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Achieving Market Leadership: The Next Challenge for Technology Firms from Growing Countries
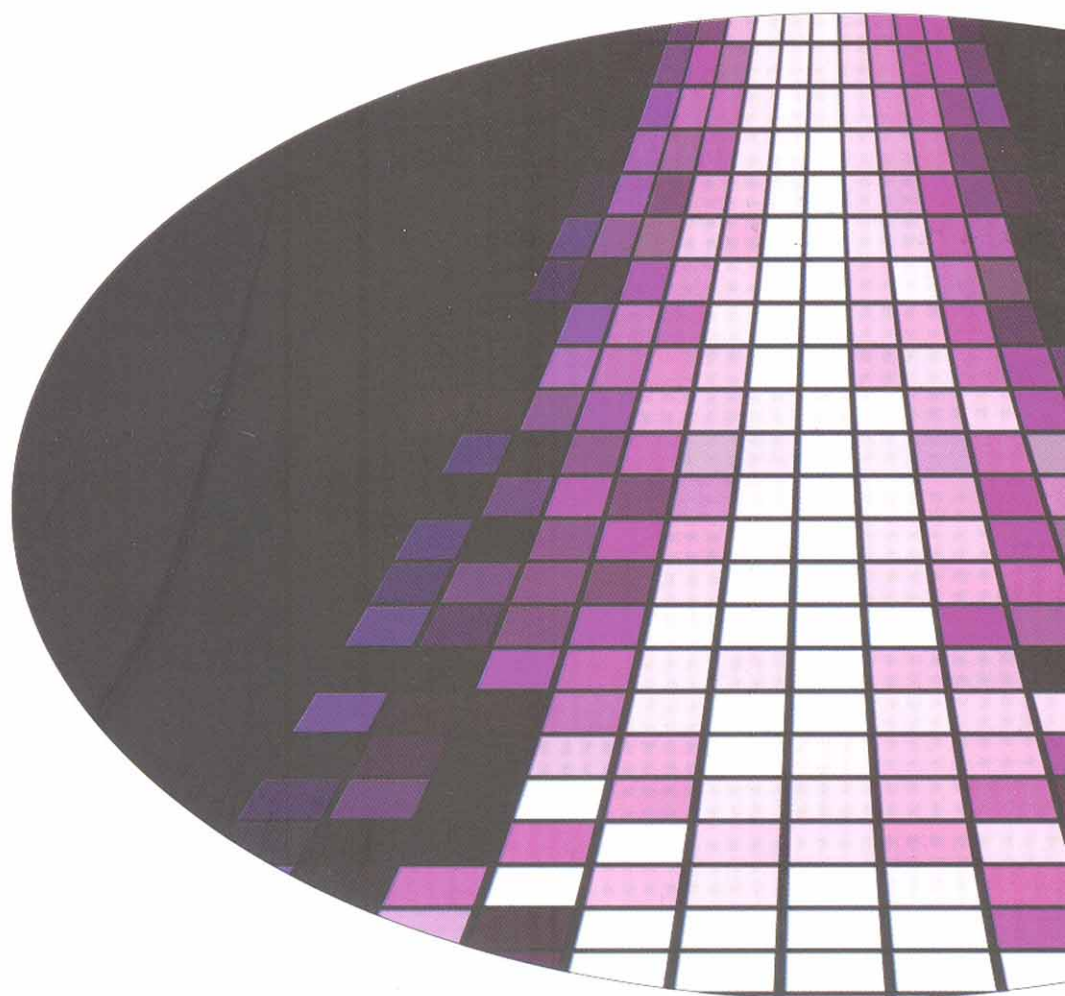
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Achieving Market Leadership: The Next Challenge for Technology Firms from Growing Countries

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Abstract

Technology industries tend to follow a "winner-takes-all" model where the whole market belongs to an oligopoly of firms. Those companies are achieving an overriding position with a product or service whose dominant design is adopted by an overwhelming number of customers and makes it a de facto market standard. We have identified seven different moves used by the firms from the developed world to push their technology-intensive solutions to the market so that they become indisputable leaders. They offer a compatible or open technology to generate increasing returns; besides they create a supportive network; they also actively promote their technology through an aggressive branding; they go after the global market in order to reach the maximum volume of users; they minimize their production costs in order to lower their price and get to new customers; finally they constantly invest more than their competitors in order to reach a critical mass which make their solution unavoidable. Technology industries have long been dominated by companies from the developed world. However in the recent years, new players are coming from growing economies, especially from China for high tech products and India for technology services. In this paper, we will explore how those technology companies from growing countries -mostly China and India- can also apply those different actions in order to reach market leadership

Keywords: *Technology industries; growing countries; market leadership: technology standard; dominant model; complementors.*

ACHIEVING LEADERSHIP IN TECHNOLOGY-BASED MARKET: AN ANALYSIS OF THE MOST SUCCESSFUL STRATEGIES

Technology-based products or services can be defined by three main features: First, they require a sophisticated technology; secondly they are innovative for the market, and finally they require a high level of R&D investment (Viardot, 2004). According to this definition the vast majority of high tech solutions belongs to a limited number of industries, namely Information and Telecommunication, Pharmaceutical and Medical, Energy, Materials, and Aerospace.

