Operations Management

Faculty – CP Garg, IIM Rohtak

What is Operations Management ?

Operations Management means managing jobs with multiple activities

Competitive Advantage through value addition

- **involving all the people**
- **across all functions**
- **at all times**

Operations Management

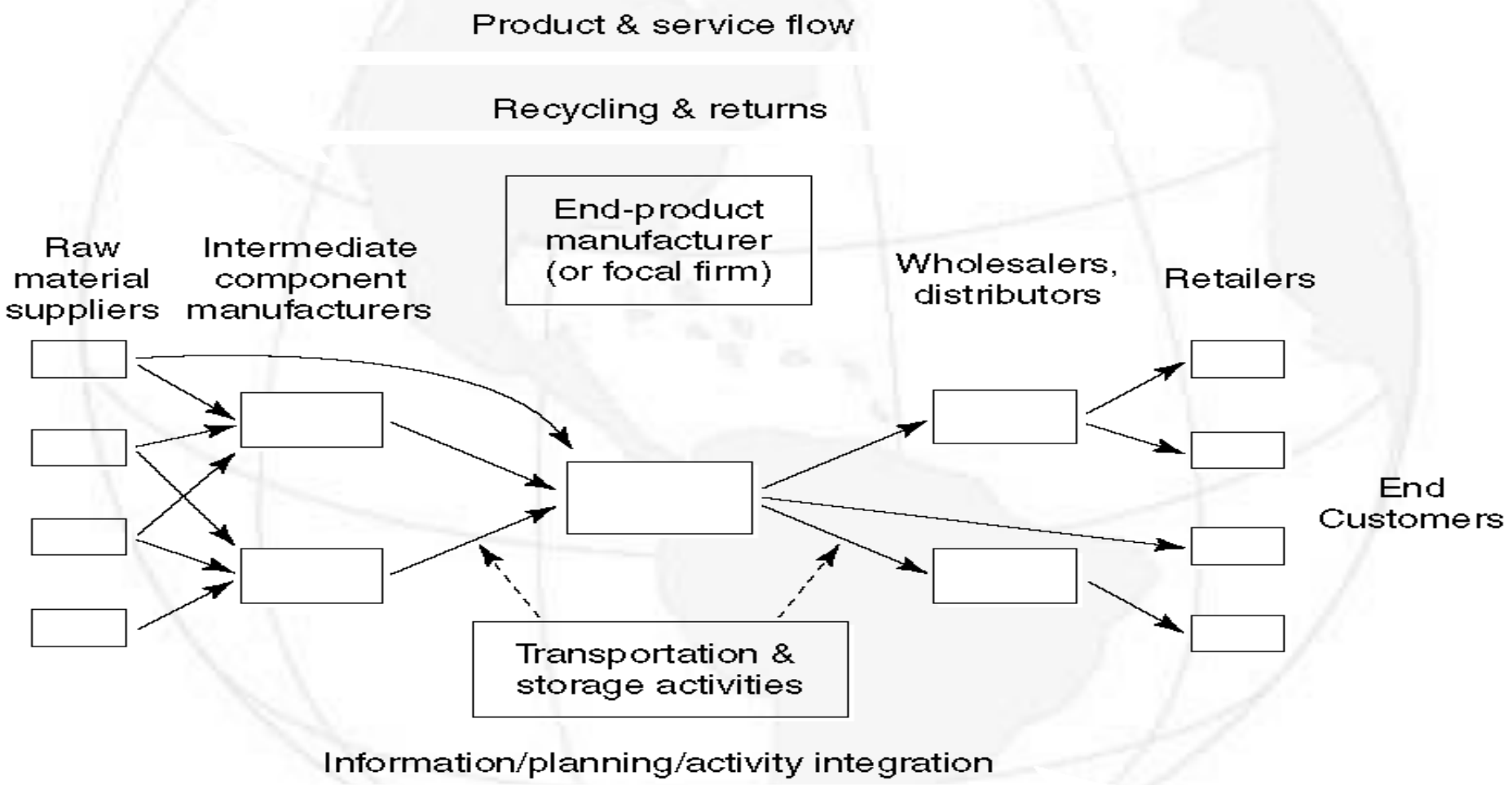
Definition :

The management of an organization's productive resources or its production system, which converts inputs in to the organization's products and services.

