Overview of Innovator's D Framework (IDF)

Note to Reader, this is effectively an overview of Clayton Christensen's The Innovator's Dilemma.

Why is there such a natural tendency for newcomers to market to see a different customer or opportunity to execute on a value proposition? Different cultural lense?

There is something about the way decisions get made in successful organizations that sows the seeds of eventual failure...

Research Indicates...

- Good management was the most powerful reason established businesses failed to stay a top their industries.
- Precisely because these firms listened to their customers, invested in new technologies that would provide customers more and better products of the sort they wanted and because they carefully studied market trends and systematically allocated investment cap to innovations that promised the best returns, they lost their positions of leadership.

The Contrarian's approach to management...It is ok,

- Not to listen to customers.
- To invest in developing lower-performance products that promise lower margins.
- To aggressively pursue smaller rather than perceived to be larger markets.

Definition: 'technology' the process by which an organization transforms labor, capital, material and information into products and services of greater value. Innovation refers to a changes in technology.

The Failure Framework

1. There is a strong strategically important distinction between sustaining technology and disruptive technology.
2. The pace of technological progress can and often does outstrip the actual market needed ie true customer demand.
3. Customers and financial structures of successful firms color heavily the sorts of investments that appear to be attractive to them, relative to certain types of entering firms.

- Research indicates that even highly difficult advances in sustaining technology don't dislodge market leaders and large established companies frequently do well with dealing with this.
- Disruptive tech is usually different and slightly lower in sophistication with a slightly different use.

The Crux of Disruptive Tech...

- Since technological capability often overshoots market demand, even though a disruptive tech may not satisfy demand, over time, after servicing low end customers, it may actually put itself in a position to just satisfy market demand thereby disrupting all the products that are busy "over servicing".

Rational Arguments against investing in disruptive tech...

1. Disruptive products are simpler and cheaper, they generally promise lower margins not greater profits.
2. Disruptive tech are usually first commercialized in emerging or insignificant markets.
3. Leading firms most profitable customers generally don't want and initially can't use products based on disruptive tech.

Why Study Theory?

- By understanding disruption it becomes possible to harness its power.
- Managers must first understand what caused the circumstances in their situation and understand what forces will affect the feasibility of their solutions.

Basic Principles required to harness disruption.

1. Companies depend on customers and investors for resources.
- Theory of resource dependence, while managers may think they control the flow of resources in their firms, in the end, it is customers and investors who dictate how money will be spent because companies with investment patterns that don't satisfy customers and investors don't survive.
- The best companies excel at killing ideas their customers don't want.
- It is important to align firm strategy w/ resource dependence, create an operating structure that can create profitability at a lower market segmentation.

2. Small markets don't solve the growth needs of large companies.
- Think, a $4bn company needs $800M in new sales to grow 20%
- Small markets aren't that big at first and research indicates that waiting till the market is big enough doesn't normally work.

3. Markets that don't exist can't easily be analyzed.
- Sustaining competitive markets have “known models” and market research is readily available, good planning plays a big role here.
- In a sustaining battle, technological leaders and followers both prosper and leadership in sustaining innovation is not considered material to profitability.
- In a disruptive battle, where very little is known about a market first mover and technological leadership are very material.
- The act of detailed planning and research to go after an unknown disruptive market is an act of futility.
- The key in this situation is to be able to shift to discovery based planning

4. An organization's capabilities define its disabilities.
- Two words, “resources, processes, values..”
- Smart people can be sent to deal with a problem but they frequently cannot overcome the organization.

5. Technology supply may not equal market demand.
- Incumbents frequently overshoot market demand

- Disruptive entrants although today, may not be good enough, frequently improve to the point of adequacy.
- Once adequacy hits, the basis of competition goes from functionality → reliability → convenience → price

Why great companies can fail

Why the Innovator's Dilemma Framework? Because in the chaos of the disk drive industry live stunningly simple and consistent factors emerge that are consistent and hold great explanatory power.

Crux of the dilemma – blindly following the maxim that good managers should keep close to their customers can sometimes be a fatal mistake.