One of the key characteristics of technology-based industries is to follow a "winner-takes-all" model (Frick and Torres, 2002). This means that in a given market a company or a group of companies is achieving a relative market share so important that the whole market belongs to an oligopoly of firms, leaving crumbles for the rest of the players. Such a dominant position is made through the success of a product or service whose dominant

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design (Aberthany & Utterback, 1978) has made it a de facto standard which is adopted by an overwhelming number of customers. Table 1 illustrates the dominance of a handful of companies in various high technology industries.

Table 1: Dominant Model in Some High Tech Industries

Industry	Market share of the dominant players	Names of the dominant players
Operating systems	89%	Microsoft
Browser	75%	Microsoft
Search engine	54%	Google
Personal computer	54%	HP, Dell, Acer, Lenovo
Mainframe	90%	IBM
Optical disks	50%	Sony
Cell phones	72%	Nokia, Motorola, Samsung
Smart phones OS	65%	Symbian
GPS systems	66%	Garmin, TomTom
Digital map	99%	Navteq, TeleAtlas
PC microprocessors	93%	Intel, AMD
Networks systems (routers)	90%	Cisco Systems, Juniper
Custom chips	70%	TSMC, UMC
Mobile phone CDMA chipset	68%	Qualcomm
Database software	84%	Oracle, IBM, Microsoft
ERP software	41%	SAP, Oracle
Large long range aircraft	100%	Boeing, Airbus
Mobile Service Satellite	50%	Inmarsat
Satellite launcher	55%	Astrium
Nuclear Power	53%	Areva
Biotechnologies	50%	Amgen, Genentech

Source: Annual reports, press release, Reuters, Blooberg, MedAd news, IDC, Gartner group

Technological standard appears usually during the growth phase of the technology, when a technology starts to peak up and that new entrants wants to offer a solution to a growing number of customers. For instance, in the online service, after initially pursuing a non standard strategy late entrants such as Microsoft and AT&T followed the standards in foundation technologies first adopted by Prodigy and AOL.

More recently, a new standard has emerged for high density optical disks, used to store data on computer and electronic devices, when the fight between two competing technology ended with the victory of Blu-ray from Sony over the HD-DVD from Toshiba.

Contrary to common sense, it is not always the "best" or the "most innovative" technology which manages to become the de facto standard. A long catalogue could be filled with the list of firms that developed a superior technology but failed to establish it as a standard. In the lone field of PCs, one may think of Apple, IBM, and Next, which have lost a battle against the so-called Wintel alliance. More recently, AltaVista lost to Google

as the leading search engine while Palm was defeated by Research in Motion for the first position in the Personal Digital Assistant (PDA) business.

Actually, an analysis of various case studies shows that all the winning companies rely less on technology than on their willingness to open the business in order to expand opportunities for other participants and for new customers. We have identified seven different moves used by the firms to push their technology to the market so that it becomes an indisputable leader. First they offer compatibility to generate increasing returns and escape market fragmentation. Some of them even put forward an open technology; besides they create a supportive network. They also actively promote their technology through an aggressive branding. They go after the global market in order to reach the maximum volume of users; they minimize their production costs in order to lower their price and get to new customers; finally they constantly invest more than their competitors in order to reach a critical mass which make their solution unavoidable.

For years the high tech industries has long been dominated by companies from the developed world. However recent years have seen the arrival of new players coming from growing economies, especially from China for high tech products and India for technology services. At present some of those firms are already positioned to become first-of-class in their category of business. For instance Lenovo from China, which did not exist in 1990, bought IBM's personal-computer business five years ago and is now the world's fourth-largest PC-maker. ZTE, another Chinese company, started its foreign operations only in 1997, and is currently one of the world's top five mobile-handset manufacturer. The Indian Tata Consultancy Services (TCS) operates in 42 countries and had revenues of $6 billion in 2009. With Infosys and Wipro, two other large Indian consulting and IT services firms, TCS plays in the same league as its western rivals such as Accenture or Cap Gemini. Other famous leading companies from growing countries are for example HTC (smartphones), Acer (laptops), China Mobile (telecommunication services) and Huawei (telecommunication equipment).

In this paper, we will explore how those technology companies from growing countries -mostly China and India- can also apply each one of the seven different actions in order to reach market leadership.

BEING COMPATIBLE

In the early days of the high technology sector, the best way to be successful for a company was to come with a new and exclusive innovation and to keep it proprietary so that the customers who were attracted by the value of this new technology would stay locked with the provider.

Some firms have managed to build powerful patent and/or copyright walls around their original technology coupled with aggressive legal enforcement to prevent copy by potential competitors. That was what Xerox did with its proprietary dry-toner xerographic technology, Intel with its X86 and Pentium microprocessor series, or Cisco Systems with its Internet operating system used in network equipment.

Some companies from the growing countries are following the same way as China and India are providing a growing contribution to radical innovations such as online games and mobile money (payments over mobile phones). For instance, China's Huawei has become the world's fourth-largest patent applicant.

But experience shows that keeping a proprietary technology exclusive is often extremely difficult in the high tech sector because patents can be quickly turned away and invented around thanks to the use of reverse engineering techniques. Patents ordinarily delay but do not stop competition. They may even push efficient competitors to invent in-house technology that may be better, like in the photocopier business where Xerox's competitors developed their own liquid-toner xerographic technology. Similarly AMD managed to emulate the performance of Intel's microprocessor. And in the beginning of this decade, Huawei modified successfully some of its products after it was sued by Cisco to have unlawfully copied and misappropriated Cisco's IOS software and infringed numerous Cisco patents.