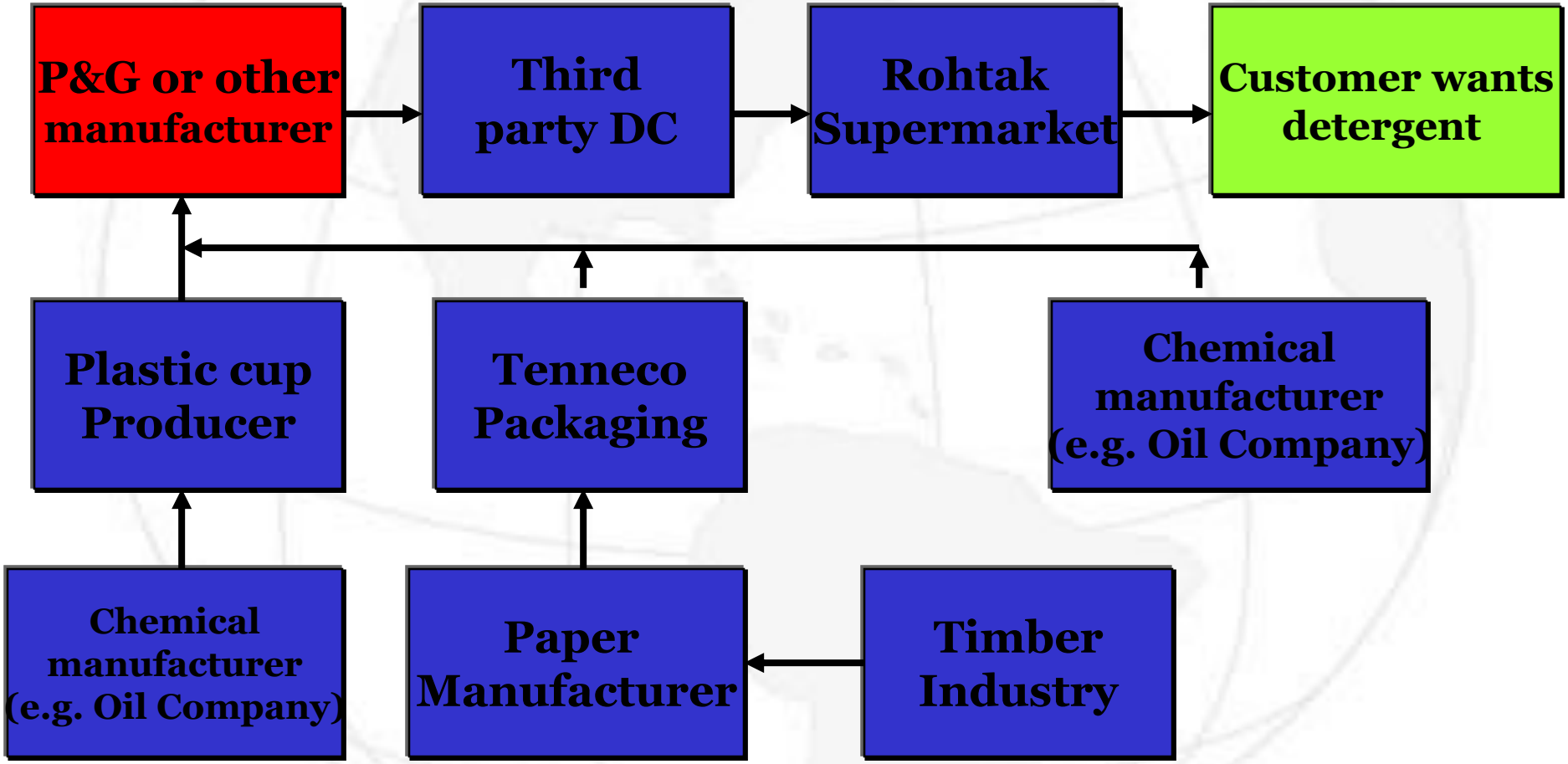
OR

The design, operations and improvement of the production systems through integration of all its resources to meet customer's needs.

What is a Supply Chain?



Detergent supply chain:



Supply Chain Management

- Supply Chain –A connected series of organizations, resource and activities involved in the creation and delivery of value, in the form of finished products and services to end customers.

- **SUPPLY CHAIN MANAGEMENT IS ALL ABOUT HAVING THE RIGHT PRODUCT IN THE RIGHT PLACE,AT THE RIGHT TIME, AND IN THE RIGHT CONDITION.**

It’s all about collaboration

Quiz

- **Components assembled to make a DELL computer are sourced from ---**

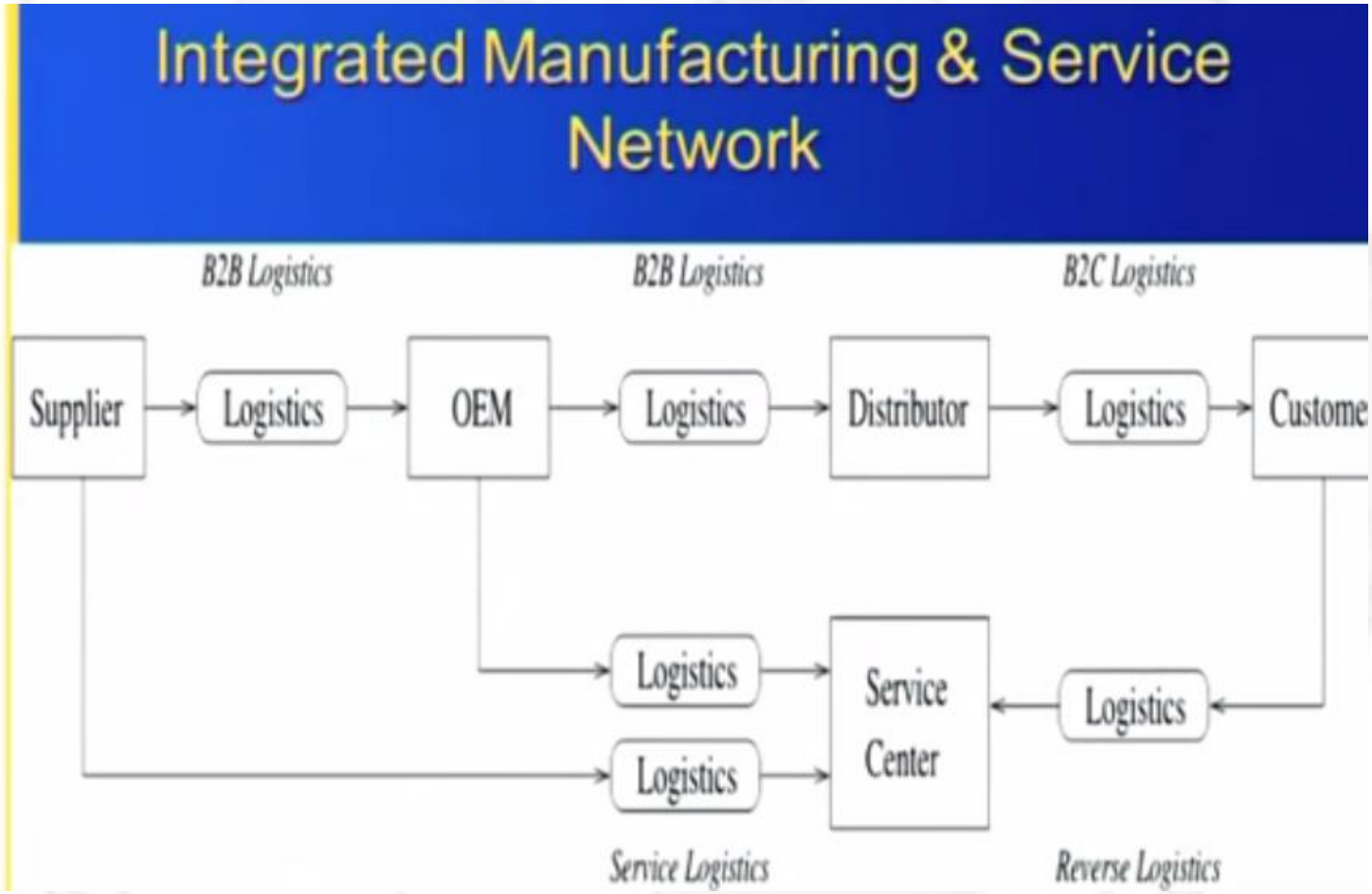
- **In India, it takes ----for the conversion of iron ore into a Main Battle Tank.**

