***Supply Chain Management – Integration***

🡨 Flow of Information 🡨

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Supplier | 🡪 | Manufacturer | 🡪 | Distributor | 🡪 | Retailer | 🡪 | Customer |

🡪 Flow of Material 🡪

Chapters out of Simchi-Levi Text.

|  |  |
| --- | --- |
| **PUSH-PULL Strategies** | **Product Development Strategies** |
| Chapter 6 | Chapter 11 |
| *Integrating Push-Pull strategies with supply chain design.* | *Integrating product design with supply chain strategy.* |
| \*PUSH-PULL Boundary  \*Characteristics  \*Relationships  \*Indication | \*Supply Chain Design  \*Development Chain Design  \*Design for Logistics  \*Design for Production |

***PUSH-PULL Strategies***

***Chapter 6***

|  |  |  |
| --- | --- | --- |
|  | ***Push-Pull Boundary*** |  |
| ***Supply chain planning*** | ***🡨 Buffer Inventory 🡪*** | ***Order fulfillment*** |

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| PULL system. Dependent on actual (realized) demand. Dependent on system status.  PUSH system. Dependent on forecasted demand. Not dependent on system status.  PUSH–PULL Boundary. Position in the supply chain where PUSH and PULL characteristics meet. |
| Factors in implementing a system strategy include demand uncertainty, economies of scale, lead time, complexity of the supply chain structure, and the focus of the enterprise. |

***Characteristics of PUSH and PULL strategies.***

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| --- | --- | --- |
| *PUSH Strategy* | *Factors* | *PULL Strategy* |
| Low demand uncertainty  (forecasted demand) | Demand Uncertainty | High demand uncertainty  (realized demand) |
| Long lead times | Lead Time | Short lead times |
| High dependence | Economies of Scale | Low dependence |
| Complex | Supply Chain Structure | Simple |
| Cost  (advanced planning) | Focus | Service  (order fulfillment) |
| Efficient & lean systems | Systems | Flexible & responsive systems |

***Relationships of PUSH and PULL strategies.***

|  |  |  |  |  |  |  |
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|  |  |  | | |  |  |
|  | *Demand Uncertainty* | High | PULL | Pull  A | Inventory  Positioning  D |  |
|  | Low | PUSH | Continuous  Replenishment  C | Push  B |  |
|  |  |  |  | PULL | PUSH |  |
|  |  |  |  |  |  |  |
|  |  |  |  | Short | Long |  |
|  |  |  |  | *Lead Time* | |  |
|  |  |  |  |  | |  |
|  |  |  |  | Low | High |  |
|  |  |  |  | *Economies of Scale* | |  |
|  |  |  |  |  |  |  |

Examples

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| A: PC  B: Grocery items with long lead times (canned goods)  C: Grocery items with short lead times (perishable goods)  D: Furniture, automobiles |

***Indication for PUSH–PULL strategy.***

|  |  |  |
| --- | --- | --- |
| PUSH |  | PULL |
| Low demand uncertainty  🡪 forecasted demand |  |  |
|  | Upstream PUSH🡨🡪PULL Downstream  ( Continuous Replenishment )  (EDI with POS) |  |
|  |  | Short lead times |

***Indication for PULL–PUSH strategy.***

***(Separable, Nested, Integrated, Strategies)***

|  |  |  |
| --- | --- | --- |
| PULL |  | PUSH |
|  |  | Long lead times |
|  | Upstream PULL🡨🡪PUSH Downstream  ( Inventory Positioning )  🡨Upstream Production Strategy (PULL)  (PUSH) Downstream Distribution Strategy🡪  (Strategic safety stock) |  |
| High demand uncertainty  🡪 realized demand |  |  |

***Indication for PUSH–PULL boundary***

|  |  |  |
| --- | --- | --- |
| PUSH | Boundary | PULL |
|  |  |  |
| Supply chain planning 🡨 | Buffer Inventory | 🡪 Order fulfillment |
|  | *Integration using* |  |
|  | Forecasted Demand |  |