Consequently, the road to success for technology firms has changed. In order to become a winner nowadays, technology firms have to make their technology readily accessible and widely available not only to customers but also to "complementors" (Brandenburger & Nalebuff 1997), i.e. companies that provide the product and services around the technology.

However the value of many high-tech solutions for the customers or the complementors is a function of the availability of complementary solutions, like software applications for a PC, or the coverage of the telephone network for a cellular handset.

In order for all those complementary solutions to work well together, compatibility is essential (Farrell & Saloner, 1985). For instance, in the computer industry, compatibility is required to ensure that computers, software, modems, printers, and other peripherals interface easily. Similarly, in the cellular telecommunications market, compatibility demands a common set of technological standards for the design of cellular base stations, digital switches, and handsets to ensure maximum geographical coverage for users. The larger the coverage, the greater the value for

customers and the bigger the future demand, leading more customers to invest in the expansion of the network (Mc Gee, Sammut, & Tanyut, 2002).

Increasing returns explain why the cellular phone has caught up more quickly in Europe than in the US in the 90s. In Europe, more than 900 telecom vendors and operators backed only one technology, the GSM (Global System for Mobile Communications) while they were four different and non compatible technologies in the US. The value for the cellular phone users clearly was much bigger in Europe than in the US.

For the same reason, the adoption of the GSM system in 1994 by China has enabled China Mobile to become the world's biggest telecommunication operator as it used the GSM technology provided by European telecommunication equipment companies to launch digital communication services as early as in 1995 (Tatsumoto & alii, 2010).

PROVIDING AN OPEN ARCHITECTURE.

The ultimate way to be compatible is to make product architecture widely available for free, so that it can benefit of the value co-creation by the complementors, the customers and any other third party. This has made the success of 'open-source' software such as Linux, Apache or Mozilla for instance which have taken over proprietary software.

The most famous case is Sun Microsystems, a network server manufacturer which had lost most of its market share to open-source Linux-based competitors at the end of the 90's. While large companies such as IBM and HP were backing Linux as a basis of their offer, Sun Microsystems, the leader at that time, clung to its proprietary server operating system, Solaris, and lost most of its market power. In 2002, it gave up and it started to offer Linux-based servers too.

In June 2008, Nokia embraced this approach when it took total control of Symbian, a UK based mobile phone operating system manufacturer with the goal of making its solution the new basis of a fully open mobile software platform. Symbian was already the leader in mobile operating software with a platform of 200 million users, 10 years of development, and the support of tens of shipping vendors as well as operators. Under Nokia's new ownership, Symbian was relabeled the Symbian Foundation and the company was turned into a non profit organization opened to all organizations and independent developers.

The new foundation was backed by a significant number of smart phones manufacturers and telecommunication operators such as Sony Ericsson, Motorola, NTT, DoCoMo AT&T, LG Electronics, Samsung Electronics, STMicroelectronics, Texas Instruments and Vodafone. With

this move, Symbian which had already a leading market share of about 60% of the world's smartphone turns the proprietary mobile operating systems from Apple Research in Motion and Microsoft in the minority.

Yet nowadays the Symbian operating system is getting aggressively challenged by another open architecture, Android from Google using a mobile Linux-based operating system. Android is backed by another business alliance name Open Handset Alliance which includes HTC, Intel, Motorola, Qualcomm, Samsung, LG, T-Mobile, Nvidia, and Wind River Systems. Indeed the creation of the Symbian Foundation was a way to undercut the Android initiative by Google, a late entrant in the market. But so far the rise of Android seems unstoppable.

Interestingly, the Taiwanese HTC has played skillfully its hand by relying on open architecture. Initially, HTC was manufacturing smartphones based on Microsoft's operating system, Windows Mobile. But, then WM went stalling and, in 2009, HTC started to shift its focus to devices based on the Android operating system mobile platform. Actually, the first Android mobile phone put on the market, the T-Mobile G1, was made by HTC.

Nevertheless, open-source is not the ultimate solution as there is always a risk of fragmentation, also known as 'forking' in the software industry. Fragmentation occurs when a single software project is split between various development teams which are making increasingly different versions of the original. The most famous example is the multiple versions of the original UNIX computer operating system which was developed in the 70's by AT&T's Bell Labs but is now sold in many different and often incompatible versions, including HP/UX, AIX (IBM), Berkeley BSD, SINIX (Siemens), Solaris (Sun), Inx (Silicon Graphics), etc. Consequently an application developed originally for the UNIX market could run only on one of the version and required a substantial adaptation to run on another version. Such an absence of compatibility has ultimately limited the value of UNIX as a market standard for PCs and servers.

CREATING AND STIMULATE A SUPPORTIVE NETWORK

The addition of more firms to a group creates an incentive for other firms to join in; thus it provides the necessary momentum and critical installed base to make a given technology successful enough to become a de facto standard by increasing the value of the technology and wiping out other competitors' technology. Such a positive feed back loop nurtures an increasing. But in order to turn up increasing returns, one has to manage aggressively the forming of a business net to work together to ensure the success of a joint product or service.

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For example, Wintel (the alliance of Intel and Microsoft), SAP, or IBM have made and forged an entire industry around their solutions, namely Windows, R/3, and Notes, with application developers, system integrators, trainers, and hardware companies working together to provide solutions to end users. SAP, the leader in ERP software for business-to business applications, has more than 2,400 partners all over the world working with and around its software solutions.

