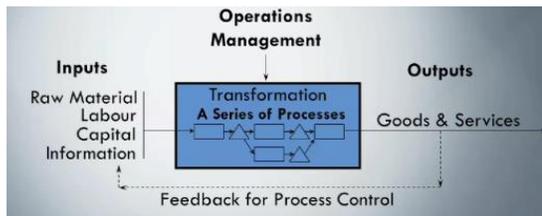


WEEK 11-OPERATIONS AND SUPPLY CHAIN MANAGEMENT:

Operations Management is one of the essential business functions and is therefore vital to any organizational system that delivers products and services, for example a bank, airline, or computer manufacturer. At the very core, operations management is all about, designing, creating, controlling and improving the many operational processes within a company (in such system environments).



Operations management deals with a transformation of inputs such as raw materials, labour, capital and information into outputs such as goods and services and can include finished products that are ready for consumptions and semi ready products such as work-in-progress or inputs for other operations. Transformation of inputs usually requires a series of processes (steps) in order to get the desired output. Successful transformation depends on sufficient feedback so that we can

continuously control and improve the existing processes. Effective process control could for example suggest that we require a raw material of a different quality, staff with more skills or more information about our customer's requirements.

OPERATIONS MANAGEMENT HAS TO WORK LIKE CLOCK WORK.

MANUFACTURING PROCESSES: Transformation of material into physical goods, goods can be transported and/or stored

SERVICE: Primary value adding activity is not easily transported or stored.

Customers by a product/service bundle. → Dining in a restaurant: combined with the FOOD and the experience.

EMIRATES PROCESS: emptying dirty dishes from a flight → washing dishes (enough for LA breakfast, lunch and dinner) → making food (handmade) → freezing → Assembling (All in one hour)

1. Sophisticated operations require many operational decisions. Firstly the operational strategy has to match and support the overall aims of the business. For example are we aiming to be a low-end provider or are we aiming to target the high end luxury market. The operations strategy has to match these aims; it is made up of a number of separate decisions: ranging from structural to infrastructural aspects.

-As part of the **STRUCTURAL DECISIONS** we have to determine the output capacity, that is how much we use and what kind of output we are planning to produce. Accordingly we have to plan the size and location of individual company **FACILITIES** and within each facility decisions have to be made in regard to the most appropriate process technology that will meet the capacity requirements.

CAPACITY: Amount, timing, type

FACILITIES: Size, Location, focus

PROCESS TECHNOLOGY: Equipment, Automation, timing

-**INFRASTRUCTURAL DECISIONS:** Requirements and investments for employees are evaluated; furthermore sourcing decisions need to be made (in house, or from a supplier?). All these decisions will have an impact on the quality of our output, hence operations manager have to figure out the most appropriate ways to ensure the desired level of quality is achieved. E.g. an airline could follow a low end strategy: Jetstar, or target the middle to high-end market like Emirates does so. The combination of decisions that we may take as part of the operations strategy have to support the overarching goals of the business.

WORK FORCE: Training, pay, size

SOURCING: independence, number, make vs. buy

QUALITY: prevention, methods, measurement.

2. FORECASTING IS NECESSARY to understand future decisions regarding the level of demands that are most likely experienced in the short, medium or even long term. Understanding of this demand allows companies to gear with a series of decisions regarding: raw materials, sales and capacity to be developed.

E.g. an airline needs to forecast the amount of passengers within the flight and for the various destinations (different menu's for different destinations) → this knowledge allows them to make informed decisions with regard to various operation tasks.

3. Forecasting and the strategy largely determine CAPACITY MANAGEMENT: e.g. size of company facilities: do we need a big factory or a small one? How many workers will be needed? What are the time horizons? If the capacity is not ready to meet demand we cannot make sales! The company needs the right amount of capacity in the short and long term in order to be profitable.

E.g. airlines: once their forecast has been established they need to demand how many aircrafts are needed to meet the forecast (what size of plane is the most appropriate?), and how much staff is required to run the aircraft.

