International Labour Organization

Planning production

Production systems

Factory Improvement Toolset

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Factory Improvement Toolset

The Factory Improvement Toolset (FIT) is an innovative self-facilitated, activity-based learning approach designed by the International Labour Organization (ILO) to create more decent and sustainable employment. FIT supports manufacturers in global supply chains to improve productivity, competitiveness and working conditions by upgrading production systems and factory practices.

FIT has been developed to be a sustainable, time- and cost-efficient option for supporting factories to enhance productivity through improved business practices and working conditions. FIT focuses on areas of production improvement and actions to be taken specific to each participating factory. It can be utilized as stand-alone learning tools or to complement other training programmes.

With each module lasting no more than 2.5 hours, FIT enables factories to train personnel, whilst minimizing interference with production realities. The easy-to-use methodology makes it possible to rapidly scale the implementation to reach a large cohort of trainees across multiple production facilities.

Working in small groups, participants review real-life situations and engage in discussions to determine improvements to be made in factory without an external trainer or specialist. This self-facilitated, activity-based and highly participatory learning approach positions participants as both student and teacher and makes the toolset self-tailored to the needs and interests of each group.

About this module

This FIT module on Planning production is a training for garment manufacturers to improve their production systems. Participants will work on planning, scheduling and controlling production. This module takes about 2 hours to complete.

Upon completion of the training, participants should have:

- Discussed the importance of production planning for productivity.
- Learnt how to plan production needs in terms of workforce, materials and machinery.
- Learnt how to use a Time & Action calendar to schedule production tasks.
- Learnt how to use a Daily production report to control production progress.

The **Factory Improvement Toolset** of the **International Labour Organization (ILO)** are developed and provided by the ILO's **Enterprises Department**.

Authors: Alix Machiels, Sara Andersson, Charles Bodwell, Jayantha R. de Silva.

Guidelines for successfully using the training tool

Read out-loud

The FIT tool is designed for participants to take turns reading the instructions in the modules out loud to the group. At least one member of the group should be selected in the beginning of the session to take this responsibility.

Work as a group

Always work in groups of 5-7 during a FIT session. The programme will not be successful if participants work independently or do not collaborate with each other.

Be active

Encourage everyone in the group to actively contribute to the discussion. Ensure that no group member dominates the discussion or does not participate at all.

Monitor the time

Select one member of the group to monitor the time for each activity and remind the group when it is time to move to the next exercise.

Complete the action plan

Complete the action plan at the end of the session. This will help ensure that FIT results in improvements in the factory. Review the plan a while after the session to make sure that actions in the plan has been completed accordingly.

Icons

A set of icons is used throughout the modules to provide easy to recognize reference points for different tasks within each session and activity.

Read out loud

One member of the group should read out loud to the rest of group.

Knowledge link

Knowledge and skills are linked to other FIT learning resources and support.

Time allotted

Indicates how much time each sessions and activity should take.

Supplies needed

Indicates that supplies may be necessary to complete the session.

Begin step-by-step instructions

Indicates that the step-by-step instructions for an activity are beginning.

Think about it

Indicates additional information for the participants to think about.

Measuring your performance

Measuring operational efficiency is a key aspect of running a productive factory. The box(es) below guides you in understanding which measurement indicator(s) can be used to measure and evaluate the performance of your factory in relation to the topic of this FIT module.

Indicator 1	**On-time delivery rate (%)**
Definition	The proportion (percentage) of placed orders being delivered (shipped) to the buyer on time over a certain period of time.
Purpose	To understand how well you plan production, set an on-time delivery improvement target, and begin to identify ways to improve production planning and control.
Calculation	(# of orders shipped on time / total # of orders shipped) x 100%
Frequency	Calculate monthly for all orders.
Responsible	Merchandiser / Shipping clerk

