end products are multiplying by the dozens each year.

Focus on operational efficiency, which includes operational flexibility to meet the evolving needs, reliable supply chain, innovation through R and D, expanding to adjacent markets through acquisitions and talent retention and growth through employee benefits.

So, what are the primers of entry into this kind of industry? If somebody has new proprietary technologies those companies can enter and this company with its rapid technological evolution offers that particular and perfect entry spot for highly technologically capable companies.

Second the incumbents could face obsolescence of their technologies not because they may not know the importance of technology, but because they are loath to invest further rounds of capital investment to continuously upgrade the technologies. So, technology of the incumbents could may could become obsolete.

And the third one is the diversified domains of the entrants. So, someone who is already in the electronic products industry could come into the chip industry and from the chip industry they can get it to the wafer industry and from the wafer industry to a participation in the entire value chain through the wafer connectivity and process controls.

The entry barriers could be proven technology-based precision equipment, trust with customers developed across global partnerships. So, chip is an industry where product and manufacturing are irretrievably interconnected, the quality of one determines the quality of the other.

The specification of the product that is the chip or the wafer determines the sophistication of the manufacturing equipment as well as the manufacturing process control. So, company analysis again has to be detailed technical and to the spot.

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The competitor landscape is not easy either big companies such as Applied Materials, Lam Research, TEL being the company which we are considering analog devices, Samsung

Electro Mechanics, Hermes Micro Vision or the competitors to the TEL which we are we have considered in this lecture.

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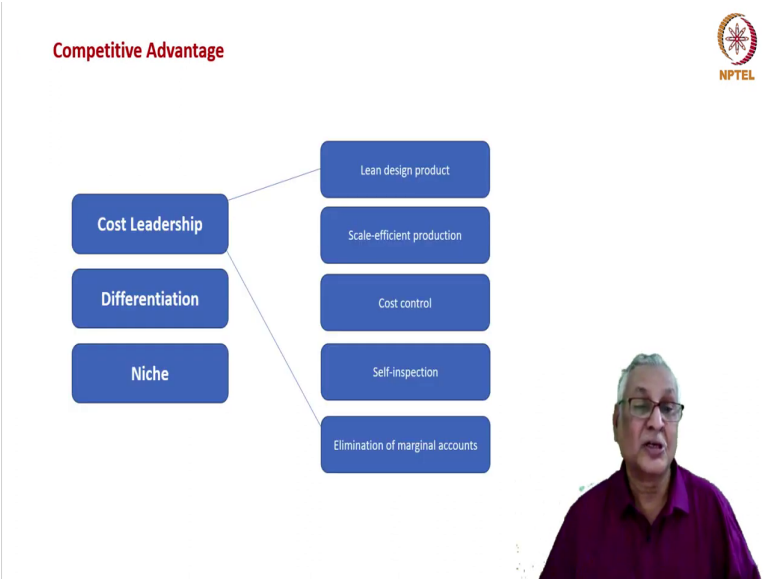

The competitive advantage for a company arises from cost leadership, technological leadership is taken for granted it has to be there for the company to even survive in the industry differentiation is necessary in terms of developing chips for the various customer needs, you got to be know as high quality producer of these products.

So, the cost leadership is the one which is going to provide the competitive edge, lean design product, scale efficient production, cost control, self-inspection and elimination of marginal accounts could be the cost leadership strategies of their company which is in this field.

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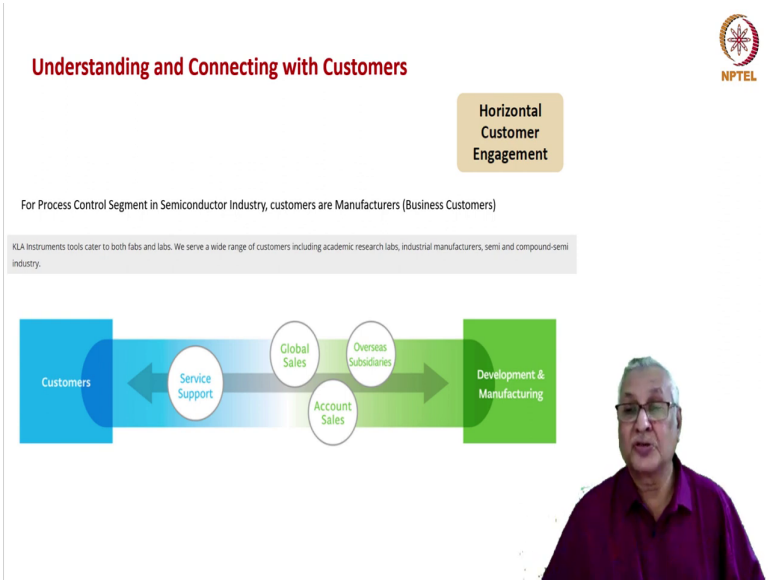

