Operations Management

Lecture 1:
Introduction

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Goods and Services

Goods	Service
▪ Physical product that can be seen, touched, or possibly consumed →**Very durable:** does not wear out quickly (lasts at least three years) →**Not durable:** it is not useful once it is used or it has a short duration (it lasts a maximum of three years)	▪ Any primary or complementary activity that does not directly produce a physical product ▪ Banking, tourism, health services and others

Tinder

Differences between goods and services

CHARACTERISTICS OF SERVICES	CHARACTERISTICS OF PRODUCTS
Intangible: *Ride in an airline seat*	Tangible: The seat itself
Produced and consumed simultaneously: *Beauty salon produces a haircut that is consumed as it is produced*	Product can usually be kept in inventory (beauty care products)
Unique: *Your investments and medical care are unique*	Similar products produced (iPods)
High customer interaction: *Often what the customer is paying for (consulting, education)*	Limited customer involvement in production
Inconsistent product definition: *Auto insurance changes with age and type of car*	Product standardized (iPhone)
Often knowledge based: Legal, education, and medical services are hard to automate	Standard tangible product tends to make automation feasible
Services dispersed: *Service may occur at retail store, local office, house call, or via Internet*	Product typically produced at a fixed facility
Quality may be hard to evaluate: *Consulting, education, and medical services*	Many aspects of quality for tangible products are easy to evaluate (strength of a bolt)
Reselling is unusual: *Musical concert or medical care*	Product often has some residual value

