

Organizational Structures in US, Germany, Italy and Japan

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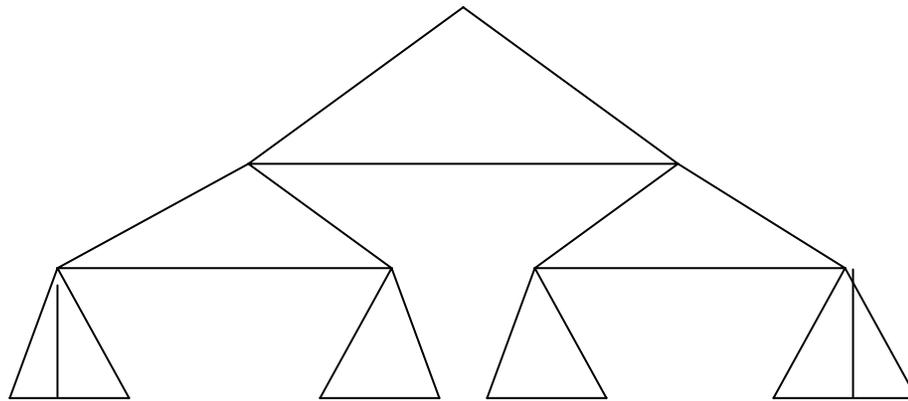
Recall earlier Discussion

- Family/team structure
- Clan structure
- Tree structure – Alfred P. Sloan’s model for GM in the 1920’s
- Layered structure
- Mixed layered/tree (hybrid) structure
 - I claim that this is a good model for some large Japanese firms
- Networks

Mixed tree and layer (hybrid) structure

Teams at every layer in the hierarchy

Teams are created by design, not randomly



Complexity/Flexibility Analysis

<u>Architecture</u>	<u>Complexity</u>	<u>Flexibility</u>
Family/team	$O(n^2)$	$O(n!)$
Tree structure	$O(n)$	$O(n)$
Layered structure	$O(n^2)$	$O(n^d)$
Mixed/hybrid Tree and Layer	$O(n)$, but higher than tree structure	$O(n^{2+})$

Readings for today

- Sloan's "My Years with General Motors"
 - Arguably one of the best books on US organizational structures from 1920-1970
- Ouchi's "Theory Z"
 - Good description of Japanese organizational structures and the underlying cultural values in them - I resonated with it when I read it in the early 80's
- Piore and Sabel "The Second Industrial Divide"
 - Won MacArthur "Genius" Prize for both authors
 - Good description of aspects of what makes Germany, Italy and Japan's organizational structures different from US tree-structured hierarchies in industrial organizations
- Watts "Six Degrees," Chapter 9. Also Dodd, Watts and Sabel
 - Based on Watts's discussions with Chuck Sabel
 - Rediscovered "mixed tree and layer" organizational structure, but emphasizes random connections, not design in lateral or nearly lateral connections

Sloan's ideas for a divisional structure for GM

When Sloan took over GM in 1920, there were some issues with the organization

- There were lots of car divisions in GM that competed with each other and that had similar prices
- There was no process for determining which proposals for sizable capital expenditures (new model development and major purchases) should be funded
- Little research was being funded
- Ford was leading in sales, largely because it had a relatively cheap and effective model

Sloan's Organizational Ideas

- Created five car divisions (Chevrolet, Pontiac (eventually), Oldsmobile, Buick and Cadillac) whose models differed by design in their price range – this way the divisions competed, but presumably not with each other in the sale of cars
- Instituted the notion (borrowed from DuPont which at one point owned 23% of GM's stock) of Return On Investment, and used it to help determine which CAPEX proposals to fund
- Created a staff finance group
- Created company-wide purchasing and technology committees where the divisions worked cooperatively to reduce associated costs (Sloan notes a trade-off between flexibility (concentrated within the divisions) and performance (cost efficiency for the firm as a whole))
- Moved the Research division (under Kettering) away from Detroit, so that it didn't interfere too much with the car divisions – one of his toughest lessons

Analysis of Sloan's Approach

- He encouraged the division heads to compete for resources and to improve their car models as much as possible within the agreed-upon price ranges
- He pressed for the development of a low priced car to compete with Ford's, but one that had more features at a somewhat higher cost
- He caused the divisions to cooperate at the top of the GM hierarchy (but not necessarily below that level) when he felt there would be significant cost savings
- He recognized the value of having clear, rational analyses of business issues – that is why MIT's President, Howard Johnson, was able to get him to endow the Sloan School
- He created a GM brand where none existed previously
- His approach worked well within the culture of the US, and in the global automobile environment until, say, the 1960's

Sloan's Analysis of his own Approach

- Decentralized divisions
 - Divisions are closer to the market
 - They thus have better knowledge of certain needed changes

Sloan felt the divisions were more adaptable than the firm as a whole
- Centralized coordination
 - Finance
 - Purchasing (with strong influence of divisions)
 - Research