- **Poor coordination wasted --- annually in the food industry in USA.**

Answers to Quiz

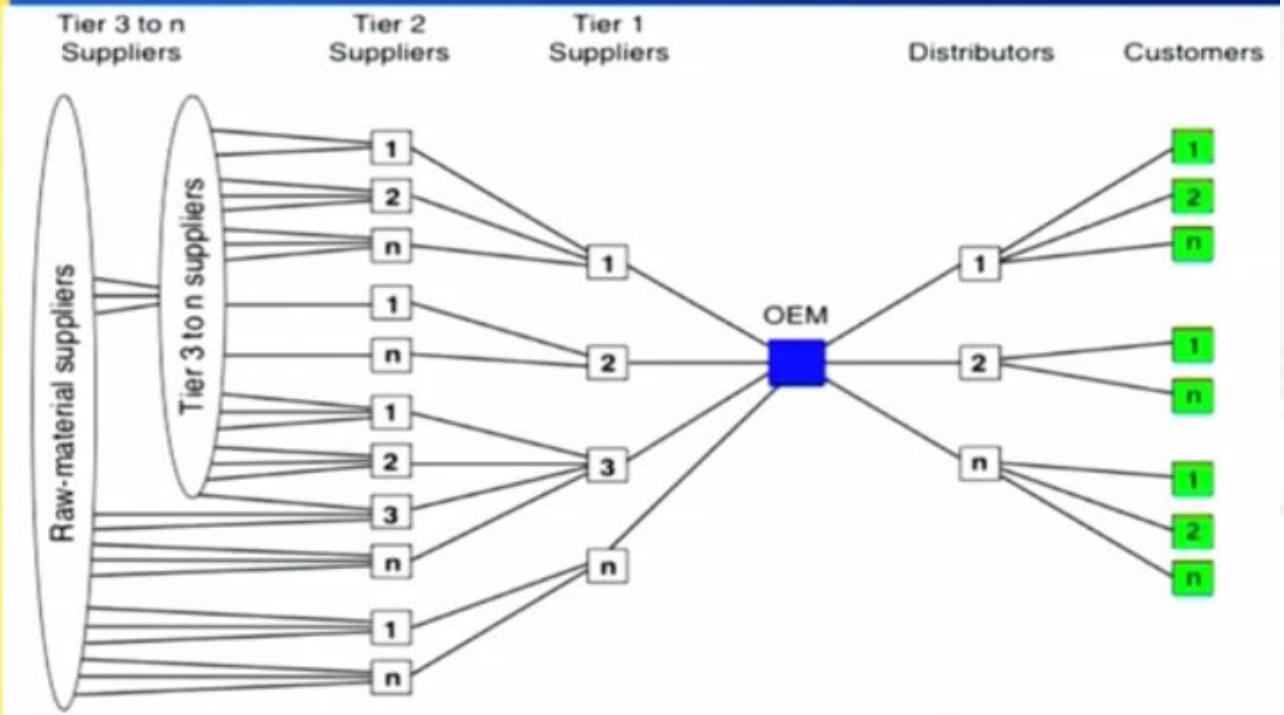
- **47 Countries.**
- **approx. 60 Months**
- **$ 30 billion**

Supply Chain Management



Global Supply Chain Management

Multi Tier Supply Chain Network



Source: National Research Council Staff (2000). *Surviving supply chain integration: strategies for small manufacturers*. Washington, DC: National Academies Press. Adapted from Lambert et al., 1998.

