Management as a technology: evidence from India

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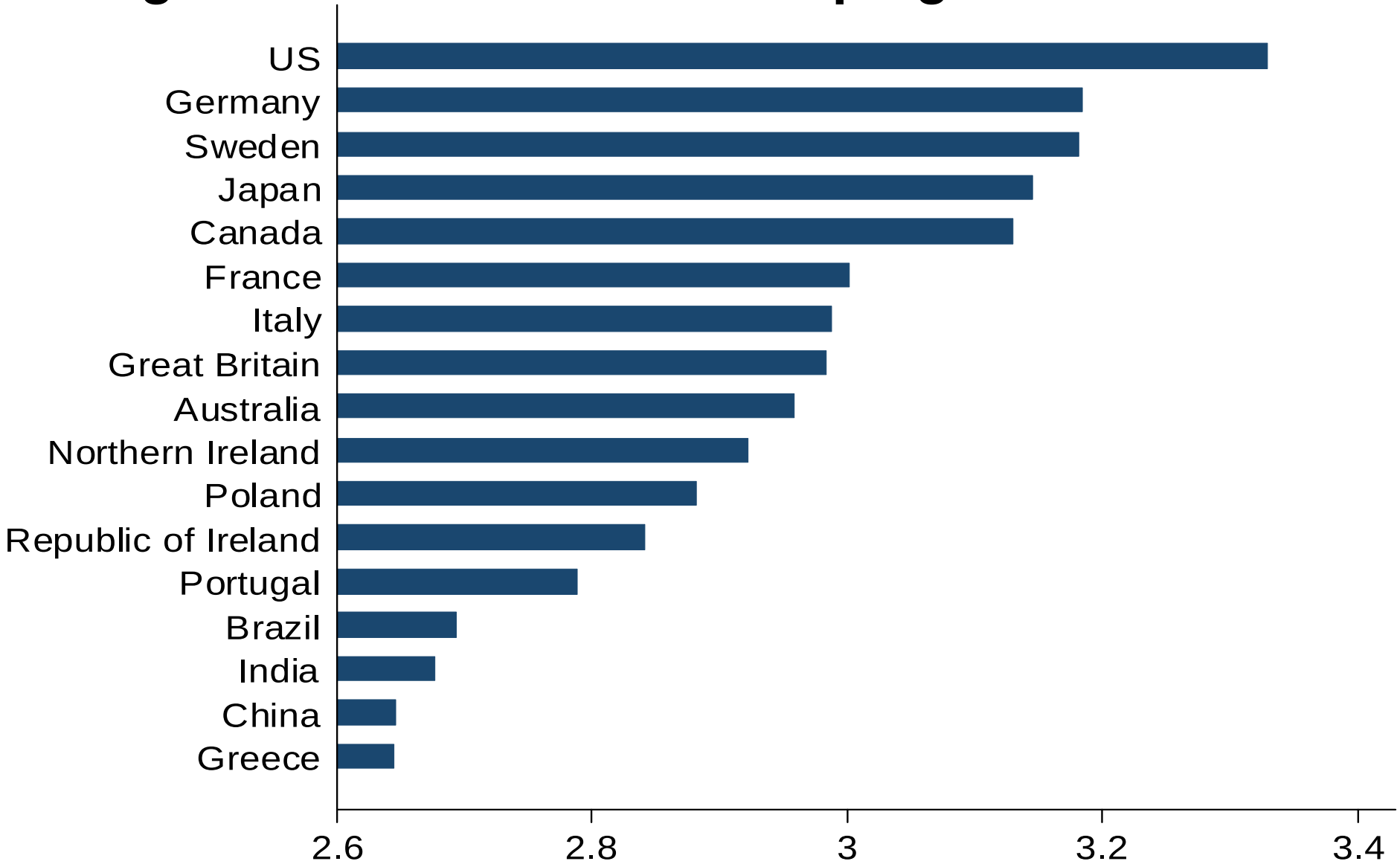
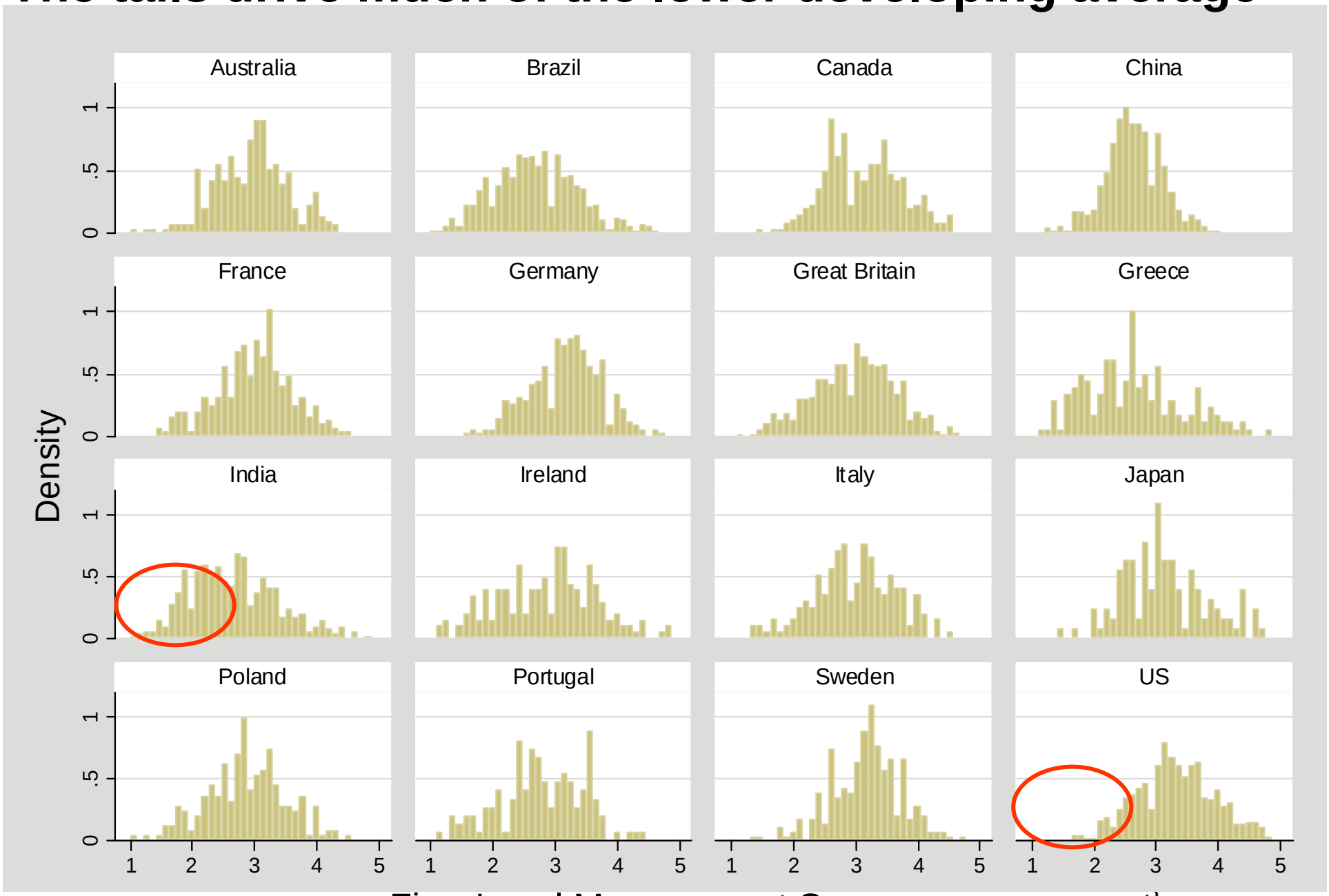
Management is worse in developing countries



The tails drive much of the lower developing average



This raises three linked questions

- What is the impact – if any – of bad management on firm (and ultimately national) productivity?

- If management does matter, why are some firms badly managed?

- If management does matter and some firms are badly managed, what policies could improve management?

