GRENOBLE ECOLE DE MANAGEMENT Graduate School of Business

Comment Form for Assessed Work

Section One *To be completed by the student* *Please tick as appropriate*

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MBA FT ☐ MIB ☐ Undergraduate ☐

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Assignment X Oral Presentation ☐ Exam ☐

Title Readings Summaries ....

I hereby declare that the attached assignment is my own work and understand that if I am suspected of plagiarism or other form of cheating; my work will be referred to the Disciplinary Committee which may result in my exclusion from the program.

Signature Joseph Lynn.. Date 09-03-09 ....

Section Two *To be completed by the Professor I lecturer*

Note below your comments on content, structure and presentation. Comments on specific points should be written on the assignment. Enter grade out of **20** on the bottom of this page. Please indicate whether this is a first or a second grading.

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Professor's name ....

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Process Design Strategy
An organisation's process design strategy impacts on its long term competitive objectives. Delivery of performance in competitive priorities needs end-to-end process and budget decisions. This impacts on the value proposition for the customer. These decisions relate to sources and types of inputs and the methods of transforming them into outputs. Decisions are required whenever there is a change or conflict in competitive priorities. Process decisions influence strategic fit, the value chain and process interfaces and address process structure, customer involvement, vertical integration, resource flexibility and capital intensity.
Process structure decisions are taken based on the type and intensity of customer contact. As customer contact increases, the process structure changes. In terms of physical presence, personal attention and methods of delivery front office processes allow high levels of customer contact, service variety and jumbled work flows tailored to each customer. Back office processes have low customer contact, little variety and standardised work flows, whilst hybrid offices are somewhere in between. Positioning on this and all other process decisions can be changed with competitive priorities.
Manufacturing process structure decisions are taken based on volume characteristics, which are linked to customisation. This relationship means that the greater the customisation, the lower the volume. Conversely, the greater the volume, the lower the complexity and divergence. At the extreme of low volume and high customisation is project process where resources are assembled for a highly customised one-of-a-kind project. The next level on the continuum is job shop, which offers a high degree of flexibility and complexity, whilst fairly low volumes. Batch processing addresses greater volumes of a narrower range of products which are repeatedly produced. Line processes are high volume, standardised products with minimal divergence and flexibility. At the far extreme of high volume products is continuous processing which runs 24 hours a day avoiding shutdown and start up costs.
Production and inventory strategies are essentially formed around the decision of whether to make-to-stock, assemble-to-order or make-to-order. Make-to-stock works best with competitive priorities of high volume, standardised products in a stable, predictable and easily forecast environment. Assemble-to-order is selected when the competitive priorities are variety and fast delivery times from few assemblies and components. Make-to-order strategies are chosen for low volume, flexible and divergent products.
Customer involvement forms another key process decision. Greater customer involvement can add complexity and divergence, adds challenges to timing and volume, and impacts quality. However, customer value can be increased through improved competitive capabilities, greater customisation and variety, and reduced costs through self-service. These trends are ever clearer as the Internet provides new ways and tools for collaborative working.
Vertical Integration, or the "make or buy" decision, can impact on long term competitive advantage. Greater vertical integration can lead to savings, better quality and more timely delivery where the skills are owned in-house, but in low volume, non-core competencies, outsourcing can represent increased returns on investment, though decisions must remain in alignment with strategic fit. A similar development is competitors forming virtual corporations through collaborative IT tools for a single project, able to adapt flexibly to demand changes.
Resource flexibility is another key process decision. It affects workforce and equipment. A more flexible workforce can perform a greater variety of tasks, but must be better trained, so cost more. Availability of part time or time employees can also help address demand fluctuations. Flexible, general purpose equipment is good for low volume, high variety equipment, whilst higher volumes justify increased special purpose machinery fixed costs, with the break-even quantity where the total costs for general purpose or specialised equipment is the same.
Capital intensity is the mix of equipment and human skills within the process. Manufacturing processes often involve labour-saving capital equipment to improve productivity and consistency, but this incurs high initial investment costs, so is only effective for high volumes. Automation is either fixed or flexible automation. Fixed automation is where one part is produced in a fixed sequence with little flexibility, whilst flexible automation is programmable, and can handle various products. Service process automation can also be achieved through capital inputs to reduce labour costs. Understanding of customer requirements and high volumes are necessary to effectively automate service processes. Through economies of scope, automation allows producing greater variety more cheaply than separately, bringing conflicting competitive priorities into greater alignment.
The five core process decisions should always be taken with consideration of **strategic fit**. Decision patterns for service process structure are taken based on customer contact, whilst decision patterns for manufacturing are based on volume. As contact or volume increases, it influences choices for the five core process decisions.
Job design is influenced by each of the core process choices. With high specialisation, since only a narrow range of tasks can be performed, training times are reduced, work pace is faster and wages are lower. However, it leads to poor morale, high turnover, quality issues, less flexibility and higher managerial attention. High specialisation is generally chosen for competitive priorities of low cost and consistent quality, whilst low specialisation offers customisation, top quality and volume flexibility. Other options are job enlargement, by increasing the range of tasks at the same level; job rotation, by exchanging jobs periodically to increase skills and flexibility and job enrichment by empowering employees and vertically expanding duties. Through plants within plants, focused service operations or focused factories it is ensured that sufficient focus is given to each process.
As strategies **change**, processes must also be open to change. Process reengineering is a radical redesign approach to create dramatic performance improvements. It is a core process, requiring strong leadership, a clean-slate philosophy and process analysis, but has been somewhat discredited. A preferred option is the systematic, continuous, iterative process improvements through understanding the process and gradual improvements. Companies must understand that their process design is central to successful implementation of their strategy.