Indicator 2	**Order-to-ship ratio**
Definition	The amount of pieces shipped compared to the amount of pieces ordered for a specific order. If the ratio is less than 1, it means less pieces were shipped than what was ordered. The ideal ratio is 1 (or higher if extra shipped is allowed).
Purpose	To understand how well your factory meets order quantities, and identify ways to consistently ship the ordered quantity by improving production planning and quality in the factory.
Calculation	Total quantity shipped (in pieces) / total quantity ordered (in pieces)
Frequency	Calculate for each order, then calculate a yearly average of all orders.
Responsible	Merchandiser


TEAM 10A
Pink
WEEK NO 02
ST # 4221
TEAM 11A
TEAM 10B
Pink
WEEK NO 01
ST # 4141
FIRE EXIT

Session 1

Business case study

Goals

Preparing you for the type of discussions you will have with other group members throughout the learning module and understanding the benefits of being exposed to different perspectives.

Understanding better why planning production is important in the factory.

Session 1

Overview

One member should read the full session out loud to the rest of group

15 minutes

Learning manual, pens, markers and poster paper

A business case study presents a real-life situation for learners to reflect on and discuss with other group members. By discussing the case, students learn from others' ideas and perspectives, and develop an understanding of the topic at hand within the workplace.

One group member reads the case study out loud

The whole group discusses the case study

Everyone develops a deeper understanding of the topic

Activities

Activity
1

15 minutes

Case study review and respond

The case study below presents a situation that could happen in real life.

Instructions:

1) As a group, listen to one member read the case study below while following along in your learning module.

Ali is a new production manager at the HS factory. He realizes that the production planning system is quite poor. Management does not calculate how many operators, lines, machines and how much material will be needed to complete the order on time. There is no production schedule either. As a result, there are many delays, and workers need to do a lot of overtime hours. This costs a lot of money, and makes workers tired and demotivated. In addition, no one tracks order progress, which makes it hard to detect and address production delays early enough.

Ali decides to make changes to improve the production planning process. First, with the management team, he decides to start calculating workforce, materials and machine needs for each order so as to meet shipment dates. He makes sure to consult with merchandisers when doing so. Then, Ali schedules each order based on shipment dates. The schedule is shared with departments so that they can plan their activities in advance. Last, a daily production report is made every morning to track progress for each order, identify delays and adjust plans accordingly.

Thanks to these changes, everyone knows what to do to complete and ship the order on time. There are less delays. Departments plan their activities more accurately. Workers do not need to do as much overtime, which saves costs for the factory.

2) Together, discuss Ali’s situation by answering the three questions in table 1 on the next page.

Table 1. Questions about Ali’s situation
1. What problems has Ali identified? What impact do these problems have on the factory and its workers?
2. What does Ali do or change in order to solve these problems?
3. What are the results of Ali’s solutions for the factory and its workers?

This page has been intentionally left blank and can be used for note taking.

Session 2

Learning about the topic

Goals

Understanding how good production planning helps improve factory productivity.

Learning how to plan production by planning workforce, materials and machines requirements.

Learning how to use a Time & Action calendar to schedule production.

Learning how to use a daily production report to control production.

Session 2

Overview

One member should read the full session out loud to the rest of group

90 minutes

Learning manual, pens, and markers

This training module helps you improve your production systems by focusing on production planning. Production planning helps you schedule and control production needs and activities to help produce the garments correctly and on time. Good production planning is key to improving productivity and profitability in the factory. Throughout this module, you will work on the three steps below.

Planning production needs

Scheduling production

Controlling production

First, you will discuss the importance of production planning for productivity. Then, you will learn how to calculate production needs to better plan production. Finally, you will learn how to use two important documents to schedule and control production accurately.

Activities

Activity
2a

15 minutes

Planning & productivity

Production planning helps you schedule and control production activities to help complete orders correctly and on time. In this activity, you will discuss its importance for productivity.

Instructions:

1) Together, discuss: How do you schedule and control production to ensure that orders are produced correctly and on time?

2) Have a participant read aloud the text box about productivity below.

