

Niche vs. Multi-Specialty Firms: A SAP-LAP Analysis of Indian Semiconductor Industry

Surabhi Goyal¹ and Anil K. Saini¹
1 GGS IP University, Dwarka, Delhi

The Indian semiconductor industry is one of most dynamic and competitive industry in India. There are several participants of this industry. Some are only semiconductor product companies and some are multi-specialty firms which are dealing in other industries simultaneously. This study will examine whether there exists any similarity between these companies or not? The study has adopted the case study method. Four semiconductor industry companies were selected and tested on SAP-LAP (Situation-Actor-Process Learning-Action-Performance) framework. The findings suggest that except few components and the structure, there is no difference in the competitiveness, the basic work environment of both types of companies.

KeyWords: Case study, Indian Semiconductor companies, Information technology (IT), SAP-LAP framework.

INTRODUCTION

Patents have become an important face of the changing trade environment. It resulted into a factor of key differentiation among companies and countries. Newer and revolutionary patents have now become the part and parcel of all fast-changing industries like IT, bio-technology, pharmaceuticals and engineering. Past decade has seen many new entrants due to change in number of patents counts. These companies have enhanced their businesses and improved their competitive positioning in the market with the help of patent filings worldwide.

Globally, Indian Patent System (IPS) is not considered as the very strong and safe system. This perception has changed considerably since 2005 (when Patent Amendment Act, 2005 was implemented) and IPS is becoming a favourite and a comfortable destination for many big corporates. There exist more scope of flexibility in Indian patent regime. Government of India has already declared some incentives and schemes to promote IP activity throughout India which includes putting up of IP protection system to protect different intellectual property rights and technology development and promotion programs, new millennium Indian technology initiative programs to attract new vendors, small business innovation research

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initiatives, setting up of technology parks and establishing pharma R & D (Research and Development) supporting funds.

intelligent vehicles, renewable energy (especially solar photo-voltaic), solid state lighting (LEDs), electronics in the healthcare sector, tablets, increasingly sophisticated displays, etc.

INDIAN SEMICONDUCTOR INDUSTRY

Indian semiconductor industry is an up-coming and highly volatile industry. Semiconductor firms sell products that embed hundreds if not thousands of patented inventions, elevating concerns about patent-related hold-up in this sector (Hall and Ziedonis, 2007). According to RNCOS, a research based company, the Indian semiconductor market is anticipated to grow at a CAGR of around 22 percent in 2012-2015. This industry is basically divided into fab and fabless products, which deals with designing and fabrication part, also called the semiconductor foundry, where the final microchip is manufactured. Within semiconductor design, there are technologies related to Very Large Scale Integration (VLSI) design, embedded software and electronic design automation (EDA). The past decade has seen a growing demand and market for smart phones,

REVIEW OF LITERATURE

Many authors had carried out studies and also identified various variables responsible for the number of patents' application filing like R & D level, market characteristics, international collaboration, level of economic development, political environment, legal tradition, examination system after patent grant, technology and system and local and international IP laws (Ginarte and Walter, 1997, Lerner 2002, Hall and Harhoff, 2004). However in the Indian context not many noticeable studies have been conducted to highlight the need and relevance of patent for profitability of organisations. Also, a differentiation between the speciality and non-speciality has not being prominently done before. Some of the studies and their findings are as follows:

Name of author and publication	Title of the study	Sample and research tool	Key findings
Czarnitzki D. and K. Kraft (2003) published in Review of Industrial Organization, Vol. 24 (1).	Management control and innovative activity	Sample: German based 3978 observations. Research tools used is: Tobit regression	The R&D expenditures of manager-led firms depend on the control exerted.
D. Audretsch and Z. Acs (1991) published in Southern Economic Journal, Vol. 57 (3).	Innovation and the size at firm level	Sample: Number of innovations in 1982. Research tool used is: t- statistics	If a firm is motivated to introduce an innovation by relatively poor growth in the past, the amount of efforts that it can expand towards its end will be constrained by its financial position.
Grindley and Teece (1997) published in California Management Review, Vol. 39(2):8-41.	Managing intellectual capital: licensing and cross-licensing in semiconductors and electronics		Excessive patenting stem from dynamic high-tech industries that face highly fragmented markets for technology, such as semiconductors, electronics, and software. If IP fragmentation was the main driver of excessive patenting, less dynamic and
Hall and Ziedonis (2001) published in RAND Journal of Economics, Vol. 32(1), pp 101-128	The patent paradox revisited: an empirical study of patenting in the U.S. semiconductor industry, 1979-1995.	Sample: 95 US semiconductor firms. Research tool used is: Econometric model	

