CHAPTER 5: PRODUCTION ORDERS

By the end of this chapter you should be able to:

- Understand the structure and make-up of a production order
- Understand the purpose of a production order
- Define the five statuses of a production order
- Create a new production order
- View the routing and components of a production order
- Reserve components for a production order
- View actual against expected costs, and capacity of a production order
- Make changes to the production order due date
- Make changes to the production order quantity required
- Make changes to the production order components required
- Use item substitution for components
- Make changes to the production order routing
- Understand the reports printed directly from a production order
- Access the Production Schedule from a production order
- Understand the standard reports available for production order reporting
- Understand the purpose of the Replan Production Order batch job
- Understand how the Replan Production Order batch job operates
- Understand the effects of scheduling a production order with a phantom BOM
- Calculate a manufacturing batch unit of measure
- Understand the two methods of changing the status of a production order
Production Order Definition

By the end of this section you should be able to:

- Understand the structure and make-up of a production order
- Understand the purpose of a production order

Microsoft® Business Solutions–Navision® uses tables to generate production orders and they include:

- Production bills of material
- Items
- Machine centers
- Work centers
- Routings

Production orders are used to manage the conversion of purchased materials into manufactured items. Production orders (job or work orders) route work through various facilities (work or machine centers) on the shop floor.

Production orders are the central components of the Microsoft Navision’s manufacturing functionality and they contain the following information:

- Products planned for manufacturing
- Materials required for the planned production orders
- Products that have just been manufactured
- Materials that have already been selected
- Products that have been manufactured in the past
- Materials that were used in previous manufacturing

Production orders are the starting points for:

- Planning future manufacturing
- Controlling current manufacturing
- Tracking of finished manufacturing
Production Order Status

By the end of this section you should be able to define all five statuses of a production order.

The production orders are displayed in different windows according to their status. You cannot change the status of a production order manually. Click the Functions button on the Production order and then Change Status to change the status.

A production order can have the status:

- Simulated
- Planned
- Firm Planned
- Released
- Finished

Simulated Production Order – SPO

The Simulated Production Order (SPO) is the only production order located in the Planning folder of the Microsoft Navision Manufacturing menu and is unique based on the following characteristics:

- As its name implies, it is not real and the main purpose is for quoting and costing – such as when the Research and Development department wants to get a cost estimate on a proposed item. An SPO serves as an example of a production order.
- It does not influence the planning of orders. Planning (MPS and MRP, discussed in other chapters) neither considers nor is affected by simulated production orders. Also, a simulated production order cannot be used as a template because it disappears when you change its status.

Planned Production Order – PPO

The Planned Production Order (PPO) is located in the Execution folder of the Microsoft Navision Manufacturing menu and is unique because of the following characteristics:

- PPOs are like released production orders and provide input to capacity requirements planning by showing the total capacity requirements by work center or machine center.
• A PPO represents the best estimate of the future work center or machine center load based on available information. Typically, they are generated from planning, but can also be created manually. Because they are erased during subsequent planning generations, manual creation is not practical.

• Their generation in planning results in a suggested "planned order release" that includes quantity, release date, and due date. The planning system logic is based on the replenishment system, reorder policies, and order modifiers that it encounters in the net requirements planning process.

• To view their impact in Microsoft Navision, look at the load for each work center or machine center on the planned production order's routing.

Firm Planned Production Order – FPPO

The Firm Planned Production Order (FPPO) is located in the Execution folder of the Microsoft Navision Manufacturing menu and is unique by the following characteristics:

• Planning cannot change a FPPO but you can make changes manually to the production order. You can automatically create a FPPO from a sales order.

• A FPPO acts as a placeholder in the planning schedule for some future job released to the floor.

• A FPPO can be generated from planning or created manually or from sales orders. They are not erased during subsequent planning.

• Their generation in planning results in a suggested "planned order release" that includes: quantity, release date, and due date. The planning system logic is based on the replenishment system, reorder policies, and order modifiers that it encounters in the net requirements planning process.
• To view their impact in Microsoft Navision, look at the load for each work center or machine center on the firm planned production order's routing. (From a work or machine center, go to WORK CENTER/MACH CTRL BUTTON→LOAD. More information on this is available in the Capacities chapter.)