SCM Issues

- Multiple partners in an extended supply chain
- Global nature of the business operations
- Increased need for coordination
- Increased need for collaboration
- Increased need for cost reduction
- Increased need for speed
- Coordination and Integration is key to success

Operations and Supply Chain Terms

Operations

Manufacturing and service processes used to transform resources into products

Supply Chain

Processes that move information, finance and material to and from the firm

Decision Making Areas

Design and Planning

- Product Design
- Capacity Planning
- Process Design
- Facility Location
- Facility Layout
- Job Design & Trg.
- Product Quality

Operations & Control

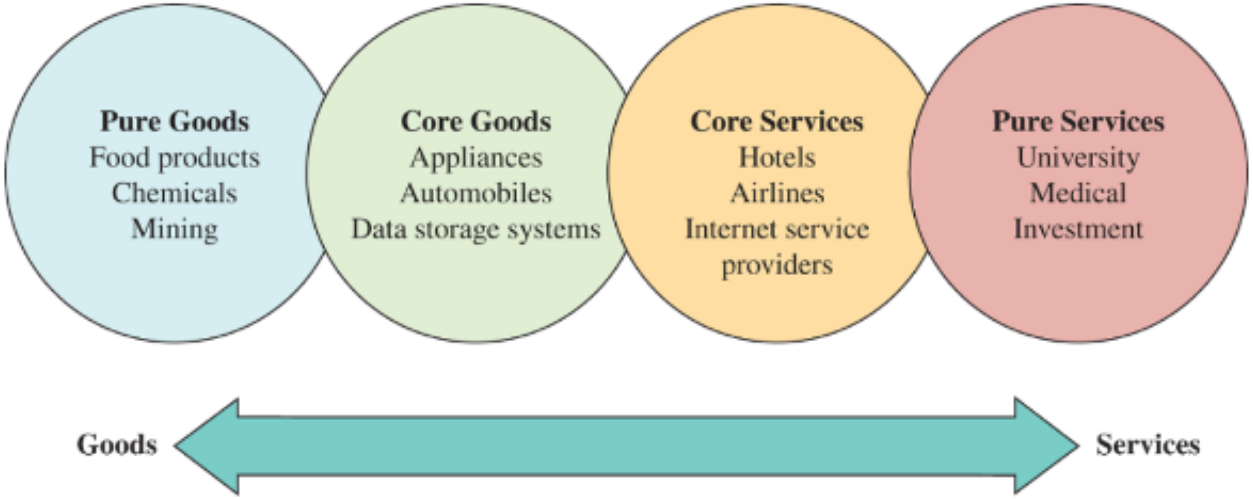
- Aggregate Planning
- Materials Planning
- Inventory Control
- Maintenance
- Scheduling
- Logistics
- Distribution

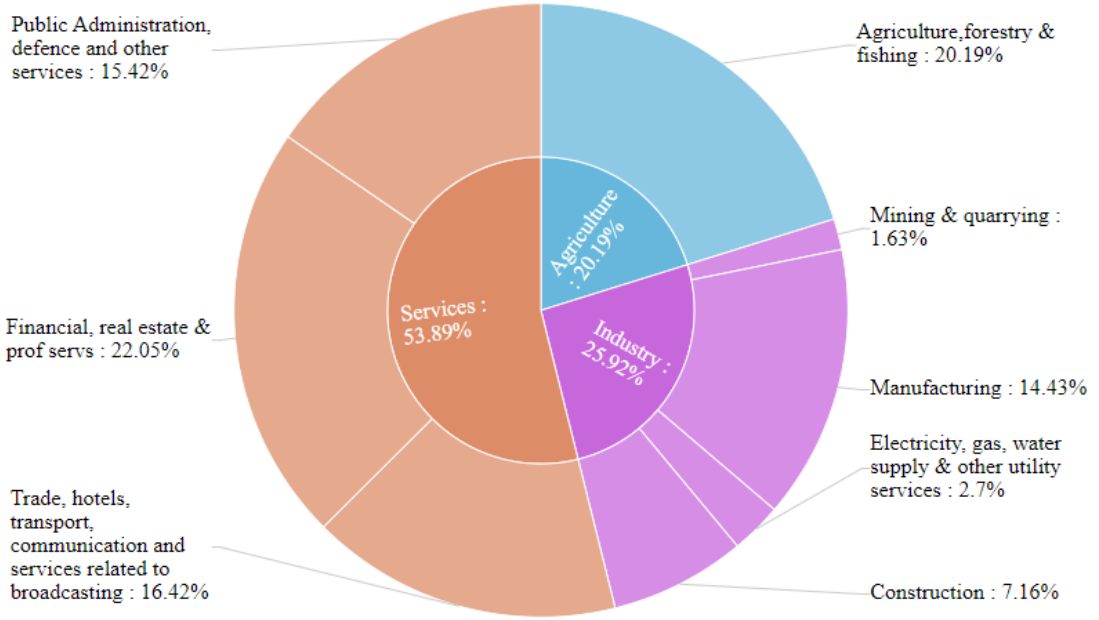
Operations Management

Decision Making areas

1. Strategic Decisions
   - ✓ For Products
   - ✓ For Processes
   - ✓ For Facilities
2. Operating Decisions – Production Planning
3. Control Decisions for operations, workforce, quality, overheads,maintenance