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Name of author and publication	Title of the study	Sample and research tool	Key findings
Ziedonis (2004) published in Management Science, Vol. 50(6):804-820	Don't fence me in: fragmented markets for technology and the patent acquisition strategies of firms	Sample: 67 US semiconductor firms. Research tools used are: Citation based fragmentation index	more consolidated industries with highly concentrated patent ownership devise ex-ante solutions to the potential holdup problems, and thus are able to avoid inefficient patent portfolio races.
Noel and Schankerman (2006) published in LSE STICERD Research Paper No. E143	Strategic patenting and software innovations	Sample: 121 firms.	
Buenstorf and Klepper (2004) published in Economics and evolution 2004-07, Max Planck Institute of Economics.	The Origin and location of entrants in the evolution of the U.S. tire industry	Sample: US Tire industry from 1905 to 1980. Research tool used is: Conditional logit regression	New firms may emerge as previous employees start up new businesses locally
Jain, Saini and Verma (2012) published in International Journal of Advanced Computer Research, Special Issue on Emerging Trends and Technology. Volume 2, Number 4, Issue 6:pp-223-229	Technical edge for competitive advantage by patenting: A study of Indian semiconductor industry	Sample: 20 Indian semiconductor companies Research tool used is: Kendall's coefficient of concordance and Chi-square test	Indian patent law is so open that many foreign MNCs with Indian subsidiaries can easily file their patents here and, if lawfully correct, can enjoy the positive inputs from it
Levin, Klevorick, Nelson and Winter (1987) published in Brookings Papers on Economic Activity: 783-820	Appropriating the returns from industrial R&D	Sample: 650 individuals from 130 lines of business Research tool used is: ANOVA	Companies in other industries reported that patents play a secondary, if not negligible, role as a means of protection for their inventions, as they tend to rely more on alternative means such as secrecy, market lead, advance on the learning curve, technological complexity and control of complementary assets
Cohen, Nelson and Walsh (2000) published in NBER Working Paper 7552	Protecting Their intellectual vassets: Appropriability conditions and why US manufacturing firms patent or not	Sample: 1478 R & D labs in US manufacturing labs. Research tool used is: Chi-square test and Wilcoxon z	
Raghavendra (2007) published in Newspaper, May1, 2007, Times of India	IT companies enjoy revenue gains from patents.		Acquisitions were made due to the companies' expertise in niche areas
Scherer (1965) published in Journal of Political Economy. University of Chicago Press. Volume 73, Number 3, pp 290-297	Corporate inventive output, profits and growth	Sample: 448 firms of Fortune 500 firms. Research tool used is: regression analysis.	Successful inventions and innovations increase only in two possible ways i.e. by widening the profit margin earned on a dollar of change and by opening up new opportunities for new profitable sales growth

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Review of literature does support speciality and multi-speciality firms in equal manner to enhance the patent scenario in Indian context. Coming sections will discuss the results of Indian semiconductor industry.

OBJECTIVE OF THE STUDY

The main objective of the study is:

“To establish a relationship between specialty and multi-disciplinary firms, particularly the firms operating in computer software embedded system and VLSI (Very large Scale Integrated Circuits) design.”

On the basis of this objective, all the patent related aspects of the semiconductor company are compared with the help of SAP-LAP framework.

RESEARCH METHODOLOGY

The objective of the study is based on characteristics of the sampled companies. The sample taken for the study was the Indian semiconductor product manufacturing companies. In present study, the companies dealing in VLSI design and computer software embedded system product shall be included. Along with the niche semiconductor companies, it also includes those companies which are dealing in other industries like telecom, engineering and electronics. In total, there are 45 semiconductor companies in India who are manufacturing the semiconductor products. Rest of the companies are assemblers. It was observed that some major players of this portfolio industry like TCS (Tata Consultancy Services), BHEL (Bharat Heavy Electrical Limited) and Samsung Electronics helped in making semiconductor industry even larger in terms of innovativeness, competitiveness and speciality. Although there is an array of products in semiconductor industry but India is more of an IC chips industry. According to S.

Janakiraman, Advisor and Executive Council Member, India Semiconductor Association (ISA), India needs to find its own niche in a specialized market that can provide major growth opportunities in the future, probably in medical electronics, since the penetration of electronics and software in the medical domain is constantly increasing. This statement shows that there is immense growth opportunity in this area and one needs to explore it.

The study stems to identify whether there exist any similarity in these niche and multispecialty semiconductor firms or they are working independently in their own style. For this, the case study method is being used. The case study method has been used to systematically develop a pattern model of patenting by the companies and also to establish the relationship between various variables and the number of patent applications filed by the respective companies. A case study (or case report) is a descriptive, exploratory or explanatory analysis of a person, group or event. An explanatory case study is used to explore causation in order to find underlying principles. Case studies may be prospective (in which criteria are established and cases fitting the criteria are included as they become available) or retrospective (in which criteria are established for selecting cases from historical records for inclusion in the study). This study is prospective in nature as we divided the complete semiconductor industry in two categories, one representing the niche semiconductor segment and the second representing the multispecialty firms. Two firms of each type are selected randomly. These four companies have been studied deeply from different perspectives based on information collected from different sources for the period of almost 10 years i.e. between 2003 and 2013. The companies selected for the case study are Qualcomm India and STMicroelectronics as niche companies and TCS and Samsung Electronics as multispecialty firms. Companies' websites, personal interviews,

case studies, annual reports and latest news helped in gathering all the information and forming a case study for these companies.

SAP-LAP FRAMEWORK BASED ANALYSIS

For analyzing the collected data, SAP-LAP framework has been used. This framework is developed by Prof. Sushil Kumar, IIT, Delhi. According to him, "SAP-LAP paradigm is the basis of inquiry in management which is equally applicable in non formal service sector" (Sushil, 1997). This SAP-LAP framework can be used for case analysis, managerial inquiry and problem solving. It comprises of three basic elements i.e. situation, actor and process. The interplay and synthesis of situation actor process (SAP) leads to learning action performance (LAP) (Sushil, 2000). The steps for case analysis using SAP-LAP framework are: understanding situation, actors and roles, evolving processes, learning issues, suggested actions, and expected performance. The situation is to be managed to an organic order by an actor through flexibly evolved self organizing management process, which recreates situation. The actor exercises the freedom of choice and systematically evolves a management process in an interactive and innovative manner. Situation, actor, process and their interplay comprise of SAP framework. A detailed description of all these terms is as follows:

"Situation" defines the external and internal environment of an organization and its performance. In a dynamic sense, the historical development and milestones provide the organizational situation are discussed in it.

The "actor" can be individual managers, or groups, departments or class of actors such as suppliers,

competitors, government, consultants, management, employees, etc. Some important variables in the "actor" domain are motivation, morale, attitude, actor performance, roles, capabilities, world-views, freedom of choice, communication, knowledge, skills and so on. The interface of "actor" and "situation" defines the organizational climate and culture that is important for the evolution of the business processes.