To address these questions we ran management experiments in India

- Prior research provides evidence that management is important for productivity
  - For example, Ichnioswki & Shaw (1997), Black and Lynch (2002) and Bloom & Van Reenen (2007)

- But hard to confirm causality without field experiments

- Because of the cost of doing field experiments no prior work with medium or large firms. Only with micro entrepreneurs:
  - e.g. Karlan and Valdivia (2006), Bruhn et al. (2009)

- Our approach has been to work with a small sample of large firms and collect detailed data across metrics and time

The experiment randomizes a management shock

- Select 16 plants in Indian fabric firms with ave 250 employees
  - –Textiles is the largest Indian manufacturing industry
  - –These firms are big enough to need formalized management

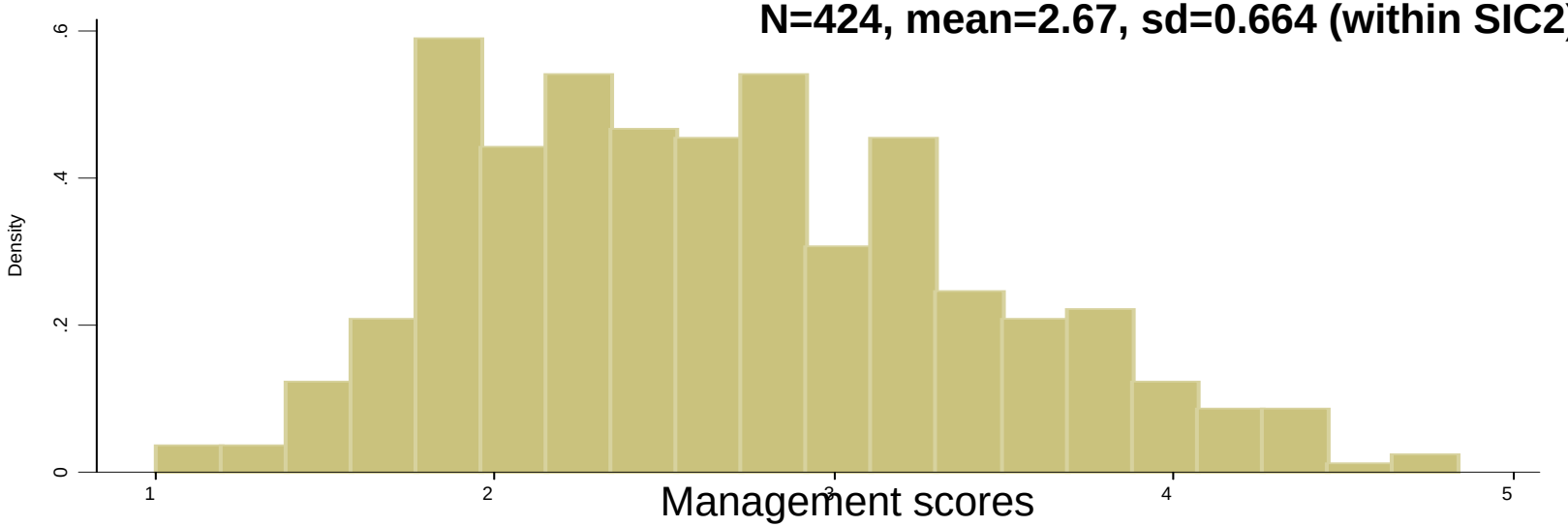
- Within this group we randomly select eight matched pairs:
  - – 8 treatment firms, given extensive free consulting
  - – 8 control firms, given very light consulting

- Firms selected according to
  - –Size (100 to 1000 employees)
  - –Location (near Mumbai and within 1 hour of each other)
  - –Data (have sufficient pre-intervention data)
  - –Agreement (CEOs & PMs agree to free consulting)

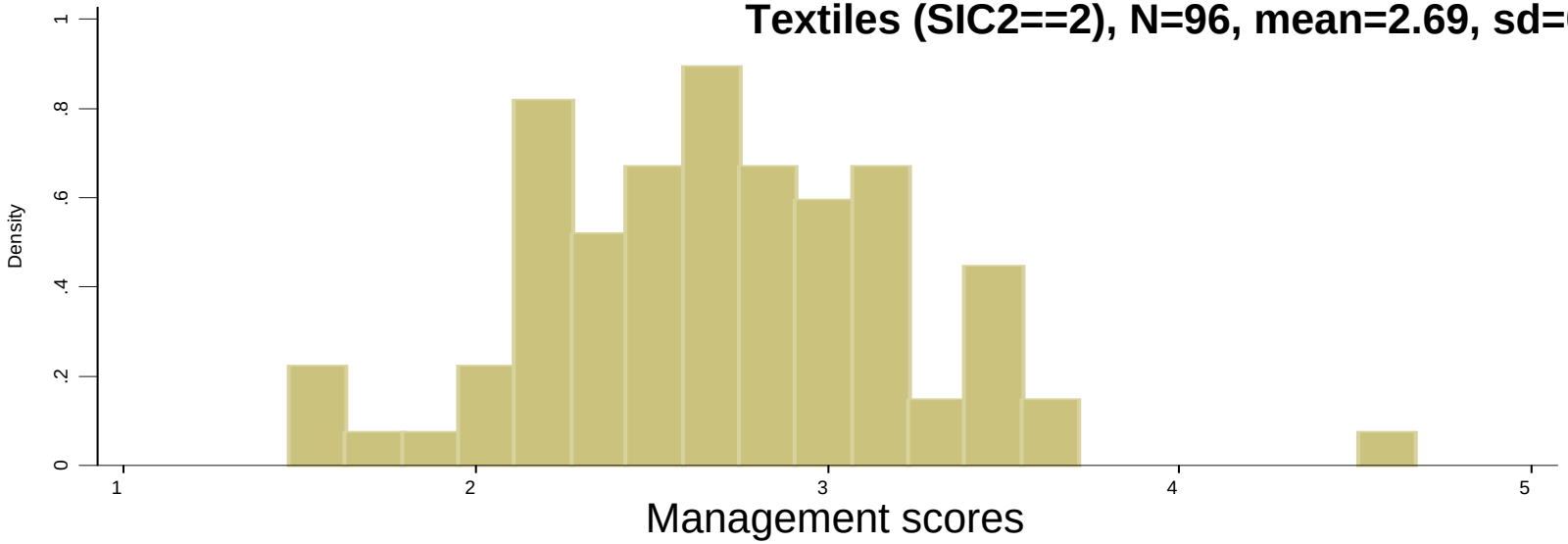
Textile firms in India have similar management scores to the rest of manufacturing in India

All manufacturing except textiles

N=424, mean=2.67, sd=0.664 (within SIC2)



Textiles (SIC2==2), N=96, mean=2.69, sd=0.548



Treatment on the treated: how we selected our sample of firms

- Started with a sample of 142 fabric firms around Mumbai with forecasted 50 to 5000 employees (based on assets)
- Kept the 64 firms within the Tarapor and Urmagaon districts, which are two central fabric firm hubs
- Of those 29 (47%) expressed an interest in free consulting on the initial telephone contact
- Of those 16 (55%) were willing to provide resources and data within 4 weeks to enable them to be part of the project

Two stage project timing

- Started with a pilot wave on 6 firms in August 2008
- Started main wave on 16 firms in April 2009
- Today I am going to present data from the pilot wave, hence will just give some example data and photos.