Technology Mudslide Theory-

Coping with technical change in the disk drive industry, which experienced 5% price per MB per quarter decline for 20+ years is like trying to run up a mudslide, basically the momentum is so great that it takes an amazing degree of focus and capability to stay on top.

- Extensive statistical research over '75-'94 indicates that pace nor difficulty of technical change lay at the root of the leading firms failure?
- Therefore, technology mudslide theory is not accurate.
- from the study emerges the observation that technology has attendance to change in 2 ways sustaining and disruptive change.

Sustaining change-> either radical or incremental advances change, ie, speed, size, weight, cost
Disruptive Change-> technological changes that result in redefined performance trajectory.

Research indicates that in sustaining battles, entrenched leaders usually win and in disruptive battles, the usually fail. Also important to notice that when entrant firms try to compete w/ sustaining technological battles, they tend to lose to incumbents.

The Attackers Advantage

- Disruptive tech is frequently COTS built stuff.
- The real question becomes, why, if an established firm, who is obviously going to win in brute technological sustainment battle going to not be able to fend of a lower cost, less tech savvy competitor?
- Disruption usually occurs w/ straightforward technological change that has an architecture packaging that makes the product valuable to a set of customers that incumbent firms either cannot or will not sell to profitably.
- Established firms are usually technologically stronger and sustaining competition rarely leads to failure.
- Biggest issues become that success by nature makes downward mobility very difficult.

Value networks and the impetus to innovate.

Innovation Studies traditionally focus on

1. Managerial, organizational and cultural responses to technological change.
2. The ability of established firms to deal with radically new technology.

- Interesting element of organization study, an organizations structure and the way its groups learn to work together can then affect the way it can and cannot design new products.
- Also highly probable that organizations designed around a product tend to handle change of product feature well but stumble when major architectural change is needed.
- In the context of dealing w/ technology, it is accepted and evidenceed w/ research that sustaining companies tend to normally have greater technological depth, that disruption is usually straightforward and less problematic.
- The fact that an incumbent's current customer base repeatedly shows no interest in the disruptive product likely bears greater sway on the ability of said company to field this new disruptive tech.

Definition: *Value Network*, the context within which a firm identifies and responds to customers needs, solves problems, procures input, reacts to competitors and strives for profit. The shape, pattern, size and historical context of a value network has great influence over how/why a company becomes conditioned to the resource allocation and return construct.

- Value networks also tend to be "nested commercial systems"... and can become very difficult to dislodge or change.
- Metrics of value help us understand how customers in different layers of a value chain price a seemingly similar detail or competitive advantage.
- There is an important relationship between cost structure and embedded value that is associated w/ a feature in any step of the chain. Ie, the cost structure can be lowered or built small enough, potential low value paying customers can be harnessed.
- Key details become that opportunities the value chain of customers sees as profitable will likely receive resource allocation but lower value segment opportunities may be perceived as unprofitable and therefore not pursued.
- Therefore, much of the competitive distinction between two firms comes not from technological or organizational diff, but flexibility and location in the value chain.
- "Good managers do what makes sense, and what makes sense is defined primarily by their value network"
- The influence of a value network impacts most greatly the allocation of resource in response to competition, not observation or ability to react.

The Six Step Pattern of Disruption

1. Disruptive technologies are first developed at established firms, are Commercial Off The Shelf solutions brought on by engineers solving known to them problems.
2. Marketing professionals then seek out reactions from new/established customers, it is common that customers can't or won't see the value in the disruptive technology.
3. Established firms step up the pace of sustaining technological development in response to customer demands, the competition moves forward.
4. New companies are formed, markets are found through trial and error, frequently frustrated engineers spin off to use/create companies w/ the disruptive technology.
5. Incumbents move upmarket to get away from pesky disruptors, once a company gets a foothold,

it becomes possible to utilize sustaining enhancements to move upmarket fast.
6. Established firms belatedly jump on the band wagon to defend their customer base.

Flash memory as an example of usefulness of the value network

- In the mid '90s, flash solid state memory emerges it is more power and efficient, lighter but much more expensive than normal disk drive, question becomes, will it disrupt disk drives?