4. Based on the forecast and capacity decisions: operations manager can decide on the most **SUITABLE PROCESSES** which match the amount of required output, and the necessary degree of product customization. For example, processes could be highly automated like an assembly line that would allow a company to produce large amounts of uniform outputs. ALTERNATIVELY, processes could be geared towards producing a large range of customized products or services which may require more manual labour and flexibility.

E.g the check in processes at an airport, based on the forecasted demand, it can be determined how many counters and ground staff are required, different customer profiles are given different services.

5. Operations managers are very concerned with continuous **PROCESS IMPROVEMENT** to ensure less waste (remove everything that does not add value) and more profit as a result of better processes. (PLAN, DO, CHECK, ACT)

E.g the airport check-in process: check-in for Air-NZ national flights is almost entirely automated and without human interaction. Accordingly Air New Zealand was able to improve their processes, meaning speed and added flexibility for the customer whilst also managing for successful improvement of an existing process.

6. Companies aim to design products and services that meet **THE PREFERENCES OF THE CUSTOMERS** that they are targeting. From an operations perspective, this requires an intimate knowledge of the customer requirements based on certain pre-requisites; that is the strategy the existing processes and the input materials available to us. These requirements have to be translated into products and services that stay functional throughout their life. E.g. customization of in-flight procedures to meet the expectations of their various customers THUS requiring various decisions requiring the quality of service delivery, in-flight entertainment etc... these requirements are often adjusted according to the customer.

7. **INVENTORY AND RESOURCE PLANNING** (holding inventories to keep g/s going): Inventory management is the process of planning and controlling physical inventory (keep track of the kind and amount of inventory required at specific times and destinations). On one hand, companies want to have enough inventories to meet demands; however they aim to minimize the costs of holding inventory. E.g. seats are inventory to an airline, once the flight has taken off the airline has lost its chance to sell those seats, in case of spare seats they need to sell the associated income with them by selling them while still using the same amount of resources such as fuel and staff costs.

PERFORMANCE MEASUREMENT: OpsManagers must ensure that companies perform well in all the above tasks. Alignment of desired behaviors with outcomes: "WHAT GETS MEASURED GETS DONE" –Operations strategies must have a good fit between the overall goals of the business.

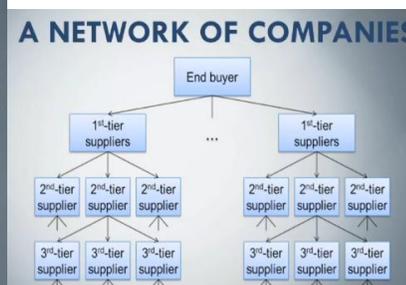
PERFORMANCE MEASUREMENT TELLS US HOW WELL A COMPANY IS DOING (on various dimensions: cost, quality of service, flexibility, safety record, customer perception, or financial revenue) → to track their own performance and compare/benchmark against competitors)

SUPPLY CHAIN MANAGEMENT: The success of companies increasingly depends on the performance of their supply chain, in many cases it is not companies who compete with each other, BUT their SC.

Supply chains bring products to customers and consist of a network or all interactions between suppliers and customers. In order to efficiently manage each facet of the SC, each company has to perform in each area; any operational decision might effect and impact the other stakeholders in the supply chain. They ensure alignment of strategy and operations with suppliers and customers through communication and information flows.



-Involves several different companies.
The individual companies are connected through flows.



However Supply chains are usually more complex.
-Multitude structure made up of multiple companies. These companies have to work together in order to form a functional supply chain.

SCM is about planning and controlling all the aspects of interaction between the companies involved in the complex process of forming a g/s.

PRODUCTION SYSTEMS: A "system" refers to a collection of parts working interdependently to create a specifiable outcome. Feedback is the information about the performance of the system, that when returned to the system, can modify the system's behavior. A system is an interconnected and coordinated set of elements and process that converts inputs into desired outputs. A company is made up of numerous individual systems in the various functional areas, not only in manufacturing or operations but also in engineering, marketing, accounting, and other areas that together constitute the overall system that is the company itself (working as subsystems within the company).