Sloan felt these functions were more efficiently done centrally, but with strong links to the divisions in cases such as purchasing and research so that the results will be acceptable to them

Sloan's analysis continued

- What is GM's advantage?
 - Its management system, not its technology
 - The system may lead to slower decision making on important issues, but is likely better than relying on individuals only
- What causes changes in the automobile business?
 - Customer preferences change
 - Reliability, however, is more important than technological innovation

Sloan's view of GM continued

- Hire good people and get out of their way
- There is no limit to GM's size; central management costs $< 1\%$ of total (Herb Simon pointed out in his 1968 lectures at MIT that led to the book "Sciences of the Artificial" that tree structured organizations, such as GM, could simply grow another level if needed)
- Convince people by rational argument – do not simply tell them what to do
- Central committee structure is no guarantee of success, but it is better than chaos

A critique of Sloan's views

- Flexibility/adaptability of firm as a whole is not clear
- Relationship of specialization of staff versus flexibility is not clear
- Role of middle managers is not clear
- Relationship of enterprise to society (e.g., environment, employment) is not clear
- Relatively slow rate of innovation. In fact, relatively slow rate of change of all kinds (tree structures can't handle medium to high rates of (lateral) change very well)
- Sloan did not indicate how difficult it is to manage a firm with many levels of (tree structured) hierarchy
- Nevertheless, he was a management genius for his time (note Bill Gates's blurb in Sloan's book)

Rates of Change

- Sloan's model works reasonably well when the rates of change of the business environment are low. Tree structured organizations can handle growth (by adding levels or merging), but have a far harder time with relatively quick movements that may require horizontal or lateral movements
- Americans are also quite good at developing small entrepreneurial firms which might undergo very high rates of change (of systems or organization) for a while, until they need/want to ramp up and thus change organizational structure (likely into a tree-structured hierarchy). These entrepreneurial firms relate well to US proclivity to emphasize creativity and individualism.
- What Japan has shown is how one can handle medium rates of change (of products or systems). This emphasizes the importance of flexibility at some loss of individuality, and an increased emphasis on cooperation within the firm as opposed to competition within it.

What do Germany, Italy and Japan have in common?

- They were the Axis powers in WWII – not entirely an accident in my opinion
- They were united as modern nation states as late as the 1860's. Thus have relatively close memories of medieval approaches and values
- Have a strong craft tradition and its attendant layered organizational structures
- Japan and Germany are still the world's 2nd and 3rd largest economies
- In the 1980's the US was extremely concerned about competition from Japan and Germany
- This is when Piore/Sabel and Ouchi's books were written

Why are we no longer so concerned about them?

- Japan went through a bubble economy in real estate in the late 80's, and has not handled it well since (New Zealand story)
- The US has learned many techniques from them (e.g., cross-functional teams, lean production)
- Yet Toyota is still arguably the best automobile manufacturer in the world
- It is not clear we learned all that there was to learn from GIJ
- Germany's social system is expensive to maintain in light of competition from countries that do not spend so much on their social systems, such as the US. Germany has also spent much money on integrating East Germany
- The workforce in Germany and Japan is getting older, so Germany's and Japan's long term future is unclear
- The Italians appear not to have learned how to effectively run large enterprises, but they are very good in high fashion industries
- I feel that the GIJ's organizational approaches are sufficiently different from US's that it is worth understanding them deeply, and these approaches may lead to continuing changes in US enterprises
- Implicit in my comments is that I do not believe that there is a structure that is ideal under all circumstances

Piore/Sabel Analysis: The Craft System

- Masters, journeymen, apprentices (three layers)
 - Apprentices have a relatively long period of study (7 years in some cases)
 - Journeymen can move around after completing projects
 - Masters can be part of groupings akin to guilds (a medieval system)
 - Quality of workmanship counts a great deal
- Construction trade in US uses this structure to some degree
- Machine tool industry in GIJ also has close relationship to a craft system
- US machine tool industry started by European immigrants

Craft-based Firms

- Does a craft-based firm need to continually grow to be successful? (Beretta example)
- Is there a trade-off between specialization (of the craftsmen) and the flexibility of the firm?
- How do we explain the geographic concentration of firms in places such as Düsseldorf or the Po Valley?

Family-oriented Niche Industry

- Certain niches in industry use a family oriented version of the craft model (e.g., high fashion shoes in Italy)
- Families in a given region or even a single town specialize in different parts of the overall design/manufacturing/marketing of products
- Different interconnections of families are created for new products, largely through negotiations of selected people, such as the head of the family
- This gives much flexibility in product design

Ouchi's Theory Z

- The formal structure of Japanese firms is a classic hierarchy with divisions, staff/line
 - But (JM) these firms use overlays of teams/clans onto the formal tree structure, making it into a mixed tree and layered organization
- Each staff member (of large organizations) belongs to several groups or teams, and cares a great deal about peer evaluation
- Lots of training in the early years, with relatively little specialization
- Hence Japanese workers in the large firms are not especially good at tasks requiring high degree of specialization (Germans are better at specialization), but good at tasks requiring lots of coordination (Japanese master swordmaker story)