Released Production Order – RPO

The Released Production Order (RPO) is located in the Execution folder of the Microsoft Navision Manufacturing menu and is unique by the following characteristics:

• When a production order has been released, it does not necessarily mean that materials have been picked or the job has physically moved to its first operation.

• In a MTO (Make-to-Order) environment, it is not unusual to create a released production order immediately after the entry of the sales order.

• Actual material consumption and product output can be recorded manually with an RPO. In addition, automatic flushing of consumption and product output only occurs for RPOs.
NOTE: Consumption (automatic flushing) and output is covered in greater detail in later chapters of this manual.

Finished Production Order – FPO
The Finished Production Order (FPO) is located in the History folder of the Microsoft Navision Manufacturing menu and is unique by the following characteristics:

- A FPO is an order that, for some reason, has been terminated. Usually, the order has been manufactured.
- FPOs are used for statistical reporting and to maintain the ability to track back to other orders (sales, production, and purchase, for example). The ability to track back to a finished production order allows you to review the detailed history.
- FPOs can never be changed.

NOTE: Finished Production Orders cannot be posted to or deleted.

NOTE: The status of a production order is changed to Finished to maintain historical information and to complete accounting and/or automatic flushing entries. This is discussed in more detail in a later chapter.

Manual Production Orders

New Order Entry
By the end of this section you should be able to:

- Create a new Production Order
- View the Routing and Components of a Production Order
To illustrate production orders, perform the following steps to enter a firm planned production order.

1. MANUFACTURING→EXECUTION→FIRM PLANNED PROD. ORDERS
2. Press F3 to create a new order.
3. Create a new production order number.
4. Enter Source Type = Item.

**Source Types**

Note that the Source Type for this order is Item. Three Source Types are available for a production order:

- **Item** - An item production order is wanted when one production order for each individual line of a sales order is appropriate.
- **Family** - A Family production order is needed when a group of items always need to be manufactured together. This type is discussed in more detail in a later chapter.
- **Sales header** - A sales header production order is appropriate when you want to produce all items of a sales order from one production order. This is useful in a large project environment where there is a relatively long manufacturing lead-time.

**NOTE:** The Source Type is discussed in more detail in a later chapter.

**NOTE:** Notice that the inventory and product posting groups default from the item card. This information is used for general ledger postings. If needed, department, project, and location codes may be entered.

- Click the **Posting** tab.
- Enter Global Dimension values if necessary.
- Click the **Functions** button and select **Refresh**.
  The Refresh function simultaneously plans and schedules the production order allowing both the needed components and the detailed routing to be scheduled at the same time. This feature is referred to as simultaneous planning.
Click the **Options** tab of the Refresh Production Order window.

Select Scheduling Direction = *Back*

*Backward scheduling begins from the ending date and proceeds backward to the required starting date.*

*Forward scheduling begins at the starting date and proceeds forward to the finishing date.*

Place a check mark in the **Lines**, **Routings**, and **Component Need** fields. This recalculates the production order lines and copies the routing steps and components from the Routing and Production BOM.

**Calculate** – you can also determine whether to calculate the routings and components for each line. Remember that you can have more than one line on a production order.

- When you run the Refresh function, existing detail lines are erased and new lines are created based on the standard production BOM and routing for each item.

- To reschedule, you may need to refresh the production order, but you may not want the program to erase the lines. This is because you would lose any changes you entered on the line (Production BOM) or you might lose order tracking information (components reserved). In this case, you would uncheck the **Lines** field.

Click **OK**.

Click on the **Schedule** tab.

**NOTE:** The program automatically schedules the order to be completed one day before the due date.
• Starting and ending dates and times have been calculated based on the standard routing.
• The lot number assigned is based on the planning lot number series entered in the Manufacturing Setup window. We review how this number can be used when we discuss changes to production orders.

**View Production Order Routing**

To view the detailed routing for this order:

- From the Production order, click the **Line** button, then select **Routing**.
  - The starting and ending dates and times for each operation are based on scheduling back from the end day prior to the production order due date.
  - Using each machine (work) center calendar, the program calculates the schedule using the setup, run, wait and move times for each operation. While queue time is not included in the determination of the starting or ending dates and times for an operation, it is calculated as the time between the end of one operation and the start of the next.