POINT VIEW: single activity at single moment in time. → **LINE VIEW:** multiple activities in sequence. → **CIRCLE VIEW:** results of one cycle provide feedback to the next cycle.

MANAGING SYSTEMS FOR PEAK PERFORMANCE:

-Help everyone see the big picture: employees do not focus too heavily on their own goals, the business is interrelated, therefore it is important employees also focus on the business' goals as a whole so that the system works efficiently.

-Understand how individual systems really work and how they interact: while trying to improve one system it is important not to damage another. Therefore it is important not to try and fix a system without understanding how each one works and how they interact with other systems.

-Understand problems before trying to fix them: "The typical way of managing is to take the whole and divide it into parts, then try to make each part perform as well as possible. But we have proven many times now that when you improve the performance of the parts you do not necessarily improve the performance of the whole. In fact, you can make it worse. Putting a Mercedes engine in a Volkswagen, for instance, doesn't make the Volkswagen a better car, even though it now has a superior engine. A system has properties that none of the parts have. You have to look at the entire system to understand what is truly happening."

-Understand the potential impact of solutions before implementing them: Everything is connected to everything else, "You can't divide your elephant in half," and "Things get better before they get worse."

-Don't just move problems around- solve them: otherwise the problem will just move around to other departments.

-UNDERSTAND how feedback works in the system: systems respond to feedback, which is information from the output applied back into the input.

TODAY'S PROBLEMS COME FROM YESTERDAY'S SOLUTIONS:

THE HARDER YOU PUSH, THE HARDER THE SYSTEM PUSHES BACK: A company cuts service dollars in favor of expenditures on marketing. But poor service disappoints customers, and sales start falling once again.

THE CURE CAN BE WORSE THAN THE DISEASE: Also called shifting the burden, bringing in consultants to spot and solve productivity problems doesn't make an organization's managers better problem solvers.

THE TOOLS OF SYSTEMS THINKING: Systems thinking comes with its own language and processes. Some of these tools are more useful to hard-core systems thinking mavens than to line managers. A sampling:

CAUSAL LOOP DIAGRAMS (CLD)-- Simple Cartesian input/output, cause-and-effect models of processes are considered inadequate for representing the workings of complex organizations and processes. CLDs are circular diagrams that show the relationships between the elements of a system and emphasize feedback dynamics.

ARCHETYPES-- Systems thinking mavens claim there are common patterns or themes among large system CLDs just as there are common themes in music and mythology. These generic systemic structures are called archetypes, and are named for the effects they create. Among them: Limits To Growth, Shifting the Burden, Drifting Goals, Fixes and Fail, and Escalation.

MENTAL MODELS-- We all have these pictures in our heads of how things work. They are as simple as "the sun always sets in the West" and as complex as $E = MC^2$. Systems thinking requires a managing of mental models: surfacing testing and improving these internal pictures of how the organization works in order to improve system functioning.

LEVERAGE POINTS-- small changes can produce big results, and that the area of highest leverage is usually nonobvious. Finding those obscure points of influence frequently requires careful observation, data gathering and computer modeling. The archetypes are an attempt to shortcut this laborious process.

VALUE CHAIN: All the elements and processes that add value as raw materials are transformed into the final products made available to the ultimate customer.

REPRESENTATIVE INPUTS → TRANSFORMATIONS COMPONENTS → TRANSFORMATION FUNCTIONS → REPRESENTATIVE OUTPUTS

OUTSOURCING: Contracting out certain business functions or operations to other companies.

VALUE WEBS: Multidimensional networks of suppliers and outsourcing partners.

OFFSHORING: Transferring a part or all of a business function to a facility (a different part of the company or another company entirely) in another country.

In the complex argument over offshoring, the transfer of business functions to entities in other countries in pursuit of lower costs, proponents claim that (a) companies have a responsibility to shareholder interests to pursue the lowest cost of production, (b) offshoring benefits U.S. consumers through lower prices (c) many companies don't have a choice once their

competitors move offshore, (d) some companies need to offshore in order to support customers around the world and (e) offshoring helps US companies to be more competitive. Those who question the value or wisdom of offshoring raise points about: (i) the future of good jobs (ii) hidden costs and risks (iii) diminished responsiveness (iv) knowledge transfer and theft issues (v) product safety issues and (vi) national security and public health concerns.