The "process" is the overall transformation process that converts a set of inputs into outputs to recreate the situation. The processes could be of various types, such as, supply chain process, customer interface process, performance management process, technology transfer process, innovation process, investment process, distribution process and so on. Depending upon the situation, one or more processes are to be studied and improved for higher flexibility.

The interface of "actor" and "process" defines the strategy, structure and systems that need to be transformed for organizational change. The interface of "process" and "situation" defines the contingency to be taken care of (e.g. contingency planning) and adaptation and response of the process to the changing situation.

The interplay and synthesis of SAP leads to Learning-Action-Performance (LAP). The researcher needs to learn about the situation, actor and process and bring out key learning issues of interest. Based on the learning, the action is to be taken on situation, actor or process or the relevant interfaces. Depending upon the effectiveness of actions, performance is generated in terms of improved processes/actors and better situational parameters. In a business situation, the performance parameters could be market share, profitability, quality, productivity, competitive advantage, core competence and so on. The SAP-LAP model can be

seen through Figure 1. Here, the "situation" examines the past, present and the expected future; the "actor" explores the world views, roles and capabilities, freedom of choice; the "process" explains the need, what characteristics, how the inputs are converted into outputs, and other alternative ways of doing the process; "learning" refers to the key issues related to the SAP; "action" refers to what ought to be done to improve SAP; "performance" indicates the impact of system's performance on SAP.

In this study, SAP-LAP is used to discuss the situation of patenting in semiconductor sector by selecting four companies, the people behind these

innovations, how these companies follow their patent procedure throughout the past 10 years. It will also discuss the initiatives by the companies to increase their profitability from patent applications and its linkages with hypotheses of the study. Information collected through primary and secondary sources shall help in extracting out some meaningful inferences.

SAP-LAP model of patent scenarios of sample companies is framed through Table 1, 2, 3 and 4. These tables will discuss the working, people, process, issues, actions and performance of the company. It will help in drawing conclusion about the hypotheses framed in the beginning of the study.

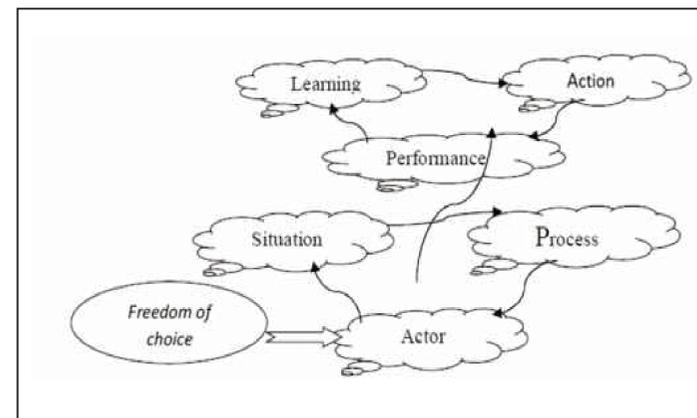


Figure 1 SAP-LAP Model

(Note: Retrieved from Dubey, D K Sen and A ATalankar, 2012.
http://www.vsrjournals.com/ME/Issue/2012_12_December/Web/1_Sandeep_Kumar_Dubey_1065_Research_Article_VSRDJUMAPE_December_2012.pdf)

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Table 1: SAP-LAP Model of patent scenario of semiconductor companies: TCS

Stages	Issues
Situation	
1. How company entered into semiconductor industry?	1. Tata Consultancy Services Limited (TCS) is an Indian multinational information technology (IT) services, business solutions and consulting company
2. How is the present performance of the company?	2. Tata Research Development and Design Centre (TRDDC) was established in Pune, India in 1981.
3. What is expected from the company?	3. The annual revenues are at Rs. 62989 Cr. which is 28.8% up as compared to last year data.
	4. TCS has 19 Innovation Labs based in three countries
	5. Provides strategic services like product engineering services, manufacturing systems, supply chain management, business services, enterprises services, BPO and analytics, software products and IT infrastructure required for future actions
	6. Global Network Delivery Model (GNDM) for best practices.
	7. TCS has filed 855 patents till date, of which 72 have been granted.
	8. Increasing sales and gross profit shows improved and regular deliverables by the company. Gross profit and net sales are moving in same way and same direction.
Actor	
1. What are the world views?	1. TCS is placed at the 29th position by business magazine Forbes
2. What roles and capabilities are exhibit?	2. Strategic services like product engineering services, manufacturing systems, supply chain management, business services, enterprises services, BPO and analytics and IT infrastructure required for future actions
3. In what domains is freedom of choice available?	3. TCS enhances Return on Investment (ROI) through remote manageability and flexible SLA-based service models on the ITIL framework.
	4. The next-gen solutions in supply chain, Customer Relationship Management (CRM), Business Intelligence (BI), and content management help scale up business and bring agility.
	5. SCM services help reduce costs through automation and IT investments, increase productivity, optimize processes, and support incremental innovation.
Process	
1. What is being done?	1. Country's largest software services firm Tata Consultancy Services (TCS) joined US2020 as a founding leadership partner.
2. What are the variables and parameters	2. The company has plans to get 20 per cent of the company's STEM workforce mentoring students by 2020