![View Production Order Routing](image)

**View Production Order Components**

To view the list of production order components:

- Click the **Line** button, then select **Components**.

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**NOTE:** The due date for each component is based on the lead-time calculation for purchased items and the routing for production items, along with any routing link code. If there are no routings, then it is based on lead-time calculation only.

**Routing Link Codes**

Routing link codes can be set up to link a component defined on an item’s BOM to an operation on an item’s routing. You can specify at which operation in a routing the material is used.
Routing link codes allow for greater just-in-time functionality because it gives you the flexibility to flush the material at a specific operational step rather than all at the beginning or all at the end of the production order.

Remember that using the JIT functionality facilitates reduced inventories, which results in a lower cash requirement or higher working capital.

### Inventory Reservation

By the end of this section you should be able to reserve components for a production order.

It may be necessary to reserve components for a production order. This can be done manually for a specific production order, or you can set it up to occur automatically. For detailed information inventory reservations, please refer to the Microsoft Navision Inventory Management manual.

To reserve a component for a production order:

- From the Prod. Order Component window select an item.
- Click the **Functions** button and then select **Reserve**.
- Select a line, for example Summary Type = *Item Ledger Entry*, in the Reservation window.
- Click the **Functions** button and then select **Reserve from Current Line**.
The Total Reserved Quantity is updated.

![Image of Production Order Statistics]

The reservation can be viewed by selecting the Order Tracking selection from the Function menu button.

**Production Order Statistics**

**View Production Order Statistics**

By the end of this section you should be able to view actual against expected costs, and capacity of a production order.

In addition to the detailed routing and components, you can view actual against expected costs, and capacity, by selecting Statistics from the Production Order Function menu button.
The fields in the **Statistics** window include:

<table>
<thead>
<tr>
<th>Field</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material Cost</strong></td>
<td>This field shows the material costs of all lines in the production order. These include: Standard cost of materials based on a standard production BOM. Expected cost of materials based on any changes made to material components for this production order. Actual cost of materials based on recording consumption for the production order. Production order variance, calculated as follows: Actual cost – standard cost = variance Dev % (deviation percentage), calculated as follows: Variance/standard cost = deviation %</td>
</tr>
<tr>
<td><strong>Capacity Cost</strong></td>
<td>This field shows the capacity cost amount of all lines in the production order. This includes the standard capacity costs (based on a standard routing), expected capacity costs (based on any changes made to the internal operations on the routing for this production order), the actual capacity costs (based on recorded output for the production order), the deviation in percent, and the variance.</td>
</tr>
<tr>
<td><strong>Subcontracted Cost</strong></td>
<td>This field shows the subcontracted cost amount of all lines in the production order. This includes the standard subcontractor costs (based on a standard routing), expected subcontractor costs (based on any changes made to external operations on the routing for this production order), the actual subcontractor costs (based on subcontractor purchase order receipts for the production order), the deviation in percent, and the variance.</td>
</tr>
<tr>
<td><strong>Capacity Overhead</strong></td>
<td>This field shows the capacity overhead cost amount of all lines in the production order. Capacity overhead includes indirect overhead costs, such as factory supervision, factory fixed expenses, or subcontractor overhead expenses. Refer to the Microsoft Navision training material, Manufacturing Costing, for more details. This includes the standard capacity overhead costs (based on a standard routing), expected capacity overhead costs (based on any changes made to the internal or external operations on the routing for this production order), the actual capacity overhead costs (based on recorded output for the production order), the deviation in percent, and the variance.</td>
</tr>
</tbody>
</table>
### Production Order Changes

There may be various types of anticipated changes that need to be made to a production order prior to it being released to the shop floor. You may also need to make changes to a production order after work has begun.

*NOTE:* In a subsequent chapter, we discuss in more detail changes made "on the fly" once work has begun on a production order.

### Due Date Changes

By the end of this section you should be able to make changes to the production order Due date.
The Starting date and Ending date fields on the Schedule tab of the Production order is automatically amended if you change the Due date in the heading of a production order.

**NOTE:** Changes to the Due Date causes a change in the scheduling tab and routing lines.

The Starting and Ending date field values are updated based on the most recent settings of the Refresh Production Order batch job and Routing criteria of the production order.

![Refresh Production Order](image)

**Quantity Changes**

By the end of this section you should be able to make changes to the production order quantity required.