Definition

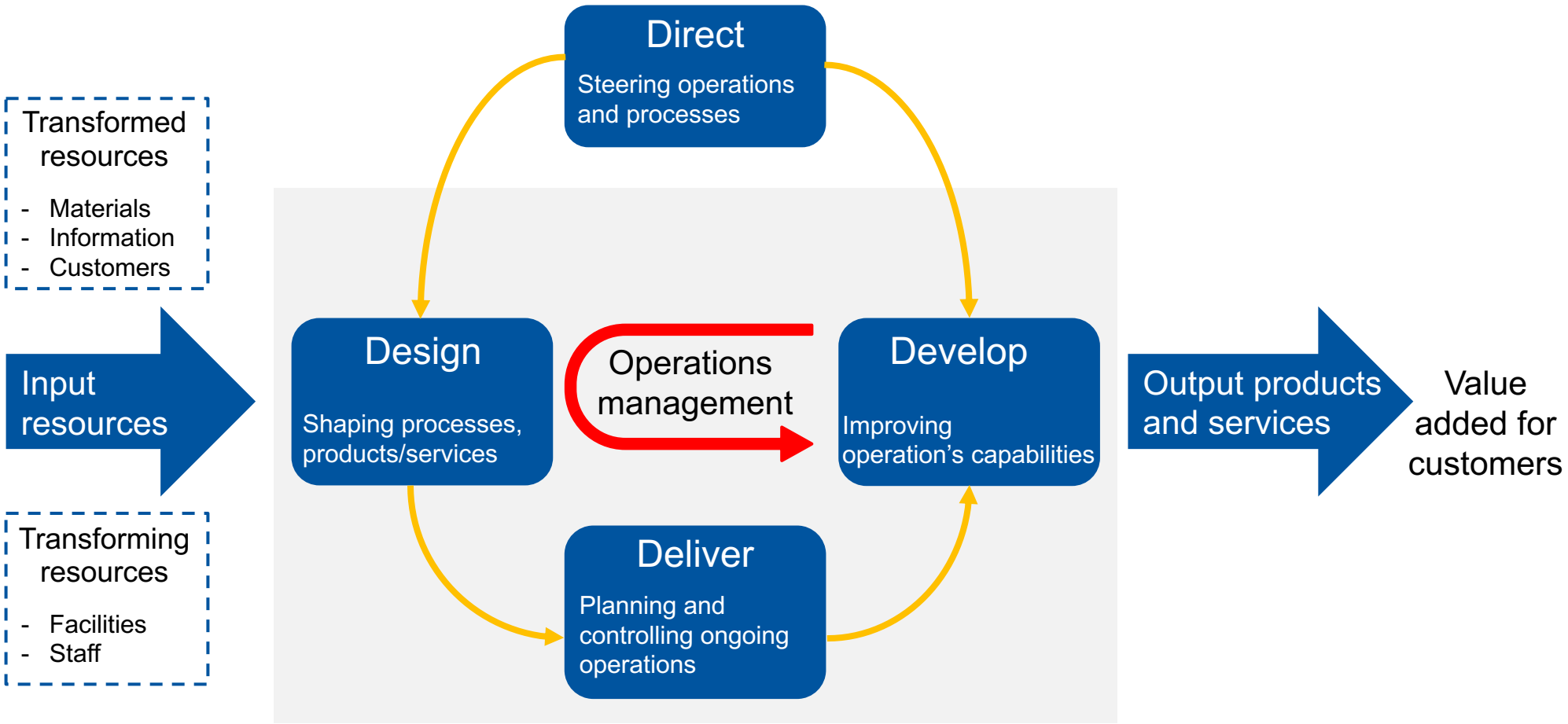
Operations Management

"… is the set of activities that creates value in the form of goods and services by transforming inputs into outputs" (Render, 2017)

"*The task of production management is the goal-oriented design and control of the transformation processes. This includes planning, monitoring and control of operational resources (human, machines, materials, information), so that products and services can be created as required by this operation in the quantity and quality required in the specified time with the lowest cost and capital expenditure*." (Schuh, 2014)

"*is an area of management concerned with designing and controlling the process of production and redesigning business operations in the production of goods or services […] is primarily concerned with planning, organizing and supervising in the production, manufacturing or the provision of services* " (Wikipedia, 2021)

Operations as a process



Operations as a process

Operation	Inputs	Outputs
Bank	Tellers, staff, computer equipment, facilities, and energy	Financial services (loans, deposits, safekeeping, etc.)
Restaurant	Cooks, waiters, food, equipment, facilities, and energy	Meals, entertainment, and satisfied customers
Hospital	Doctors, nurses, staff, equipment, facilities, and energy	Health services and healthy patients
University	Faculty, staff, equipment, facilities, energy, and knowledge	Educated students, research, and public service
Manufacturing plant	Equipment, facilities, labor, energy, and raw materials	Finished goods
Airline	Planes, facilities, pilots, flight attendants, maintenance people, labor, and energy	Transportation from one location to another

Operations as a process provides a basis for seeing an entire business as a system of interconnected processes. This makes it possible to analyze an organization and improve it from a process point of view

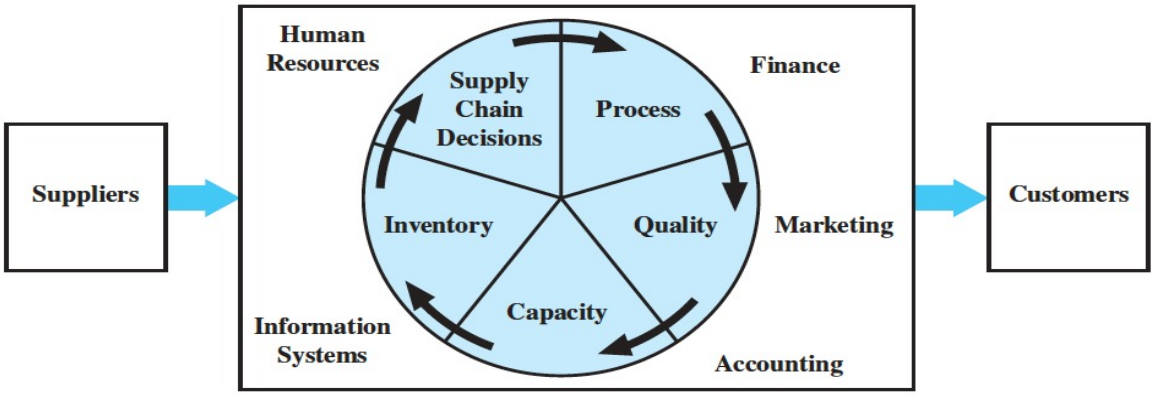
Strategic operations and supply chain decisiones: an example