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Stages	Issues
3. What can be changed?	3. Strategy makers and knowledge workers are the key to success.
4. What it is being done?	4. Evaluation of the strategies has to be continued on yearly basis.
5. How is it being done?	5. Strong commitment by the stakeholders
6. What, why and how else?	6. TCS'co-innovation network partners include Collabnet, Cassatt, academic institutions such as Stanford, MIT, various IITs, and venture capitalists like Sequoia and Kleiner Perkins
Synthesis	
Learning	
1. What are the key issues related to situation?	1. The ability to manage growth, intense competition among Indian and overseas IT services companies.
2. What are the key issues related to actors?	2. An appreciating rupee, the ability to attract and retain highly skilled professionals.
3. What are the key issues related to process?	3. Political instability, legal restrictions on raising capital or acquiring companies outside India, unauthorized use of our intellectual property and general economic conditions affecting our industry.
	4. The ability to manage the international operations and reduced demand for technology in the key focus areas.
	5. The ability to successfully complete and integrate potential acquisitions and the success of the companies in which TCS has made strategic investments
Action	
1. What can be done to improve situation?	1. Assessment of the challenges mentioned earlier is one of the key tasks of this group.
2. What can be done to improve actors?	2. Meaningful domains become the drivers and key stakeholders for the success of the program
3. What can be done to improve process?	3. Communication of the challenges within the organization.
	4. Specialists leading the technology COEs business mains, and program offices can be appointed.
	5. Creation of the right teams, agreeing on an approach and closely coordinated execution can take even the most complex of PAI scenarios to a successful conclusion.
Performance	
1. What will be its impact on situation?	1. Improved and faster patent portfolio
2. How will the actors be affected?	2. Better participation of employees in profit sharing
3. How will the performance of the process be affected?	3. More technology based mergers and acquisitions
	4. Market oriented strategy formulations
	5. Future strategies for mentioned challenges
	6. Better assessment of competitors moves.

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Table 2: SAP-LAP Analysis of STMicroelectronics

Stages	Issues
Situation	
1. How company entered into semiconductor industry?	1. It is French multinational electronics and semiconductor manufacturer headquartered in Geneva, Switzerland.
2. How is the present performance of the company?	2. It is a hardcore product manufacturing semiconductor company.
3. What is expected from the company?	3. ST focuses its product strategy on sense and power technologies, automotive products and embedded-processing solutions.
	4. Almost one quarter of its employees work in R&D and product design and in 2012 the Company spent about 28% of its revenue in R&D.
	5. Among the industry's most innovative companies, ST owns about 16,000 patents, about 9,000 patent families and 515 new filings
	6. The company has 16 research and development units and 39 design and application centers.
	7. It is world's largest semiconductor companies with net revenues of US\$ 8.49 billion in 2012.
	8. They have a positive relation between sales and gross profit of the company for the last decade.
Actor	
1. What are the world views?	1. STMicroelectronics has been given a triple-A rating in eco-efficiency by Innovest Strategic Value Advisors.
2. What roles and capabilities are exhibit?	2. They confirmed as a leading Secure Element vendor 2 and, during 2012, they added a new secure micro platform that has already been adopted by several card manufacturers for EMV (Eurocard, Mastercard, Visa) Banking migration in China.
3. In what domains is freedom of choice available?	3. In trust and data security, ST diversify into Industrial, Automotive, Digital Still Cameras, and Gaming applications.
	4. ST gained transaction for high-resolution multimedia-monitor controllers in premium monitors and public displays with many of the top manufacturers, including LG, Samsung and others.
	5. ST was the first company in the world to deliver samples of a 28nm FD-SOI System-on-Chip device from our Crolles (France) 300mm facility.
Process	
1. What is being done?	1. Working with breakthrough projects and on-going incremental changes to the products, processes, quality management system and the organization.
2. What are the variables and parameters?	2. Recognition to individual and team contributions to achieving this objective through corporate.
3. What can be changed?	3. Local recognition programs for excellent individual and team performance.
4. What it is being done?	4. ST operates a worldwide network of front-end and back-end plants.

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Stages	Issues
5. How is it being done?	5. The company actually improved its net financial position to \$1.19 billion.
6. What, why and how else?	6. The advances and breakthroughs in products and technologies in 2012 contributed to ST gaining market share in several targeted markets.
	7. Major automotive players in Europe, Japan and the US confirmed our leadership by choosing its latest 110nm BCD process for Safety, Power train and Body applications.
	8. It earned key design wins for the world's most powerful set-top box system-on-chip in Set-Top box families for cable, terrestrial & IPTV saw fast adoption globally.
Synthesis	
Learning	
1. What are the key issues related to situation?	1. STMicroelectronics has stayed out of the volatile markets for DRAM and PC microprocessors.
2. What are the key issues related to actors?	2. The time between technology concept and real market adoption is longer.
3. What are the key issues related to process?	3. The issue of coexistence is foreseen as one major threat to WSN mass-market adoption.
	4. To maintain financial flexibility and a strong cash position taking care of operating expenses simultaneously.
Action	
1. What can be done to improve situation?	1. ST's market share in the MEMS mobile and handset market to 48%. 1 — more than 2x of the closest competitor — and ensured that ST has leadership in MEMS across all mobile operating systems.
2. What can be done to improve actors?	2. The setup of standard solutions will definitely help in reducing device costs and creating true interoperability.
3. What can be done to improve process?	3. Leadership in Sense and Power and Automotive Products and embedded processing solutions.
	4. Establishment of new Sales & Marketing organization with a particular focus on our major accounts, as well as expanding our penetration of the mass market.
	5. The innovative products in various areas, combined with the competitive technology and flexible and independent manufacturing capabilities, bring even more opportunities to significantly grow the revenues and gain market share.
	6. Employee suggestion scheme for improving performance.
Performance	
1. What will be its impact on situation?	1. Communication, teamwork and knowledge sharing will allow the company to connect people to information and people to people.
2. How will the actors be affected?	2. The search for excellence addresses quality cost and service items for any processes using fact-based methodologies.
3. How will the performance of the process be affected?	3. More capturing of market share with more satisfied customers.
	4. Creation of new financial model resulting into less dependency on outside partners.