This slide deck outlines some preliminary findings

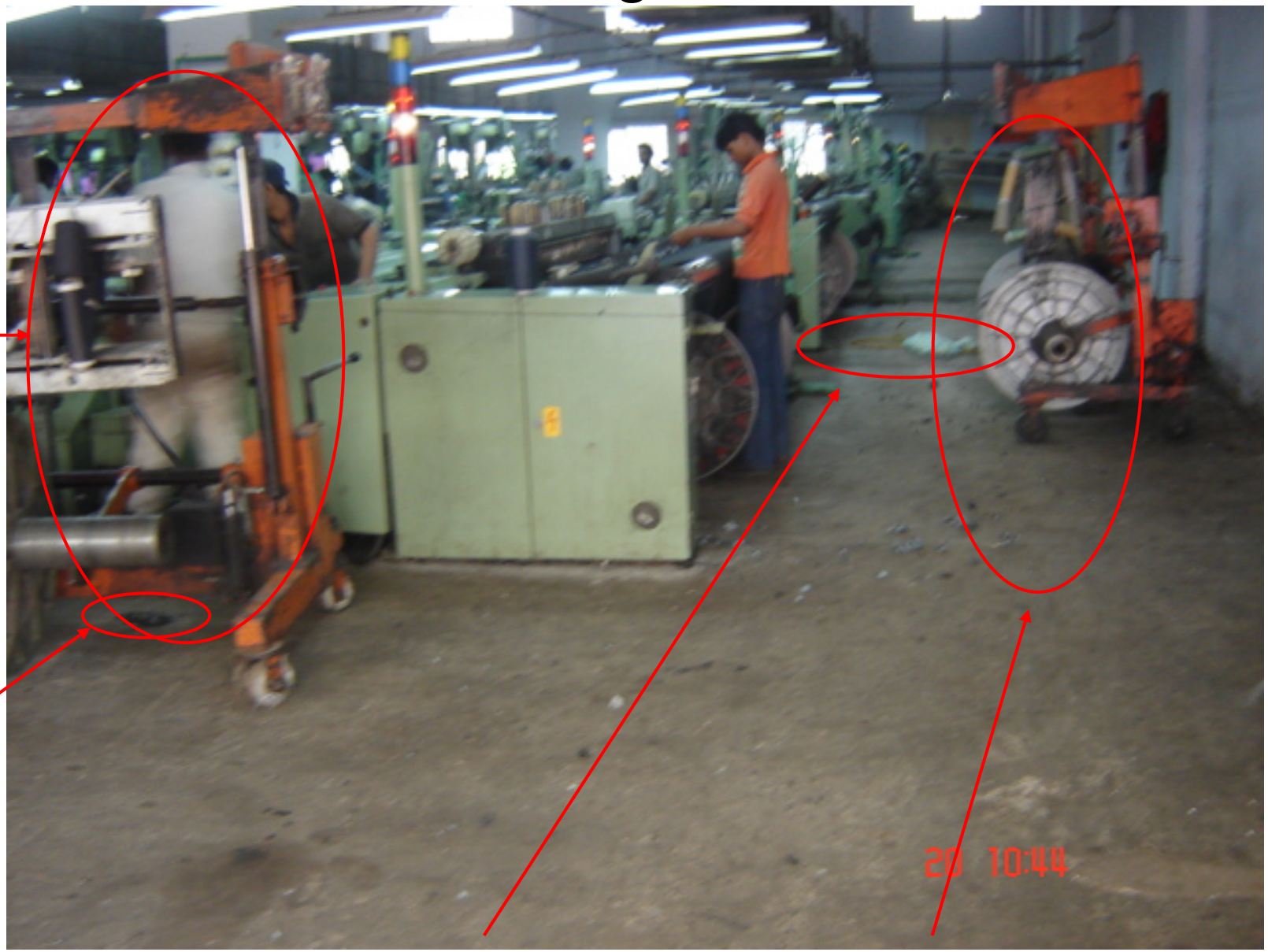
How can better management raise productivity?

- **Operational efficiency and safety**
- Inventory management
- Quality control
- Monitoring and planning
- People management

Why were these practices not introduced before?

Many parts of the factories are dirty and unsafe

The factories are also disorganized



And machinery and tools are not maintained (which leads to frequent production downtime)

Extremely dirty machine parts

Tools lying on the floor.

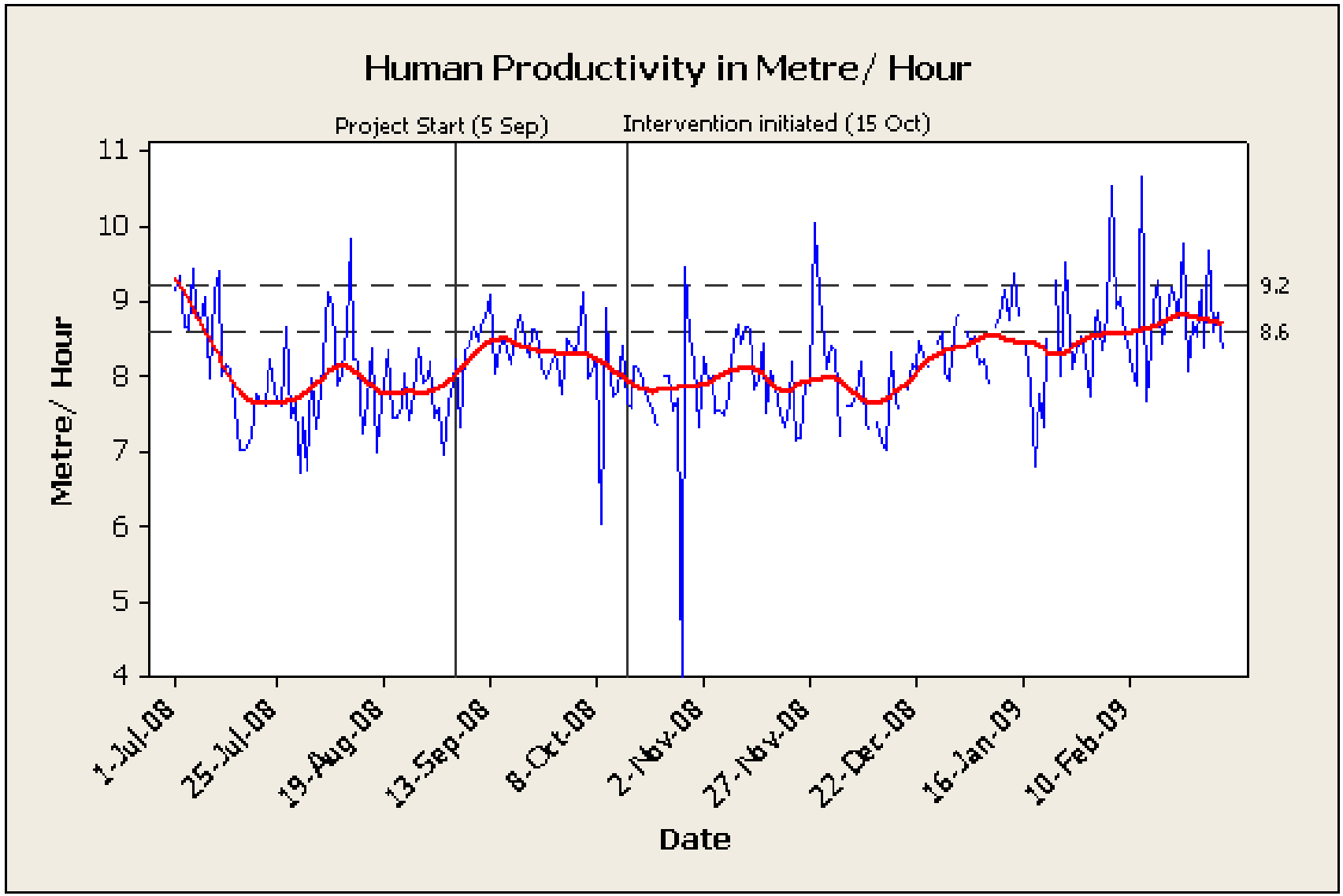
The treated firms have started to introduce basic initiatives (called “5S”) to organize the factory

Worker involved in 5S initiative on the shop floor, marking out the area around the model machine

Snag tagging to identify the abnormalities on & around the machines, such as redundant materials, broken equipment, or accident areas. The operator and the maintenance team is responsible for removing these abnormalities.

Large volumes of waste was removed from the factories and productivity is slowly rising

Daily labor productivity – one example firm



Example data from firm A

This slide deck outlines some of the key areas of management that we are improving in these firms

How can better management raise productivity?

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- **Inventory management**
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Why were these practices not introduced before?

Inventories were very disorganized, so that firms typically had more than a year of yarn inventory

Yarn without labeling or in any sort of order

Different types/colors of weft Yarn lying mixed

Organizing inventories enables firms to reduce capital stock and reduce waste (yarn rots)