If a production order has a Source type of Item or Family, and you make a change to the Quantity field in the heading, or to the Quantity field on the line, then you must run the Refresh Production Order batch job to reschedule the production order lines.
NOTE: If ledger entries have been posted for the order, then you cannot change the quantity on the production order header or lines, nor can you reset dates and time on the Schedule tab.

Changes to Required Components

By the end of this section you should be able to

- Make changes to the production order components required
- Use item substitution for components

Components may often need to be changed in order to manufacture an item. This is usually the case in a MTO company, where items are produced to customer specifications. A production order may be created for an MTO item with components from a standard template production BOM. The operations are then modified as needed.

To make a change to a production order component:

- From the Prod. Order Component window select the component/item to be changed.
- Press F4 to delete the component.
- Click the Yes button in the Delete Prod. Order Component confirmation window.
- Press F3 to insert a new component in the BOM and complete the required fields.
Item Substitution

Production Order Components can use substitutions, similar to sales order substitution. Setting up item substitution is done the same for both sales and production, ITEM CARD→ITEM BUTTON→SUBSTITUTIONS.

From a production order, choose LINE BUTTON→COMPONENTS to see the list of components. Use show column to add the field Substitution Available. If a check mark is in the field, a substitution is available. You can then choose LINE BUTTON→SELECT ITEM SUBSTITUTION.

Order Planning

One reason you might choose to substitute a component is because the usual item is out of stock. A quick check of component availability is available through reports (shown later in the chapter) and Order Planning.

From a production order, choose ORDER BUTTON→PLANNING then go to FUNCTIONS→CALCULATE PLAN. If any components are not available for this production order, a planning line is displayed for the production order header and any unfulfilled demand lines are expanded under it. If all demand is met for the production order you are on, then a message appears saying that all items are available and no planning line was created for it. One line (collapsed) per production order of unplanned demand.

Order planning is shown in detail in the chapter that covers Sales Order Interface & Order planning.

Routing Changes

By the end of this section you should be able to make changes to the production order routing.

Similar to the components, it may be necessary to modify the production order routing. In an MTO company, this is usually the case where items are produced to customer specifications. A production order may be created for an MTO item with operations from a standard template routing. The operations are then modified as needed.

In order to recalculate the routing when operations have been changed, you would have to utilize Function – Replan. Later in this chapter, we discuss the Replan section in greater detail.

To make a change to a production order routing:

- From the Prod. Order Routing window select the operation to be changed.
- Press F4 to delete the operation.
Click the **Yes** button in the Delete Prod. Order Routing Line confirmation window.

Press **F3** to insert a new routing line and complete the required fields.

Run the Replan Production Order batch job.

### Printing from a Production Order

By the end of this section you should be able to:

- Understand the reports printed directly from a production order
- Access the Production Schedule from a production order

There are four reports available to be printed directly from a Firm Planned or Released Production Order. Those reports are:

- Prod Order. – Job Card
- Prod Order. – Mat. Requisition
- Prod Order. – Shortage List
- Prod Order. – Gantt Chart
Prod. Order – Job Card

The Job Card report can be used to record actual operating times for this order and provides a list of the work in progress of a production order. Output, Scrapped Quantity, and Production Lead Time are shown or printed depending on the operation. In addition, this report displays material components required at each operation based on the routing link code and can be used in a Just-in-Time environment. To print this report from a Firm Planned or Released production order, first click the Print menu button, and then select Job Card.

Prod. Order – Mat. Requisition

The Material Requisition report shows component requirements for this order. The report shows you the status of the production order, the quantity of end items, and components with the corresponding required quantity. You can view the Due Date and Location Code of each component. To print this report from a Firm Planned or Released production order, first click the Print menu button, and then select Mat. Requisition.

Prod. Order – Shortage List

The Shortage List report shows any component items with insufficient quantities to produce the item(s) on the order. You are shown how the inventory development is planned from today until the set day -- for example whether orders are still open. To print this report from a Firm Planned or Released production order, first click the Print menu button, and then select Shortage List.

Prod. Order Gantt Chart

This report provides a routing schedule for this order, based on time periods and Start Date defined on the Options tab of the Request form. To print this report from a Firm Planned or Released production order, first click the Print menu button, and then select Gantt Chart.