- Pizza U.S.A., Inc., produces and markets pizzas on a national basis.
- The firm consists of 85 company-owned and franchised outlets (each called a store) in the United States.
- The operations function in this company exists at two levels: the corporate level and the level of the individual store.

- Describe the five main decisions made by operations and supply chain managers.

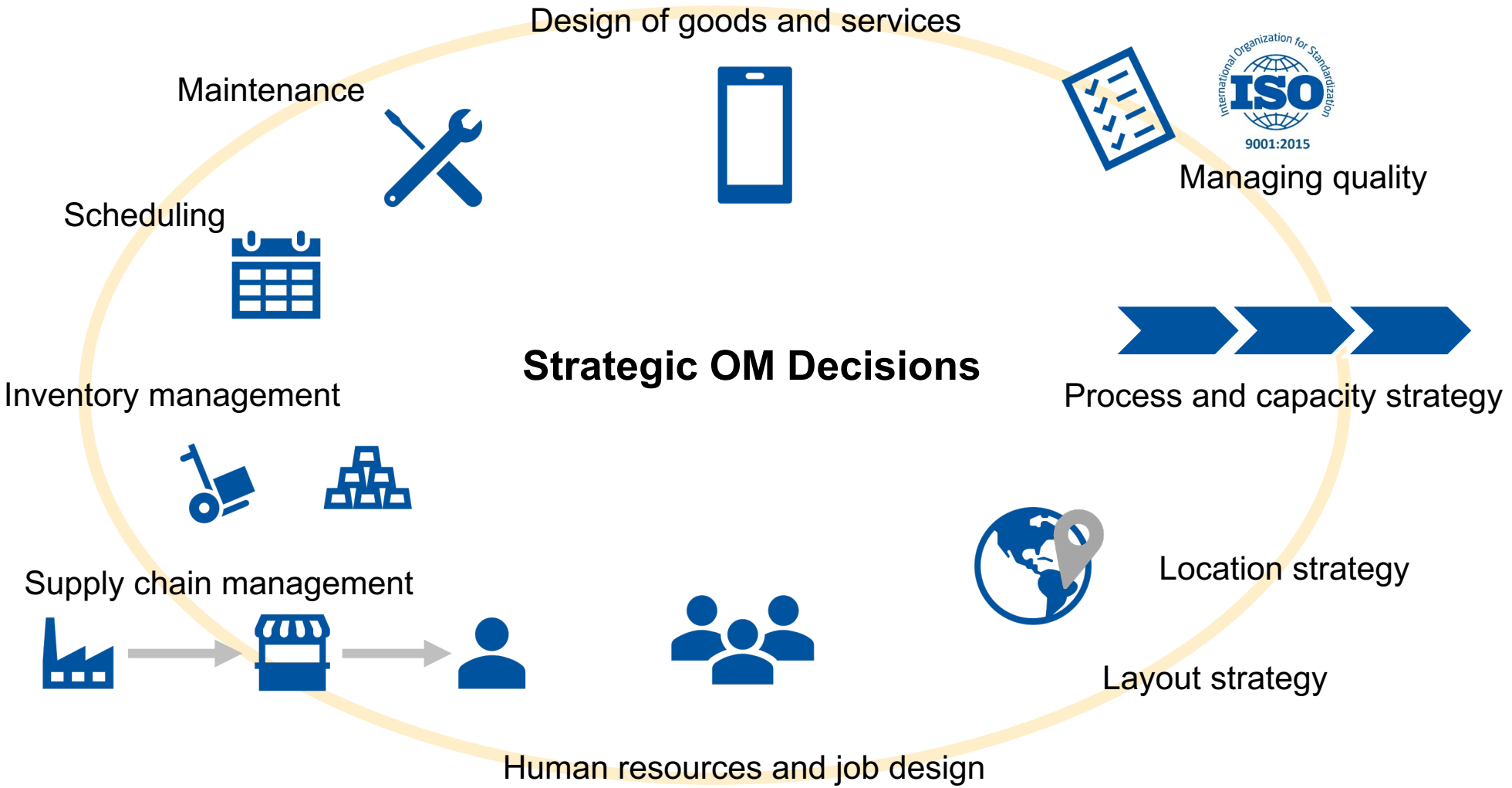
Framework for operations decisiones in supply chain according to Schroeder