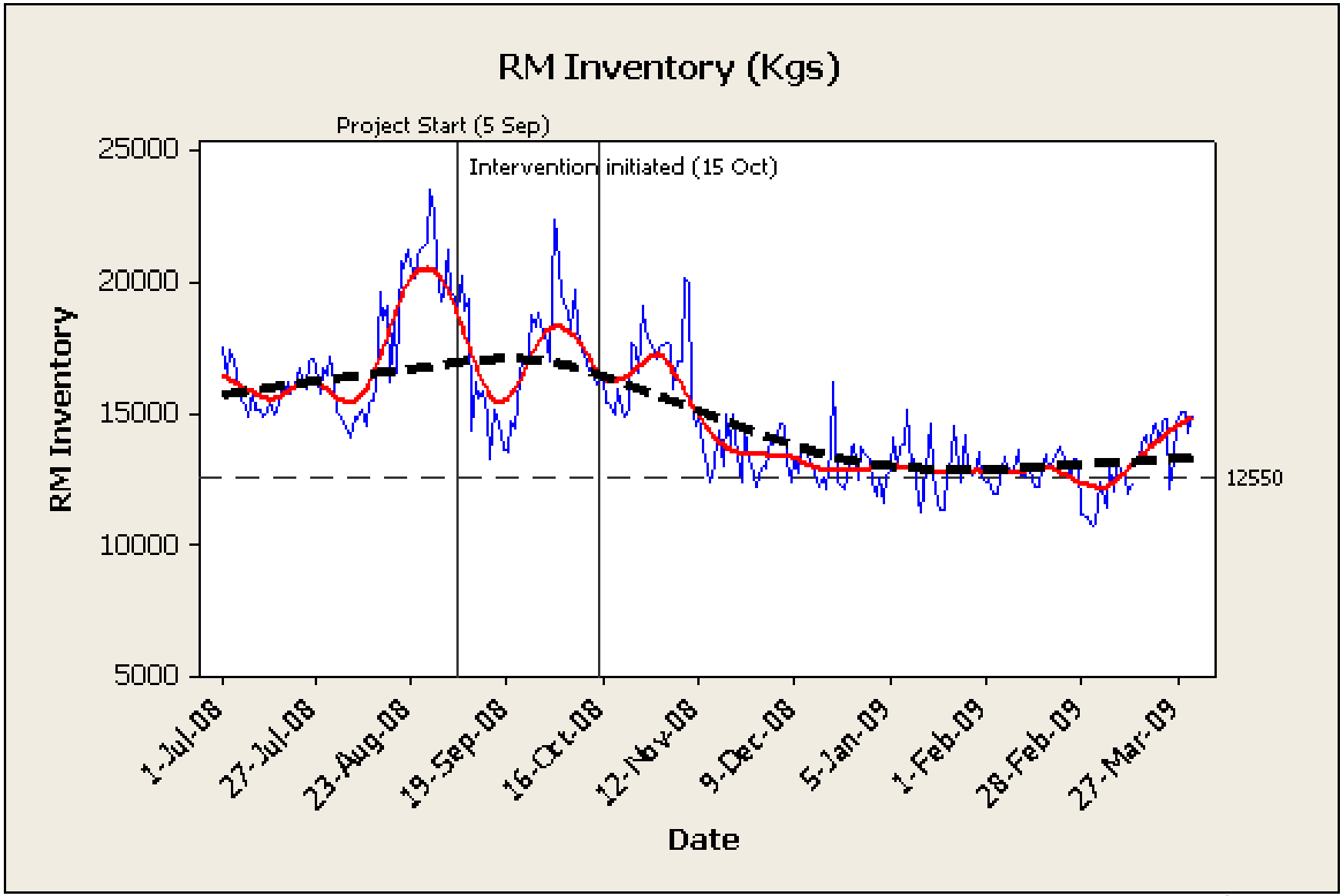
Stock is organized, labeled, and entered into an ERP system which has details of the type, age and location.

Inventory is now calculated on a daily basis as part of the set of metrics shown to the factory manager

New stock is ordered by demand forecast. Sales is also informed about excess stock so they can incorporate this in new designs.

Shade cards now produced for all surplus yarn. These are sent to the design team - which are typically based in central Mumbai several hours drive from the factory - so they can utilize in future designs

Inventory levels are slowly falling



Example data from firm A

There was a similar story for spares – these could often not be found or were damaged

Spares without any labeling or order

No protection to prevent damage and rust

Organizing spares reduces downtime (since parts can be located quickly), capital stock and waste

Nuts & bolts sorted as per specifications

Parts like gears, bushes, etc.

sorted as per specifications

A stand made in-house for storing reeds

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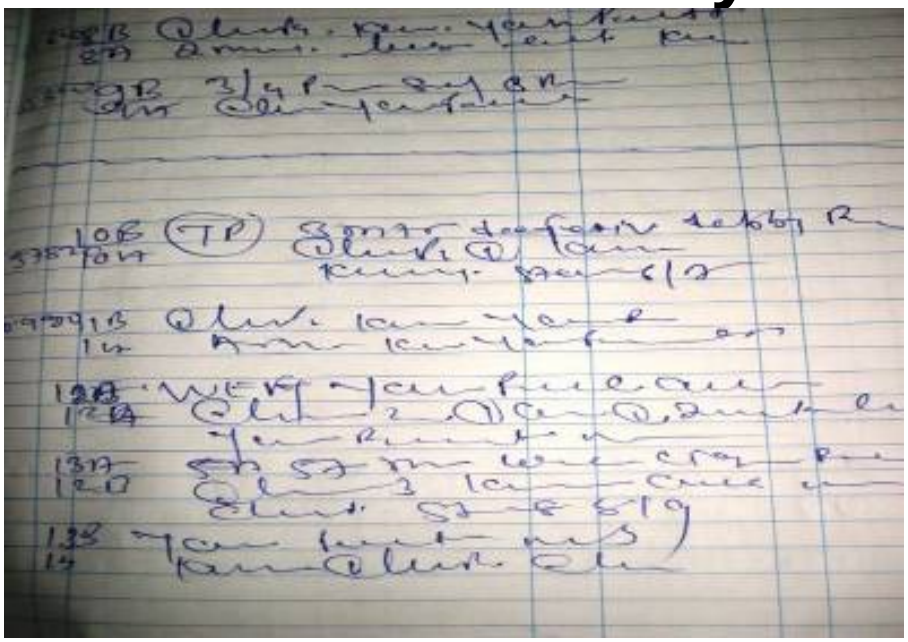
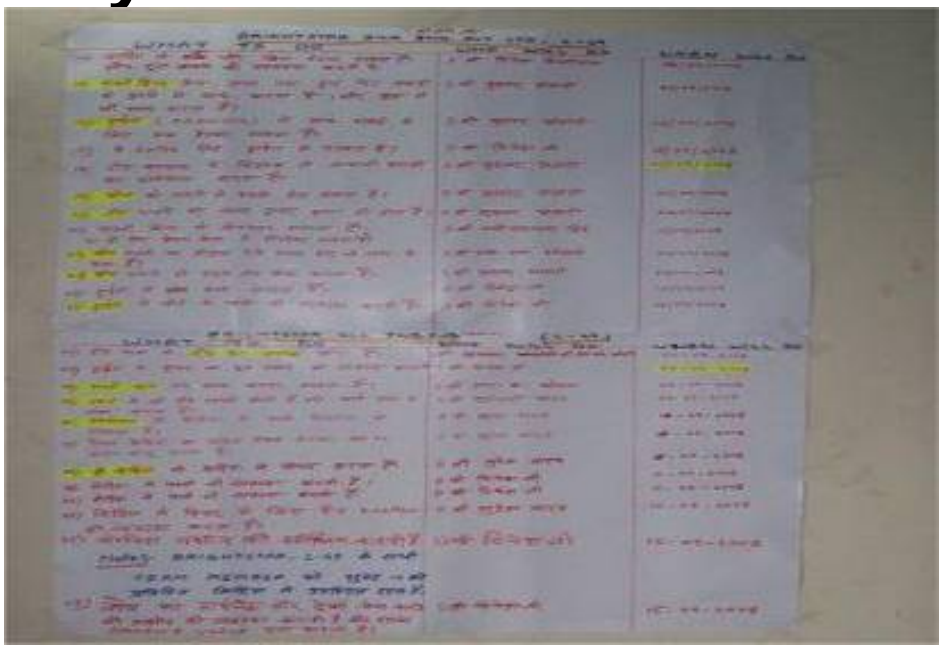
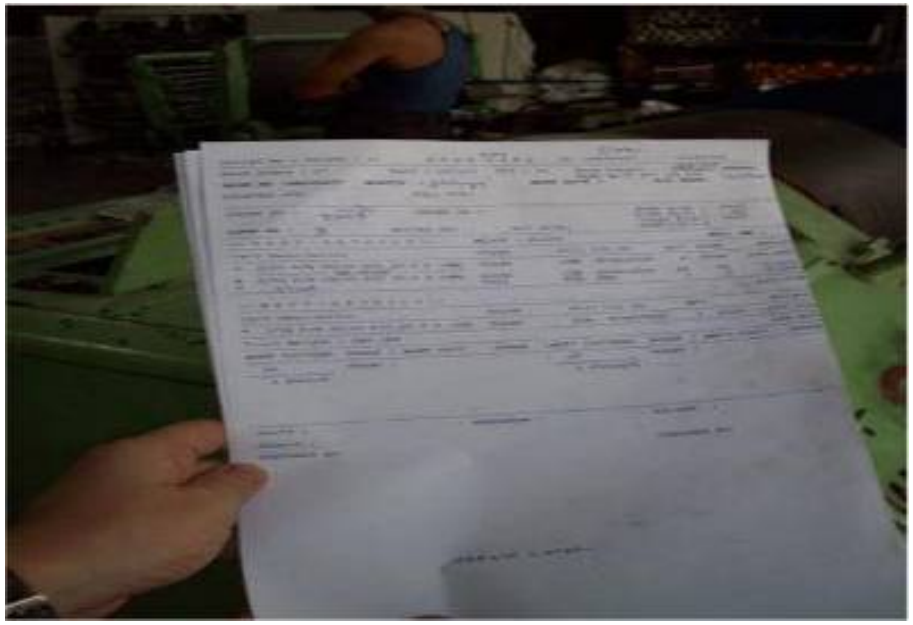
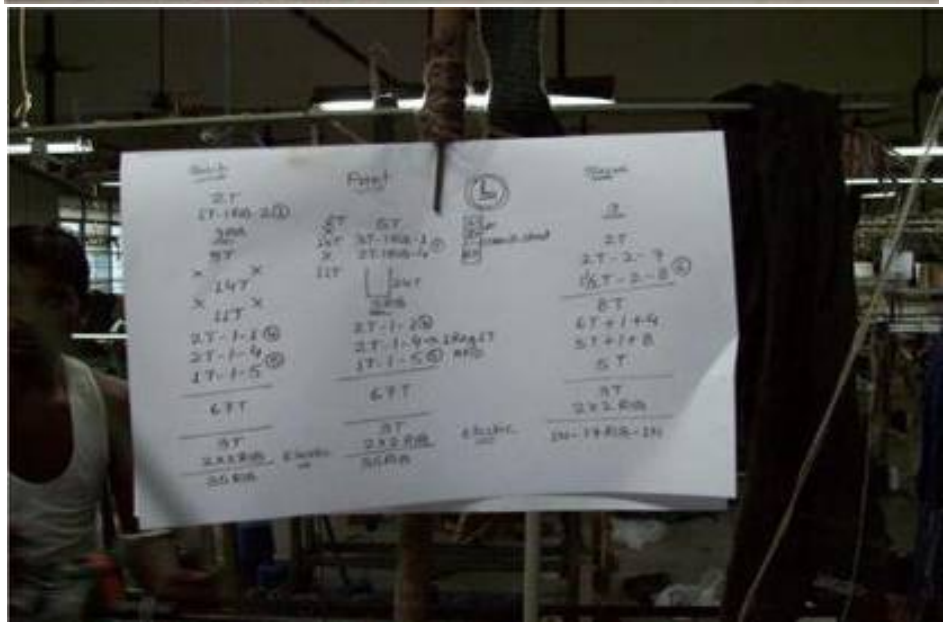
Why were these practices not introduced before?