Process Analysis

Process analysis offers a systematic approach to understanding a process and identifying opportunities for improvement. The tool kit incorporates supporting techniques of flow charts, service blueprints and process charts, alongside data analysis tools of checklists, bar charts, Pareto charts, cause-and-effect diagrams and simulations.

Through using a **systematic approach** to analyse processes, firms can gain competitive advantage by improving their processes. By understanding the business in detail, firms can achieve long term success. In recent years, innovations in operations management have developed in lean, ERP, six sigma and TQM. Organisations can utilise an integrated process for continually improving processes, through aiming to become a learning environment.

Process analysis occurs through a six step process. The first is identifying opportunities, with focus on supplier relationships, new service/product development, order fulfilment and customer relationship, addressing questions of competitive priorities and strategic fit. Next is defining scope, to establish boundaries for analysis and matching resources to meet that need. Next is to document and display the process diagrammatically. Then SMART targets are set for performance analysis. The penultimate stage is to redesign the process to address performance gaps, through creating a list of potential improvements and including those where benefits are greater than costs in new process design. Finally the new process is implemented. This is achieved through participation, special expertise, jobs and training, project management and steering committees and top down support for the enhancement.

Process documentation is achieved through flowcharts, service blueprints and process charts. **Flowcharts** display the flow of inputs through the steps of the process. Whilst they have no set format, generally they are formed of rectangles, lines and arrows, with shapes denoting different steps. Divergence is communicated through an arrow splitting into parallel arrows. Different flow charts can be created for different levels in the organisation, with high level diagrams displaying strategic linkages and core processes, whilst more detailed views can be generated for departmental analysis. Diamond shapes represent decisions or outcomes of inspections, and rows represent hand-offs between departments. Importantly, though most work flows across traditional departmental boundaries, hand-offs put cross-functional coordination at the greatest risk due to silo mentalities. **Service blueprints** are a specific type of flow chart which highlights steps with high customer contact. **Process charts** drill down to job level for individuals, teams or nested processes. They offer deeper analysis of steps performed within the process, offering an organised way of documenting all activities performed. They are generally organised into the categories of operation, transportation, inspection, delay and shortage, though other categories can be used. Of these categories, only operation actually adds value to the customer. Analysts identify steps performed throughout the process and estimate cost. Other processes are benchmarked against this cost. Performance measures other than time and distance travelled, such as error rates can also be useful in creating benchmarks.