- Careful attention to the five decision areas in the framework is the key to the successful management of operations and the associated supply chain.
- Indeed, well-managed operations and its supply chain can be defined in terms of this decision framework.
- If decisions in each of the five groupings support the strategy of the firm, provide value, and are well integrated with the other functions of the organization, the operations function and its associated supply chain can be considered well managed.



Decisions	Examples of Decisions
1. Process	• What type of process should be selected? • How should the service delivery system be designed? • How should material and customer flows be managed? • What principles of lean systems should be deployed? • How should environmental and global goals be met?
2. Quality	• What should the quality standards be? • How can quality be controlled and improved? • What statistical approaches should be used (e.g., control charts and Six Sigma)? • How should the suppliers and customers be involved in quality?
3. Capacity	• What is the facility strategy for size, location, and timing? • How should Sales and Operations Planning be implemented? • How should variable demand be handled with capacity adjustments? • What priority rule should be used for scheduling?
4. Inventory	• How much inventory should be held? • What should the order size and reorder frequency be? • Who should hold the inventory? • How can the inventories of suppliers and customers be coordinated?
5. Supply Chain	• What suppliers should be used for products and services? • How should sourcing be conducted and evaluated? • What form of transportation should be used? • How should warehouses be used to allow economic flow of materials?

Strategic Operations Management Decisions according to Render

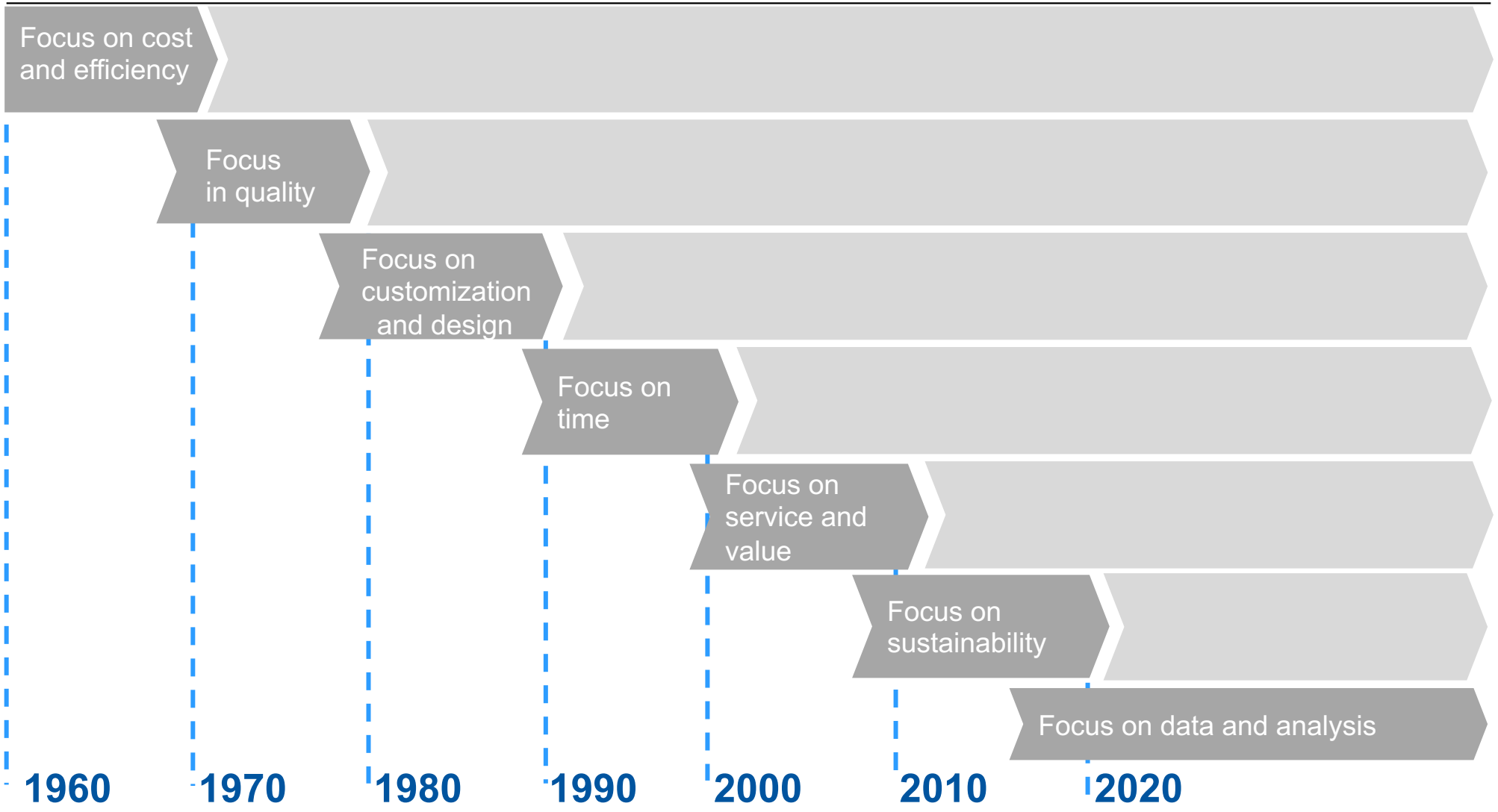


Operations Management as cross-functional decision making

- Functional areas are concerned with a particular focus of responsibility or decision making in an organization.
- Every function must be concerned not only with its own decision responsibilities but also with integrating decisions with other functions.