Creating a supportive network can be achieved through distribution and licensing agreement or through partnership and alliance. A prominent example is what Matsushita did in 1975 with the VCR when it licensed its VHS technology to other consumer electronic enterprises including Hitachi, Sharp, Mitsubishi, and Philips NV, and formed an original equipment manufacturer (OEM) agreement with GE, RCA, and Zenith. In doing so, Matsushita put together a big network of firms eager to push the same technological solution to the end-user, while Matsushita continued to compete against these companies in the final market place under the JVC brand name. Consequently, Matsushita managed to win over its main competitor, Sony, whose product was based on a different technology called Betamax and which refused to open its technology to any other players in the market.

The lesson was not lost on Sony when it launched the 3.5-in computer disk drive in 1984. First, Sony sold or licensed its new technology to leading PC producers, including IBM, Apple, Compaq, and NEC. Consequently, the 3.5-in disk drive quickly became a worldwide standard in this global industry and Sony achieved a 50% market share.

Again when Sony started to work on a new optical disk technology for data storage, the company decided not to work alone but to make an alliance to promote its new technology. In 2002, it spearheaded the creation of the "Blu-ray Disc Founder group" with eight other leading electronic companies: Matsushita, Pioneer, Philips, Thomson, LG Electronics, Hitachi, Sharp, and Samsung in order to develop and license this technology. The association renamed 'Blu-Ray association" expanded swiftly to more than 250 members coming from consumer electronics, computer hardware, and motion picture production. Six years later, Blu-ray became the de facto standard of this category of product when its major competitor the HD-DVD technology by Toshiba exited the market.

Google has also build a significant business net by teaming with various public and private organizations in order to consolidate its leadership position in the search engine industry. Through a mix of distribution agreements, partnerships, and alliances (see Table 2), Google aims to make its search engine widely available for all categories of applications.

Table 2: Google Main Partnerships Since its Foundation

Year	Company/organization	Type of relation	Official goal
2001	Yahoo!	*Partnership*	Become Yahoo's default search provider
2001	Universo Online (UOL)	*Partnership*	search service (for the Brazilian leading online service provider)
2002	AOL	*Partnership*	offer Google search and sponsored links to 34 million customers
2004	Libraries of Harvard, Stanford, University of Michigan, Oxford, and New York Public Library	*Partnership*	digital scanning
2005	NASA Ames Research Center	*Partnerships*	Research projects involving large-scale data management, nanotechnology, distributed computing, and the entrepreneurial space industry
2005	Sun Microsystem	*Partnership*	Share and distribute each other's technologies
2005	Time Warner's AOL	*Partnership*	Enhance each other's video search services
2005	Websites	*Service:"Adsense for Mobile",*	Provides the ability to monetize mobile websites through the targeted placement of mobile text ads
2006	News Corp.'s Fox Interactive Media	*Agreement US$900 million*	Provide search and advertising on the social networking site, myspace
2006	eBay	*Partnership*	Advertising partnership
2006	Adobe	*Distribution agreement*	Toolbar distribution
2006	Intuit	*Strategic alliance*	Offer a variety of Google services to Intuit small business customers
2006	Dell	*Partnership*	Install search software on Dell computers
2007	China Mobile,	*Partnership*	Provide CM users with Google mobile search
2007	Samsung	*Collaboration*	Put Google products and services on selected Samsung phones
2007	Salesforce.com	*Partnership*	combining on-demand CRM applications with AdWords
2007	The University of Texas at Austin library and the Princeton University library	*Partnership*	Library Project: digitize and make available approximately 15 million volumes on line before 2015
2007	Google, HTC, Intel, Motorola,Qualcomm, Samsung, LG, T Mobile, Nvidia ,Wind River Systems, TI,etc	*Open Handset Alliance*	Develop an open platform for mobile services called Android.
2007	NORAD	*Sponsorship and partnership*	Google Earth was used for the first time to track Santa Claus in 3-D NORADTracksSanta Channel on YouTube
2007	IBM	*Partnership*	Supercomputing initiative so that students can learn to work at Internet scale on computing challenges.
2008	Publishers	*Partnership*	Digitize millions of magazine articles and make them available on Google Book Search.

Source: Adapted from Google.com.

Some technology companies from growing countries have replicated this strategic approach and they have built their own network of partners in order to gain market power. For instance, Baidu from China, Google's biggest competitor in the web search business, has already more than 350,000 publisher partners. They are members of the "Baidu union" and represented 25% of Baidu's total income in 2008; the proportion should reach 30% in 2010.

Very recently in June 2010 Baidu has also teamed with the Symbian Foundation have teamed to co-establish a joint research laboratory in order to launch a wireless "box computing". This device will enable application and web developers to incorporate search functionality into their applications based on the Symbian operating system. The results will be shared with the entire mobile industry and will be made available through the Symbian Foundation's open source policy. The goal is clearly to extend the Baidu/ Symbian ecosystem by bringing new applications to Symbian devices and expanding the scope of Baidu in the mobile phone business.

Similarly, in business-to business markets, Huawei has formed many partnerships with leading companies, either to incorporate or co-develop technologies, to improve the time to market its products, or to integrate new management practices into its organization.

The list of Huawei's multinational partners is impressive and includes ADI, Agere, Altera, Freescale Semiconductor, HP, IBM, Infineon, Hay Group Intel, Microsoft, Motorola, Oracle, PwC, Qualcomm, Siemens, Sun Microsystems, Texas Instruments and Xilinx.