3) Together, look at ways that planning helps improve productivity in table 2. Discuss, and put a ✓ on the right if this could be improved in your factory.

Productivity is the efficient use of resources (labour, energy, materials, machinery, etc.) needed for production. A more productive factory produces more garments (output) with less resources (input).

Table 2. Planning & productivity

Planning helps improve productivity by…	✓
1. Avoiding poor order scheduling and production delays.	
2. Reducing unnecessary, costly overtime hours.	
3. Setting realistic production schedules and targets.	
4. Using resources more efficiently.	
5. Meeting order deadlines.	
6. Ensuring enough materials are available for production.	
7. Ensuring required machines or tools are available for production.	
8. Ensuring enough skilled workers are available for production.	

Activity
2b

30 minutes

Planning needs

The first step of **production planning** is to correctly identify your production needs in terms of workforce, materials (before order confirmation) and machines (after order confirmation). In this activity, you will learn how to identify those needs properly.

Instructions:

1) Have a participant read aloud the text box below. Then, discuss: How do you plan capacity, inventory and operations in your factory?

2) Together, read the information on capacity planning in table 3, then answer the three questions. Solutions are at the bottom of the page.

3) Together, read the information on inventory planning in table 4, then answer the three questions. Solutions are at the bottom of the page.

4) Together, read the information on operations planning in table 5, then answer the three questions in the table. Solutions are at the bottom of the page.

Production planning should include three types of planning:

- Capacity planning (how many workers?)
- Inventory planning (how much material?)
- Operations planning (how many machines?)

Table 3. Capacity planning
Capacity planning helps you plan how many sewing operators will be needed to process the order on time. This way, you can avoid not having enough workers when production starts, or having to do a lot of overtime. You can carry out capacity planning by calculating line capacity using the formula: Line capacity = $\dfrac{\text{(\# operators in line x \# working hours x 60 min x line efficiency \%)}}{\text{Estimated Garment SMV}}$
Practice questions
1. In factory X, there are 30 operators in each line, who work 8 hours a day. Line efficiency is 60%. For style #888, SMV is 15 min. What is line capacity? Line capacity = (30 x 8 x 60 x 0.60) / 15 = _____ garments

2. Line B’s capacity for style #666 is 500 garments a day based on the SMV. The buyer wants the order shipped within 20 days. Order quantity is 20,000. Can the factory meet the target with Line B?

   20,000 / 500 = _____ days

3. Given 2. above, how many lines will be needed to meet the order quantity within 20 days? How many operators in total will be needed?

   20,000 / 10,000 = _____ lines = ______ operators

Table 4. Inventory planning

Inventory planning helps you plan the amount of material (fabric and trims) needed to complete the order. This way, you can avoid not having enough of the right materials when production starts.

You can carry out inventory planning based on the counter sample approved by the buyer. Based on this, you will be able to calculate your material costs!

Practice questions

1. For style #888, the sample maker estimates that you need 1.5 meters of fabric for one garment. Order quantity is 2,000. How much fabric is needed (without adding waste allowances)?

2. The factory orders an additional 5% of the calculated quantity for estimated wastage. How much fabric will the factory order?

   __________ + (__________ x 5%) = __________ meters

3. The cost of the fabric used is 4$ for 1 meter. How much will the total fabric cost be for this order?

   4$ x _______ meters = ___________ $

SMV and fabric consumption are often estimated based on sample makers’ experience. To estimate this faster and more accurately, you can set up a database listing SMV and fabric consumption for each style. Merchandisers can then consult it and estimate SMV and fabric consumption based on similar styles.

Solutions (table 3): 1. 576 garments; 2. 40 days, so 20 days is too short; 3. 2 lines, so 2 x 30 = 60 operators.

Solutions (table 4): 1. 1.5 x 2,000 = 3,000 meters; 2. 3,150 meters; 3. 4$ x 3,150 mtrs = 12,600$.

Table 5. Operations planning

Operations planning helps you plan the amount of machines needed to process the order. This way, you can avoid not having enough of the right machines when production starts.

