

Production & Operations Management

Chapter 5

Process Mapping

- ## Process Mapping
- A process map is a description of a method or process of accomplishing a task
 - A geographical map of movements
 - A list of movements made
 - Both materials and information
 - Drawings, charts, diagrams, layouts, etc.
 - An enterprise budget

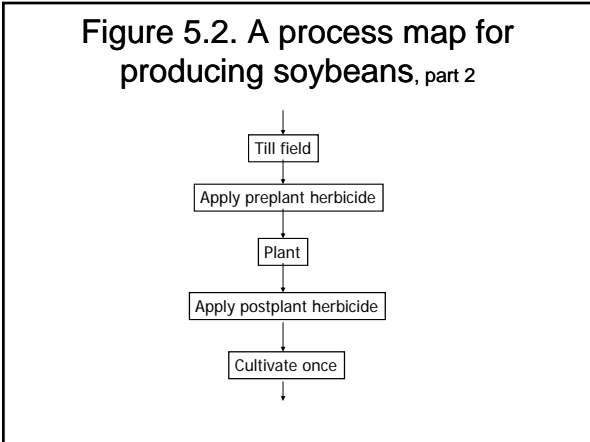
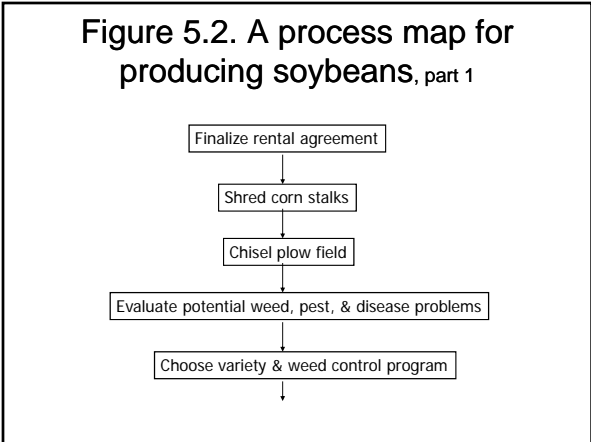
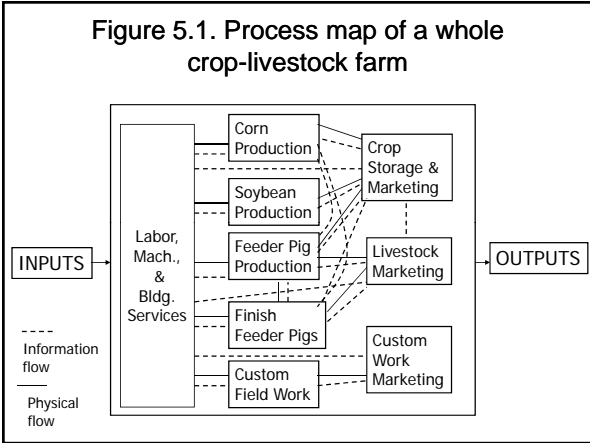
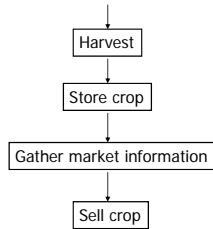


Figure 5.2. A process map for producing soybeans, part 3



Steps for Reloading the Corn Planter (from Table 5.3)

1. Stop at end of field	0 minutes	
2. Inspect supplies on planter	1	
3. Walk to supply truck	3	
4. Drive to planter	1	
5. Check seed variety	1	
6. Load seed	13	
7. Load fertilizer	8	
8. Check equipment	4	
9. Move supply truck	2	
10. Start planting	0	

Draw your own process map

- Either:
- Whole farm diagram
- Flow Diagram or List of activities
- Activities with time estimates

Improving the Current Process

I keep six honest serving men
 (They taught me all I knew);
 Their names are What and Why and When;
 And How and Where and Who.

