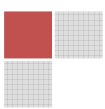
Role of Standards in the Information Economy

The world has become a small place, thanks to the communication infrastructure. Infrastructure is the lifeline of the Information Economies of the world. Ever since data digitization, many forms of data like voice, text, images, videos have been created and transmitted using these networks. It is impossible to comprehend how different countries and continents that have no common language or practices, have managed to plug into the worldwide network for communication. How can a person make a call to the opposite side of the world and have a real time conversation? How can news and other critical information get transmitted across the world for consumption through the various channels, almost instantaneously? There is no one word answer to this question, rather, five decades of innovation, concepts, disruptive technologies and standards that have helped build this entity. The situation is analogous to the Tower of Babel, where the building of the tower stopped because God created languages to de-motivate people from co-operating. Though in the real world, the varied cultural and social differences amongst the different countries doesn't seem to hinder setting up of a colossal Tower we call the internet. Innovations and other technological advancements aside, for an infrastructure to run seamlessly we need a common language, a Standard.

Standards have been pivotal in establishing the info-communications industry as we know it. The info-communication industry is regarded by many as the unexplained new economy, but deeper analysis reveals that standard economic properties, which apply to any other industry, apply to this industry as well. Almost every industry goes through the cycle of innovation, mass production, standardization and consolidation. Growth is always characterized by standardization. This is an attempt to restore stability in a chaotic market. An effort to profit from economies of scale created due to a standard.

This essay talks about the emergence of standards in the info-communications industry, the reason they come about and their importance to the customer and the supplier. The essay tries to highlight the advantages of standardizing a market, the pitfalls, the implications and the opportunities created by it. The order in chaos theory isn't sufficient explanation to the need of standards. Standardization typically changes the markets, kills monopolies, opens up the market and fosters co-operation. This essay will take multiple viewpoints and analyze the role



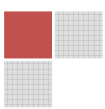
of standards in the network economy. I shall use the term product and technology interchangeably, by which I mean an entity that can be standardized.

Products and Markets

The network economy, in a broad sense, refers to an economy driven by products that are influenced by network externalities and hope to cash in on economies of scale. Telephony, Internet and its supporting technologies, Cellular radio, gaming hardware and software etc are products in this space. A brief look at the history of these products will show the birth of new technologies and the dramatic evolution of the existing ones. The industry is characterized by Schumpeter's vision of capitalism, or the force of creative destruction, in which a disruptive technology enters the market with a radical innovation and renders the preceding technologies obsolete. Quoting Heraclitus of Ephesus**,**" Change is the only constant". In such a space, the danger of a lock-in can mean considerable switching costs to newer alternatives. Lock-in arises whenever users invest in multiple complementary and durable assets specific to a particular information technology system[3]. Products therefore seek to lock-in customers in order to benefit from network externalities and ensure future sales and profits.

The network economy is also characterized by a rapid rate of new entrants. Compared to traditional industries, there aren't many entry barriers to info-communications industry. This directly translates to a lot of competition and varied product choices. Also, unlike old school industries, product lifetimes are very short and most companies try to make the most of the time they have before a disruptive technology proves itself in the market. It's a winner takes all market [3]. The market therefore, is chaotic with a multitude of products and standards. A network market is also characterized by high levels of dependence on other products. A classic case in point is the Netscape Browser, which had to run atop Microsoft's operating system Windows. It's very important to figure out your allies in this business. More often than not, dependent businesses ride on the success of others businesses owing to the network externalities. With such high levels of competition and multiple implementations, there comes the need to standardize.

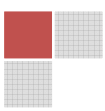
Historical evidence shows that lack of standardization kills businesses and the economy as a whole. Take for example the Japanese Computer Industry. Lack of a proper standard in computing filled the Japanese markets with different kinds of incompatible hardware. The Big Five had competing and often incompatible hardware technologies which created lock-ins and



extremely high switching costs. The lack of an established standard meant slowdown in innovation and also a fragmented market, which in the network economy means no economies of scale. The result was slowdown of the Japanese Computer Industry. It is not enough if the technology is standardized; it needs enforcement to be effective. There is no use in making a standard if no one uses it. The French control over its telephony and internet, shutting it away from the world by not adopting the standard protocols is a good example here. The French regulation in an attempt to promote local industrial development flooded the market with non standard hardware and networks. This was a grave mistake given the fact that both telephony and more recently the internet rely strictly on network externalities to be of any use. As a result, the French do not have a strong presence on the internet and could not capitalize on the global network economy. Their home grown Minitel is lagging compared to the world.