You already know how many machines you need by calculating how many operators are needed. But, you will need different machines depending on the operations required for the style. This is determined by the line supervisor during the operation breakdown.

Practice questions

1. Based on the operation breakdown (in the Operations Bulletin) for style #777, the sewing manager has found the following information (table below):
    - How many over lock machines are needed? _____
    - How many lock stitch machines are needed? _____
    - How many flat lock machines are needed? _____

#	Operations	Machine type	# of machines
1	Shoulder join	Over lock	1
2	Neck rib tuck	Lock stitch	1
3	Neck join	Over lock	2
4	Label make	Lock stitch	1
5	Back neck binding	Flat lock	1
6	Front neck top	Flat lock	1
7	Back neck top	Lock stitch	2
8	Sleeve hem	Flat lock	1
9	Sleeve join	Over lock	2
10	Side seam	Over lock	3
11	Sleeve tuck	Lock stitch	1
12	Body hem	Flat lock	1

2. Currently, there are only 5 available over lock machines in the lines. What could you do to make sure the order is processed on time? Discuss the four options below, as well as any other option that you can think of.
    a) Purchase new machinery
    b) Do overtime
    c) Rent extra machinery
    d) Use another type of machine by adjusting the machine if possible (e.g. removing a needle if need be from a double needle lockstitch machine)

To learn how to carry out an operation breakdown and calculate machine needs, ask for the "Making an operation bulletin" module.

Solutions (table 5): Over lock – 8; Lock stitch – 5; Flat lock – 4.

Activity

2c

20 minutes

Scheduling production

Once you have identified production needs, you can start **scheduling** production activities, to complete the order on time. In this activity, you will learn how to use a Time & Action (T&A) calendar to do this.

Instructions:

1) Have a participant read aloud the first text box below. Then, look at the T&A calendar in table 6 and make sure everyone understands.

2) Together, look at the list of steps for making a T&A calendar in table 7, and put them in the right order by writing a number from 1 to 7 on the right. Solutions are at the bottom of the page.

3) Have a participant read aloud the scenario in table 8. Then, use it to practice filling in the blank T&A calendar in table 8 by deciding on start and end dates for each task.

A Time & Action calendar shows when each production task needs to happen for the order to be completed on time. Merchandising prepares a T&A calendar for each order, and shares it with the production team so that they can prepare their own schedule and plan (cutting manager makes a cut plan, sewing manager makes a line plan, etc.). T&A calendars can help you improve factory operations by identifying which production areas / operations should be improved to avoid delays.

Table 6. Time & Action calendar

Buyer: iloFIT	**Order Qty.:** 7,000	**Planned order cycle time:** 53 days
Order #: 87986	**Prepared by:** Ali	**Actual order cycle time:** 58 days
Style #: 907	**Order confirmed date:** 22 Dec	**Planned prod. cycle time:** 18 days
Description: Men's shirt	**Shipment date:** 12 Feb	**Actual prod. cycle time:** 19 days

Key processes		Planned		Actual		Responsible person
		Start date	End date	Start date	End date	
1	Order confirmed	22 Dec		22 Dec		Merchandiser
2	Make pattern	23 Dec	25 Dec	23 Dec	25 Dec	Pattern Master
3	Consumption approval	27 Dec		27 Dec		Merchandiser
4	Counter sample	28 Dec	02 Jan	29 Dec	04 Jan	Pattern Master
5	Sample approved	04 Jan		07 Jan		Merchandiser
6	Order materials	05 Jan		08 Jan		Merchandiser
7	Make size set	06 Jan	16 Jan	09 Jan	17 Jan	Pattern Master
8	Size set approved	18 Jan		20 Jan		Merchandiser
9	Make boards	19 Jan	21 Jan	21 Jan	23 Jan	Pattern Master
10	Issue boards	22 Jan		24 Jan		Merchandiser
11	PP meeting	24 Jan		25 Jan		Merchandiser
12	Materials received	25 Jan		28 Jan		Store manager
13	Cutting	26 Jan	31 Jan	30 Jan	05 Feb	Cutting manager
14	Sewing	27 Jan	06 Feb	31 Jan	12 Feb	Sewing manager
15	Finishing	29 Jan	07 Feb	02 Feb	13 Feb	Finishing manager
16	Packing	30 Jan	08 Feb	03 Feb	14 Feb	Packing manager
17	Shipment audit	10 Feb		15 Feb		Head of QC
18	Dispatch	12 Feb		17 Feb		Finishing manager