Production Schedule (Gantt Chart)

A Gantt chart view of production schedule planning and resource planning is available. The Production Schedule is explained in more detail in the chapter that discusses shop loading.

From a planned, firm planned, or released production order, click FUNCTIONS→PRODUCTION SCHEDULE.

The Production Schedule window opens showing all existing production orders (except simulated and finished). The operations for the relevant production order are highlighted with blue color. Each status of production order has its own section. A tool tip text displays all relevant information when you place the cursor over an operation.
Production Order Reports

By the end of this section you should be able to understand the standard reports available for production order reporting.

Microsoft Navision offers the following standard production order reports found in the Execution and Costing folders (Reports folder) of the Manufacturing menu:

<table>
<thead>
<tr>
<th>Report</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prod. Order – Calculation</td>
<td>This report shows a summarized report of total operation and component costs.</td>
</tr>
<tr>
<td>Prod. Order – Detailed Calc.</td>
<td>This report shows a detailed listing of the costs for each operation and component for production orders selected in the order filters.</td>
</tr>
<tr>
<td>Prod. Order – List</td>
<td>This report can be used to review the status (Due Date, Quantity Completed, and so on) of production orders selected in the order filters.</td>
</tr>
<tr>
<td>Prod. Order – Picking List</td>
<td>This report can be used for material picking purposes.</td>
</tr>
<tr>
<td>Prod. Order – Precalc. Time</td>
<td>This report is a detailed listing (both routing and components) of the production order requirements.</td>
</tr>
<tr>
<td>Prod. Order – Routing List</td>
<td>This report can be used to record completed and scrapped quantities at each operation.</td>
</tr>
</tbody>
</table>

Replan Production Order Batch Job

By the end of this section you should be able to:

- Understand the purpose of the Replan Production Order batch job
- Understand how the Replan Production Order batch job operates

The Replan Production Order batch job is used to reschedule production orders, such as when you want to make changes to a production order routing. It is also used to create and plan production orders for lower level assemblies, as required by the current parent production order. When you click the Functions menu button and then select Replan, you not only select the scheduling direction, but also the number of levels for which you are planning.
The Replan Production Order batch job is not meant to be a substitute for the more advanced calculations of planning. While it can create orders for required lower level assemblies, it does not include time phasing, which is integral to planning calculations. A good use of this batch job is for a multi-level production order in which the parent and sub-assemblies are on the same production order and the **Ending date** is adjusted for the parent item. In this situation, the batch job enables you to adjust the dates for the lower level assemblies.

There are three different levels that can be used when replanning:

- No Levels
- One Level
- All Levels

**No Levels** – The **No Levels** option is used to calculate a multi-level or multi-line production order. In this case, all of the items and subassemblies must be Make-to-Order and new requirements would be added to the existing production order as additional line items.

**One Level** – The **One Level** option is used to create and plan production orders one level down. If the current production order is for an item that is Make-to-Order, but the first level subassemblies are Make-to-Stock, then the program creates new and separate production orders for that level.

**All Levels - All Levels** is used to create separate production orders for all level requirements of the current production order. By using the order tracking functionality, you can easily view which parent production order is the source of demand for a lower-level production order(s).

Furthermore, when lower level production orders are created, the planning lot number is copied from the parent production order heading to the lower level production order headings. This is another link or connection between production orders. To illustrate, calculate the production requirements for the first level down. Item 1000 is set up as Make-to-Order, while lower level subassemblies are set up as Make-to-Stock.
Chapter 5: Production Orders

For example, to track from a production order to the production order of a parent item by calculating the production requirements for the first level down, set up the Item on a Firm Planned Production Order as Make-to-Order, with lower level subassemblies set up as Make-to-Stock, and the Order Tracking Policy field set to Tracking Only on the Item card, and perform the following steps:

1. From the MANUFACTURING MENU→EXECUTION→FIRM PLANNED PROD. ORDERS

2. Press F5 to display a list of production orders.

3. Select the firm planned production order for your item set up above.

4. Click the Functions menu button and select Replan.

5. Click the Options tab, select the Back and One Level options.

6. Click OK.

7. Press F5 to display a list of production orders.

**NOTE:** Production orders are created for all subassemblies.

8. Select the firm planned production order for a subassembly.

9. Click the Functions menu button and select Order Tracking.

10. Click the Show button to see the source of the demand – the parent item.

**Production Orders with Phantom BOMs**

By the end of this section you should be able to understand the effects of scheduling a production order with a phantom BOM.