Standardization is nothing new and so are the consequences of no standard. Take for example the Great Baltimore Fire of 1904. One reason for the fire's duration was the lack of national standards in fire-fighting equipment. Although fire engines from nearby cities (such as Philadelphia and Washington, as well as units from New York City, Wilmington, and Atlantic City) responded, many were useless because their hose couplings failed to fit Baltimore hydrants[5]. In social sciences the idea of standardization is close to the solution to the co-ordination problem, a situation in which all parties can realize mutual gains, but by only making mutually consistent decisions[6]. Standards provide for a common accepted platform for a product or a technology. This step turns research directions from the changing face of technology to the betterment of that technology. The TCP/IP for example was a competing standard to many other protocols. But by adopting TCP/IP as a standard, manufacturers could now concentrate on making standards compliant hardware and software knowing that their product could sustain in the face of competition and also be accepted by the buyers.

Standards move the locus of companies from fighting for the market to fighting within the market. Standard setting is usually followed by acceptance by large numbers and also expanded network externalities. More the number of users more is the benefit derived from the network, hence, more demand. In the next section we will look at standards from the viewpoint of companies and from the viewpoint of users.

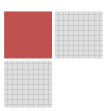


Implications of Standards for Companies

Standards change the way companies do business. Companies that invest in research and are producing state of the art technology or products will benefit the most. Companies fight to make their technologies or products into standards. There are three ways of achieving this objective. Firstly, a technology or product can capitalize on the tippy nature of the network markets and launch a product that becomes so widely accepted that it becomes de-facto. The example in this case would be Windows from Microsoft. Their strategy in selling Operating systems with any kind of hardware made their operating system a de-facto choice. As the era of microcomputers peaked the network externalities were in favor of Windows and the user base grew to phenomenal proportions. The Second option is to battle it out to make a product or a technology a standard. The companies usually meet across the table to decide on the value of each artifact in deciding which technology or a product becomes a standard. TCP/IP is an example where despite competing technologies being prevalent in the market, TCP/IP was decided as a standard to be. Lastly companies open up their technologies to gain a lot of allies and supporters. Open standards usually means that there is hardly any switching cost which works in favor of the standardization process.

As there is collective benefit by agreeing on a standard most companies participate in establishing standards. Most companies battle it out to make their products into standards. The first mover advantage is always an important factor in network markets but time and again this has been proved incorrect. Though UNIX came much before DOS, the markets favored DOS rather than UNIX. Products of superior quality usually turn out to be winners in the standards race. Companies compete on the standards playing field in the hopes of earning royalties on their patents if their innovations become standards. Standards shift competition away from features and towards price[3]. Standards also mean that there are less compatibility problems amongst dependent technologies. Standards reduce uncertainty as to the future of the market, in a way opening up the market for allies and also extensions to the standard. This becomes necessary as companies will now have to differentiate their products from others. Standards also shift the locus from systems to components[3].

Companies developing new technology collectively welcome standards, because standards typically expand the size of the market and may even be vital for the emergence of the market in the first place[3]. A new standard usually means death of an old one. Not only that , but standards also mean that companies with large installed base relying on a technology which

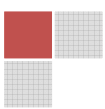


becomes a standard, are usually put into the eye of the storm as they lose their competitive advantage. Other producers will start producing products adhering to these standards there by bringing down price. The Economics of Information is also very important in this context; in the info-communications industry goods have a very high fixed cost and almost negligible marginal costs. Therefore it becomes very easy to build clones once a standard is established. The decline of the American Semiconductor manufacturing industry is a classic example where imports from countries like Japan, South Korea and Taiwan, thanks to their low labor costs, produced equal or sometimes better quality products at cut throat prices. This led to the downfall of the American Semiconductor industry.

For smaller companies standards can mean that they can produce standards compliant products and compete within the market even though they cannot afford research. In a sense, standard setting is almost like selling research so that companies can start production and benefit from economies of scale.

Standardization is also accompanied by complementary products, services and extensions. They add value to the product and the network on the whole. It's possible that accessories to your product can do more for your product than your product can do for itself. A good example would be the add-ons available to the Mozilla browser or the industry that has spawned providing accessories to the Apple IPod.

There are various standard setting bodies like the International Telecom Union (ITU), the Institute of Electronic Engineers (IEEE), National Institute of Standards and Technologies (NIST), American National Standards Institute (ANSI) etc. These organizations help in setting standards by providing an unbiased forum for formal standard setting. Such organizations are required as companies tend to bias themselves over profits. Incumbent providers can even hamper the standard setting process if they sense a threat to their businesses. Standardization is sometimes also accompanied by opening up of technologies, meaning companies have to disclose their intellectual properties in order to become a standard. All in all standards help companies establish themselves in the market. Formal standard setting is now being used to develop more standards than ever before. Companies must use sound tactics in setting of the standard in order to set the right atmosphere for competition and growth. It becomes important for companies to find allies and "complementors" before starting to set up a standard. It doesn't mean you should open up the technology in order to establish a standard. Open standards usually fork out into multiple products and stagnate over time. Take the example of UNIX , open

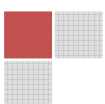


standards meant every user could modify the code to fit their needs. This led to multiple versions of the product and failure to capitalize on the ripe operating systems market.