- The five areas of operations and supply chain decisions, cannot be made separately; they must be carefully integrated with one another and, equally important, with decisions made in marketing, finance, and other parts of the organization

Key Decision Area	Interface with Operations Decisions
Marketing	
Market segment and needs	Quality design and quality management
Market size (volume)	Type of process selected (assembly line, batch, or project) and capacity required
Distribution channels	Inventory levels and logistics
Pricing	Quality, capacity, and inventory
New-product introduction	Cross-functional teams
Finance and Accounting	
Availability of capital	Inventory levels, degree of automation, process type selected, and capacity
Efficiency of conversion process	Process type selection, process flows, value-added determination and sourcing
Net present value and cash flow	Automation, inventory, and capacity
Process costing or job costing	Type of process selected
Measurement of operations	Costing systems used
Human Resources	
Skill level of employees	Process type selected and automation
Number of employees and part-time or full-time employment	Capacity and scheduling decisions
Training of employees	Quality improvement and skills
Job design	Process and technology choice
Teamwork	Cross-functional decisions in operations
Information Systems	
Determination of user needs	Systems should support all users in operations
Design of information systems	Systems should help streamline operations and support all analytics and decisions in operations
Software development	Software is needed for capacity, quality, inventory, scheduling and supply chain decisions
Hardware acquisition	Hardware is needed to support automation decisions in operations and to run software

Eras of production management: 7 approaches through history



Eras of production management: 7 approaches through history

1960 - 2020

Cost minimization	→	Sustainability
Mass production	→	Mass customization
Manufacturing-based technology	→	Information-based technology
Focus on assets	→	Focus on the value of goods and services
Local markets	→	Global markets

Fathers of Operations Management

Frederick Taylor

- Father of scientific administration
- He contributed to the recruitment, planning and scheduling
- He started with the first time and motion studies (study how homework should be done)
- He created principles of efficiency.