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Table 3: SAP-LAP Analysis of Qualcomm Incorporated

Stages	Issues
Situations	
1. How company entered into semiconductor industry?	1. Qualcomm has a very distinctive position in the global wireless telecom market.
2. How is the present performance of the company?	2. Qualcomm owns majority IPR to the CDMA (Code Division Multiple Access) wireless standard.
3. What is expected from the company?	3. Qualcomm built the Eudora email program, which they continue to sell.
	4. Qualcomm is among Top 10 companies to work for in India.
	5. It is also among top 100 companies to work for in America and among Top 25 best companies to work for in Canada.
	6. It has a highly engaged and motivated workforce.
	7. It has somewhere more than 13,000 patents in its account.
	8. Qualcomm's annualized attrition rate is down by 5.3% in FY'12 from 9.8% in FY'11.
	9. The core objective of Qualcomm is to be flexible, open and transparent to its employees.
	10. It embraces change with a continuous focus on building organization capabilities.
	11. It generate revenues by licensing portions of intellectual property portfolio
Actor	
1. What are the world views?	1. It generate revenues by licensing portions of intellectual property portfolio
2. What roles and capabilities are exhibit?	2. As per GSA (Global Mobile Suppliers Association), approximately 800 wireless networks support 3G globally.
3. In what domains is freedom of choice available?	3. Each inventor is eligible for a Patent Application Filing Award of upto \$ 1500 upon filing of an application and a Patent Issuance Award of upto \$ 1500 upon issuance of the patent. An inventor is also awarded a plaque commemorating the patent issuance.
	4. The last fiscal year revenue counts to \$12.37 billion.
Process	
1. What is being done?	1. The company has developed a corporate structure in order to address various legal, regulatory, tax, contractual compliance, operations and other matters.
2. What are the variables and parameters	2. QUALCOMM Incorporated completed a corporate reorganization in which the assets of certain of its businesses and functions, as well as the stock of certain of its direct and indirect subsidiaries, were contributed to Qualcomm Technologies, Inc. (QTI) from Oct., 2012.
3. What can be changed?	3. Neither QTI nor any of its subsidiaries has any right, power or authority to grant any licenses or other rights under or to any patents owned by QUALCOMM Incorporated. This may delay the patent processing.
4. What it is being done?	4. Innovation and innovative mind is the key to success.
5. How is it being done?	5. Qualcomm technologies to improve socioeconomics and are committed to helping local governments reach their Information and Communications Technology (ICT) and universal service goals, including increasing teledensity and Internet penetration.
6. What, why and how else?	6. "Each and every community we work in has contributed to our success."

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Stages	Issues
Synthesis	
Learning	
1. What are the key issues related to situation?	1. Wireless operators delay 3G and/or 3G/4G multimode deployments, expansions or upgrades and/or delay moving 2G customers to 3G or 3G/4G multimode devices.
2. What are the key issues related to actors?	2. LTE, an OFDMA-based 4G wireless standard, is not more widely deployed or commercial deployment is delayed
3. What are the key issues related to process?	3. Restricting the expansion of 3G wireless connectivity, primarily outside of major population areas
	4. Wireless operators are unable to drive improvements in 3G network performance and/or capacity.
	5. Global economic conditions that impact the communication industry could negatively affect the demand for the products and the customers' products, which may negatively affect the revenues.
	6. Wireless operators and other industries using these technologies deploy other technologies.
	7. Competition may reduce average selling prices for the chipset products and the products of its relative customers and licensees.
Action	
1. What can be done to improve situation?	1. The company expect to continue to face competition throughout the world as new technologies and services are introduced in the future.
2. What can be done to improve actors?	2. The company may continue to make substantial investments in developing improvements to existing and new products and technologies.
3. What can be done to improve process?	3. The price Qualcomm charge for the products and services may continue to decline as competition continues to intensify.
	4. To increase and/or accelerate demand for the integrated circuit products and drive their adoption into the most popular device models and across a broad spectrum of devices.
	5. To be a preferred partner (and sustain preferred relationships) providing products that support Android, Windows Phone/RT and other operating system platforms and the effective commercialization of new devices using these platforms.
	6. To develop brand recognition as Qualcomm can compete against better known companies in mobile computing and other consumer driven arenas.
Performance	
1. What will be its impact on situation?	1. To continue to be a leader in 4G technology evolution, including expansion of its OFDMA-based single mode licensing program, and continue the timely introduction of 4G turnkey, integrated products and services.
2. How will the actors be affected?	2. Qualcomm's comprehensive Health & Safety program ensures that employees' wellbeing is a top priority.
3. How will the performance of the process be affected?	3. Better placement leads to better inspiration leading to more partners leading to more production and results.
	4. Qualcomm strive to ensure compliance with applicable global environmental legislation and various industry initiatives, including Qualcomm's own environmental initiatives.
	5. A fiscally fit enterprise with a great historical record and the financial resources to fund and exploit a large and worldwide growing market, coupled with the expertise to be a leader, can result into a future great company.