Production information is collected but is rarely stored electronically or analyzed

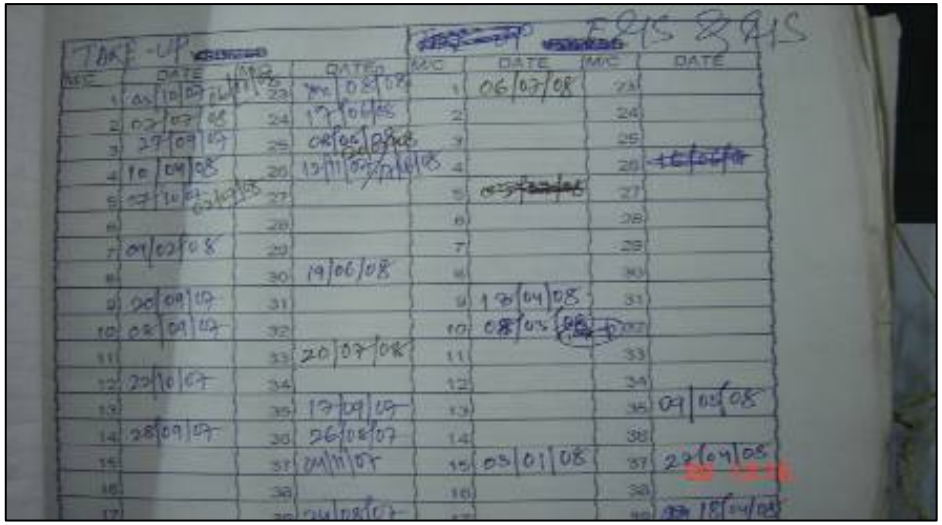




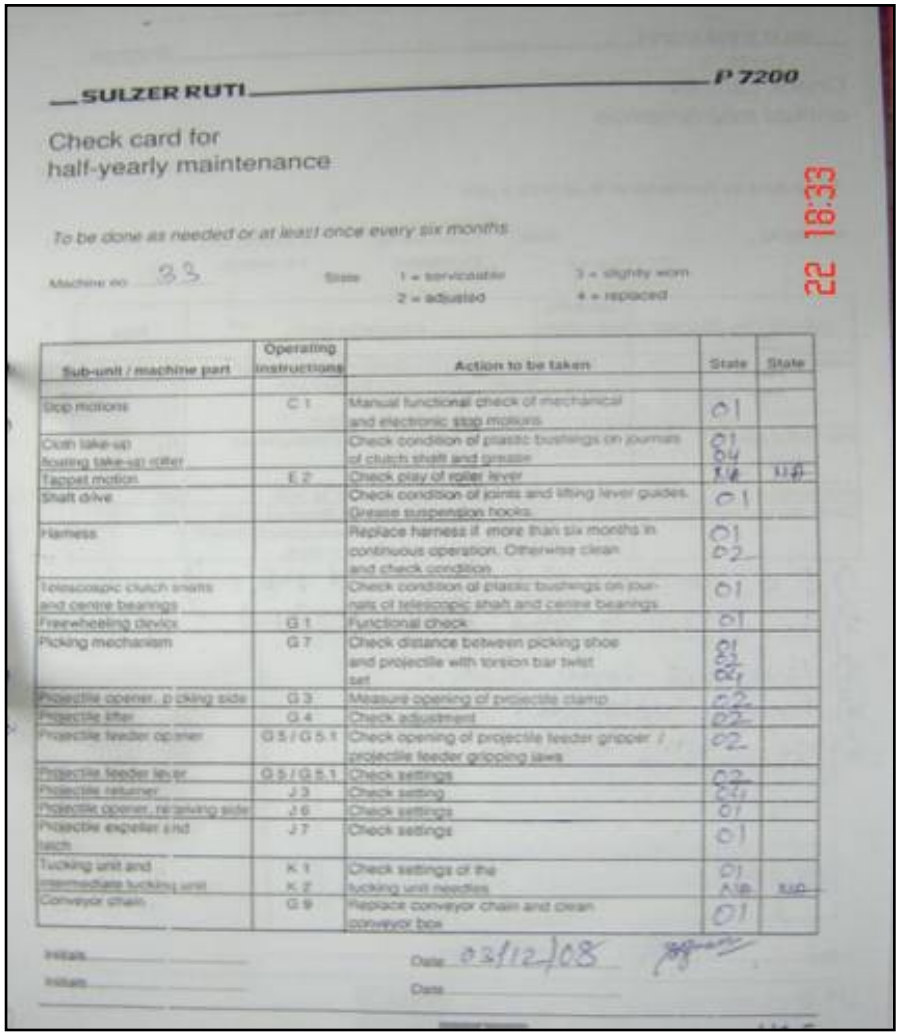




Part of the problem is much of the documentation is also ad hoc



Before treatment: the preventive maintenance record is not properly maintained.



After treatment: the appropriate recording format is designed and used.