Frank & Lillian Gilbreth

- Used statistics to analyze processes
- Their methods involved operators in decision-making
- Creators, consultants and promoters of the concept of total quality management

Edwards Deming

- Used statistics to analyze processes
- His methods involved operators in decision-making
- Creator, consultant and promoter of the concept of total quality management

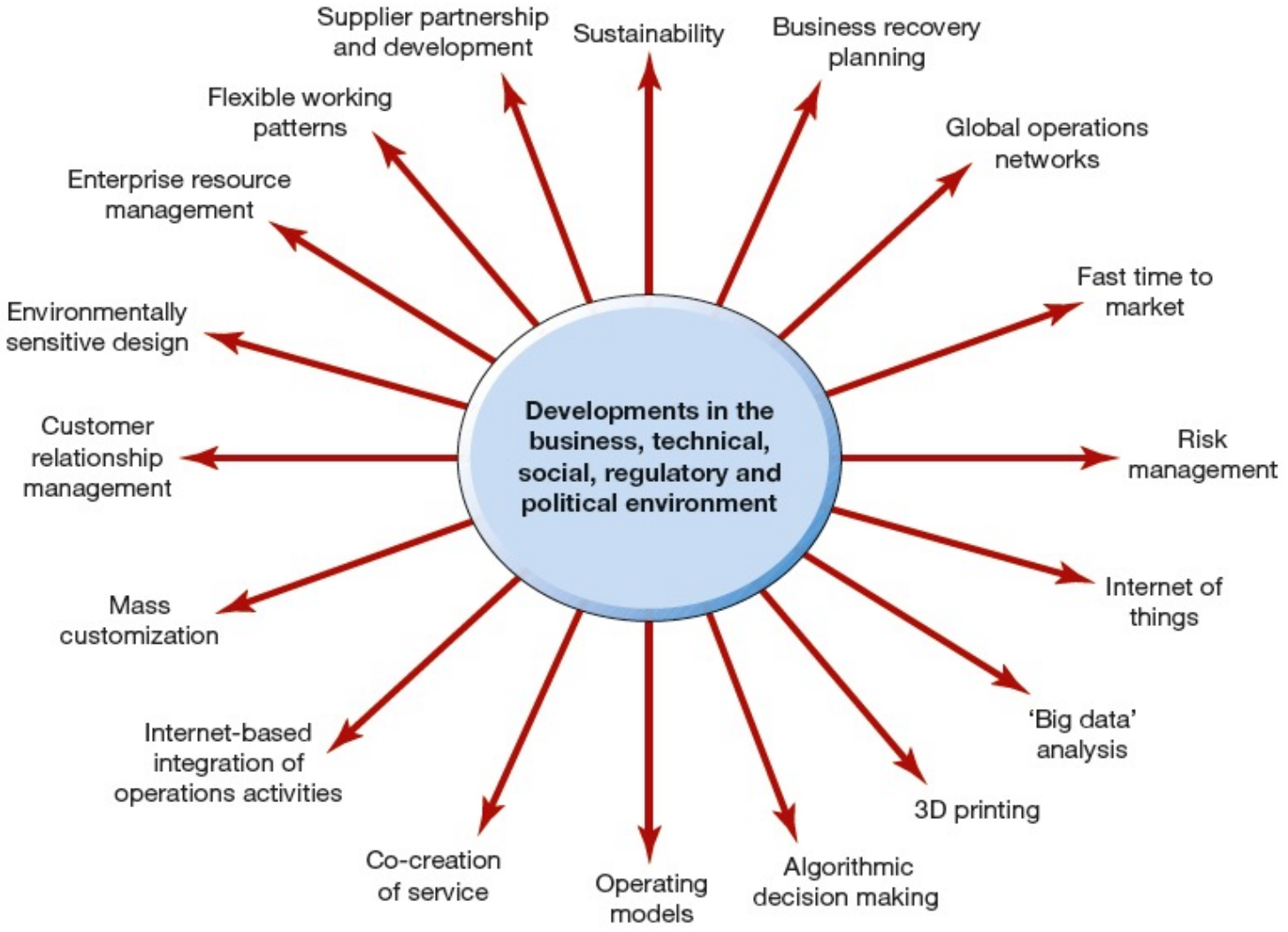
Henry Ford

- Founder of Ford Motor Company
- Father of modern production lines for mass production.
- He introduced the concept of the assembly line, where men stayed in one place and materials moved.
- He paid his employees well ($ 5 / hour)!