Theory Z continued

- Employment patterns
 - Lifetime employment– limited to large Japanese firms, up to age 55 for most, then retirees obtain jobs with supplier firms
 - There is a hierarchy of firms – retirees from supplier firms have fewer options after age 55
 - Features of personal relationships in large firms
 - Trust – associated with long term outlook – it's ok for your team/division to lose out in the short run – it'll be made up in the long run; you will work better in a team with others whom you trust (at the beginning of the project)
 - Subtlety – know who works well (or who would likely work well) with whom.
 - Intimacy – close relationships foster the role of community. Managers do not usually work behind closed doors
 - Ambiguity
- JM claims that the goal of Japanese middle management is, in part, to develop trust among their staff, as well as among their staff and staff of other (nearby) middle managers, since it is likely these people will work together on new teams

Theory Z continued

- Japanese management is disciplined and flexible – some (Dore) have called Japan a place of flexible rigidities – within certain bounds the systems are flexible, but if you get out of bounds the system is relatively rigid – may help explain why the recession in Japan has had such long-lasting effects since getting out of the recession required making out-of-bounds moves
- Japanese values and beliefs lead to a consistent understanding of processes/rules for dealing with changing circumstances
- There is little need for individual assessment of junior staff – raises are pretty much the same for everyone up to a certain age. Opposite of Jack Welch's approach in GE
- Japanese avoid conflicts during normal hours, but use sake to tell bosses off after hours

American Theory Z firms (ca. 1980)

The military, IBM, (universities)

- Lifetime employment (no longer true at IBM, but IBM is now a systems-oriented IT company more than ever)
- People get moved around (not in universities)
- Avoid matrix management by having middle managers play multiple roles, especially in the technical education of their staff
- In universities, “good” department heads help mentor junior faculty, help create interdisciplinary connections which they learn about via high level committee memberships

Watts/Sabel analysis

- Critique of pure tree structures
 - Overly specialized staff
 - Not flexible
- We now need economies of scope rather than economies of scale
- Flexible specialization
 - General purpose equipment and skilled workers
 - Wide range of products in smallish batches
- Claim that flexible specialization is the dominant mode of industry now because rate of change is higher now than it was when Sloan ran GM

Medium rate of change and ambiguity

- People often don't really know what new products to design and how to do it
 - That is part of the task (see Lester and Piore book on Innovation)
 - (JM) Middle-out design can help the exploration process, based on what your firm can do well and what you learn is needed in the market
- New product development under such conditions requires new teams, thus it is critical to be able to form teams that are effective quickly
- Problem solving is the dominant mode of work
- Middle managers coordinate others, do not produce output directly

Coordination Problem

- You might add random connections to the teams to perform the coordination
- Does not solve the problem since it ignores hierarchy (which is desired due to its ability to control a system)
- Therefore create teams at each layer (thus creating a mixed tree and layered (hybrid) organization)
- Information flows at all scales (layers) at the same time

Critique of Watts/Sabel

- Not enough emphasis on role of managers in creating trust and using their knowledge of who might work well with whom (subtlety)
- Might enterprises not wish to limit ad hoc connections among their staff members to keep complexity under control?
- Not enough emphasis on role of managers in the education of their staff (thus avoiding matrix management)
- Not enough emphasis on relationship of the mixed structure to layered organizations and layered societies with their long history, their slow promotions, etc.

How have many American firms responded to the Japanese challenge by 1995?

- Cross-functional teams
 - Good, but if level of trust is initially low, it may take quite a while for a new team to work effectively
- Flattening
 - good, but do they understand the possible roles of middle managers in creating trust, thus allowing the formation of teams that are effective quickly?
 - trees with fewer levels are still trees and thus relatively inflexible
- Lean production
 - Wonderful, but Toyota is still tops
- Virtual enterprises
 - Remains to be seen how successful this approach is
 - Consortia and related sharing arrangements are also unclear in the long-run in societies that emphasize competition

The 2005 world

- Globalization, the rise of India and China, off-shoring, networked organizations
- Assuming a layered organization, one could move a layer to another country (fabless IC firms often use fabs in Taiwan)
- See “How we compete” by Suzanne Berger (MIT)

The Inverted Pyramid

- There is much concern about losing engineering jobs to India and China and elsewhere
- Where will the technical jobs be found?
- In many large scale systems, such as IT systems, the most technical jobs are at the bottom of an inverted pyramid.
- These are also the ones most likely to be lost to graduates of the Indian IITs, for example

Higher Layers of the Inverted Pyramid

- Intermediate layers will include architects of the application system
- Higher layers will include designers of particular components of the large scale application
- These layers will have involve many more people than the bottom, most technical layers
- The higher the layer the closer the designers have to be to the users, and thus the more difficult to place these people in far away places
- Conclusion: The systems that ESD is interested in will require many new jobs and may be difficult to move elsewhere, at least for a while