INTEGRATED SUPPLY CHAIN NETWORKS

Ecosystem Aware

Global Supply Chain Management

CEMEX
Transforming a Basic Industry Company

N. Viswanadham
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GLOBAL SUPPLY CHAIN MANAGEMENT

CEMEX - Building Solutions Company
Why do we study a Cement company, CEMEX?

- The cement industry is conventional and low-tech, but CEMEX stands out as an emerging economy Giant.
- CEMEX is a “best-practice” model—since the late 1980s it has grown rapidly from a local cement producer to become the Third Largest Cement Company in the world.
- The success of the company is because of it has built superior information and logistics capabilities, Excellent business models, and an efficient supply chain with risk responsive operating practices.
CEMEX: Transforming a Basic Industry Company

- What is the transformation?
- Operating processes: Risk Responsive, How?
Customers need Sustainable Construction Solutions not Cement

*We need to supply not only Cement but also a broad range of other building materials leveraging our world class logistics and distribution capabilities to help our customers succeed.* 2001

*As the largest concrete producer of the world we have an obligation to define and support a sustainable construction industry.* 2011

*Lorenzo Zambrano - Cemex CEO.*
You should be asking whether we have just been lucky, or whether our business model really is better than our competitors.

If you look down our industry’s value chain—including aggregates, ready mix, distribution, and others as well as cement—total revenue generation could be four times larger than cement alone, with well more than double the operating cash flow.
Global Cement Companies

- Lafarge, Holcim, CEMEX, Heidelberger, Italcementi, and Blue Circle are the six largest multinationals
  - They have clearly identifiable national origins and control large market share of their respective home countries.
  - Each operate production facilities around the world
- In 1988, the 6 large MNEs accounted for only 12% of capacity worldwide. By 2000, this figure had gone up to 25% - 30% excluding China.
- International trade in cement accounts for significantly less than 10% of world production
- Multinationalization is more popular in cement, largely as a result of FDI since the late 1980s
CEMEX: Products and Customers
What are CEMEX's Offerings?

- CEMEX is a growing global building-solutions company that provides products of consistently high quality and reliable service to customers and communities in Americas, Europe, Africa, the Middle East, and Asia.

- The operations network produces, distributes, and markets cement, ready-mix concrete, aggregates, and related building materials to customers in over 50 countries.
What are CEMEX's Offerings?

- **Cement**: the main ingredient in ready-mix concrete.
- **Aggregates**: includes stone, sand, and gravel the primary ingredients in ready-mix concrete & asphalt and mortar.
- **Ready-mix concrete**: is an extremely durable building material made from a mixture of cement, aggregates, water and admixtures and can be cast into many different shapes.
- **Other related products**: Includes gypsum, fly ash, asphalt, concrete blocks, roof tiles, architectural products, concrete pipes, and other precast products such as concrete floors, box culverts, bridges, drainage basins, barriers etc.
CEMEX Customers

- Distributors
- Small house constructors
- Ready mix concrete dealers
- Value added transformation companies: slabs, pre-fabricated concrete blocks
- Large infrastructure projects: airports, roads, housing complexes, etc.
Ecosystem Model
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Input – Output model: CEMEX a Construction Services Company

Resource: Knowledge, people, finances, distributor network management

Effective use of IT, automation technologies, satellite communication etc.

Input – natural resources, Human resources, information resources, financial resources

Output for its customers - "Construction solutions"

CEMEX Value addition to customers Leveraging on the strengths of its resources, global reach and IT capabilities

Design, architecting, material procurement and handling on site, financial and technical support

Delivery management using IT, alliance with truck companies, innovative trucking etc.

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Attributes of each elements of BIRD

**B (Construction solutions)**
- Design, architecting and material procurement and handling
- Supplier integration, Inventory management for builders,
- Logistics management, information services, finance etc.

**I (Trade barriers (government intervention))**
- Import restrictions (to feel secure from international competition)
- Imposition of antidumping duties
- Stock market movements, currency performance (FOREX), Economic downturns, FDI policy in emerging countries etc.