**NOTE:** Phantom BOMs are discussed in detail in the Production Bill of Materials chapter of this manual.

Phantom BOMs reduce the number of levels in the product structure, which significantly reduces the overall complexity of the manufacturing process.
When a production order with a Phantom BOM assembly component is created and the Refresh Production Order batch job is run, Microsoft Navision "blows through" the phantom BOM and displays its components instead of the Phantom BOM assembly.

For example, if a firm planned order is created for a bicycle with a Phantom BOM pedal assembly that is made up of a pedal and a pedal screw, once the Refresh Production Order batch job is run, the pedal and pedal screw is displayed as Level 1 components of the bicycle.

Production Orders with Manufacturing Batch Unit of Measure

By the end of this section you should be able to calculate a manufacturing batch unit of measure.

If an item is stocked in one unit of measure, but produced in another, Microsoft Navision can create a production order that uses a manufacturing batch unit of measure to calculate the correct quantity of the components during the Refresh Production Order batch job.

To calculate a manufacturing batch unit of measure:

1. From the MANUFACTURING MENU → EXECUTION → FIRM PLANNED PROD. ORDERS
2. Create a production order (Quantity = 5) for an Item stocked in “each” or “pieces.”
3. Create a Unit of Measure equal to 12 “each” or “pieces” and name it DOZ.
4. Manually enter the production order line using the following:
   Use same Item No.
   Quantity = 5
   Unit of Measure = DOZ
5. Click the Functions menu button and select Refresh.
6. Click Options tab and clear the Lines field.
7. Click OK.
8. Click the Lines menu button and select Components.
Based on the standard production BOM to build a dozen, the program calculates the correct quantity of the components.

Changing Production Order Status

By the end of this section, you should be able to understand the two methods of changing the status of a production order.

The first method of changing the production order status is to change the status in the current production order itself by selecting the Functions menu button and selecting Change Status.

This window allows you to select the status which this production order is to be assigned, enter the appropriate Posting Date, and select whether the unit costs of this production order are updated by placing a check mark in the Update Unit Cost field.

The second method is to utilize the Change Production Order Status batch job. Multiple orders can be changed simultaneously using this batch job. To run this batch job:
From the MANUFACTURING MENU→EXECUTION→CHANGE PRODUCTION ORDER STATUS

Select the Status of the production orders to define a filter on the lines of the form to view in the Status filter field.

To define the filter on the lines, enter dates in the Must Start Before and Ends Before fields.

Select the production orders you wish to update by highlighting each order or pressing CTRL+F1 on each order line.

Click the Functions menu button and select Change Status.

Enter the appropriate Posting Date.

Place a check mark in the Update Unit Cost field if you want the unit cost of this production order updated.

Select the Yes button.
Test Your Skills – Production Orders

Version: Microsoft Navision 4.0
Data Set: Microsoft Navision Demo Database_Data.mdf
Company: Cronus International, Ltd.

Exercise 5.1 Create Firm Planned Order
1. Create a firm planned production order for 5 pieces of item 1001, Touring Bicycle, due 11/15/04.
2. Refresh the production order – backward schedule and calculate lines, routings and component need – noting the changed starting and ending dates

Exercise 5.2 Change Dates
1. Change the Due date of the production order header to 11/20/04. Do the starting and ending dates change? Review the routing. Has this changed as well?
2. On the Schedule tab of the production order, change the ending date to 11/20/04. What happens to the routing for the order?
3. Review the list of components for the production order. Revise the component list as follows:
   - Delete item 1850
   - Add item 1860.
   - Delete item 2000.

Exercise 5.3 Replan Production Order
1. Replan the Touring Bicycle (Item 1001) production order – Back Schedule, All Levels.
   Why did the program create 2 new production orders for front wheels and back wheels, etc?
2. Delete all of the firm planned production orders, except for the order for the Touring Bicycle (item 1001).
3. Change status to Released.
Quick Interaction: Lessons Learned

Take a moment to write down 3 Key Points you have learned from this chapter:

1.

2.

3.