In fact, it seems that in order to achieve economies of scales, many companies from the emerging world prefer to involve a wide range of partners in the process of production and distribution. This "scaling out" is much more effective than "scaling up" with a centralized manufacturing to produce long runs of standardized items because, in those countries, populations are often scattered and distribution systems dreadful.

DEVELOPING A DOMINANT BRAND NAME

Another avenue to achieve a leadership position for a high tech solution is to develop a strong and famous brand image in order to rally the maximum of customers. For instance, at different times in history, IBM, Nokia, or Cisco Networks have all managed to grow their brand name at the same time that they were increasing their business.

A brand is a name, a set of words, a sign, a symbol, a design, or a combination that identifies a seller's goods or services. In the high-tech world, a brand is a basic necessity (Temporal & Lee, 2000), because one

of the main criteria that determine a customer's choice is confidence in a company and its products. As the purchase of a high-tech product often represents a leap into the unknown, an individual or industrial buyer needs to be reassured by a well-known and familiar brand.

Furthermore, a strong brand facilitates product identification while attaching a quality image and a personality that establish customer loyalty and justify a price difference. Additionally, a product's registered trademark can protect against clones, which is at least as important as protecting technology with patents.

Also, a potent brand communicates the producers' values. For instance, IBM stands for performance and success. Nokia evokes focuses on the consumer and his needs, and is summed up in the slogan, "human technology". Cisco is associated with technological leadership in telecommunication hardware for the Internet.

Ultimately, a dominant brand is the one that comes first in customers' minds before competitors. Dominant brands have greater returns than their competitors: on average, the "top of mind" brand has a return on investment of 34 per cent, while the second competitor has 21 per cent, and the third 16 per cent (Burke and Schoeffler, 1980).

Branding for leadership is not exclusive to private companies. It has been used very effectively by some alliances to promote an industry standard. This has been the case of Bluetooth, a short-range networking protocol for connecting different types of digital devices (mobile phone, computer, GPS, etc) or accessing the Internet by wireless signals.

In 1998, five companies founded the Bluetooth Special Interest Group (SIG), Ericsson, IBM Corporation, Intel Corporation, Nokia and Toshiba Corporation. Its goal was to promote the development of the new protocol as the standard solution for wireless connections. Very early the decision was made to develop a strong brand in order to accelerate its recognition by the end -consumers and adoption by other industrial companies.

A name and a logo were chosen and have been actively promoted by the members of the SIG among the end users. As measured regularly in a sample of countries (USA, UK, Germany, Japan and Taiwan), the average brand awareness level for Bluetooth has risen steadily from 60 percent in 2004 to 85 per cent in 2007. Such a high level of recognition has pushed many companies to adopt Bluetooth as the standard wireless connection in the telecommunications, computing, automotive, music, apparel, industrial automation and network industries (see table 3).

Table 3: Number of Associate Members in the SIG Group and Brand
Awareness

	2004	2005	2006	2007
Number of associate members	3400	5500	9000	10,000+
Percentage of brand recognition	60%	73%	81%	85%

Source: Bluetooth.com

Though they are lagging behind their older competitors from the developed world, some high tech firms from India and China have started to invest more in building a stronger corporate brand. For instance, the owner of Tata Consulting Services, the Tata Group reckons that its brand is worth today about 100 billion rupees ($2.2 billion).

And in the latest ranking of technology brands by Millward Brown in 2009, Baidu shows at the 19th position with a brand value estimated at US$ 5,765 million. In another ranking of the major international brands by the Financial Times in 2009, China Telecom appears at the 7th rank with a brand value estimated at US$ 61,280 million.

GOING GLOBAL

In today's global economy, increasing returns follow the firms that penetrate one large geographical market after another. The mobile phone leader, Nokia was a Finnish company in the 80's; it was a European company in the early 1990s and by the late 1990s it was truly global (Steinbock, 2001). In 1997, Nokia shipped just over 20 million units worldwide; in 2009, Nokia sold 425 million units and plan to sell 500 million handsets in 2010 with a 40% worldwide market share. Today, less than 3 per cent of Nokia's revenues come from Finland.

Similarly, in the industrial software industry, the swift growth of the German SAP relied on the increasing global acceptance of its ERP (Enterprise Resource Planning) software as the governing standard for running every aspect of a company. In 2007, more than 97,000 companies in over 120 countries run SAP software. At present, SAP makes more than 80 percent of its turnover outside the German market.

Table 4 shows how some high tech companies have managed to grow their leadership by promoting their solution outside of their native markets. Interestingly, Yahoo has a smaller degree of internationalization compared to some of its rivals, such as Google and Microsoft. This is probably one of the reasons, among others, why Yahoo has not been able to maintain the leadership position it had acquired at the end of the 90's in the search engine business. Similarly Apple has recently decided to accelerate the

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internationalization of its iPphone to make it a real smartphone market standard. The iPhone has got a significant market share in the US (28% in Q1 2010 against 35% for RiM, according to Nielsen) but is still small on a worldwide level (16.1% in Q1 2010 against 89.8 % for Nokia and 19.1 % for RiM, according to IDC).