Understanding and connecting with customers in a horizontal manner is important, for the process control segment in the semiconductor industry customers are manufacturers that is the business customers. KLA instruments has tools that cater to both fabs and labs. The company serves a wide range of customers including academic research labs, industrial manufacturers, semi and compound semi-industry.

Customers are supported with service and they are also supported with development and manufacturing and the bridge entities to make this happen or the service infrastructure, global sales infrastructure, overseas subsidiaries and sales management, accounting systems.

How do you do the brand planning? You have to position your product as a niche solution to cater to the business needs of the manufacturer and you need to consistently brand yourself to the next higher level.

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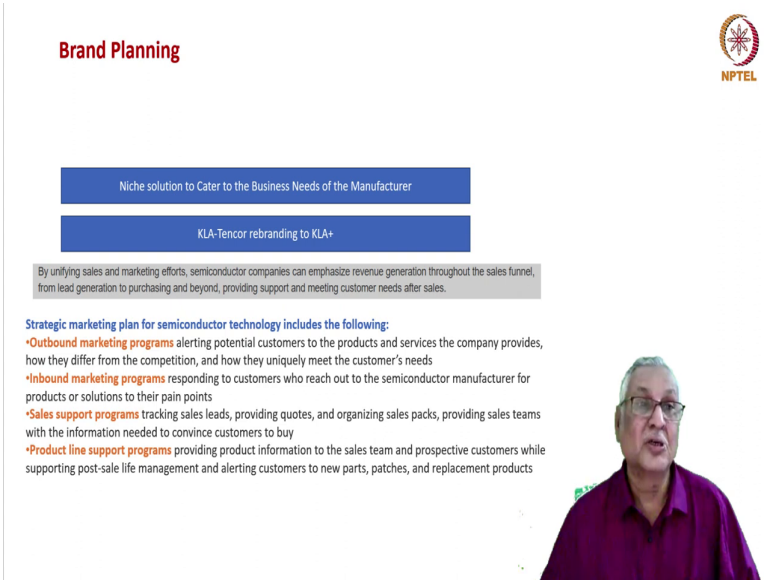

By unifying sales and marketing efforts, semiconductor companies can emphasize revenue generation throughout the sales funnel, from lead generation to purchasing and beyond, and they could provide support and meet customer needs after sales.

Strategic marketing or business development for semiconductor technology includes the following; 1, outbound marketing programs alerting potential customers to futuristic products and services that the company provides. How they are superior to competition and how they uniquely meet the customer's needs.

The second is the inbound marketing programs that is responding to customers who reach out to the semiconductor manufacturer for products or solutions to their pain points. Sales support programs in terms of tracking sales leads. providing quotes and organizing sales packs providing sales teams with the information needed to convince customers to buy.

And finally, product line support programs providing product information to the sales team and prospective customers while supporting post sale life management and alerting customers to new parts, patches and replacement products. With this we come to the end of this lecture, but you have would have noted from these two examples as to how macro markets become micro markets and the nature of the markets is very much dependent on the nature of the products.

The products considered here the semiconductor process control systems and equipment as well as the off-highway brake equipment or nothing similar to the ones which I have discussed so far whether they are the FMCG products or automobile products, oil and gas products and multiple industries of various types such as regenerative medicine or artificial intelligence etcetera.

These are highly technical and highly specialized activities which we call as industries based on the products. One is low volume, but high technology high capital intensity, the other is of high-volume high technology and high capital intensity what is common between the two high technology and high capital intensity.

One of the lessons that we get is that irrespective of the nature of the industry its specialization in these days high technology and high capital intensity are the order of the day. We need to have business strategies which enable competitive advantage and competitive efficiency even at low volumes and high capital intensities which makes it easier to have viability at high volumes as well as with high technology and high capital intensity.

And business development strategies also have to follow this principle and position the products as perfect techno economic products and conduct these business development and strategic processes as techno academic marketing and business development process.

Thank you; look forward to seeing you in the next lecture.