SUPPLY CHAIN: A set of connected systems that coordinates the flow of goods and materials from suppliers all the way through to the final customers.

SUPPLY CHAIN MANAGEMENT: The business procedures, policies and computer systems that integrate the various elements of the supply chain into a cohesive system.

Supply chains help: manage risks, relationships, trade-offs and promote sustainability.

INVENTORY: goods and materials kept in stock for production or sale.

INVENTORY CONTROL: determining the right quantities of supplies and products to have on hand and tracking where those items are.

PROCUREMENT: the acquisition of the raw materials, parts, components, supplies, and finished products required to produce goods and services.

MATERIAL REQUIREMENTS PLANNING (MRP) is a production planning and inventory control system used to manage manufacturing processes. Most MRP systems are software-based, while it is possible to conduct MRP by hand as well. An MRP system is intended to simultaneously meet three objectives:

-Ensure materials are available for production and products are available for delivery to customers.

-Maintain the lowest possible material and product levels in store

-Plan manufacturing activities, delivery schedules and purchasing activities.

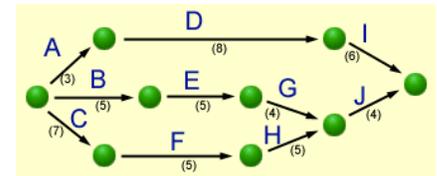
ENTERPRISE RESOURCE PLANNING (ERP) is a cross-functional enterprise system driven by an integrated suite of software modules that supports the basic internal business processes of a company. ERP gives a company an integrated real-time view of its core business processes such as production, order processing, and inventory management, tied together by ERP applications software and a common database maintained by a database management system.

PRODUCTION AND OPERATIONS MANAGEMENT: Overseeing all the activities involved in producing g/s.

CAPACITY PLANNING: Establishing the overall level of resources needed to meet customer demand.

CRITICAL PATH: In a Programme Evaluation and Review Technique network diagram, the sequence of operations that require the longest time to complete.

PRODUCTIVITY: the efficiency with which an organisation can convert inputs into outputs.



LEAN SYSTEMS: systems (in manufacturing and other functional areas) that maximize productivity by reducing waste and delays. → **JUST-IN-TIME (JIT):** Inventory management in which goods and materials are delivered throughout the production process right before they are needed.

MASS PRODUCTION: The creation of identical goods or services usually in large quantities.

CUSTOMISED PRODUCTION: The creation of a unique g/s for each customer.

MASS CUSTOMISATION: a manufacturing approach in which part of the product is mass produced and the remaining features are customized for each buyer.

The delivery of services presents of number of unique challenges, including (1) perishability: the services are consumed at the same time they are produced; (2) location constraints, which often require that customers and service providers be in the same place at the same time; (3) scalability challenges, which can make some types of service businesses difficult to expand; (4) performance variability and perceptions of quality, which heighten the challenge of delivering consistent quality and increase the subjectivity of the customer experience. (5) customer involvement and service provider interaction, which can put some of the responsibility for the service quality on the customer's shoulders and increase the importance of good interpersonal skills.

QUALITY: The degree to which a product or process meets reasonable or agreed-upon expectations.

QUALITY CONTROL: measuring quality against established standards after the good or service has been produced and weeding out any defective products. **vs. QUALITY ASSURANCE:** A more comprehensive approach of companywide policies, practices, and procedures to ensure that every product meets quality standards.

CONTINUOUS IMPROVEMENT and STATISTICAL PROCESS CONTROL (SPC): The use of random sampling and tools such as control charts to monitor the production process.

SIX SIGMA: A rigorous quality management program that strives to eliminate deviations between the actual and desired performance of a business system. Define → Measure → Analyse → Improve → Control

ISO 9000: A globally recognized family of standards for quality management systems