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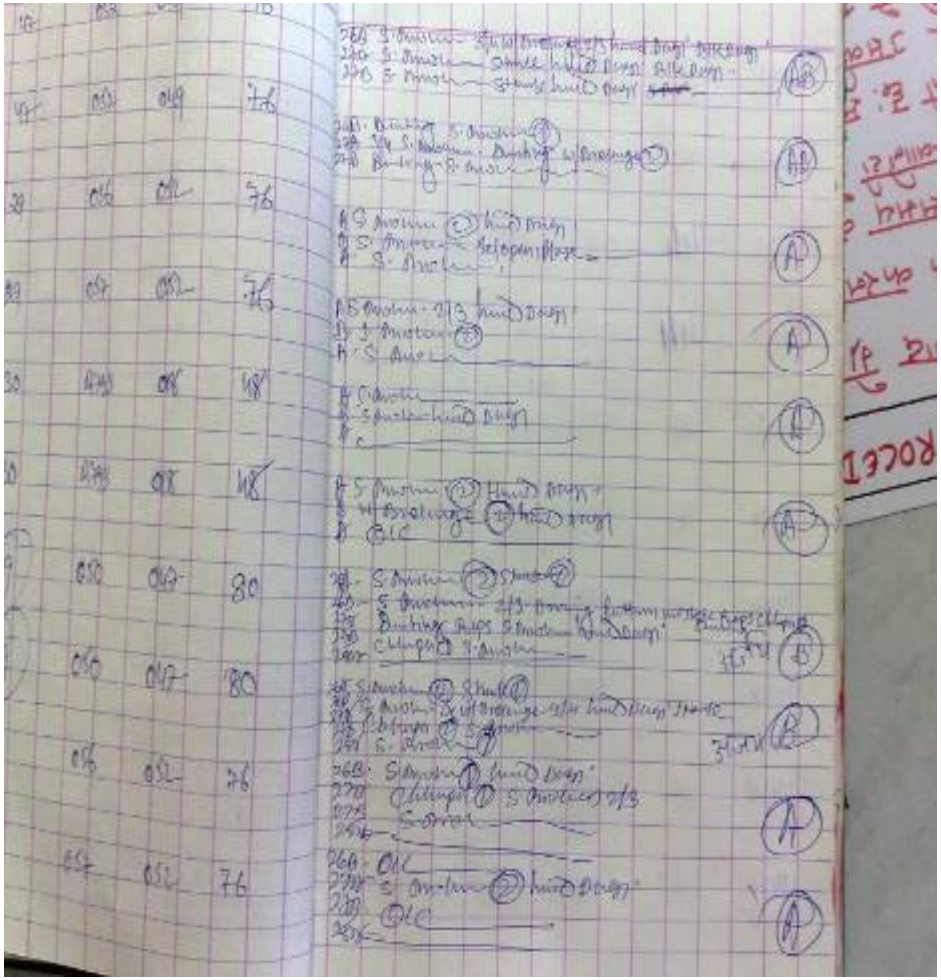
Data formats were simplified & converted to electronic modes to facilitate analysis and tracking



Before

The quality defects were captured in a format with poor readability which did not allow any data analysis

Date	Total Meters	Type of Defects																												QDI (No.)
		Selvedge Broken	Hole	Knotted	Broken Thread (No.)	Broken Thread (Metre)	Shade	Dobby Line (No.)	Dobby Line (Metre)	Double Pick	Short Pick (No.)	Short Pick (Metre)	Wrong Pick (No.)	Wrong Pick (Metre)	Double End (No.)	Double End (Metre)	Weft Cut	Drawing Broken	Drawing Metres	Oil Dag (No.)	Oil Dag Metre	Warp Pattern (No.)	Warp Pattern (Metre)	Line Off Pieces	Line Off Metre	QDI (No.)
1-Nov	5007	5	6		3	15		2	2	2	1					50	1	1	145	1		4	70			1.957
2-Nov	4713	3	4	2	2	45			70				4	120				2				2	155			1.634
3-Nov	5898		8					4	72	1					1	50		3	195			5	275			1.452
4-Nov	6047				1	20	2	4	4				2	2			1	2	125			6	345			1.089
5-Nov	7624	2	2		3	75	1	2	2	10							2	8	65			8	338			1.787
6-Nov	7215	4	12		1		4	8	8		7		2	32		30		4	130			10	310			2.580
7-Nov	6104	1			1	10	5	2	2	4	1						1	1	50			6	330			1.278
8-Nov	9918	1	4			30	7	2	10	4	1						8			3		4	150			1.260
9-Nov	7227	4	2		2	10	4	4	4	3			2	358				1	30			4	220			1.386
10-Nov	7394	1	6		1		4	2	2	4			2	68				2	70			5	220			1.434
11-Nov	6135	18	3				8	4		4	1				1	25		1				4	77			2.445
12-Nov	7295	1	2		1	3	2	2		6					1	30		1				4	200			0.980
13-Nov	7420	8	2		1		3	2	2	3					1	50	4	1	40	1		3	38			1.523
14-Nov	8892	6	6	1	2	10	6	2	12	4	1		2	28	2	100	2		25	1		6	205			1.785
15-Nov	6074	2	2	2			7	4	132		1				3	12	2	1	60			2	30			1.629
16-Nov	8668	1		2	1	2	4	8	8	8	2				1	30		1	70	1		4	135			1.286
17-Nov	6143	1	2		3	3	2	4	84	2	1		1	58	2	120						2	355			1.042
18-Nov	7361		4	2	1	20	9	8	8	4					1	10		1	45			2	342			1.712
19-Nov	7407		18	4	2	80	9	4	4	7	4												141			2.585
20-Nov	7223	2	8		3	64	3	2	52	4	2				2	200	2	1	80			1	170			1.516
21-Nov	6022	2	8		2	28				6					1	40				1			56			1.362
22-Nov	7517	3	4				13	1	14	10					1	20	2	2	65			2	348			2.089
23-Nov	7453	5	22		1	20	8	6	6	12	7				2	90		2	90			2	345			3.795
24-Nov	7378	5	12				13	4	4	19	4				2	25		1	95			1	220			3.289
25-Nov	5871	8	11		2	2	11	8	8	8	1				2	185	2	1	125			1	267			3.617
26-Nov	6397	3	4		1	15	6	4	4	4					1	100	2	2	95			2	90			1.798
27-Nov	7557	5	9	1			15			16					4	205		2	90	1		3	155			3.017
28-Nov	3498	3			1	10	4	4	4		2							2	170			3	468			2.088
29-Nov	6245	3	18	2	1	125	3	1	10								6	1	25			1	125			2.578
30-Nov	11857	5	11				22	2	2	12			4	4	4	380		2	65			3	110			2.286
1-Dec	4858		8		1	2	18	2	2	8					1	60	2	1	15			4	160			4.015
2-Dec	4808	2	17		2	24	7	2	2	10								1	30			2	140			3.689
3-Dec	7277		8		2	22	18	2	2	13	2	3			2	40	2					2	70			2.735
4-Dec	7228	4	18				10	2	2	4	3	45			1	125	6			1	120	2	95			2.960

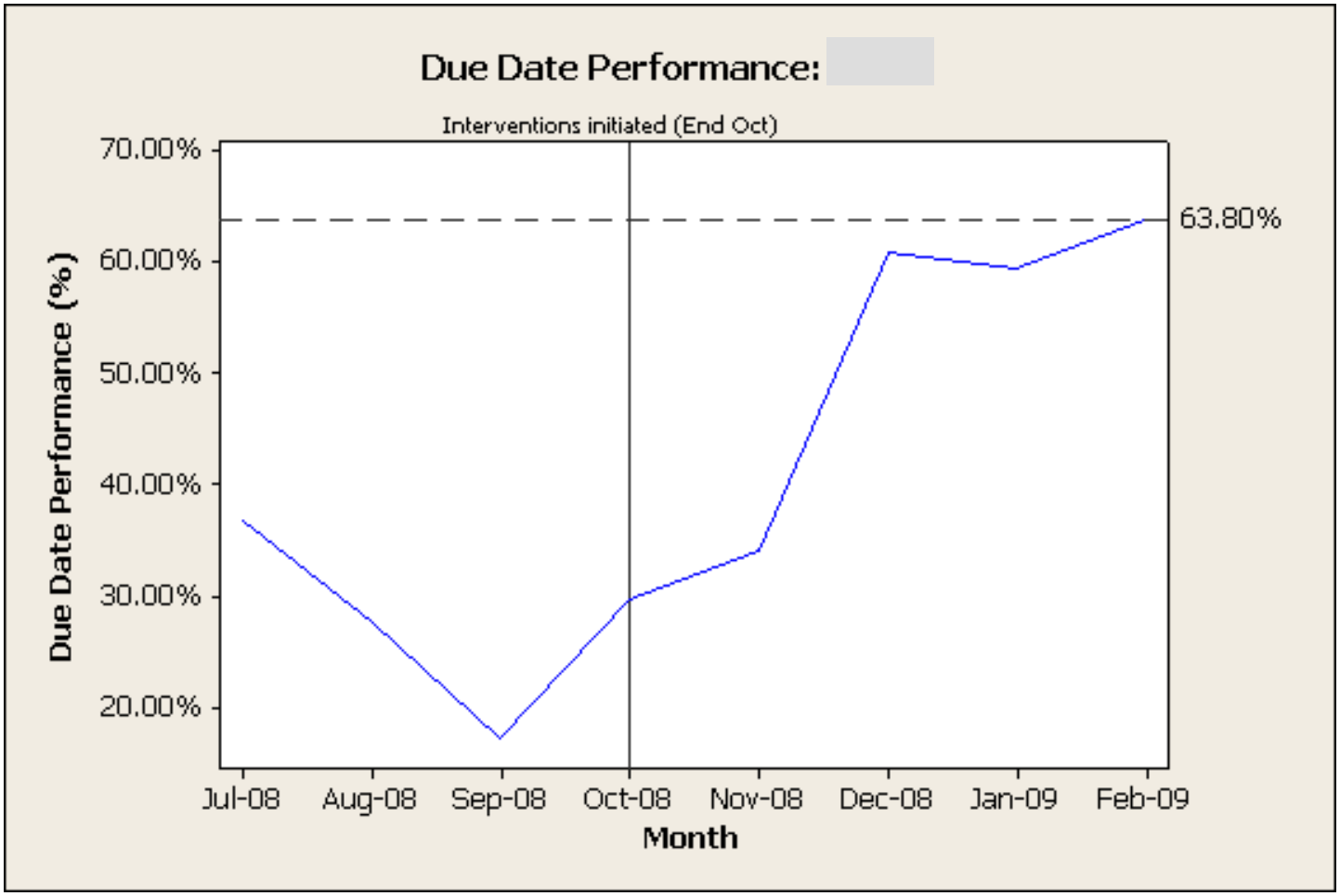
After

Quality defects are now stored in electronic format and a daily quality score is calculated and tracked