Table 7. Making a T&A calendar

Steps	#
Fill in the details of the order (style #, buyer, etc.) in the top part of a T&A form. In the left column, list key processes (tasks) needed to produce the style.	1
During production, fill in the "Actual" column, listing when each task actually started and was completed.	
Distribute a copy of the T&A calendar to all the people listed in the "Responsible person" column.	
Work back from the shipment date to decide the planned start and end dates for each task.	
Consult with the sample room to make sure key processes (production tasks and their order) are accurate.	
Write down the name of the person responsible for completing each task.	
Determine the amount of time needed for each task, by calculating capacity and / or consulting with the different production departments.	

Solutions: 1, 7, 6, 4, 2, 5, 3.

Table 8. Scenario

The HS factory has received an order for 6,000 pieces for style #222. The order is received on March 15, and shipment date set for May 15 – which means that lead time is 60 days. Cutting capacity is 2,000 pieces a day (2 lines). Planned capacity for sewing is 10 days. Merchandiser Andi fills in a T&A calendar form to help schedule the order.

T&A calendar

Buyer: iloFIT	**Description:** Men's shirt	**Planned order cycle time:** 60 days
Order #: 76856	**Prepared by:** Andi	**Actual order cycle time:**
Style #: 222	**Order confirmed date:** 15 Mar	**Planned prod. cycle time:**
Order Qty.: 20,000	**Shipment date:** 15 May	**Actual prod. cycle time:**

Key processes		Planned		Actual		Responsible person
		Start date	End date	Start date	End date	
1	Order confirmed	15 March				Merchandiser
2	Make pattern					Pattern Master
3	Consumption approval					Merchandiser
4	Counter sample					Pattern Master
5	Sample approved					Merchandiser
6	Order materials					Merchandiser
7	Make size set					Pattern Master
8	Size set approved					Merchandiser
9	Make boards					Pattern Master
10	Issue boards					Merchandiser
11	PP meeting					Merchandiser
12	Materials received					Store manager
13	Cutting					Cutting manager
14	Sewing					Sewing manager
15	Finishing					Finishing manager
16	Packing					Packing manager
17	Shipment audit					Head of QC
18	Dispatch	13 April				Finishing manager

Activity

2d

25 minutes

Controlling production

During production, progress must be **controlled** so that planning can be adjusted on time to avoid delays. In this activity, you will learn how to fill in and use a daily production report (DPR) to control production.

Instructions:

1) Have a participant read aloud the first text box below. Then, look at the DPR in table 9 (Order 1) and make sure everyone understands.

2) In pairs, discuss and fill in the blank cells for Order 2 in table 9. Solutions are at the bottom of this page.

3) Together, discuss: What should you do if you notice a delay, to ensure that the order can be completed on time?

A Daily Production Report (DPR) lists how many pieces were cut, sewn, finished and packed yesterday for one specific order. It also shows the cumulative total (how many pieces since the start of production) and the balance (how many pieces left to complete the order). It should be prepared every morning for the previous day based on information from departments. By comparing the DPR with the T&A calendar, you can see whether there are any delays. If yes, make sure the relevant department(s) are aware of it and adjust their plan accordingly.