Evaluating performance is the activity of gathering metrics and information about current performance to complete process documentation. Several data analysis tools which can be used to display the information held within a particular metric. These tools include checklists, histograms and bar charts, Pareto charts, scatter diagrams and cause-and-effect diagrams. **Checklists** collect frequency of performance-related characteristics. **Histograms and bar charts** represent a compiled view of checklist information offering a quick view of the data. **Pareto charts** are based around the theory that 80 of an activity is caused by 20% of the factors. A Pareto chart identifies those factors which have the most impact, by plotting bars in decreasing frequency, with the left axis showing frequency, and the right showing cumulative percentage frequency. By plotting those factors which have the biggest impact on the problem, analysts can make the most efficient use of their time. **Scatter diagrams** allow an analyst to plot two variables and verify whether they are related, which can provide valuable information about the interrelations of factors. **Cause-and-effect diagrams** are a tool for linking metrics to inputs, method and processes. By using an Ishikawa fishbone diagram, design problems can be identified by identifying the major categories of potential causes for the problem, and then brainstorming to identify the causes. **Simulations** model the behaviour of processes over time through using software applications, such as SIMQUICK and Extend, to describe the process. Simulations allow analysts to make changes and see how the metrics are impacted.

Redesigning the process is the next step once a process has been analysed. With the information that describes the current state of the process, the performance metrics and disconnects in the flow, analysts can remodel the process. It is important to adopt a questioning attitude, to ask what, when, who, where and how is the process being done. Through these answers, they are then challenged on the basis of why, where and when it is being done, which inspires creativity. Often these sessions take place as brainstorming sessions with a facilitator recording rapid-fire ideas on a flip chart, avoiding evaluating the ideas until after the session. The next phase is the "get real" component, where the changes with the best payoffs are evaluated. These changes could involve capacity, layout, technology or location. The sessions help visualise the future design with a proof of concept analysis. Since many changes involve investment, the payoffs must be analysed alongside risks, costs and time.

Benchmarking can also be another useful source for process redesign. It provides a systematic procedure for comparing processes, services and products against market leaders. Through this information, companies gain understanding of competitors' methodologies, in order to target their own. Benchmarking statistics include cost per unit, breakdowns per customer, revenue per unit and customer satisfaction. Benchmarking involves 4 steps, planning of process and collecting metrics, analysis of gap, integration of goals and action. Competitive benchmarking is an industry comparison, functional compares with departments of outstanding firms in any industry, and internal compares units. They are best applied through continuous improvement.

Managing processes is central to running an efficient business. When analysing processes, managers must align with strategy, involve the right people, provide a mandate for change to design teams and be satisfied with incremental change. These guidelines will ensure processes are managed effectively.

Supply-Chain Design

Supply-chains (SC) coordinate key processes of customer relationship, order fulfilment and supplier relationship. They are interconnections between input suppliers and customers of firm's outputs. **SC management** (SCM) designs key processes in alignment with those of suppliers and customers to match flows with demand.

Service providers offer a **service package** in the form of supporting facilities, including retail stores, computers and employees, facilitating goods, including items required for order fulfilment, explicit services and implicit services. The SC supports the service package since suppliers are central in meeting competitive priorities in terms of delivery speed, on-time delivery, quality and customisation. Thus, improved SC can enhance competitiveness. **Manufacturers** control their inventory through managing their SC. Typically, they spend more than 60% of their revenue on services and materials, so cost control through SCM is a competitive weapon. Each "Tier 1" supplier has their own suppliers at Tier 2, so a SCM can be highly complex, linking thousands of companies. Firms can gain control through backward integration or holding Tier 1 suppliers accountable for performance of Tier 2 suppliers.

SC dynamics occur when downstream customer's demand fluctuations impact upstream suppliers. Due to the "bullwhip effect", order quantities become increasingly variable further up the chain. Dynamics occur due to **external causes**, such as volume and product mix changes, late deliveries and underfilled shipments, and **internal causes**, such as shortages, engineering changes, promotions and information errors, impairing SC performance.

Developing integrated SC coordinates purchasing, production and distribution. It involves phases from all key actors behaving independently, through creation of an internal SC by sharing information, to extending the internal SC to suppliers and customers, working in a more cooperative fashion so that everyone benefits.