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Table 4: SAP-LAP Analysis of Samsung Electronics

Stages	Issues
Situation	
1. How company entered into semiconductor industry?	1. Samsung is a big corporate dealing in semiconductor, telecommunication, digital media and digital convergence technologies.
2. How is the present performance of the company?	2. Samsung Electronics acquired Korea Telecommunications and renamed it Samsung Semiconductor & Telecommunications in 1980.
3. What is expected from the company?	3. For further expansion, in 1988, Samsung Electronics was merged with Samsung Semiconductor & Telecommunications offering new range of products.
	4. After England, Samsung India Electronics announced the signing of a memorandum of understanding (MOU) with the Government of Tamil Nadu, India to set up the company's second manufacturing complex at Sriperumbudur near Chennai in India.
	5. The company consists of five main business operations comprised of 13 business units.
	6. The company recorded revenues of \$139,167.3 million during the financial year ended December 2010 (FY2010), an increase of 13.4% over FY2009. The operating profit of the company was \$15,566.9 million in FY2010, an increase of 58.3% over FY2009. The net profit was \$14,219.1 million in FY2010, an increase of 65.1% over FY2009.
	7. Samsung Asia accounted for 16.1% of the total revenues in FY2010. Revenues from Asia reached \$22,368.3 million in FY2010, an increase of 14.8% over FY2009.
	8. The company invested approximately 5.9% of its revenue in R&D activities in FY2010.
	9. Digital Media & Communications which encompasses the business units that manufacture and sell digital TVs, monitors, computers, mobile phones, communication systems, air conditioners, refrigerators and other appliances; and Device Solutions which includes businesses that specialize in semiconductor memories, system LSI, LED and other products.
	10. It held more than 600 American patents and more than 2,800 international patents, making it the largest owner of AMOLED technology patents
Actor	
1. What are the world views?	1. Samsung Electronics is ranked No. 1 in market share for standalone mobile APs for smartphones, CMOS image sensors for mobile cameras, display driver ICs and smart card ICs.
2. What roles and capabilities are exhibited?	2. Samsung is better than anybody else at learning from its competitors.
3. In what domains is freedom of choice available?	3. Samsung is a diverse business with chips, displays, and other technology. This pays dividends, allowing it to compete on price and increasingly.
	4. The company is accused of being overly hierarchical and dominated by its founding family.
Process	
1. What is being done?	1. Organization structure can be more diversified for better and quicker results.
2. What are the variables and parameters?	2. SAMSUNG has maintained a mission statement that responds both to its own change, and to new developments in the world.

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Stages	Issues
3. What can be changed?	3. The talent, creativity and dedication of SAMSUNG people are key factors to its efforts, and the strides they've made in technology offer endless possibilities to achieve higher standards of living everywhere.
4. What is it being done?	4. SAMSUNG goal is to create the future with its customers.
5. How is it being done?	5. Successful outcomes are encouraged through an incentive program, however they are not subject to penalty if they don't achieve their goals.
6. What, why and how else?	6. Samsung is the world's second largest semiconductor company behind Intel Corp, with over a third of the company's \$US56.7 billion global revenues (2005) generated by the semiconductor business.
Synthesis	
Learning	
1. What are the key issues related to situation?	1. Working with global business partners and its own geographically dispersed facilities.
2. What are the key issues related to actors?	2. Whether Samsung can move from a close-and-gaining second to becoming truly dominant.
3. What are the key issues related to process?	3. Whether it can deliver products that are truly dependent and newer to the world market.
	4. Profits from any Android application.
	5. Internal issues - fostering creativity among employees; employee jumping shifts for start-ups; more emphasis on goods developed in-house; more focused guidance for the company into the global electronics elite and lack of accountability to shareholders.
	6. External issues - compatibility between profit and growth of the company; compatibility with obsolete products; threat of losing patents; cross shareholding among affiliates; outside directors appointed by the Samsung family;
Action	
1. What can be done to improve situation?	1. Samsung must bring innovative products to market faster while ensuring high quality and holding down costs
2. What can be done to improve actors?	2. Aggressive investment in silicon valley can help it start to lead in software as it already does with hardware.
3. What can be done to improve process?	3. Other focus areas are user experience, design and solutions.
	4. The company's core businesses must strengthen their dominance in technology and global markets to secure "an absolute lead."
Performance	
1. What will be its impact on situation?	1. More thorough and newer innovations by the knowledge workers.
2. How will the actors be affected?	2. More and diversified expansion of business resulting in more profits and growth.
3. How will the performance of the process be affected?	3. Head-on to the big competitors like Intel, Sony, LG, Motorola, etc.
	4. Open work environment will lead to more and innovative knowledge workers leading to core competitive edge in the market.

On the basis of the model framed, some results are extracted. A comparison is done in the form of a comparative table (Refer table 5). This table provided a better outlook to the performance and useful findings for the study. Few basis are shortlisted to get some meaningful and constructive conclusions and the SAP-LAP statements helped in discussing that differentiation and common platforms.

INTERPRETATION OF SAP-LAP ANALYSIS

This analysis was done to compare the findings of two niche companies and two corporates having product portfolio of various sectors (including semiconductor industry). Among these companies, Qualcomm and STMicroelectronics are the outlier niche company. Samsung Electronics and TCS are the outlier corporate companies. Equal weightage has been given to all companies. With the help of abovementioned comparative sheet, the reason behind the difference in number of patent applications filed was sorted and a comparison other variables was extracted. The basis wise comparison will be done in following paragraphs.

Qualcomm is a CDMA based company while STMicroelectronics is a sensor and power technologies & software embedded solutions' company. They have their unique customer followup in semiconductor industry. On the other hand, TCS is more of a solution based company having its hands on telecom sector, BPO sector and providing IT infrastructure to global customers. Despite of this wide range of market exposition, TCS has some contribution in patent acquiring in semiconductor industry. Another company, Samsung Electronics, is a blend of electronics, electrical, semiconductor and networking industry and has a record of diversified patents. Having a look of patent numbers, it was very much clear that if a company is focusing on only one type of industry

then it will definitely have a competitive edge over other conglomerate companies of that industry. This fact was clear through the patent data of the companies. Qualcomm and STmicroelectronics have more than 13000 and 16000 patents respectively till June 2013. On the other hand, TCS and Samsung have 855 patent applications and 4000 patent applications respectively till date.