The Goods–Services Continuum





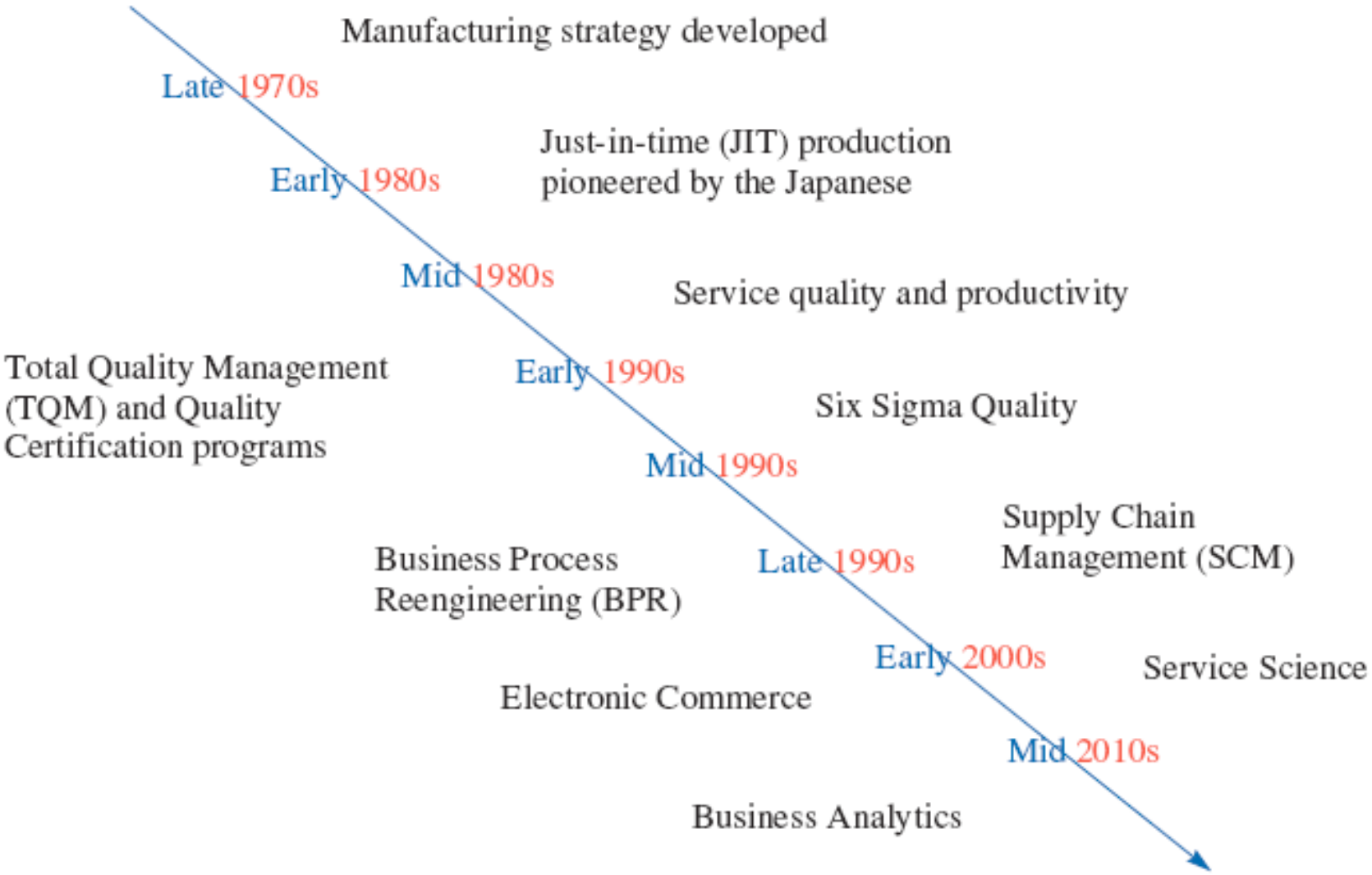
Sector-wise GDP of India – 2021

Operations Management

Product and Service Systems

Products are tangible assets, hence are physical outputs of a process. Services being intangible, involve customers' direct contact and location of the service facility

Time Line Depicting When Major OSCM Concepts Became Popular



Operations Management

Operations as a System

It is a combination of inputs, with conversion process and controlling process as sub-systems.

Inputs

✓ Primary Resources – Men, Materials, Machines, Money and Time

✓ Market - Customer Needs, Competition, Product Information

Operations Management

✓ External Environment – Legal/Political, Social, Economic and Technological

Conversion Sub-systems

✓ Production Processes – Design of Methods, design of Services and Quality Assurance

✓ Manufacturing, Warehousing, Transportation, Retailing / Wholesaling.

Control Sub-system – feedback mechanism

Operations Management

Outputs – Products and Services

Indirect Outputs

- ✓ Taxes
- ✓ Wages and Salaries
- ✓ Technical Development
- ✓ Environmental Impacts
- ✓ Social & Safety impacts

Operations Management

Do the Right thing First Time and Every time – **Dr. Deming**

Efficiency, Effectiveness, and Value

- **Efficiency -** doing something at the lowest possible cost
- **Effectiveness -** doing the right things to create the most value for the company
- **Value -** quality divided by price
  - **Quality -** the attractiveness of the product, considering its features and durability

Operations Strategy

- The Means by which operations implement by firm.
- Corporate Strategy helps to build a customer driven firm.

VISION (What company going to do)

MISSION (What steps they are taking)

Corporate Strategy

Operations Strategy

Operations Management

Operations Strategy as a subset of Corporate strategy

(Both resources based)

Operations & SC Strategy

Def. Operations Strategy is a process by which key operations decisions are made that are consistent with the overall strategic objectives of the firm.

- ✓ To help in structural and infrastructural decisions to support overall business strategy.
- ✓ To support the development of core competencies in the firm's operation and supply chain.

Structural Decisions

- Capacity

Eg. Amount, Type & Timing of Capacity changes (Lead, lag or match market demand)

- Facilities

Eg. Service facilities, Manufacturing, Warehouses, Distribution hubs, Layout

- Technology

Eg. Manufacturing process, Material Handling, Transportation, Computer systems

Infrastructural Decisions

- Organization

Eg. Centralization/Decentralization, Control flow, Workforce

- Sourcing & Purchase Decisions

Eg. Sourcing strategies, Supplier selection, Supplier Performance measurement

- Planning & Control

Eg. Forecasting, Tactical Planning, PPC

- Quality Management

Eg. TQM, CI, SQC

- Product & Service Development

Eg. Development Process, Org. & Suppliers Role

Operation Strategy

Identify Business Concern

Evaluate options

Develop Strategy Plan

Resource identification

Modification on business dynamics

Environmental Scanning & Control

Identify Business Concern

1. **Need Identification**

   a. Product/Service Needs- Price, Quality, Degree of Customization

   b. Delivery System Needs- Reliability, Availability, Convenience, Delivery Speed, Delivery dependability

   c. Volume Needs- High or Low volume, Variation in volume.