Table 9. Daily production report

Order 1 (Example)

Date: 25 March	**Style #:** 749	**Order qty.:** 2,000	**Merchandiser:** Mina	**Receipt date:** 15 February
Order #: 1	**Style description:** Men's shirt	**Order qty + extra: 2,100**	**Buyer:** iloFIT	**Shipment date:** 28 March

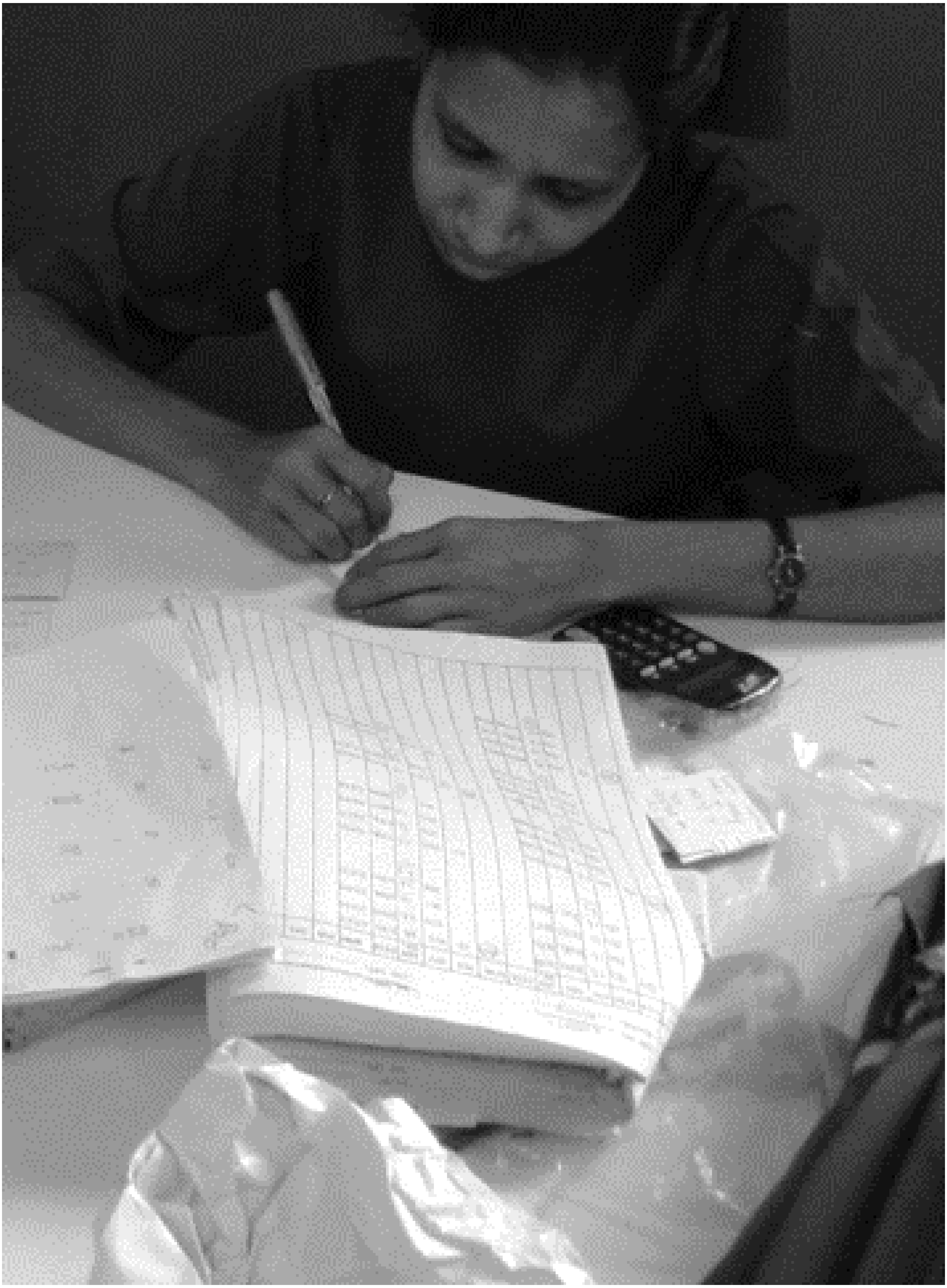
Colour & order qty	Cutting			Sewing				Finishing				Packing				Ware-housing
	Today	Cum.	Bal.	Total input	Today	Cum.	WIP	Total input	Today	Cum.	WIP	Total input	Today	Cum.	WIP	Ware-housed
Blue 1,050	0	1,075	-25	1,075	0	1,070	5	1,070	0	1,070	0	1,070	0	1,070	0	1,070
Red 1,050	0	1,025	25	1,025	0	1,025	0	1,025	500	1,005	20	1,005	500	500	505	0
Total	**0**	**2,100**	**0**	**2,100**	**0**	**2,095**	**5**	**2,095**	**500**	**2,075**	**20**	**2,075**	**500**	**1,570**	**505**	**1,070**