There are then four frameworks with which to analyze this question,

1. Capabilities viewpoint, this is the "core competency" argument, can the organization change or apply the technology fast enough? In this case the skills required to sell flash memory are quite similar and firms that have their own design staff for disk drive manufacturing tend to move quickly into flash memory, evidence generally indicates that firms can do this so the capabilities viewpoint is diminished as a strategic lense.
2. Organization Structure Framework, since flash is radical tech change, a new org needs to be used, Seagate, Quantum do this very effectively, again reducing the relevance of this strategic framework.
3. S-Curve framework, by looking at the development slope of disk drives compared to flash since disks are still increasing at an increasing rate, it would stand to reason that until they hit the inflection point and increase at a decreasing rate, flash drives are not feature competitive. This then also reduces the relevance as a strategic. S-curve modeling tends to only really apply well in a sustaining competitive battle.
4. Value Network Theory, asserts that when firms don't have resources to develop a new technology, they will acquire them. It also asserts that S-curve theories are only good in analyzing sustaining battles because disruptive products develop in parallel, the question is wrong, the most important question is if/when the disruptive tech will intersect with what the market needs.

This is a very important detail, the value network indicates that even though a company can change, because its supplier and customer base don't yet value the disruptive tech, the firm won't see the revenue potential and it will fail to change until the disruptive tech intersects w/ true market need. The initial market for flash memory is not computing centric, it is cellphones, medical gear, then at a certain point the flash memory may become good enough for the normal competitive computing market.

Key Implications of the Value Network Framework

1. The context of a firms value network is defined by its customers and the way they order product attributes and suppliers as they establish a firm's cost structure.
2. A key determinant in assessing the likely success of any innovation is how well does it address the needs of well known players in the established value network, incumbents tend to do well w/ innovations that are closely aligned w/ the value structure of pre-existing market incumbents but then lag w/ disruption because of the uncertainty present in how the current value network will use it.
3. Decisions not to pursue disruptive tech become fatal when 2 distinct trajectories intersect. 1^{st} is the performance demanded over time within a given value network. 2^{nd} is the performance that technologies provide within a given paradigm.

4. New entrants have attackers advantage over incumbents because entering new and usually lower value (lower cost/price point) networks is a major challenge for incumbent firms.
5. Competition then becomes all about entrant firms ability to change strategy and cost structure.

Practical Example - Disruptive Change in the Mechanical Excavator Industry

- Steam dominated the mechanical shovel market, after WWII hydraulics emerged and by the '70s only 4 of 30+ major established firms had moved into the new market.
- All of the sustaining competitions like fuel source, shape, capacity for steam were handled effectively by established firms.
- In '45, excavation required 1-5 cubic yard capacity, first hydraulic bakhoe was ¼ cubic yard capacity.
- Since market demand capacity was too high, entrant firms had to come up with new applications, effectively finding customers who could use under a different value context.
- Entrant firms began selling backhoes on small industrial and farm tractors which began being used to dig water/sewer ditches for track home projects, which were too small for normal large scale gear and were still being dug by hand.
- It is very important to illustrate the competitive characteristics of sustaining vs emerging competitive markets, in sustaining markets the competitive criteria are size and scale, in emerging markets the competitive criteria are speed, flexibility and maneuverability.
- Effectively the two different user groups were highly different.
- Eventually the hydraulic system progressed to the point that it dwarfed the regular competitive environment.
- If the capacity of the hydraulic bucket stayed consistent w/ average bucket used by residential guys, there would be no potential for disruption but since the trajectory of bucket size has a considerably steeper slope it eventually overtakes the primary market application.
- The lower value segment customer allows the tech to develop to the point that it destroys the main markets competitive basis.

What Goes Up Can't Come Down.