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Table 4: Global Reach of Some Leading High Technology Firms

Company	Percentage of annual revenues made outside the country of origin	Company	Percentage of annual revenues made outside the country of origin
SAP	80%	Google	52%
Sony	80%	Nokia	50%
IBM	75%	E-Bay	50%
HP	70%	Cisco	50%
Intel	70%	EMC	48%
Microsoft	60%	Apple	40%
Dell	54%	Yahoo	25%

Source: Annual Reports and Press Releases Compiled by the Author

Many technology firms from growing countries are following the path of embracing globalization as a way to achieve growth and success. They are active actors in the rebalancing of the economic power between old and emerging countries. They are among the 21,500 multinationals which are currently based in the emerging world, according to the United Nations World Investment Report.

Emerging-world champions need to find new markets to make up for their slim profit margins. They do it mostly in their native countries but have also turned their eyes to other parts of the world. One of the first was China's Lenovo which bought the PC division from IBM in 2005 and became almost instantly a global company. Similarly in 2008, India's TCS bought Citigroup Global Services from the US and is now present in more than 42 countries. This year, Bharti Airtel has acquired Zain a leading African telecoms company

Sometimes those firms are even reversing the traditional global supply chain such as Brazil's Embraer which buys many of its component parts from the West and does the assembly work of jet aircrafts in Brazil. Those companies are also expanding into new geographies to become global players, and their targets are mostly the growing countries. For example, Huawei has opened a research centre and Lenovo has moved its global advertising headquarters in Bangalore; Embraer has new customers in Saudi

Arabia, Panama and Poland and set up a joint venture in China; and India's Wipro has recently started open new development centers in Brazil, China, Philippines, Poland, and Romania, along one in the US.

MINIMIZING PRODUCTION COST

All the successful high tech companies which have managed to get an exceptional part of their market have pursued a strategy of aggressive cost-cutting in order to be able to lower their final price to the consumer. This is easier for firms which propose knowledge-based products such as software, information, or drugs because they have a marginal cost of production that is almost zero. Consequently, any additional market share has a tremendous impact on profit. Some of those companies have even become market leader by being free of charge for the customer, such as Facebook or Twitter which have developed into the most popular social networking websites on the Internet at an amazing speed. Facebook was created in 2004 and hit the 400 million unique visitors' threshold in February 2010. Twitter was born in 2006 and had more than 100 million users worldwide in the beginning of 2010.

But leading companies providing hard technology-based products have also manage to keep their cost under control. It has allowed them to cut their prices and increase their market share in order to achieve or comfort their leadership position.

Among famous examples are electronic product manufacturers such as Dell, Nokia and TomTom which have managed to become leader through aggressive cost control. The reason is simple: in the electronics industry product costs-measured by the cost of goods sold (COGS)-are critical to profitability because of their weight in the total revenues, which is about 80 per cent. Consequently, the difference in profitability between more and less successful companies comes from COGS rather than operating expenses. A 5% savings on the COGS may have a positive impact of between 50 and 600 on the profitability before tax. Furthermore, any market increase contributes to the decrease of the unit fixed costs because of the economies of scale made on the amortization of the fixed cost assets. This decrease can be passed to the market in lower prices which are contributing to the selling of more product and the continual decrease of unit fixed cost. Such positive feed-back loop contributes to strengthen the leadership position of a winning product, and especially when the technology is getting mature and when the new consumers are more sensitive to price than innovation or status.

Figure 1 illustrates the relationship between sales volume and price decrease in the case of TomTom, the European leader in Portable Navigation Device (PND) for GPS. As shown in table 6, TomTom has been constantly pushing down the average selling price of its PND in order to boost sales by reaching new customers. The correlation index between price and volume is quite large at -0,872 over the period. This aggressive pricing has allowed TomTom to increase its presence in the US market to a 20 percent market share while keeping its lead with over 50 per cent of the European market.

Volume
'000 units

Average Price Unit (euros)
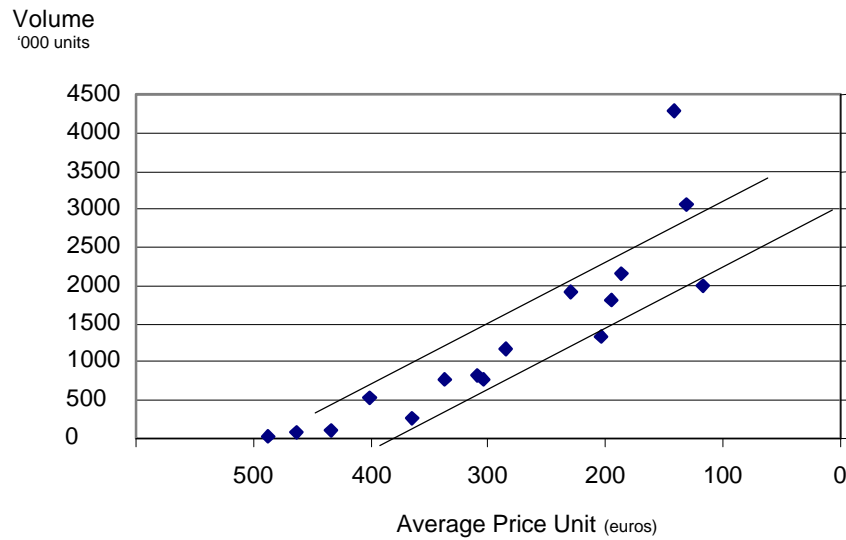
Source: TomTom annual reports. Figures compiled and analyzed by the author

Figure 1: Price Volume relationship for Personal Navigation Devices

Table 6: TomTom Pricing Strategy from 2004 to 2008

	Q2 04	Q3	Q4	Q105	Q2	Q3	Q4	Q1 06	Q2	Q3	Q4	Q107	Q2	Q3	Q4	Q1 08	Q2
ASP euro	487	463	465	434	365	402	337	305	310	285	230	204	195	187	141	117	131
000 s units	22	73	_	108	262	538	779	762	830	1180	1915	1330	1807	2160	4278	1997	3066

Correlation index: -0,872
Source: TomTom annual reports. Data compiled and analyzed by the author

Technology companies from growing countries such as Acer, Huawei, or HTC have been pursuing the same logic of cost cutting for a long time when they were manufacturing products for the developed markets.