This data is now used in the new daily production and the weekly sales & operations meetings

Meetings aimed at continuous improvement based on high frequency performance analysis

Better organization helps in many areas – for example on time deliveries



- **Tracking production allows firms to change scheduling if orders are forecasted to be missed**
- **Sales now has visibility of the production schedule so can commit to dates that are feasible when taking orders**
- **Late production requires expensive air freight**

This slide deck outlines some of the key areas of management that we are improving in these firms

How can better management raise productivity?

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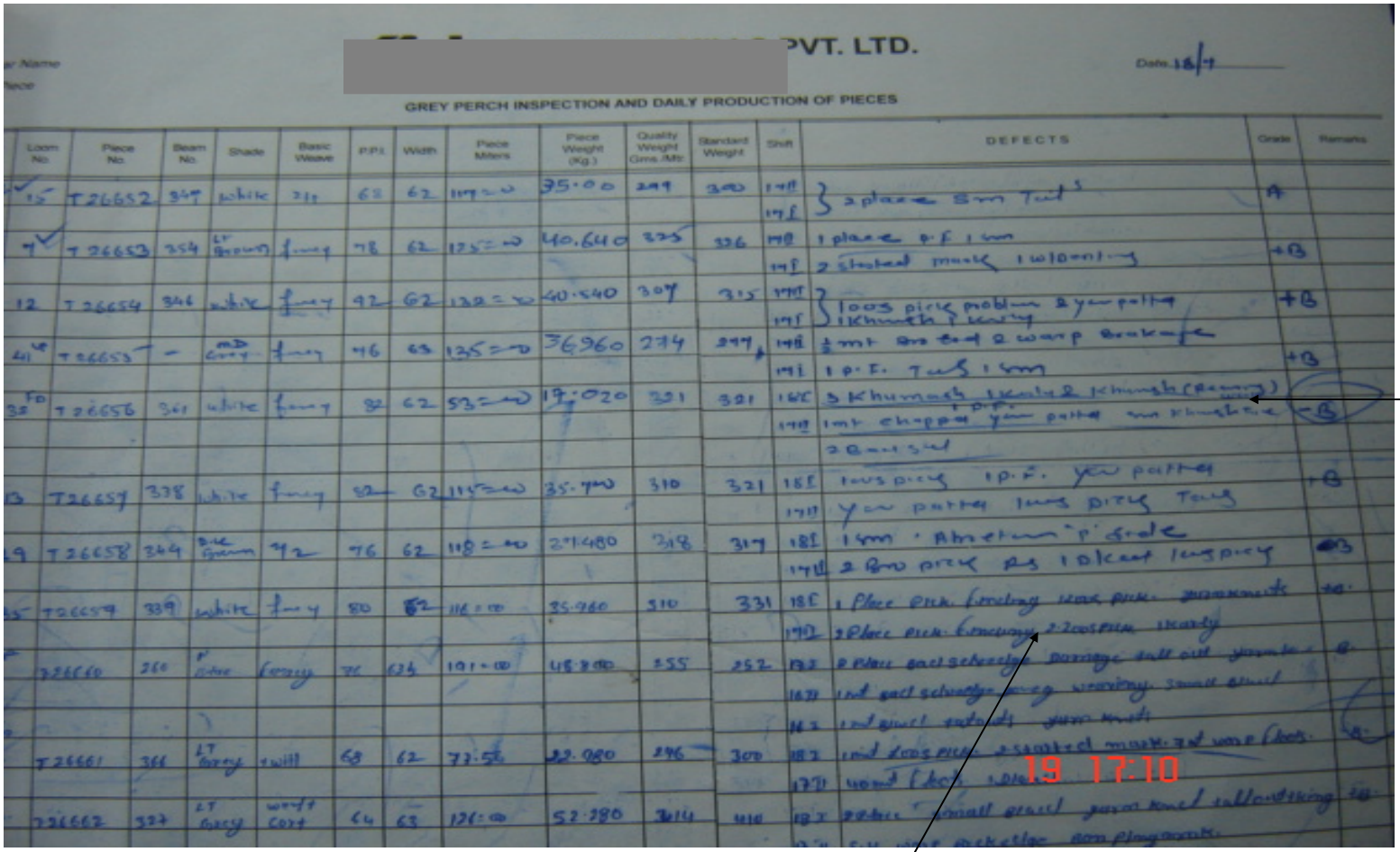
Why were these practices not introduced before?

About 1/3 of employees are involved in quality checking and repair

Previously quality checking was only used for customer rebates



No standard fabric grading norms

No standardized way to capture defects, so daily quality score was not available.

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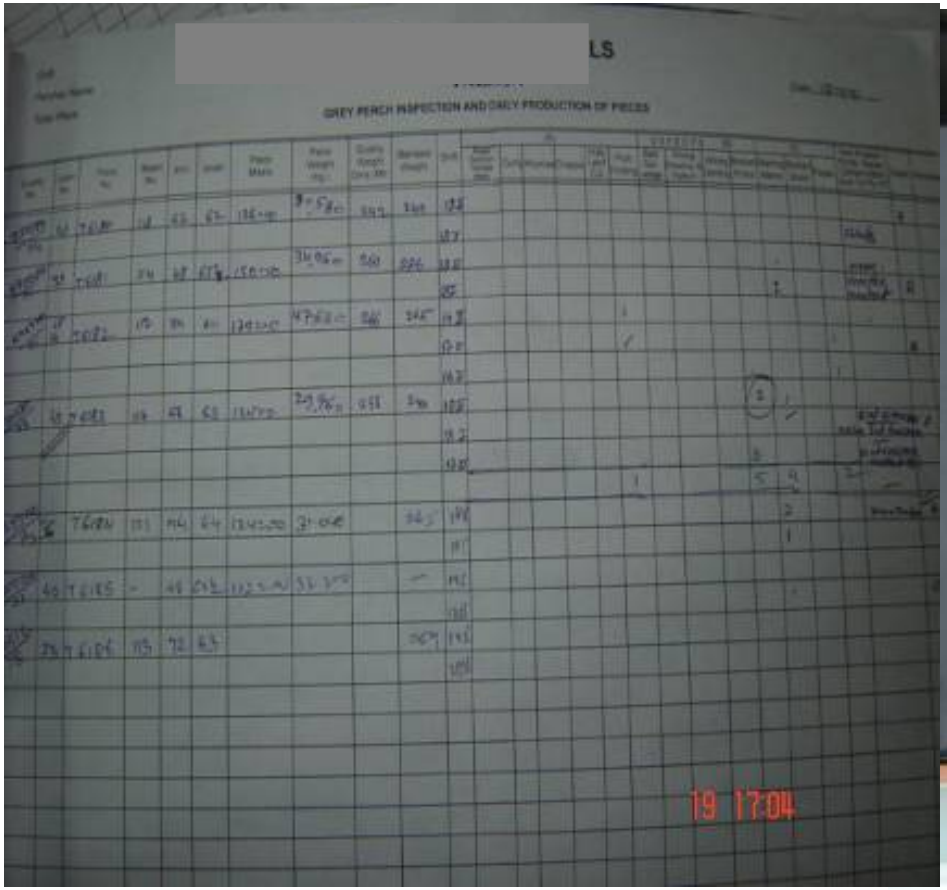
Now quality is measured in a systematic way, on a daily basis, and used for continuous improvement



The quality format is changed to accommodate all the frequent defects. This is used to calculate a daily Quality Defects Index (QDI). This is analyzed daily.