Another thing which was taken into purview was the innovative environment of the firm. All the innovations are created by their innovators and hence to be recognised for their contribution to the firm. It has been observed that all successful firms have a favourable employee friendly environment in the organization. All the firms provide financial or recognitional awards to their employees for their contribution to the firms.

Coming to the financial health of the companies, single stream of products will produce limited revenues. A portfolio of diversified product and services will lead to unlimited value creation from all the corners of the relative market. Big corporate needs to have big and strong financial backing up in comparison to those focused and limited resources requiring niche companies. As per the data collected and graphical presentation done in last chapter, it has been seen that gross profit and sales are positively correlated with each other except in case of Qualcomm (this company focuses more on royalties and licensing). The GPM of the companies are 28.57, 39.65, 34.56 and -0.32 for TCS, STMicroelectronics, Samsung Electronics and Qualcomm respectively for 2011-2012.

There are several issues involved in every company along with the rewards for good work. These counts from illegal penetration, political disturbances, competitors, newer products and disbursement of obsolete products, etc. Other than these, the companies have their own diversified issues related to proper handling of the company. Qualcomm says that delay of products, reduction of average selling price is their main concern due to near competition

products. STMicroelectronics says internal financial position is also one of the biggest concerns for the company. TCS says that legal restriction on raising capital; patent troll and unstable economic condition of the country of parent company are the biggest concerns for the company. Samsung Electronics' biggest hurdle is to maintain balance between various rules and guidelines of various countries worldwide. Management of knowledge workers and their compatibility with various stakeholders is also one of the major and common concerns for the sample companies.

For handling these issues, companies have their respective road maps to follow. Some of the common plans include newer products and services, increased market share in semiconductor industry worldwide, satisfied stakeholders and securing IP information from competitors. Qualcomm plans to add more joint ventures, mergers and acquisition to avoid competition and to have more market penetration. They are also focusing on newer products like Android, Windows Phone/ RT and other operating system and effective commercialization of new devices. STMicroelectronics plans to include Employee suggestion scheme to enhance employees, reduction of device costs, creation of true interoperability and creation of financial model. TCS has plans for more and highly experienced top authorities for the company and lastly, Samsung Electronics is

planning to have more guidance for market penetration, handling of work-in progress products and decrease in the time of its resulting product. It is also focussing aggressively on Indian Semiconductor market.

This shows that innovation and growth of the company are highly related to each other. To acquire more and more competitive edge in the market, every company has to diversify and try newer technologies and save the older and about to be obsolete technologies. The type of ownership structure also impacts the number of patent applications filed by the company. Lastly, niche companies have no botheration about the competitors market but big corporate do like to compete in technologically clustered areas to get a better view of their close competitors.

CONCLUSION

On the basis of information allocated to several sub-headings, a comparative chart was made. The findings are: according to table 5, in Indian semiconductor industry, there are several participants. Some are specialized while others are portfolio companies. Even if there organization structure is different, there are similarities in their working environment. They have the same resources, almost same external issues, same market but there exists differences also.

Table 5: A comparative sheet of the inferences drawn from the findings of both outlier companies: Qualcomm India and Samsung Electronics with other same structure companies

Basis	Qualcomm	STMicroelectronics	TCS	Samsung Electronics
1. Industry profile	Qualcomm is a distinctive global wireless telecom company.	It is a hardcore product manufacturing semiconductor company	Tata Consultancy Services Limited (TCS) is an Indian multinational information technology (IT) services, business solutions and consulting company	Samsung is a big corporate dealing in semiconductor, telecommunication, digital media and digital convergence technologies.
2. Product focus	Qualcomm owns majority IPR to the CDMA (Code Division Multiple Access) wireless standard.	Sense and power technologies, automotive products and embedded-processing solutions.	Provides strategic services like product engineering services, manufacturing systems, supply chain management, business services, enterprises services, BPO and analytics, software	Digital media & communications which encompasses the business units that manufacture and sell digital TVs, monitors, computers, mobile phones, communication systems, air conditioners,

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Basis	Qualcomm	STMicroelectronics	TCS	Samsung Electronics
			products and IT infrastructure required for future actions	refrigerators and other appliances; and device solutions which includes businesses that specialize in semiconductor memories, system LSI, LED and other products.
3. Patent profile	It has somewhere more than 13,000 patents in its account.	Among the industry's most innovative companies, ST owns about 16,000 patents, about 9,000 patent families and 515 new filings	TCS has filed 855 patents till date, of which 72 have been granted.	it held more than 1000 American patents and more than 3000 international patents, making it the largest owner of AMOLED technology patents
4. Relationship between Sales and growth of the company	They are not mutually correlated due to dependence of revenue more on licensing and royalties.	They have a positive relation between sales and gross profit of the company.	Increasing Sales and Gross Profit shows improved and regular deliverables by the company. Gross Profit and Net Sales are moving in same way and same direction.	The company recorded revenues of \$139,167.3 million during the financial year ended December 2010 (FY2010), an increase of 13.4% over FY2009. Sales and gross profit are highly correlated.
5. Individual ownership of patent	Financial rewards and recognition for the individual performance in patent creation	Recognition to individual and team contributions to achieving this objective through corporate.	Rewards for the achievements	Successful outcomes are encouraged through an incentive program, however they are not subject to penalty if they don't achieve their goals.
6. Financial position	The last fiscal year revenue counts to \$12.37 billion.	The company actually improved its net financial position to \$1.19 billion.	The annual revenues are at Rs. 62989 Cr. which is 28.8% up as compared to last year data.	\$US56.7 billion global revenues (2005) generated by the semiconductor business
7. Several issues	Delay in deployment of wireless devices, global economic conditions affecting the demand of product, other available technologies and reduction in average selling price of the products due to competition.	Lesser involvement in volatile product market, longer time lag between concept and market adoption, coexistence with competitors, internal financial position and cash position for operating expenses.	Ability to manage growth, intense competition among Indian and overseas IT services companies, Political instability, legal restrictions on raising capital or acquiring companies outside India, unauthorized use of our intellectual property and general economic conditions affecting our industry, The ability to manage the international operations and reduced demand for technology in the key focus areas.	Working with global business partners and its own geographically dispersed facilities, delivery of newer products. Internal issues - fostering creativity among employees; employee jumping shifts for start-ups; more emphasis on goods developed in-house; more focused guidance for the company into the global electronics elite and lack of accountability to shareholders.
8. Prospective solutions for the issues	New technologies and services will be introduced in the future, substantial investments in developing	Establishment of new Sales & Marketing organization with a particular focus on major accounts, as well as expanding the	Meaningful domains become the drivers and key stakeholders for the success of the program, Creation of the right teams, agreeing on an approach and closely coordinated execution can	Bringing innovative products to market faster while ensuring high quality and holding down costs, aggressive investment in silicon valley can help it start to lead in software as it already does with