-Rudyard Kipling

Ideas for improvement:

- Reducing input use
- Substituting inputs
- Increasing productivity
- Expanding
- Reorganizing

Figure 5.3. A revised process map for producing soybeans, partial

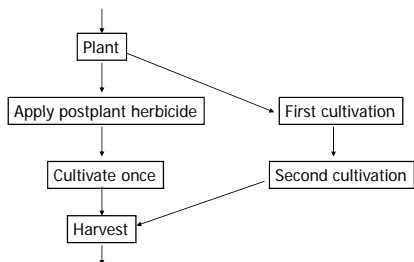


Figure 5.4. Partial budget for substituting cultivation for postplant herbicide

POSITIVE EFFECTS:	(\$/acre)
1. Additional Receipts	0.00
2. Reduced Expenses	16.19
Total Positive Effects	16.19
NEGATIVE EFFECTS:	
3. Reduced Receipts	21.00
4. Additional Expenses	4.01
Total Negative Effects =	25.01
NET EFFECT =	-8.82
<small>= Positive effects minus Negative effects</small>	

Enterprise Selection

Gross Margins for Enterprise Selection

$$\text{Gross Margin} = \text{Gross Income} - \text{Variable Costs}$$

$$\text{or: } \text{GM} = \text{GI} - \text{VC}$$

Crop Selection using Gross Margins

1. Select the crop with the largest GM/acre & increase the acreage up to limit
2. Select the crop with the second largest GM/acre & increase the acreage up to limit
3. Continue selecting crops until acreage limit is reached
4. Repeat the process using GM/hour
5. Add livestock enterprises

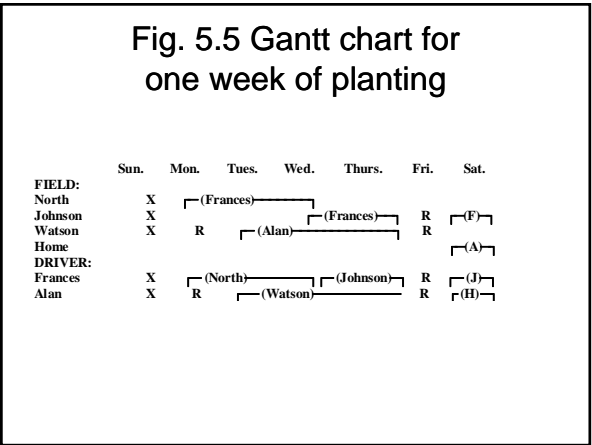
From Table 5.5. Estimated Gross Margins

	Corn	Soybeans	Spring wheat	Sweet corn	Sweet peas
Gross income	335	250	193	292	403
Variable costs	164	85	76	106	57
Fixed costs	97	84	74	55	84
GM/ac	171	165	117	186	346
Hours	2.8	2.3	1.9	2.4	1.3

Scheduling Operations

- ## Scheduling
- Scheduling has 3 competing objectives:
 - Cost
 - Schedule
 - Performance
 - Two techniques for farm management:
 - Sequencing (Gantt charts)
 - Dispatching rules

- ## Symbols for Gantt Charts
- ┌ Start of an activity
 - └ End of an activity
 - ┌─ Allowed activity time
 - Actual work progress
 - X Time set aside for nonproductive activities
 - M Moving time
 - R Day set aside for potential rainfall



- ## Dispatching rules
- FCFS: first come, first served
 - SPT: shortest processing time
 - SPT with truncation
 - EDD: earliest due date
 - LS: least slack time
 - MINCR: minimum critical ratio
 - ESD: earliest start date
 - RANDOM: random selection
 - Economic importance

- ## Most beneficial rules for farmers:
- SPT: shortest processing time
 - EDD: earliest due date
 - Economic importance

Hughes aircraft study

SPT was the best for efficiency & flow rate

LS was best for meeting due dates

FCFS & ESD did worse than RANDOM

Source: LeGrande, 1963