But things have changed recently with the rise of the Chinese and Indian markets as well as in other developing economies. Now, because of

the lower purchasing power of their customers, technology companies are coming up with new products and services that are dramatically cheaper than their Western equivalents such as $300 computers, and $30 mobile phones that provide nationwide service for less than 2 cents a minute.

The number of those "frugal" products is growing rapidly as those firms are rethinking their business models to squeeze costs and accept thin profit margins to gain volume. Four ways of reducing costs are proving particularly successful. The first one is to simplify everything. Western companies have done that before but Chinese and Indian firms are pushing the limits. For example, on electronic devices multiple buttons are reduced to three or four; bulky printers are replaced by tiny ones like those used in portable ticket machines in order to fit into a small backpack and run on batteries. In India, a company has reduced an ATM machine to a smartphone and a fingerprint scanner that allow a bank branch to be taken to rural customers.

The second way to cut costs is to contract out. For instance, Bharti Airtel, the low fee Indian mobile company has contracted out everything but its core business of selling phone calls, handing over network operations to Ericsson and Nokia Siemens Network as well as the business support to IBM. The third cost-saver is the use of mass-production methods for sophisticated services. India's largest outsourcing firms such as TCS, Wipro, Infosys, were the first to show that economies of scale and scope could be made from services that used to be geographically based and highly fragmented.

The fourth way to shrink cost is to use existing technology in creative new ways. For example, TCS has designed a box that connects the television to the internet via a mobile phone, because personal computers are still relatively uncommon in India but televisions are everywhere. Another Indian company, VNL, has redesigned mobile-phone base stations so that they can run on a solar-powered battery for the many customers who can not access the electricity grid. The Chinese battery maker BYD has drastically reduced the price of expensive lithium-ion batteries from $40 to $12 apiece by using less costly raw materials and learning how to make them at ambient temperatures rather than in expensively heated "white rooms".

One should note that those frugal products are not second-rate. For instance, many cheap mobile handsets come equipped with rubberized key pads, flashlights because of frequent power cuts, and multiple phone books because they often have several different users; their menus are in several different languages, and they allow users to play video games and surf the net.

INVESTING MORE THAN THE COMPETITORS

Traditional theory states that industries are inclined to diminishing returns as a result of competition between firms for scarce resources. However, on the opposite, the law of 'increasing returns' states that returns from marginal investments go up rather than down: as some firms continue investing, their profitability grows, and eventually one or two firms end up dominating the market because the other firms are unable to match their level of investment.

Archetypal examples of increasing returns are utilities, which are consequently regulated as de facto monopolies. Still, the law of increasing returns plays a large role in the high-technology and knowledge-based industries of today.

Increasing returns happen when competitors are unable to match each other's investments. In the microprocessor industry, the cost to build a wafer manufacturing plan for Intel is around 3$ billion. The next generation of factory for 450mm wafer could require a $10 billion investment. Additionally, Intel has invested in more than 1,000 information technology companies in more than 30 countries through its venture capital division.

In the software industry, Microsoft has a $25 billion cash and investment capacity which is dwarfing its competitors. Oracle stands alone in the database business for exactly the same reason. Its yearly $10 billion cash capacity has allowed him to acquire its competitors such as PeopleSoft ($10.3 billion), Siebel ($5.8 billion), Hyperion Solutions ($3.3 billion), and BEA Systems ($7.2 billion), mostly by offering cash.

Google is another recent example of a company which has been investing ad infinitum in order to achieve a critical mass so that its search engine and its business model become unbreakable. When Google started at the end of the 90's competing against other search engines such as AltaVista, Google leaped to the top because it offered something new: a simple interface, a fast search, and a large database.

Since then, Google has invested continuously to improve its model. Besides the partnerships, Google has acquired different companies to expand the reach of its search engine and to enlarge the market for its targeted advertisements associated with search keywords. Among more than 50 acquisitions, the most notable are the acquisition of the online video site YouTube for US$1.65 billion in 2006, and the online advertising site Double-Click in 2007 for US$3.1 billion. Google has also invested heavily in network architecture and it has developed it own category of Internet servers in order to guarantee that its services can be reached almost

instantly by the users. The size of Google's search system is presently undisclosed, but the best estimates place the total number of the company's servers at 450,000, spread over twenty five locations throughout the world, a quantity that no other competitors can match today.

As the number of companies from Brazil, India, China and Russia on the Financial Times 500 list more than quadrupled in 2006-08, from 15 to 62, the technology champions of growing economies are also investing heavily to overpass the competition. For instance, Infosys has financed one of the world's largest corporate universities on a 335-acre campus with a permanent faculty of 250, outstanding sport facilities and even a multiplex cinema. It trains thousands of new recruits and existing employees who are coming from the entire world.