   d. Others Needs- International Finance, Compatibility in Legal services

2. **GAP Identification**

3. **Resource Availability- CTQ**

Evaluate options

- This is done by Costing of Alternatives and Pareto Analysis
- 80-20 Rule

Develop Strategy Plan

- Four Performance Dimensions-

1. Cost- Labor/Material/Engineering/Quality
2. Quality- Performance/Reliability
3. Time- Delivery Speed/Delivery Window
4. Flexibility- Mix/Changeover

Resource identification

1. Labour
2. Land
3. HR
4. Machines
5. Technology
6. Materials
7. Methods.
8. Money
9. Entrepreneurship

Modification on business dynamics

Continuous Improvement in Process/ Product/Services

Because- Time change, People change, technology change so Products/services need change by Partial or Modification.

Environmental Scanning & Control

- It is the process by which managers monitor trends in the environment (Industry, Market place & society) for potential Opportunities or Threats- Reason to stay ahead of the competition
- Eg. Car Manufacturers- Electric Car/Gasoline and Hydrogen Cars.

Operations Strategies

- Design, Process and Inventory Policy
- Product/service Plans- Design & Development
- Outsourcing Plan- Make or Buy Plan/3PL/4 PL/5 PL
- Process/ Technology Plans
- Strategic Location of Resource- Funds, Capacity, Machines, Materials, Personnel etc.
- Facility Plans- Location & Layout

Operations Management

- Human Assets Management
- Market Research
- Design and Planning – failsafing/integrated approach
- Flexible manufacturing / outsourcing
- e-procurement and vendor partnership
- Delivery / Outsourcing / RFID
- Supply Chain Integration (IT involvement)

Operations Management

- Human Assets Management
  - Selection and Recruitment as per QR
  - Training – Cultural & Job Specific
  - Motivation – Monetary & Recognition
  - Job Description / Empowerment / Ownership
  - Synergy at work

Operations Management

Happiness hides in life's small details.

If you'r not looking it becomes invisible

– JOYCE BROTHERS

Factors Affecting Operations Management today are-

1. Reality of global Competition.
2. Quality, Customer Service and cost challenges.
3. Rapid expansion of advanced technologies.
4. Continued growth of the service sector.
5. Scarcity of operations resources.
6. Social responsibility issues.
7. VUCA World

Current Issues in Operations and Supply Chain Management

1. Coordinating the relationships between mutually supportive but separate organizations
2. Optimizing global supplier, production, and distribution networks
3. Managing customer touch points
4. Raising senior management awareness of OSCM as a significant competitive weapon
5. Sustainability and the triple bottom line
6. Managing in VUCA world

Operations Management

Design of New Product

- ✓ Needs Identification
- ✓ Product Planning & Design
- ✓ Conceptualization
- ✓ Acceptance – Compatibility with Resources
- ✓ Execution – Actual Manufacture - Pilot Sample
- ✓ Product Evaluation – Performance Test
- ✓ Specifications Frozen and Product Cleared for Production
- ✓ Finalization of Product Details – Technology and Degree of Automation

Operations Management

Desirable Features in Product Design

- ✓ Minimize number of parts
- ✓ Use common components and processes
- ✓ Standardize components and tools
- ✓ Simplify assembly through – ease to use fasteners, orientation & accessibility and fool-proof operations and assembly
- ✓ Use modularity to obtain variety
- ✓ Make product specifications and tolerances reasonable
- ✓ Design products to be robust

Operations Management

Competitive priorities- The Critical dimensions that a process or value chain must posses to satisfy its internal/external customers, both Now and in the future

- Product Differentiation- Perceive different like Thumps-up/ Bajaj bulbs
- Product Cycle / Flexibility- Product improvement while different phases of PLC
- Cost Optimization- Low cost operation eg. Nirma
- Quality of Operations- Q=f(C,P) Wastages are eliminated to increase Productivity
- Convenience and Schedule of Delivery- Distribution up to Mark
- Scope for varying demand- According to segment
- New product introduction speed- in cell phones GPS, Camera/ New Bicycles

Operations Management

Order Winners and Qualifiers

These are marketing oriented priorities - Product Differentiation, Cost Optimization

Order Winners (Feature that leads the customer to choose the product)

Cost of the product and its quality and reliability.

Order Qualifiers (Feature a must to enter the market)

Perception to ensure product to be candidate for purchase.

Operations Management

Value Engineering

Purpose – to simplify products / processes

Objective – to achieve equivalent / better performance at lowest total cost, maintaining all functional requirements

Method – identification and elimination of unnecessary costs through brain storming process for : Unnecessary feature / parts / weight / non standard component

CASE: Narayana Health—An Innovative Healthcare System in India

Dr Devi Shetty is an icon of modern entrepreneurship in healthcare of millions of poor Indians. He pioneered and championed an absolutely unheard model for treating India's poorest people, for whom money was always a constraining factor in healthcare. For example, an open heart surgery, which normally costs ₹2.50 lakhs with over ₹2,500 per month in post-operative care and medicines, common man lacks resources to manage this. Most of the similar heart speciality hospitals in India are beyond the reach of common people as they function in a corporate-style. This does not allow a poor patient to enter into their system. Dr Shetty's *Narayana Health* offers a welcome-note to these poor and yet it is a sustainable and an effective business model. Till 2013, Narayana Health (NH) was known as Narayana Hrudayalaya.