**R (External – Distributors (network), truck companies (logistics), truck drivers, relationships with end-users and other participants near to the customers (like architects, planners, builders, contractors, MFIs etc.**
- Connecting and sharing information (internal and external) with the participants and points in the supply chain – intranet, extranet, internet

**D (E-way of managing its business and relationships – portal for distribution logistics, procurement, transportation management, consulting etc.)**
- Satellite communication systems, Knowledge databases and systems (Ex: Logistics University), enabling knowledge and information sharing and transfer

**Internal – assets, infrastructure, quarries, employees, Knowledge of the production & logistics processes, SCM, financial resources**
Supply Chain:
CEMEX manages a multi-product building material supply chain
CEMEX helps Its distributors

- **Construrama** is a national chain of independent distributors initiated by CEMEX.
- CEMEX undertakes several initiatives to help distributors:
  - Manages a multi-product building material supply chain
  - Helps with the store building their look, computerization and logos. Provided training courses on store management.
  - Helps with inventory control, logistics, marketing strategy and product line expansion.
- Distributors become a part of large professional network and get benefits of size and were able to face stores such as Home depot.
Financial and Technical Support for End users: Small house constructors

- **Construcard**: A credit card offered in partnership with GE capital accepted by construrama stores.
- **Patrimonio Hoy**: A micro lending program like a kitty party
- **Construmex**: Program to help Mexican workers to send money back to their families for construction. Cemex received money in the USA and their families got construction materials
Inventory Management for Builders

- CEMEX manages SUPPLY HUBS for large construction projects.
  - The material is owned by CEMEX until drawn by the builder. CEMEX did the material planning and all the back office tracking and scheduling.
  - Builders save the storage, working capital and single window on site delivery system.
- In return, CEMEX received builders business. *The purchasing decision is supplying valued added services and SCM, rather than cement.*
Value Added Services to Builders

- CEMEX also worked with large construction project owners such as hotels to help them in design, architecting and material procurement. The contract assignment is providing valued added services and this includes cement purchase.
Resources
Resources

- **Internal** – assets, infrastructure, quarries, employees, Knowledge of the production & logistics processes, SCM, financial resources
- **External** – Distributors (network), truck companies (logistics), relationships with end-users and other participants near to the customers (like architects, planners, builders, contractors, MFIs) etc.
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Resource Management & Service Orientation

- **Asset management**
  - Manages lime stone deposits, plants, acquired plants & capital assets
  - Data & supply chain knowledge to plan the logistics activities
- **Human resource management:**
  - Improving their knowledge, skill sets, build up of logistics university to train them, updating of the process knowledge
- **Organizational orientation:**
  - Focus on the first level of customer (end-user) and plan solutions by including all the stakeholders (end-user, architect, contractor, distributor etc.) in constructing a building
  - This strategy helped CEMEX to gain business since it is value addition to the participants (using knowledge and relationships effectively to speed up activities and reduce costs)

Customers prefer CEMEX over its competitors for its service based business strategy
Delivery services
Delivery Services Management

- Truck, Ship & Train services to transport building materials and Fuel for the plants
- Capabilities (using i2 and ERP software) for planning the materials procurement and also the deliveries.
- Truckers, shippers and customers are all available on the same communication platform providing visibility of all orders
- Satellite communication systems, Knowledge databases (Ex: Logistics University), enabling knowledge and information sharing and transfer
- E-way of managing its business and relationships – portal for distribution logistics, procurement, transportation management, consulting etc.
Agility at CEMEX

Dynamic Synchronization of operations controls plant production, tracks vehicle movements, and automatically optimizes order fulfillment.

Customers have the flexibility to change orders.

Cement trucks can deliver orders in a 20 minute window.

Global Digital enables tracking of orders and payments.
e-Enabling CEMEX

- e-Enabling CEMEX is about building an open corporate information structure that allows all employees and partners to access the company’s information and resources.
- e-Enabling consists of three major areas:
  - **e-selling**: Electronic storefront that delivers customized online services to customers.
  - **e-procurement**: CEMEX’s purchasing process allows employees to purchase supplies online based on their exact requirements.
  - **e-workforce** using a corporate Intranet: Connects CEMEX employees globally; promoting greater knowledge sharing.
The CEMEX Way: The IT Legend

- CEMEX in a league with Dell and Cisco as one of the world's leading digital re-inventors.” *(Business Week)*

- CEO Zambrano can check sales figures or kiln temperatures in any plant in the world from a communications center in Monterrey.