Implications of standards to Consumers

Consumers are benefited the most through standardization. Standardization means assured quality and sustainability. Consumers can be assured that the product they buy will be the accepted norm and can expect to benefit from market externalities. Take the example of the VHS which became a standard though there were competing technologies. Though the other technologies were of better quality, the popularity and cost of each VHS cassette proved to be a good enough reason for the US to turn towards the VHS standard. The standardization was coupled with the growth of the home video and video rental industry. Almost every person in America had owned a VCR and the more the users there were, more was the value in buying one. The impacts the network externalities have on a network product are huge. Take for example the telephone market; the personal value of owning a phone is of course the driving force behind the purchase, but the real value of owning a telephone comes from the wider network of people you can connect to. Quality standards are being recognized as important for products and quality organizations like the ISO are defining quality metrics for everyday products and services. The ISI standard in India is now a trusted name and people relate the ISI mark to good quality products. Same is the case with the CMM and ISO standards for software services.

Consumers whole heartedly embrace standards. The shift from systems as a whole to components as a result of standardization lets the user pick and choose the components he/she likes. A failed standard however proves costly to the consumer. Most failed standards don't usually fail because of poor quality but due to a better alternative or a disruptive technology. The flip side to this industry is that a standard is no substitute for a better product. The social characteristic of consumers in this industry is also to adopt the newest or the latest of the technologies, even though the technology is unproven. This blind faith in technology is to be attributed to the nascent models for quality assurance in this sector. Most technologies get substituted before they get proven or usually the disruptive technology proves the inefficiency



of the current technology. Either ways, given the lifespan of a technology, its almost certain the technology may perish before it gets standardized.

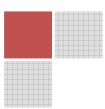
Standards also ensure that companies shift from competing for the market to competing in the market. Given the economic nature of information goods, primarily the low marginal costs, the price for the standardized product has nowhere to go but down. Consumers benefit greatly from the dramatic reductions in price. In order to survive a company must sell, and sell fast in hopes that network externalities will kick in; this is only achieved through cut throat pricing.

There is also another genre of standardization, the one initiated by the consumers. Example in point is the standardization of COBOL language. COBOL owing to its success started forking off different versions and more and more users found it almost necessary to halt this rapid forking of usage of the language. COBOL was probably the first computer language to be standardized based on recommendations of users. This was followed by Pascal and later C. Standardizing COBOL meant that programmers could write standards compliant code and be assured that target machines would run the code. For standardization of entities like COBOL, consumer participation is as important as the participation by the supplier. Presence of consumers in deciding of standards also ensures that user expectations are managed well.

Not all standards are right and justified. Take for example the QWERTY keyboard layout, which was introduced to slow down typing speeds. Though faster keyboard layouts existed, due to the widespread use of this layout it attained the de-facto status. What consumers are now left with is an inferior quality product that undermines the value obtained from the keyboard. Thanks to the de-facto status and the boom in personal computing, QWERTY layout based keyboards have penetrated the market and are here to stay.

Conclusion

Standardization is a must. Growth and popularity of a commodity is characterized by its standardization. Standards reduce customer lock-in and reduces switching costs in the face of a better alternative. Standards help in keeping monopolies at bay and also foster for a collaborative producer market, which is essential for the growth of any technology or product. Companies strive to make their products into standards and in the process gain valuable allies, complementors and sometimes even open up the technology in order for competitors to adopt



the technology. Open standards have been proven time and again to be the best option but care must be taken to prevent fragmentation of the open standard. Standardizing a product usually creates new market for collaborators, complementors and other manufacturers who ride on the success of the accepted standard and provide value added extensions to the standard, not to forget the patent royalties. Suppliers of standards based product must encourage such collaborators as the value added by these extraneous elements is tremendously important especially in the info-communications industry.

Network externalities dictate the standardization of an entity and standardization further fuels an explosive demand for the standardized entity. The flip side is of course the entry of competitors into the market and the fight to survive and exploit economies of scale in order to profit from sales of the standardized entity. Standards also do a world of good towards further research in the concerned field. Standards usually provide a platform for dependent concepts to emerge and foster the birth of an entire industry.

The only clear beneficiaries in this process are the consumers who benefit from high quality products, reduced costs and reduced risks of lock-in. Standards are in a way safeguarding the consumer's interests.

It is clear that in the information economy, innovation and low barrier of entry create a very fertile playground for companies to compete in. It's unethical that consumers should bear the brunt of multiple standards and be left behind during the eventual evolution or the destruction of the technology. Standards are an effort to bring order into this chaotic industry and ensure that consumers and suppliers interests are safe. The increased knowledge about the need to standardize is seeing an increase in the attempts to standardize everyday products and technologies. Every year more and more technologies and concepts are being standardized to increase adoption and acceptance. This trend will continue and will play an important role in the future of this industry.

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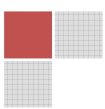

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