- The disk drive and excavator scenarios tend to indicate that upward mobility through the value chain is possible but for numerous reasons downward mobility is very hard.
- Part of this is tied to finance and value, in good companies, resources and attention tend to get allocated more towards higher performance projects with higher promised margins. (graphic 4.a)
- In the early '80s, Seagate's focus was 5.25 inch disk drives in desktop computers.
- In '87 when 3.5 was introduced, Seagate responded by moving upmarket
- The issue becomes that established companies are incentivized to move upmarket, which effectively opens the door for the disruptor to take even greater hold and then ultimately own the market at both service and capacity levels, this leads to “Asymmetric Mobility”
- Part of the problem is tied to the cost structure a company implements to exploit a particular position in the value network. Once established, gross margin requirements become very difficult to shrink
- It is an easy sell though to convince people to go after larger, more profitable markets

Part of the downward mobility problem is tied to resource allocation, 2 types of which exist

1. “Top Down” senior management through a series of choices, find and screen new innovations to fund. Anything that lacks the right attributes gets canceled.
2. Innovative projects are actually sourced from deep within ie, below and organization because success and failure of the project have such implication for management's careers, people and middle managers only select projects that are highly likely to succeed and make them look good.

    - There is also a very serious selection bias because innovation is risky, projects that don't go for technical reasons are much less problematic than for if there was no market to sell into. Think, this makes sense cause engineering stuff is complex and uncertain but market readiness should conceivably be easier to assess, research indicates that failure tied to technical problems is less destructive on a career than poor market entrance choices.
    - Ultimately, middle management have made critical choices about what options senior management sees and therefore have a huge unseen impact on the resource allocation system of a firm.
    - There is a lot of culture tied to this, it becomes very difficult for a successful organization to propose uncertain, lower value plays even if senior management understands the drive to go after disruption, it become very difficult to motivate employees to do things that don't make sense in the context of their own careers.

1.8 inch drive example

- CEO, we can't sell 1.8 inch drives, we are on 4th gen product but no one wants them
- hmmm
- 1 month later in a class, a Honda engineer says “Oh yeah, we were making dashboard navigation systems w/ 1.8 inch drives, funny thing is that you can't buy them from larger firms, you have to get them from boutique providers”
- so important point is that customer wanted, large company had but because the customer wasn't a current customer of large company, large company couldn't find said customer, all of which is illustrative of the relevance of value network determining what customers see what products.
- Large enterprises operating structure didn't allow for the discovery of these new different customers
- Also important to note that if a firms customers are themselves drifting upmarket, they may move up market even easier and not even realize they are drifting.

Disruption of Integrated Steel (I have the Nucor HBR case on this one)

- In the '60s, minimills, which scale competitively at 1/10 the cost of integrated mills became viable.
- Minimills have demonstrated the ability to eat huge segments of established markets
- Basically, minimlls originally produced lower quality steel, they used the rebar market as the first foothold, large integrated players didn't like the rebar market cause it was low margin and high price sensitivity, it didn't promise the profit that large cars, cans, beams provided
- Large integrated shops readily ceded this ground to minimills they saw it as a useful way to focus only on the most lucrative part of the value network.
- So minimills get effectively kick started in rebar which is protective in nature, they use that

foothold to develop enough to sell at prices that no matter, integrated mills cannot match.

Framework for Managing Disruptive Change

- Once we begin to understand what disruption is, we can begin to understand how to harness and defend against it

The innovator's dilemma becomes...

… Good mgmt, that has led to sustained success, is often the reason why companies struggle with disruptive tech. The process of 1. listening carefully to customers 2. tracking competitor's actions 3. investing resources to design and build higher performance products that yield greater profit is exactly why companies fail to adapt to disruptive tech.

There is no effective way to get mgmt to execute the above when the way to nurture disruptive tech is to 1. focus resources on proposals that customers reject that offer lower profit that under-perform existing technology and can only be sold in insignificant markets.

Across industries, management that has dealt with this problem has demonstrated understanding that,

1. Resource dependence, customers effectively control the resource allocation pattern in well run companies.
2. Small markets don't solve growth needs of large firms.
3. End uses and applications of disruptive gear is unknowable in advance, failure is an intrinsic step toward success.
4. Organizations have capabilities that exist independent of the capabilities of the people who work within them, an organization's capabilities reside in its processes and values, the processes and values that define a firm's core capabilities effectively also define their disabilities
5. Technology supply may not equal market demand. The attributes that make disruptive tech unattractive in established markets are often the ones that constitute their greatest value in emerging ones.

