Network Effect & Critical Mass Mental Model Applied to AIA Engineering

If you are reading this article I can safely assume that you are either a student of Charlie Munger's school of mental models or you have an investment interest in the company AIA engineering (NSE: AIAENG) in the Indian equity space. But, before I proceed further I would like to define the scope of this article so that you know exactly what to expect and not waste your time if it doesn't interest you.

SCOPE: This article will not explain the two mental models in depth as that would be enough content in itself to fill an entire book. However, I will leave a link at the end so that those interested can study this topic in depth later. This article is not a research report or a stock recommendation on the company AIA engineering, if you are reading this I will assume you have in depth knowledge of the company and its business model from your own research. I will only pen down my views about how these two mental models pertain to its business model. My views are purely speculative, founded in historical facts and based in future.

Motivation & Source: Before I start I would also like to disclose my motivation for writing this article. I was reading this very good piece written by Tren Griffin on these two mental models and while reading it I instantly applied them to my investment and I realized they may just fit in to help describe a tipping point effect in the future.[1]

Why I chose these two mental models?

The reason to choose these two mental models is that they are the least intuitive models to be used for a heavy manufacturing company and product. These mental models are most often used to describe the success and competitive advantage of technological companies like Facebook, Twitter, Amazon, Netflix, Google, and many more. The effects of these models on AIA are not apparent at a first glance. However, with some deliberation we will together find that the two mental models and specially the critical mass mental model is relevant to the business of AIA engineering.

AIA Engineering

Ahmedabad Induction Alloys is the manufacturer of High Chrome Mill Internals which are used in the crushing and grinding process in the cement, thermal and mining industry. The company's current focus is in the grinding process with future scope to expand further in the crushing aspect. The company is on track to be the largest supplier in the world in FY17. The company's product is the industry standard for grinding in the cement industry, however in the mining space the industry standard is forged media. The company claims that its HCMI product is superior to the current industry standard on the basis of superior power saving and grinding that leads to better mineral recovery downstream.

AIA Engineering's Competitive Advantage

The Good: Those who have researched the company will know that its moat (competitive advantages) arise from a niche product that is technologically superior in performance to the current industry standard. The barriers to new entry are affirmed by the need for specialist knowledge, a steep learning curve of the technology, high fixed costs, mission critical product, high switching costs for customer, and low cost labour advantage. The company also enjoys low supplier power, low competitive rivalry, low threat to substitution and no significant buyer power. All this helps the company retain good margins and good return on incremental investments.

The Bad (A Blessing in Disguise): The replacement demand for HCMI product is huge and to cater to long term contracts the company has to keep a certain amount of inventories. The DIO (Days of Inventory Outstanding) for the past 5 years have averaged a 193 days. This does not signal that the company is bad, it reveals the nature of the business. Most heavy manufacturing companies have such characteristics. What it means is that a significant amount of capital is needed to be invested in working capital. This provides both stability and protection to the business from new entrants.

What are Network Effects?

Network effects arise when the users of a products increase the value of the product with each increase in the number of users. This is its definition in its most simplistic firm but believe me the topic is much more complex. Network effects can be strong, weak, direct, indirect, sustainable and perishing. Identifying them individually on a case to case basis is where the magic trick lies.

What is Critical Mass?

Critical mass is defined as any quantity that causes something new to happen. This model is applied to a variety of disciplines and the quantity can take on any unit depending on the application. For examples it is used in nuclear fission equations to determine a self-sustainable fission rate, in astronomy to define a critical mass that causes a star to go supernova or turn into a black hole and in chemistry as a specific ratio at which a complete chemical reaction takes place.

Applying them to Business and Investing

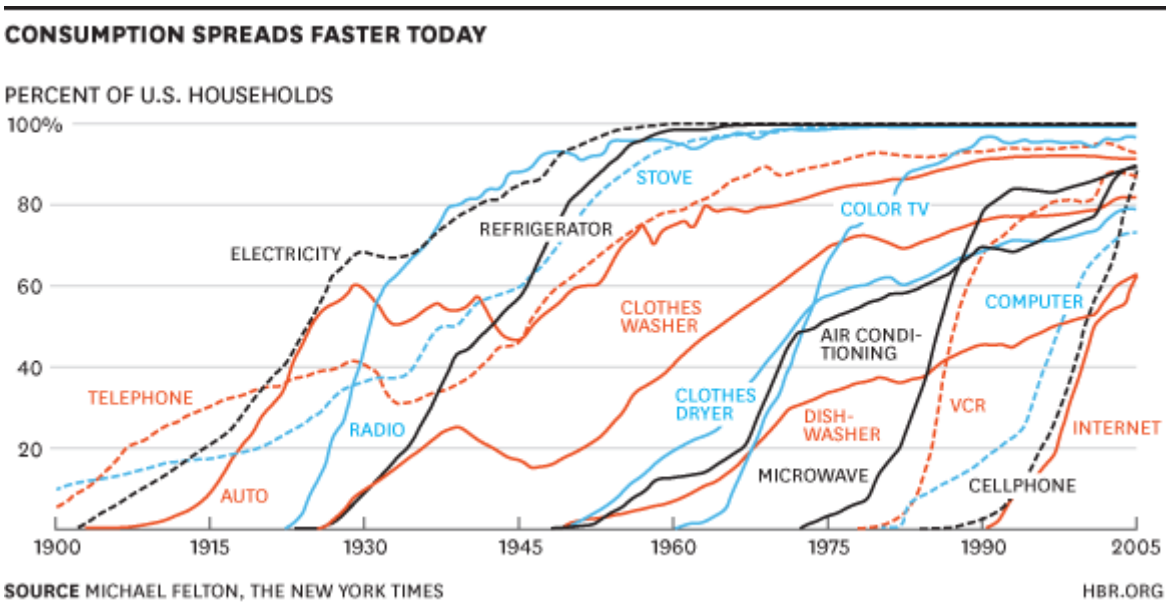
Both network effects and critical mass are credited to mass adoption of several services and products in our society. A few examples are Microsoft products, fax machines, the Ethernet standard, console gaming, torrent software, and many more. The ones I have mentioned are mostly technologically advanced products and services but the effects of network and critical mass can be seen even in something as mundane as your local market. Your local marketplace (grocer, vegetable vendor, meat market, fruit supplier) gains its value from the network of customers in the