The **customer relationship process** is central to SCM, and involves decisions about the marketing process and the order placement process. The Internet has allowed considerable reengineering of the order placement process offering cost reductions, improved revenue flows, global access and pricing flexibility. The core **order fulfilment process** involves the activities which deliver the product or service to the customer. It can be driven by any of the competitive priorities of cost, time, quality or flexibility. One component of the order fulfilment process is **Virtual SC (VSC)** which is enabled through the internet. The SC is redesigned to outsource some of the order fulfilment process through the web, but they are managed as if in-house. Benefits of VSC include reduced investment in inventories, greater variety, lower costs due to economies of scale and lower transportation costs. The costs of VSC include lack of information flows affecting delivery of service, vulnerability to the outsourcing partner, and increased transparency meaning the partner could go direct. The traditional approach is preferable when volumes are high, and when order consolidation and supplier's small-order fulfilment capability are important. VSC approach is preferable when demands are volatile and high variety is important. Firms must balance the tradeoffs between relinquishing control of order fulfilment with the benefit of increased flexibility. Another fundamental decision in the order fulfilment process is **Inventory Placement**. The continuum of decisions extends from Inventory Pooling, with all inventories at the plant and direct shipping, through forward placement, where distribution centres hold stock closer to customers to placing vendor managed inventories (VMI) at the customer, monitored and replenished by the supplier. There is a balance between reduced inventory and transportation costs and increased lead time.

The **supplier relationship process** involves the design collaboration, sourcing and buying processes. Each of these processes can contribute to cost reduction and improved delivery and quality. The process of selecting suppliers should be made based on competitive priorities, and are often decided on price, quality and delivery, alongside environmental impact. Some firms use a supplier certification program to evaluate, monitor and approve suppliers. Firms that take a **competitive orientation** towards their **supplier relations** consider that negotiations are a zero sum game, aiming for lower prices and determining purchasing power on volume share, whilst those taking a **cooperative orientation** strive for partnership, long term commitment, and support in design of products through sharing purchasing information which enables better forecasting and reducing costs for supplier in a win-win situation. Supplier relations should be determined by the needs of competitive priorities. Another decision is whether to **buy centrally or locally**, since centralisation allows greater buying power and economies of scale, but on the local level, it can mean loss of control, regional expertise and slower delivery times. Firms should work to compromise between local autonomy and centralised buying. A final supplier relationship decision is **value analysis**. This is a systematic effort to reduce cost or improve performance by asking what the function of the product or service is, and if it can be improved, standardised or the cost reduced. It is part of a continual effort to improve SC performance, and is linked with early supplier involvement – bringing suppliers into the design phase.

There are several ways to measure SC performance, based on inventory measures, process measures and financial measures. **Inventory measures** include **average aggregate inventory value** (AAIV), which is the total value of all items held in inventory, **weeks of supply**, which is AAIV divided by weekly sales at cost and **inventory turnover**, which is annual sales at cost divided by AAIV and should be benchmarked against industry leaders. **Process measures** involve measuring performance on customer relationship, order fulfilment and supplier relationship metrics and are linked with statistical analysis to assess statistically significant changes. **Financial measures** including ROI, working capital, cost of goods sold, total revenue, and cash flow relate to SCM through inventory investments, reduced costs, customer satisfaction, and improved cash-to-cash ordering processes.

SCM is linked to **operations strategy** through the choice of whether to have efficient or responsive SC. Efficient SC minimise inventories and maximise efficiency in predictable demand, low cost scenarios using make-to-stock standardised high volume services. Responsive SC position inventories to hedge against demand uncertainties in unpredictable demand, fast delivery time and volume flexibility scenarios. Poor SC design limits SC performance.

SC software shares information between suppliers and customers, improving decision making capabilities.

SC design is pervasive throughout the organisation. It is central to achieving appropriate competitive priorities.

Lean Systems

Lean is a management system which involves the entire organisation in designing efficient processes. Just In Time (JIT) is a popular form of lean which eliminates waste through removing non-value-added activities and reducing excess inventory through continuous improvement of processes and quality. Employee involvement is essential.