The ways that management harness these principles to their advantage,

1. They embedded projects to develop and commercialize disruptive tech within an organization whose customers needed them. When management aligns disruptive tech with the "right" customers, customer demand increased the probability that innovation would get resources.
2. They placed projects to develop disruptive tech in organizations small enough to get excited about small opportunities.
3. They planned to fail early and inexpensively in search for the disruptive technologies' market. **They found that their markets generally coalesced through an iterative process of trial, learning and trial again.**
4. They utilized some of the resource of parent organization but were careful not to use its processes and values, they created a different operating culture whose values and cost structure was tuned to the disruptive opportunity at hand.
5. When commercializing disruptive tech, management tended to find or create markets that valued the disruptive tech as is rather than search for some technological breakthrough that would be useful and make the tech competitive in the established sustaining market.

Give disruptive technology to organizations whose customers most need them.

Theory of Resource Dependence - companies freedom of action is limited to satisfying the needs of those entities outside the firm that gives it the resources it needs to survive.

- This is very much a survival of the fit enough theory, only the firms that can satisfy customers and investors can survive, it creates the contrarian argument though that management is powerless to enact change in the face of customer and investors' demands. A classic chicken and the egg problem.
- This all leads to the problem, what to do with an obviously good disruptive tech that a firms customer clearly do not want?
- 2 solutions become 1. lobby, influence and communicate why to adopt the disruption and 2. create independent organization and embed it with customers who do want the tech.
- the 2nd solution becomes more realistic because it doesn't go against strong culture, the 1st solution is possible but much harder and rarer.

Match the size of the organization to the size of the opportunity.

Managers who confront disruptive tech must be leaders not followers. Based on 1. leadership is more critical when dealing w/ disruptive rather than sustaining competitive battles and 2. small emerging markets cannot solve near term growth and profit requirements of large companies.

- Evidence also indicates that creating new markets is significantly less risky and more rewarding than entering established markets
- Leadership and first movers advantage in a sustaining battle does not appear to be important, ie, leaders and laggards can both prosper and sustain.
- In a disruptive battle, first movers advantage tends to be extremely important.
- Finance also complicates this as a firm gets bigger, the stock price must imply growth at an increasing rate to maintain its targeted or modeled price, this creates extreme pressure to continually move up market and pursue bigger revenue/margin opportunities. **(huge problem)**
- Irony becomes – it is precisely when emerging markets are small, when they are least attractive to large companies in search of big chunks of new revenue, that entry into them is so critical.

There are 3 strategies that mgmt can use to deal w/ the small size/value of emerging markets.

1. Try to affect the growth rate of the emerging market so that it becomes big enough, fast enough. Example, think Apple 'Newton' (pda thing from '90s), Apple invested heavily to jump start demand, it didn't work, sales were flat.
2. Wait until the market 'emerges', becomes more defined, enter it after it “has become large enough to be interesting”, Example disk drive makers in established markets who waited for disruptive plays to be big enough, basically, all who waited were never able to gain a foothold and research shows they didn't live through the industry change.
3. Place responsibility to commercialize disruptive tech in organizations small enough that their performance will be meaningfully affected by revenue profit and small orders in the disruptive business in its early years, example is numerous companies show that by skunkworks or by acquiring very small stakes in disruptive companies and then launching new products many very large companies have shown that they can deal w/ disruption, ie, match the small market to the small org.

Of the above, 1 and 2 are problematic, 3 has issues but is the stronger/better/more likely choice.

Discovering New and Emerging Markets

- Markets that do no exist cannot be analyzed.
- Suppliers and customers must discover them together.
- Not only are the market applications for disruptive tech unknown at the time of their development, they are unknowable.

In the context of the disk drive industry, predictions about sustaining development and markets tended to be quite good, on the contrary, predictions and estimations about disruptive markets tend to be bad in all cases.