Order 2 (Practice)

Date: 25 March	**Style #:** 687	**Order qty.:** 4,000	**Merchandiser:** Mina	**Receipt date:** 05 March
Order #: 2	**Style description:** Women's shirt	**Order qty + extra:** 4,100	**Buyer:** iloFIT	**Shipment date:** 05 April

Colour & order qty	Cutting			Sewing				Finishing				Packing				Ware-housing
	Today	Cum.	Bal.	Total input	Today	Cum.	WIP	Total input	Today	Cum.	WIP	Total input	Today	Cum.	WIP	Ware-housed
White 2,050	0	1,050	1,000	1,050	550	1,550		1,550	400	850		500	300	300	200	0
Black 2,050	0	2,000		2,000	0	2,000	0	2,000	0	2,000	0	2,000	0	2,000		0
Total		**3,050**	**1,050**		**550**	**3,550**	**500**	**3,550**		**2,850**	**700**	**2,500**	**300**		**200**	

Solutions: White → 500; 700. Black → 50; 0. Total → 0; 3,050; 400; 2,300; 0.



Session 3

Action items

Goals

Summarizing and revising the new knowledge gained.

Identifying concrete applications of the new knowledge that benefit your factory.

Session 3

Overview

One member should read the full session out loud to the rest of group

20 minutes

Learning manual, pens, and markers

Throughout this module, you gained new knowledge on how to better plan, schedule and control production to increase productivity in your factory.

Planning production needs

Scheduling production

Controlling production

In this session, you will think of ways to apply your new knowledge to improve production planning in your factory by reviewing best practices and drafting your own action plan.

Time & action calendar and daily production report templates are available online for you to print out and use in your own factory. To obtain it, contact your factory's FIT coordinator!

Activities

Activity
3a

5 minutes

Best practices checklist

In this activity, you will review best production planning practices as a next step for evaluating your own and implementing improvements.

Instructions:

1) Together, look at the list of best practices in table 10, and put a ✓ in the column on the right if you use these practices in your factory.

Table 10. Planning production

Best practices	✓
1. Planning / Merchandising plans capacity (workforce), operations (machines) and inventory (materials) requirements for each order.	
2. Planning / Merchandising schedules production tasks for each order based on the shipment date.	
3. Planning / Merchandising uses a Time & Action calendar to schedule production for each order and identify areas for improvement.	
4. Factory Management makes a daily production report for each order every day.	
5. Production / Merchandising use the daily production report to control production, identify delays and address them on time.	

Activity

3b

15 minutes

Your action plan

In this activity, you will think of ways to apply your new knowledge to improve production planning in your factory by drafting your own action plan.

Instructions:

1) Together, fill in the action plan (table 11) on the next page. Identify a key problem that you want to solve and write down the solutions you identified while working on this module.

Table 11. Planning production – Action Plan				
Problem identified				
Solutions identified	**Action(s) to be taken**	**Person responsible**	**By when?**	**How will improvements be measured?**

Planning production

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FIT is being piloted in Asia under the regional Decent Work in the Garment Sector Supply Chains in Asia project funded by the Government of Sweden.

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