***Summary***

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| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  | **Characteristics** | **PUSH** | **PULL** |  |
|  | Objective | Minimize Cost | Maximize Service Level |  |
|  | Supply Chain Complexity | High Complexity | Low Complexity |  |
|  | Focus | Resource Allocation  &  Supply Chain Planning | Responsiveness  &  Order Fulfillment |  |
|  | Lead Time | Long | Short |  |
|  | Demand | Low Demand Uncertainty | High Demand Uncertainty |  |
|  |  |  |  |  |

***Product Development Strategies***

***Chapter 11***

|  |  |  |
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| **Design** |  | **Example** |
| Design Supply Chain  Design Development Chain  Design for Logistics  Design for Production | 🡪  🡪  🡪  🡪 | PUSH-PULL  Product Structure  Inventory & Transportation  Mass Customization |

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|  |  |  |  |
|  | **Design Supply Chain**  >Demand uncertainty  >Economies of scale  >Lead time | **Design for Logistics**  >Packaging  >Parallel processing  >Standardization |  |
|  | **Design Development Chain**  >Technology clockspeed  >Outsourcing decisions  >Modular & Integral products | **Design for Production**  >Mass Customization |  |
|  |  |  |  |

**Supply Chain**. Push vs. Pull

|  |  |
| --- | --- |
| Demand uncertainty:  Economies of scale:  Lead time: | High uncertainty (PULL) vs. Low uncertainty (PUSH)  Low dependence (PULL) vs. High dependence (PUSH)  Short lead times (PULL) vs. Long lead times (PUSH) |

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| **Supply Chain Design & Development Chain Design** | | | | | |
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|  |  |  | ***Supply Chain Design*** | |  |
|  |  | | Low Demand Uncertainty | High Demand Uncertainty |  |
|  | ***Development Chain Design*** | | PUSH | PULL |  |
|  | Fast Clockspeed | Modular Product | 3. PUSH | 2. PULL |  |
|  | Slow Clockspeed | Integral Product | 1. PUSH | 4. PUSH-PULL |  |
|  |  |  |  |  |  |
| Examples:  1. PUSH: Diapers, soup, and pasta  2. PULL: PC, printers, and cell phones  3. PULL: Cell phone engine  4. PUSH-PULL: High-end furniture, chemical products, commodities, and specialty items  . . . | | | | | |

***Design for Logistics (DFL) – Inventory, Transportation***

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| --- |
| Packaging.  >Design dimensions to reduce space.  >Design product for delayed packaging to support cross-docking. |
| Parallel processing.  >Translate series functions to parallel functions.  >Decouple processes to support parallel functions. |
| Standardization.  >Aggregate demand to support risk pooling and economies of scale.  >Create modularity. Create a modular product and/or modular process. |

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| ***Standardization*** | Process NOT Modular |  |  | Modular Process |
| Modular Product | Part Standardization | 1 | 2 | Process Standardization |
| Product NOT Modular | Product Standardization | 3 | 4 | Procurement Standardization |

|  |
| --- |
| 1. Part Standardization.  >Commonality |
| 2. Process Standardization.  >Postponement or Delayed Product Differentiation.  >Process re-sequencing to support postponement.  >Modularity of products through re-sequencing of processes to support postponement. |
| 3. Product Standardization.  >Downward substitution.  >Super product design. |
| 4. Procurement Standardization.  >Equipment procurement to meet multiple internal process needs. |

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| Where would PUSH-PULL boundary occur?  What are Drivers for location?  How does Outsourcing correspond to DFL? |

**Extend production system design to “Mass Customization”**

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|  | Craft production |  |  |  |  |  | Increased  Variety and Service |  |
|  |  |  |  |  |  |  |
|  |  |  |  | Mass customization |  |  |  |  |
|  | Mass production |  |  |  |  | Decreased  Cost and Time to market |  |
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|  |  |  |  |  |  |  |  |  |

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| Where would these attributes be most effective in supporting mass customization?  *Instantaneousness – Costless – Seamless – Frictionless* |