- Consider HP's 1.3 inch Kittyhawk drive, extensive research and forecasting was done but since ultimately, the application was a disruptive tech, they fell short and expectations were not met, they were woefully undermet.
- Honda's supercub bike, effectively no market predictions just a few sales people trying to do something new. Eventually they discovered that the supercub, contrary to high dollar high margin motorcycle channels were successful w/ off road enthusiasts and sold in sporting goods stores, again though, Honda grossly underestimated the market for this segment.
- Intel successfully transitioned from dram company to semiconductor manufacturer by effectively experimenting on a small scale w/ semiconductors, which at the time were highly disruptive to transistors.
- Expert forecasts are usually wrong, lots of ideas fail, learning and adapting is important.
- In the context of failed ideas vs failed businesses, guessing the right strategy at the outset isn't nearly as important as conserving enough resources so that new business initiatives get a second or third shot.
- In the context of failed ideas and failed managers, most manager feel they can't fail, this is a problem because discovering markets for emerging technology inherently involves failure and most individual decision makers find it very difficult to risk backing a project that might fail because the market is not there.
- In the context of plan to learn vs plan to execute, careful planning followed by aggressive execution is the right formula for sustaining competition. Because a disruptive market is unknown, discover driven planning must rule. Agnostic marketing, ie, marketing under the assumption that no one, nor the firm or customers can know whether, how or in what quantities a disruptive product can or will be used before they have experience using it, therefore, learning by trial and error is the most important thing to focus on.

How to appraise your organization's capabilities and disabilities, Resources, Processes and Value..

Resources – tangible things that can be used, people, equipment, technology.
Processes – organizations tranform inputs of resources into products and services of greater value. The patterns of interaction, coordination, communication and decision making through which they accomplish these transformations can be formal, informal.

Values – the criteria by which decisions about priorities are made → very important because values are the guiding factor for many of the small incidental decisions made by an org, ie, is an order attractive or unattractive, is a customer more or less important, should or should not resource or attention be allocated.

RPV framework is very powerful in framing disruption, large established players have resources but their processes and values are frequently not developed for disruptive adoption.
Small emergent players usually have limited resource flexible processes and values that can find profit in new market segments.

Contrary to "change mgmt ideology", it is quite difficult to change an established firms processes and values. For mgmt who know they are unsuited to deal w/ a change, they can acquire a new org w/ adequate processes and values, try to change processes and value of current organization, or create a skunkworks.

Performance provided, market demand and the product life cycle.

One key element of disruptive competition is that somewhere along the line, the sustaining competitors get into a battle that creates a performance oversupply between what customers need and what is delivered. When the nature of the sustaining battle delivers a service level greater than what is demanded, disruptive opportunities ensue.

Performance oversupply is what facilitates changes in the basis of competition, established firms can only over deliver for so long until a competitor turns the gap into an advantage and delivers a product more closely aligned to actual demand.

Insert graphic 9.a

Basis of competition tends to be tied to functionality, reliability, convenience, price
Note 1 – weaknesses of disruptive technologies are their strengths
Note 2 – disruptive tech is usually simpler and cheaper, more reliable and convenient that established technology.

Dilemmas of Innovation, a Summary.

1. The pace of progress that markets can demand or absorb may be different from the progress offered by technology. Products that aren't useful to customers today may be exactly what they need tomorrow, therefore, a firm can't constantly look to its customers for product leadership
2. Managing innovation mirrors the resource allocation process, innovation proposals that get funding and resources have a higher likelihood of success. The cultural problems tied to allocating resource to projects that don' quite make business sense is a major hurdle to innovations
3. Just as there is a resource allocation problem w/ innovation, matching the market to the technology is another. In this context selling disruptive tech is more of a **marketing discovery issue** than an actual technological or engineering centric problem.
4. Capabilities of established firms are usually quite specific and tied to their position in a value network. New markets enabled by disruptive tech frequently require new capabilities
5. Information required to make large, decisive investments in the face of disruptive threats doesn't exist, here, fast flexible discovery plans are the most powerful way to learn and adapt.

6. It is not wise to take a blanket approach to market leadership, in a disruptive situation, early mover status is very important, in a sustaining battle less so, firms need to fully understand the context of the competition to be effective and make good choices.
7. Even though big firms usually have better resources and significant barriers to entry, small firms can exploit the fact that it just doesn't make sense for big firms to invest in early emerging markets, precisely when they need to be invested in.