surrounding area. Without you there would be no market place, which is the reason why you don't see a thriving supermarket in the middle of the jungle. The critical mass effect comes in when the marketplace (that is the number of customers) gets so big that a tipping point is reached where the market can provide more valuable items. For example you do not see a BMW showroom in every city because the population of such cities is yet to reach the critical mass that would make it profitable for BMW to service them.

Applying them to AIA engineering

I believe the network effect and critical mass played a key role in the adoption of the HCMI technology in the cement space. I do not have the technology adoption data for the cement industry, so I cannot ascertain the pace of adoption of the HCMI technology but if the adoption process followed network effect and critical mass concepts the adoption would have been linear initially and grown in a non-linear fashion until total saturation. The network effect would be that once a few cement companies adopted the HCMI technology its cost saving effects would have become apparent in a few years and other companies would have the incentive to adopt this new technology. As more companies adopted this technology (the network) the value of this technology in the eyes of the industry would increase and once enough companies had adopted it (the critical mass) the adoption would have been industry wide and the product would soon become the industry standard.

Before I drive home the point I would like to give examples of adoption of a new technology that follow the same pattern.



The perfect example to illustrate my point is the adoption of computers. The graph is the light blue dotted line on third position from the right. You will see the adoption was linear at first and grew exponentially thereafter. What was the tipping point, there wasn't one but many, costs came down, the technology became user friendly and its applications expanded but the final tipping point was the prestige attached to

owning the computer. Once your neighbour had it, you also had to have it. You can apply the same process to mobile phone, televisions, cars, refrigerators and other creature comforts.[2]

You would say these technologies are all consumer facing and differ from industrial, business facing technology, but businesses are comprised of human beings and follow the same group and social dynamics. Before adopting a new idea (technology/product/service) we wait for social proof from the early adopters. Once we are satisfied the new idea works we adopt it. Similarly once companies in a sector see the benefits of a new technology they adopt it at a faster pace. Take the examples of adoption of fax machines, computers, emails, in the past, and cloud computing more recently.

AIA starter supplying HCMI to mining companies in 2009 and by 2013 had reached 100,000 TPA of sales. The total replacement market in the mining sector is estimated to be 3,000,000 TPA. The company is targeting an incremental volume growth of 120,000 TPA in the next 3 years. As you can see the industry is still in the linear growth phase of the adoption of this technology. I believe once a certain percentage of that 3 MTPA demand is successfully converted from forged media to HCMI the growth will increase significantly. To this purpose the company has expanded it current production capacity to 340,000 TPA and will further expand to 440,000 TPA next year.[3]

I will not try to forecast the actual timeframe when HCMI becomes the industry standard but as an investor I am satisfied to know that that day will come in the future.

One caveat that the growth after the tipping point will not be as exponential as that of other technologies, the reason being this is heavy manufacturing space and production capacity increases require long lead times, additionally the adoption process is not as easy as going to a retailer to buy, the HCMI product goes through stringent tests under actual work conditions at the customer's facility and the data recorded over many cycles, goes through for approval from various departments (production, finance, purchase) before a customer is convinced to place a multi-year supply contract.

That being said the current CAGR target for mining revenue is only

(220000 / 100000) ^ (1 / 6) – 1 = 14%

This is a mining replacement volume growth rate from 2013 to 2019. Whether this growth will overachieved or underachieved only time will tell but I do believe the adoption rate will be quicker once the tipping point is reach in the mining industry and AIA will have to be ready with excess capacity to cater to the new demand.

Conclusion:

While the statements above may paint a rosy future, I would like to share with everyone that our view of the future rarely unfolds the way we see it today. There are many underlying assumptions with varying levels of probabilities that need to work in tandem to produce a result both positive and negative. Please try to keep this in mind when performing your own research or reading someone else's.

DISCLAIMER

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Details of Financial Interest in the Subject Company:

Invested in the stock.

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