We live in a VUCA world

The need for agile enterprises is rising

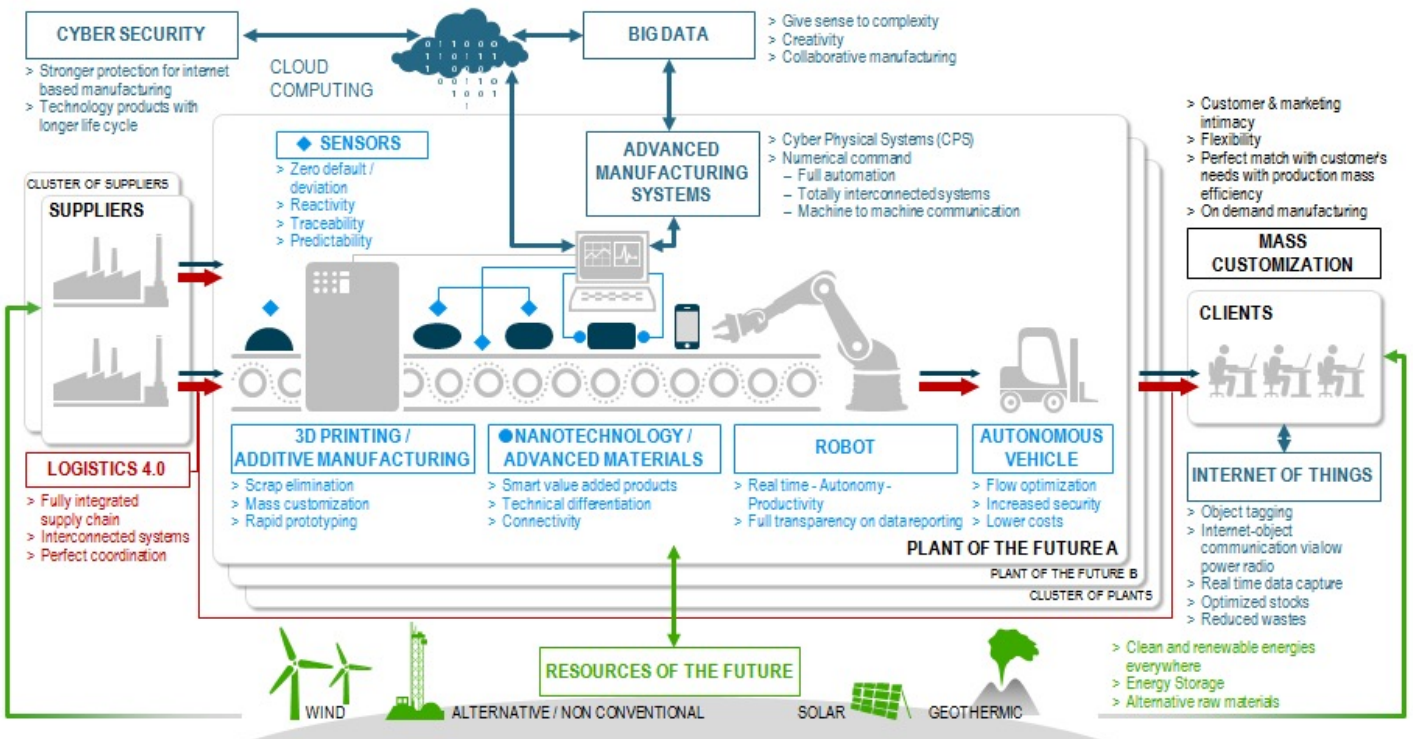
Challenges and trends



Industry 4.0

- Represents a new level of organization and control of the entire value chain throughout the life cycle of products through the [digital network] connection of people, objects and systems, dynamic added value networks are created, optimized in real time and self-organized between companies [...]

Verband Deutscher Maschinen- und Anlagenbau e.V.



"It is the integral transformation of the entire sphere of industrial production through the fusion of digital technology and the internet with conventional industry."

- Angela Merkel

References

- Slack, N., et al. (2016) . *Operations Management*. Pearson
- Stevenson, W. (2015*). Operations Management*. McGraw-Hill
- Schroeder et al. (2018). *Operations Management in Supply Chain*. McGraw-Hill
- Render, B. & Heizer, J. (2014). *Principios de administración de operaciones*. Pearson
- Render, B. & Heizer, J. (2017). *Operations Management: Sustainability and Supply Chain Management*. Pearson
- Krajewski et al.(2013). *Administración de operaciones, procesos y cadena de suministro.* Pearson
- Chase, R. & Jacobs, F. (2014). *Administración de operaciones, producción y cadena de suministro.* McGraw – Hill
- Slack & Lewis (2016). *Operations Strategy*. Pearson
- Collier & Evans (2016). *Administración de operaciones.* Cengage
- Ulrich, K. & Eppinger S. (2013) . *Diseño y Desarrollo de productos.* McGraw-Hill
- Schuh, G. (2012). *Innovationsmanagement - Handbuch Produktion und Management.* Springer Verlag
- Meyers, F. & Stephens, M.. *Diseño de instalaciones de manufactura y manejo de materiales*. Pearson.