Those companies are also making a lot of acquisitions in the West to get or extend their skills, brands and distribution channels. In 2008, TCS Services bought Citigroup Global Services, the outsourcing division of the American bank, $512m while HCL Technologies, another Indian global IT Services company, acquired Britain's Axon Group for $672m. This year, Bharti Airtel purchased Zain, a leading African telecoms company, for $9 billion

CONCLUSION

We have seen that in technology based industries where increasing returns exist and standards are important, the guideline for success is to maximize the installed base of users by offering them solutions to fit their needs. We have identified seven different ways to do it. An interesting question is to consider the timing of how to execute those actions. The more logical seems to go sequentially (see figure 2).

The first step starts with the design of a compatible architecture, which maybe fully opened initially or at a later time. Then the firm can nurture and stimulate a network of complementors which are attracted by the compatibility of the technology with their own solution.

After that, the company can translate the number of complementors and partners in the brand value of its product and promote it actively to the end-users market. This will boost the appeal of its solution to new complementors which will be drawn by the perspective of a bigger market. Finally, armed with a strong product, a solid network of partners and a robust brand image, the company may decide to use those assets and reach for the global market in order to make its solution a worldwide standard.

In parallel, the company has to cut its unit costs persistently in order to lower its price to reach new customers more sensitive to price. It has also

to invest doggedly in R&D, manufacturing, and marketing in order to asphyxiate its competitors which will not be able to match its investments. Such a sequential path has been followed by companies such as Intel or Microsoft for instance and has proven to be very effective.
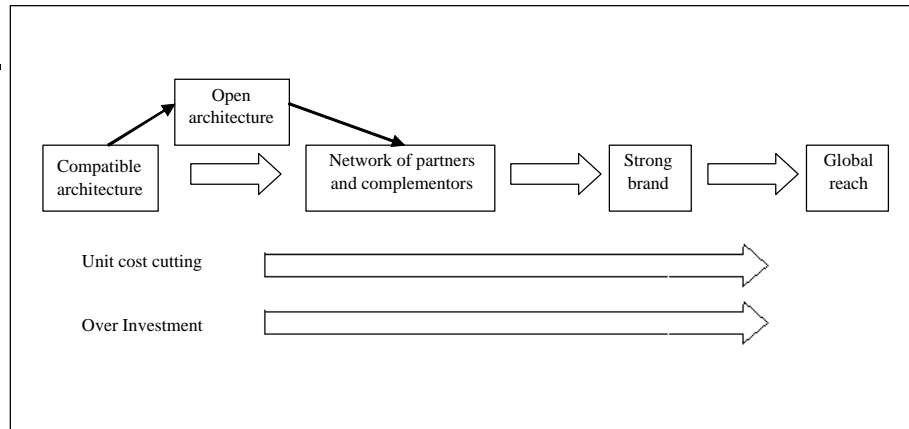
Figure 2: Combining Actions for Becoming a Market de facto standard: a sequential approach

However in reality few companies are following this theoretical model. The analysis of various technology companies from developed countries shows a wide diversity in the approach to achieve market leadership.

Some firms have skipped the technological compatibility initial step and have started directly by offering an open architecture -like the Apache Foundation with the web server Apache. Other companies have actively promoted their brand even before having a strong network of partners, such as Tom-Tom did in the GPS systems business in Europe. Alternatively, several companies have built a strong brand and a solid network of complementors but have not opened their architecture, such as Apple with its iPhones. Ultimately, some companies have not gone sequentially but have done all those actions in parallel in order to create some kind of a 'big bang' and to rally the market to a new innovation. This has been the strategy of Sony for its Blu-ray optical discs and it has shown to be very effective. Such an approach is clearly for companies which have large financial pockets and which are not faint-hearted as it can be very costly if it fails.

When considering the moves of technology firms from growing countries, there is also a huge variety of methods to become a market winner. For instance, HTC or Acer have started with an impressive group of associates but without a strong brand name as long as they were

manufacturing 'white' products rebranded by major western companies. Only recently have they initiated to invest more on their own brands. Lenovo set off with the purchase of a strong brand (IBM PC) and a large network of partners in order to build its global reach. Huawei begun with the offering of compatible technology over the Internet then developed its connections with partners globally before investing on branding. TCS, Wipro, Infosys and other Indian technology services established their global business by becoming outsourcers for larger Western rivals then beefed up the quality and complexity of their skills as well as the richness of their partnership to move upmarket and increase the value of their corporate brand. All those firms have been able to contain their costs constantly but few are rich enough to over-invest in comparison with their Western counterparts.

But this will change in the future because some technology companies from growing countries are clearly in the business for the long run. While Western firms are buying cheap manufacturing in the developing world, they are acquiring sophisticated corporate machinery in the West in a kind of "reverse M&A" and they are now challenging their competitors from the developed world. It tells a lot that when Arun Sarin was the CEO of Vodafone, he sent his top executives to India to learn about its low-cost business model while the CEO of GE, Jeff Immelt, has suggested that his company should disrupt itself with frugal products from China and India.

Furthermore the characteristics of emergent markets are pushing those technology firms to continually improve. Because many of their customers have a low purchasing power, they have to go for increasing volume with frugal products, extensive networks, and cost control. But because piracy is so ubiquitous, they also have to keep upgrading their products and services with continuous innovations. Thus, they are turning problems into opportunities as in the 1980s Toyota and Honda took to "just-in-time" inventories and quality management because land and raw materials were expensive in Japan. Those rising champions will certainly rely on some of the seven ways that we have detailed in order to achieving a successful market leadership.

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