Narayana Health or Narayana Hrudayalaya (NH) is now one of the largest private hospitals in India. It performs more heart surgeries per year than the leading hospitals in the U.S., with matching quality and effectiveness. Dr Shetty has developed a scalable, low-cost model, in which those who can pay are paying for themselves but the hospital is able to treat patients who otherwise cannot afford such healthcare. Majority of other Indian corporate-type modern hospitals just do a lip service to these poor. NH group currently has about 5900 operational beds. It is spread across 23 hospitals, 7 heart-centres and a network of primary care facilities across India. It provides advanced healthcare in over 30 specialities, including cardiology and cardia surgery, cancer care, neurology and neuro-surgery, orthopaedics, etc. On an average, 343 daily surgeries or procedures are done. It has an ambitious plan to expand in the coming seven to ten years so as to become the largest healthcare player in the country.

Strategy of NH to Drive Development and Growth

NH has developed a four pronged strategy for development and growth. It is as follows:

1. *All Healthcare Needs Under One Roof:* NH has branded itself as a recognized and proven centre of excellence in cardiac and renal sciences. Despite the fact that only six core specialities contribute to about 89 percent to group's revenues, NH is committed to provide entire healthcare system under one roof. Its main revenue generating specializations are: Cardiac and Renal Sciences, Oncology, Neuro Sciences, Gastro and Intestinal Sciences, and Orthopaedics.
2. *Adopting Technology, Improving Lives:* NH is always keen to adapt disruptive technology for having excellence in the profession. Through technologies like satellite-based communication systems and many others, it has focused on becoming a true Pan-India healthcare provider.
3. *Leverage upon Operational Synergies:* Providing affordable healthcare is a key to all the planning within the NH system. NH has focused on its supply chain to manage cost. Economy of scale has worked in favor of its profitability.
4. *Tailor-made Engagement Framework*: NH maintains a healthcare ecosystem that is very inclusive in nature. It also ensures optimal utilization of resources.

Strategy of NH to become Cost Effective

Dr Shetty dreams to make cardiac surgery affordable to the poor and the children by creating a chain of heart hospitals in every state of India. The root of this dream lies in an initial generous funding by his father-in-law, who put just one condition to Dr Shetty. No poor and children would be turned away for the lack of money in NH. Developing NH as one of the best equipped hospitals of world was not very difficult for Dr Shetty. He got the best collaborators. Indian Space Research Organisation (ISRO) provided satellite services to link small local hospitals in the country with NH so that immediate advises for a heart attack patient may be sought by local hospitals from NH. During operation of an infant, anaesthetics in the U.S. can support the surgeons in operation theatre of NH. Telemedicine is now possible for people located in remote places too. Biocon has supported NH in offering new drugs, which are considerably cheaper than conventional ones. The attrition of doctors is almost

NH is not like a typical government hospital which lacks doctors and equipment. It now symbolizes the best-in-class healthcare delivery system. Therefore, when the rich people come here, they pay the normal charges as NH provides the best care. On the other hand, NH does not turn away the poor for the lack of money. NH Business model has some similarity with that of Wal-Mart. It takes advantage of volume in its favor. It conducts an average of 150 surgeries every day and treats an average of around 80,000 outpatients every month. It is much higher than other Indian hospitals of similar size. Dr Shetty himself provides consultation to almost two patients per five minutes. But, all of them are well examined and diagnosed by an expert support team before they meet Dr Shetty. A large number of pathological tests per day per machine brings down per unit cost due to economy of scale. Some of the expensive machines are on rent from the suppliers so as to save the immediate capital expenditure. However, these suppliers earn regularly by supplying reagents, needed to run the same machine, on use basis. Again, high volume helps in bringing down the rental cost. Lean staff further helps in bringing down cost and reducing corruption.

The initial investment, or capital cost, in a healthcare industry is quite high. It is up to ₹ one crore per bed for a high-end hospital. On the other hand, a typical 200 bed NH hospital has been built at a cost of ₹350 million with pre-fabricated materials, which means only ₹17.5 lakh per bed. To save cost, many non-value added costs have been cut. For example, in place of centralized air-conditioning (AC) for the entire hospital, AC is used at critical places like operation theatres, Intensive Care Units (ICUs), and a few patient recovery rooms[1,2].

Many State governments have understood and supported Dr Shetty's dream for heart care for the poor and the needy. For example, Karnataka State Government supports India's largest Micro Health Insurance Programme called Yeshaswini at a monthly premium of ₹10, to over three million farmers.

Dr Shetty feels lucky to have treated Mother Teresa. As narrated in an interview, Dr Shetty recalls that one day, Mother, who at that point of time was recovering in the intensive care unit of the hospital, saw Dr Shetty examining a blue baby. She told Shetty, "Now I know why you are here. To relieve the agony of children with heart disease, God sent you to this world to fix it". Of course, this must have been the touching moment for this paediatric cardiac surgeon and perhaps the best compliment any professional has ever received for the purpose of his being in the profession. No wonder, he keeps a wall-hanging of Mother Teresa in his office with the following word written below: "*Hands which help are better than the lips that pray*". He says, "When you do your work without expecting anything in return, just for the joy of bringing happiness to others, that's when you'll realize it is not your hands, which do the job, it is the hands of God".

Questions

1. Discuss the need and approaches towards low-cost health delivery in India.
2. How can we implement lean system in services like healthcare?
3. Discuss critical success factors for NH in India. Can these be replicated in other services?

Process

- A set of logically related tasks or activities performed to achieve a defined business outcome.