Lean has several key characteristics. One of these is **pull work flow**. Traditional push techniques produce in advance of orders based on forecast demand, whilst pull is triggered by customer demand meaning the order must be fulfilled quickly. The decision to use push or pull is often based on situation. Where there are long lead times and accurate forecasts push is effective, whilst highly repetitive, high volume work can often use pull. Another lean characteristic is **consistent quality**, achieved through eliminating process errors and rework for uniform quality of work. Tools utilised to ensure quality include Total Quality Management and six sigma, incorporating employees into the quality process through empowering them to make quality decisions. Lean emphasises **small lot sizes**, reducing average inventory levels, reducing defective rework costs, consuming less workstation capacity and levelling workloads, but changeover frequency increases. Setup times must be reduced to benefit from small lots. Another characteristic is **uniform workstation loads**, where efficiencies are achieved through managing the load on resources. Capacity planning and load balancing help develop the master planning schedule. The planning schedule can be built around daily demand for models, demand ratio, or in single lots for capacity smoothing. Lean also utilises standardised components and work methods to realise efficiencies through part commonality to increase repeatability, leading to greater productivity from workers learning more efficient ways of working and reduced costs through lower inventories and economies of scale. Since lean systems have low levels of slack, **close supplier ties** are necessary. Stock shipments must be frequent, on time, high quality with low lead times. Purchasing managers focus on reducing numbers of suppliers, using local suppliers and improving supplier relations. Suppliers are compensated for increased pressure by offering advanced order information, synchronised inventory flows and early involvement within product design. Lean tends to source from local suppliers due to the reduced need for safety stocks and shorter lead times. Cooperative orientation with suppliers is essential as lean allows improved efficiencies and reduced inventories throughout the supply chain. Lean requires a **flexible workforce** trained to do more than one task, in order to shift workers around to reduce bottlenecks as they arise. Lean tends to use **line flows** when volumes are large enough, organising the resources to eliminate setup times. Where the volumes are too low, technology groupings are made to produce related component families on the same line so changeovers are shorter than moving between products. Lean utilises **automation** as a key to low-cost operations. Inventory reductions and efficiencies can reduce cost, and lead to greater profits or market share. Lean also relies on **preventative maintenance**. Since there is so little slack, unplanned downtime is costly, therefore it is necessary to make workers responsible for routine maintenance of their machines, balancing the costs of maintenance against the risk and cost of failure.

Lean systems focus on **continuous improvement** in quality and productivity, what the Japanese call Kaizen. Kaizen is an understanding that excess capacity and inventory hides underlying process issues. Lean systems systematically reduce inventories and capacities until problems are exposed, identified, analysed and addressed. Periodically stressing the system to identify problems is central to lean systems.

Kanban is a “visible record” attached to containers of items used to control flow. When the container is emptied, the card is put on a receiving post and the empty container is taken to the storage area. The card signals demand for another container of the part. When it is refilled, the card is returned to the container and moved back to the storage area, starting the cycle again. For kanban to work, each container must have a card, can never be removed without a kanban being posted and must always have the same number of parts. Assembly lines should never push parts, only non-defective parts should pass down the line and total production should not exceed the amount authorised by the kanban system. Determining the **number of containers** required for the process is significant, because it controls the authorised inventory. Management needs to consider how many units should be held per container, which is determined by lot size based on cost of setup compared to cost of holding inventory, and how many containers to have in the system, which is determined by the average lead time to produce a container of parts. Kanban allows fine-tuning of materials flows by reducing the inventory by removing cards, reducing the number of containers and reducing safety stock. As well as signalling with cards, kanbans can use empty containers, or an empty square in a **containerless system** as a sign that they should be filled.

Another development in lean is **JIT II**, where an in-plant supplier representative is always onsite as an active member at the supplier’s expense. The representative is empowered to replenish stocks, issue purchase orders, and work on design ideas, replacing the buyer, salesperson and materials planner. Customers benefit from reduced admin cost, cheaper materials and early supplier involvement, whilst suppliers benefit from eliminated sales effort, increased volume of business, renewable contracts with no end and admin efficiencies.

Lean systems offer **operational benefits** in terms of reduced space requirements, inventory investment, lead times and paperwork and increased productivity, equipment utilisation, quality and workforce participation. They drive setup times very low and remove non-value-adding processes and deliver greater simplicity in the organisation.

There can be **implementation issues** in moving to lean. These include human costs in lost autonomy due to the little slack, potential cooperation and trust issues between management and staff, and the need to realign reward systems and labour classifications with new objectives. It may also be necessary to change the plant layout and alter product flows. Alongside that, lean requires stable schedules for balanced production lines, reduced setup times and are particularly vulnerable to new products, and require reliable, regular shipments.

Implementing lean requires defining the value of services, eliminating unnecessary, wasteful components, removing barriers to flow of value and allowing customers to pull value through the system.