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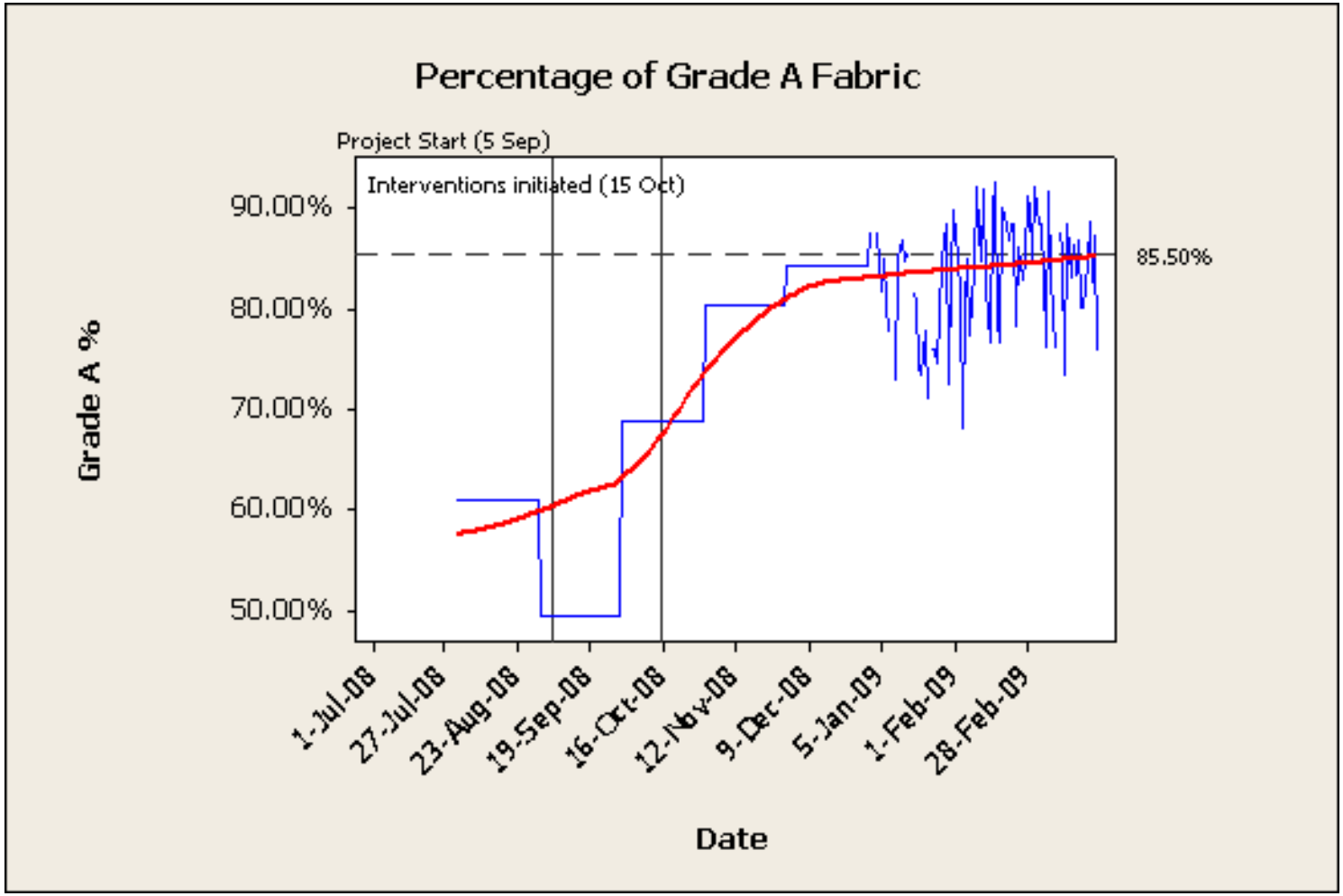
Quality is gradually improving, and as this happens less labor is used for checking and repair



- **Every fabric is given a grade (A, AB, B or C) at the gray checking stage**
- **A fabric is graded as 'A' if it has one or lesser number of defects which can be cut from the fabric at the stage of packing**
- **Grade A fabrics command the highest prices. Grade B or below are often unusable.**

Example data from firm A

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Why were these practices not introduced before?

Longer run improvements also require reforming HR practices to improve employee morale and incentives. Some limited changes have been done.

Director presenting a reward to the Top Weaver at the factory in the month of November

The names of the Top performers displayed on the notice board at the factory

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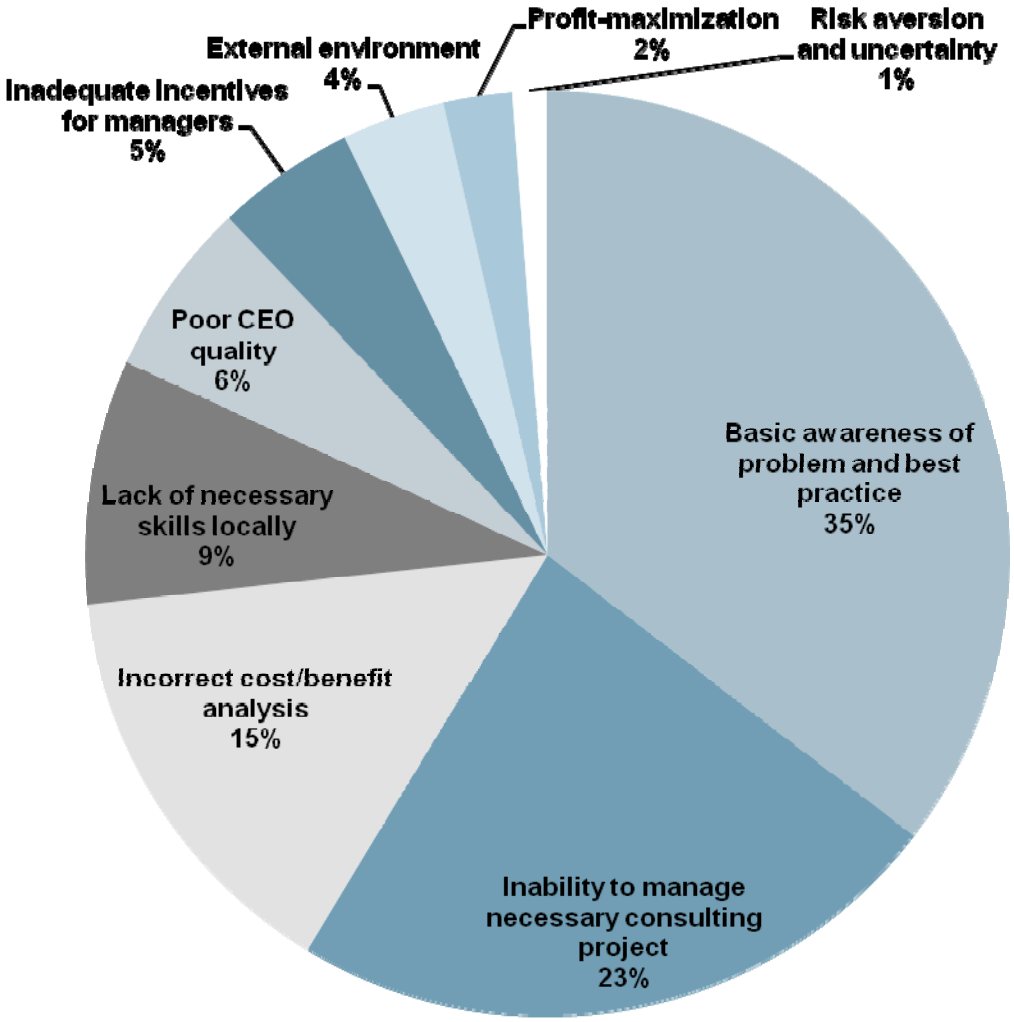
Why were these practices not introduced before?

“information” and “human capital” were the main reasons these practices were not introduced before

Across 128 individual management improvements Accenture undertook a root-cause analysis to evaluate why these management improvements had not previously been undertaken



This informational gap is not surprising

Management practices are gradually evolving over time

But these firms do not have links with will managed domestic firms (e.g. Tata or Reliance) or foreign multinationals

They also have no employees with an MBA, or any sophisticated customers

And no firm has ever hired consultants – they had no idea they are particularly badly managed

So there is no easy route for better management practices to filter through into this population of firms

This suggests policies to increase managerial awareness could have major impacts

Good management – like any technology – will generate direct productivity improvement and positive cross firm spillovers

Policies to help improve management include:

- Improved basic business education (e.g. 3 month “MBAs”) on finance, operations and HR basics
- Greater foreign exposure via competition, ownership & exports
- Government and industry association provided training
- Encouraging a cheap domestic consulting industry