- Christopher (2016). *Logistics and Supply Chain Management*. Pearson
- Dumas, M. et al. (2018). *Fundamentals of Process Management*. Springer
- Peña & Rivera. (2016). *Administración de procesos*. Pearson
- Lovelock, C. et al. *Administración de servicios*. Pearson
- Johnston et al. *Service Operations Management*. Pearson
- Kumar, S. & Suresh, N. (2008). *Production and Operations Management*. New Age International Limited Publishers
- Cuatrecasas, L. (2012). *Organización de la producción y dirección de operaciones*. Ediciones Díaz de Santos, S.A.
- Gupta, S & Star, M. (2014). *Production and operations – management systems*. Taylor and Francis Group
- Fritzsimmons, J. & Fritzsimmons, M. *Service Management*. McGraw-Hill
- Swink et al. (2014). Managing operations across the supply chain. McGraw-Hill

References

- Freivalds, A. & Niebel, B. *Ingeniería Industrial – métodos estándares y diseño del trabajo*. McGraw-Hill
- Kalpakjian, S. & Schmid, S. *Manufactura, ingeniería y tecnología.* Pearson
- Groover, M. *Fundamentos de manufactura moderna*. McGraw-Hill
- Render, B. (2016). *Métodos cuantitativos para los Negocios*. Editorial Pearson.
- Anderson, D. & Sweeny, D. (2019). *Métodos Cuantitativos para los Negocios*. Cengage
- Nahmias, S. (2007). *Análisis de la Producción y las Operaciones*. McGraw-Hill
- Schlick, C. *Arbeitswissenschaft*. Springer Verlag
- Rees, M. (2015). *Business Risk and Simulation Modeling in Practice*. John Wiley & Sons Ltd
- Winston, W. (2017) *Microsoft Excel 2016 – Data Analysis and Busines Modeling*. Microsoft press

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