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Basis	Qualcomm	STMicroelectronics	TCS	Samsung Electronics
	improvements to existing and new products and technologies, preferred partner (and sustain preferred relationships) providing products that support Android, Windows Phone/RT and other operating system platforms and the effective commercialization of new devices using these platforms.	penetration of the mass market; Employee suggestion scheme for improving performance; setup of standard solutions will definitely help in reducing device costs and creating true interoperability.	take even the most complex of PAI scenarios to a successful conclusion and Specialists leading the Technology CoEs, Business Domains, and Program Offices can be appointed	hardware and core businesses must strengthen their dominance in technology and global markets to secure "an absolute lead."
9. Future Plans	Developing brand recognition as Qualcomm can compete against better known companies in mobile computing and other consumer driven arenas, Better placement leads to better inspiration leading to more partners leading to more production and results and comprehensive Health & Safety program ensures that employees' wellbeing is a top priority	More capturing of market share with more satisfied customers and creation of new financial model resulting into less dependency on outside partners.	Improved and faster patent portfolio, better participation of employees in profit sharing, competitors watch for better market penetration, technology based mergers and acquisitions.	More thorough and newer innovations by the knowledge workers, head-on to the big competitors like Intel, Sony, LG, Motorola, open work environment for the employees.

Another similarity among all companies is that none of the company provides individual ownership to patents. The ownership rests with company only. One dissimilarity is that the financial health and patent applications count of cases is different. More specialized companies are more concentrated in to one business leading to exclusive R & D and resulting into more patents. On the other hand, multi-speciality companies have to take care of all the businesses simultaneously resulting in less

concentration in one business (as compared to speciality companies dealing in semiconductor industry only) and lesser number of patent applications filing as well. At the last, all the companies are adopting some safety and motivational strategies for the well-being of their employees.

It can be concluded that Indian semiconductor industry has same environment for all of its companies, whether niche or multi-speciality.

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Although they have different financial need and different number of patent applications but they are handling the same environment in their own manner. Hence, speciality and multi-speciality firms are related to each other.

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BRIEF PROFILE OF THE AUTHORS

Surabhi Goyal, is an MBA in Finance and Human Resource from Institute of Management Studies and Research, Maharshi Dayanand University, Rohtak (Haryana) having passed out in 2006. After that she immediately joined Amity business School as a Lecturer in 2006 and then got selected for the post of Lecturer in Department of Business economics, Maharshi Dayanand University, Rohtak (Haryana). She also cleared her UGC-NET exam with JRF in December 2007 attempt. In the same year, she registered herself with GGSIP University as a Doctoral student. In 2008, she completed her M Phil from the Department of Commerce and Management from Chaudhary devi Lal University, Sirsa (Haryana). She has a teaching and research experience of seven years. Presently, she is a Doctoral student of University School of Management Studies, Guru Gobind Singh Indraprastha University, Delhi and is working on Patents in semiconductor industry. She has presented various papers in national and international conferences. She has published 8 papers in national and international journals, conferences and seminars. Before joining Guru Gobind Singh Indraprastha University, New Delhi as a Full Time Research Scholar she worked with Amity Business School, Gurgaon and Department of Business Economics, Maharshi Dayanand University, Rohtak as a lecturer for around two years. Her areas of interest are Accountancy, Finance, Human Resource Management and Intellectual Property Rights.

Prof. Anil K. Saini, before joining USMS, he was holding a senior academic position at FMS, University of Delhi. He carries with him blend of industrial and academic experience of more than 28 years out of which six years in the industry in responsible capacities. Dr. Saini has to his credit six published books and over sixty papers in national and international journals/conferences. He has travelled extensively abroad and has visited Europe under Teacher-Exchange Programme for teaching courses abroad. Dr. Saini is also the Director of Industry Interaction Cell of the University. He has been proactively involved with professional associations and is Senior Life member of Computer Society of India (CSI), Fellow of Institution of Electronics and Telecommunication Engineers (IETE), Life Member of AIMA, Operational Research Society of India (ORSI). Dr. Saini has served as Chairman of CSI Delhi and IETE Delhi Centre and Governing Council member of IETE. He has been elected as a Member of the National Nomination Committee of Computer Society of India for the year 2013-14. Dr. Saini is a member of the Board of Studies of AIMA and Jamia Millia Islamia University since 2011. Dr. Saini is guiding eight Ph.D. scholars and has produced six Ph.D. students. His major interests include: Computer Applications, Information Systems, Databases, Technology and Innovation Management, Knowledge Management and Healthcare systems.