Three type-

Primary Process: A Process that addresses the main value-added activities of a firm eg. Goods/ Services

Support Process: A Process that performs necessary, although not value-added activities. eg., transportation activities & Inventory dec**.**

Development Process: A Process that seeks to improve the performance of primary and support processes. Eg. Training, market research

Operations Management

Major Process Decisions

- Process Structure – Process design related to the kind of resources needed or volume levels and customization becomes competitive priority
- Customer involvement – participation level
- Resource flexibility – use of equipment for variety of products through multi skill functions
- Capital intensity – equipment/human skill mix

Make-to-Stock versus Make-to-Order

Make-to-order

- Only activated in response to an actual order
- Both work-in-process and finished goods inventory kept to a minimum
- Response time is slow

Make-to-stock

- Process activated to meet expected or forecast demand
- Customer orders are served from target stocking level

Hybrid

- Combines the features of both make-to-order and make-to-stock

Operations Management

Hybrid Processes

- Process with moderate levels of customer contact and standard product/service
- Work flow progresses from one workstation to another with some dominant paths apparent, hence complexity reduced to a large extent

Operations Management

Process Improvement

- Process re-engineering
- Cross functional / Integrated approach for process change keeping customer's service in view
- Information technology – primary enabler for process improvement, helping customer order fulfillment
- Detailed analysis and eliminating the unnecessary

Operations Management

Process Selection Strategy

- Gap between competitive priorities and capabilities.
- New product or service under offer
- Quality improvement imperative
- Large variation in demand
- Cost / availability of inputs changed
- New technologies / competitor strategies

Productivity & Efficiency

Productivity: A measure of Process performance; the ratio of outputs to inputs.

Productivity = Outputs/Inputs

Efficiency : A measure of process performance ; the ratio of actual outputs to standard outputs

Efficiency = Actual Outputs/Standard Outputs

Operations Management

Documenting the Process

- Process charts for following activities
  - ✓ Operations ○
  - ✓ Transportation ⇨
  - ✓ Inspection □
  - ✓ Delay / Storage ▽
- Process Analysis – Task, Flow and Storage

CASE: Analyzing Casino Money-Handling Processes

Retrieving money from a mechanical slot machine is referred to as the *drop process*. The drop process begins with a security officer and the slot drop team leader obtaining the slot cabinet keys from the casino cashier's cage. Getting the keys takes about 15 minutes. The slot drop team consists of employees from the hard count coin room, security, and accounting. The slot drop leader, under the observation of a security officer and a person from accounting, actually removes the drop bucket from the slot machine cabinet. When the drop bucket is pulled from the slot cabinet, a tag with the proper slot machine number is placed on top of the coins to identify where that bucket came from when the weigh process begins. Retrieving the drop bucket takes about 10 minutes per slot machine. Once a cart is filled with buckets from 20 different slot machines, the drop team leader and security and accounting people deliver the buckets to the hard count room. The buckets are securely locked in the hard count room to await the start of the hard count process. Delivering and securing the buckets takes about 30 minutes per cart.

The hard count process is performed at a designated time known to gaming regulatory authorities. The hard count team first tests the weigh scale, which takes 10 minutes. The scale determines the dollar value, by denomination, for set weights of 10 and 25 pounds. These results are compared to calibration results, calculated when the scale was last serviced, to determine if a significant variance exists. If one does exist, the hard count supervisor must contact the contractor responsible for maintaining the scale and the controller's office. If no significant variance is found, the weigh process can continue.

Following the scale check, each drop bucket is emptied into the weigh scale holding hopper. Using information from the identification tag, the specific slot machine number from which the bucket originated is entered into the weigh scale computer. The weigh scale computer is programmed to convert the weight of coins, by denomination, into specific dollar values, which are recorded in the weigh journal along with the slot machine number. This weighing and recording process takes seven minutes per bucket. Once the scale has weighed the contents of the drop bucket, the coins automatically drop onto a conveyor belt, which transports them to wrapping machines. As the coins are wrapped, the rolls of coins drop onto another conveyor belt, which takes them to a canning station. Twenty-five silver dollars are wrapped in each roll at a rate of 10 rolls per minute.

At the canning station, the coin rolls are placed in metal or plastic cans that hold specific dollar amounts based on coin denomination. The cans are stacked to facilitate counting the wrapped coins. Silver dollar cans hold $1,000, or 40 rolls, and take five minutes to fill and stack. When the weigh process is completed, the weigh scale computer runs a summary report totaling the weight by denomination. These totals are recorded on the weigh/wrap verification report, which takes five minutes to produce.

When the wrap portion of the count is completed and all of the rolled coins have been canned and stacked, they are manually counted by denomination. These totals are also recorded on the weigh/wrap verification report. The variance in both dollar amounts and percentages, for each denomination, is calculated. Variances that exceed 2 percent of the total or $1,000 (whichever is less) must be investigated by the hard count supervisor, who writes an explanatory report. If no significant variances exist, all members of the hard count team sign the weigh/wrap verification report. To complete the hard count process, the casino cashier's cage is then notified that the slot drop is ready to be transferred into cage accountability. Manually counting and verifying the counts take, on average, two minutes per can.

In a process separate from the hard count, a cage cashier performs an independent count and verification, by denomination, of the wrap. If everything balances, the main bank cashier signs the weigh/wrap verification report, accepting the slot drop into cage accountability. It is at this point that the actual slot gross gaming revenue is recognized.

Questions

1. Draw a diagram of the drop process. How long should it take to empty 300 silver dollar slot machines?
2. Draw a diagram of the hard count process. How long should this process take to complete for 300 silver dollar slot machines? Assume that each slot machine has an average of 750 silver dollars when it is emptied.
3. The casino is considering the purchase of a second coin-wrapping machine. What impact would this have on the hard count process? Is this the most desirable machine to purchase?
4. What would be the impact of purchasing "electronic" slot machines that do not use coins?

Thanks !