- Cemex's ready-mix delivery trucks are equipped with dashboard computers that allow tracking by global positioning satellite (GPS) technology.”

- “Post-merger integration teams” i.e. executives armed with laptops, were dispatched to analyze the new acquisition, to cut costs & to harmonize its technical systems and management methods with CEMEX's.
The CEMEX Way, an information system and process standardization program

- In 2000 CEMEX also initiated a company-wide program: **The CEMEX Way**, to incorporate best practices developed by various CEMEX units around the world into the standard platforms.
- This program allows knowledge sharing as well as a more information-oriented employee on a global basis.
- CEMEX was able to ride the wave of change in its industry using CEMEX Way
The Cemex Way

- The Cemex Way is the core set of best business practices with which Cemex conducts its business throughout all of its locations.

- The approach was instituted in recognition of the need to build “one Cemex” that is more flexible in response to rapid growth and maintains a consistent customer focus worldwide.
Integrate acquisitions quickly and achieve optimal operating standards

- CEMEX implemented several standardized platforms to reduce costs, streamline processes, and extract synergies from global operations.
- CEMEX takes steps to improve product quality & reduce the environmental impact of its operations.
- With each international acquisition, CEMEX refines the technological and managerial processes required to integrate acquisitions into the CEMEX corporate structure. Was able to consolidate acquisitions more quickly and effectively.
Institutions
Globalization - Entry

- The pattern of multinationalization in the cement industry is that the presence of the Big 6 firms is bunched i.e. the largest MNEs have a tendency to locate in the same country markets.
- **Mimicry or strategic convergence or imitation herding** so as to appear with-it or so as to avoid standing out.
- The major cement MNEs typically enter new markets by acquiring existing capacity, often during economic downturns.
- MNEs achieve competitive advantage by operating the physical assets more efficiently.
Restrictions from markets, governments & society
- Trade barriers (government intervention)
- Import restrictions (to feel secure from international competition)
- Imposition of antidumping duties
- Environmental regulations and the application of rules and limits on market access and pricing within and across countries.
- CEMEX faces substantial currency risk, as it operates in many countries.
GRIP Framework
Governance Structures
Performance
**CEMEX by the numbers**

As of December 31, 2012

CEMEX, S.A.B., de C.V. (NYSE: CX/BMV: CEMEX), a holding company, is a public stock corporation with variable capital (S.A.B. de C.V.) organized under the laws of Mexico.

<table>
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<th>50+</th>
<th>43,905</th>
<th>94.8</th>
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<td>countries where CEMEX has presence and trade relations in approximately 100</td>
<td>employees worldwide</td>
<td>million tons of cement, annual production capacity</td>
<td>million cubic meters of ready-mix concrete, approximate annual production level</td>
<td>million tons of aggregates, approximate annual production levels</td>
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<tr>
<td>57</td>
<td>1,899</td>
<td>371</td>
<td>221</td>
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<td>cement plants plus 12 with minority participation</td>
<td>ready-mix concrete facilities</td>
<td>aggregate quarries</td>
<td>land-distribution centers</td>
<td>marine terminals</td>
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</tbody>
</table>
Enabling Home Ownership and Self-Sufficiency

- Patrimonio Hoy is Cemex’s flagship social business that helps low-income families to improve their quality of life through dignified housing through a well-planned savings scheme.
- During 2012 it reached more than 42,900 families.
Innovations

- CEMEX named most Innovative Enterprise at 2013 Manufacturing Leadership 100 Awards
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Sustainability Initiatives

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CEMEX's Three Main Sustainability Objectives

● **Enhance its Value Creation**: CEMEX aims to deliver the innovative, high-performing products, services, and solutions to the resource-constrained society requires for a low carbon economy.

● **Manage its Carbon Footprint**: CEMEX strives to minimize the ecological impacts of its operations in the communities in which it operates by carefully identified by carefully measuring and reducing its carbon footprint to technically and economically feasible lowest levels.

● **Engage Stakeholders**: With highly committed & empowered employees, CEMEX closely collaborates with a variety of institutions with complementary core competencies to strengthen the local communities.

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The production of cement is carbon-intensive, requiring high temperature sintering of limestone, clay, and iron oxide to create clinker—the base material for cement.

This heating process takes place in large rotary kilns that reach temperatures over 1,400°C (2,500°F) to catalyze proper chemical reactions.

Both the fuel requirements of the kilns and the reaction processes, result in significant releases of CO₂ into the atmosphere.

The cement industry as a whole represents 5% of all carbon emissions associated with human activity—an issue that has spurred widespread effort to reduce the carbon footprint of cement production.
CEMEX Carbon Strategy

- CEMEX has designed its carbon strategy to help reduce the environmental impacts of its operations, while creating economic value and driving the construction industry’s participation in the development of a low-carbon economy.

- The key components of CEMEX carbon strategy:
  - Reducing the ecological footprint of our production process
    - Replacing traditional fossil fuels with lower-emission alternatives
    - Reducing the clinker content in cement
    - Increasing our use of renewable electricity and the energy efficiency of operations
  - Aligning operations and initiatives with international standards, regulations, and market-based mechanisms for emissions reduction
A key pillar of our CO2 reduction efforts is our Carbon Footprint Tool (CFT) that helps us to quantify the direct and indirect amount of CO2 emitted during the production process of cement, concrete and aggregates up until the product leaves our facilities.
Cemex’s carbon strategy is to reduce the environmental impacts of its operations, as well as to drive the development of a low-carbon economy from waste to value.

Cemex uses residues or by products from industrial, domestic, agricultural, and forestry processes to fuel its cement facilities.

The wastes include Used tires, Spent solvents and waste oils, Processed municipal solid waste, Household waste, Agricultural wastes such as rice, peanut shells and coffee husks and animal meal, Sewage sludge.

The process reduces our reliance on fossil fuels.

Cemex’s use of alternative fuels increased to 27.1% of total fuel mix from 20.3% in 2010.

Mimicks Bioecosystems where waste for one entity delivers value for another.
Developing Alternative Energy Sources

- CEMEX owns a wind farm in Oaxaca, Mexico with a capacity to provide 25 percent of the energy needed to run Mexican operations, and in 2011, allowed CEMEX to avoid 489,169 tons of CO2 emissions.

- CEMEX reduces carbon footprint by using efficient process technologies and changing the way it sources electricity.

- In 2011 CEMEX Philippines launched a collaborative project with Sinoma Energy Conservation Ltd to devise a system for capturing waste heat from kilns to produce clean, alternative electricity.
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Risk Mitigation Strategies

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Risk

- Supply Chain Risk
- Risk from Delivery Processes
- Institutional Risk
- Resources Risk
- Managers at CEMEX rarely differentiate between managing risk and managing the business. For them, incorporating risk considerations into everyday tasks is seen as the usual way of running their business.
CEMEX has asset specific fixed & operating costs in cement plants, terminals & distribution facilities. Oversupply or demand fall will seriously affect its performance.

CEMEX invested heavily in port terminals and vessels, and developed a sophisticated process to operate them to respond quickly to mismatches in the market demand.

Cement is a low value to weight ratio product, shipping it too far away from production is not economical.

- CEMEX's management of trading and logistics is an effort to reduce its industry risk.
- Innovative business models by bundling a commodity product with high value added services.
Most important institutional risks CEMEX faces is the uncertainty regarding the application of environmental regulations and in pricing across countries. These uncertainties regarding acceptable behaviour may limit market access.

Given the increased public awareness of the role of cement production in global warming, Institutional risks come from social expectations about the role of companies and its management of environmental risks.
The day-to-day management of risks related to marketing, operations, community engagement, government relationships, and legal oversight are concentrated in the hands of local managers; those who have a more intimate knowledge of the idiosyncrasies of the local environment.

Functions such as technology and finance are highly centralized.

Though CEMEX is a highly centralized and hierarchically organized company, many risk management decisions are dispersed geographically and functionally.
Conclusions

- CEMEX has become a role model in several dimensions although it manufactures low value high weight product.
- CEMEX has won several awards: Best Innovation award, Best Manufacturer award, Sustainability award, etc.
- Risk is generally not addressed explicitly as such, but rather tightly integrated into the way the company is organized and decisions are made.
- Its business model of selling value chains and also social networking with stakeholders in providing client solutions has made it a resilient high performance company.