Origin Africa 2012

Technology & Machinery Development

Effect of Technology and Machinery on Production World *vs* Africa

Addis Ababa, April 25th,2012

GHERZI

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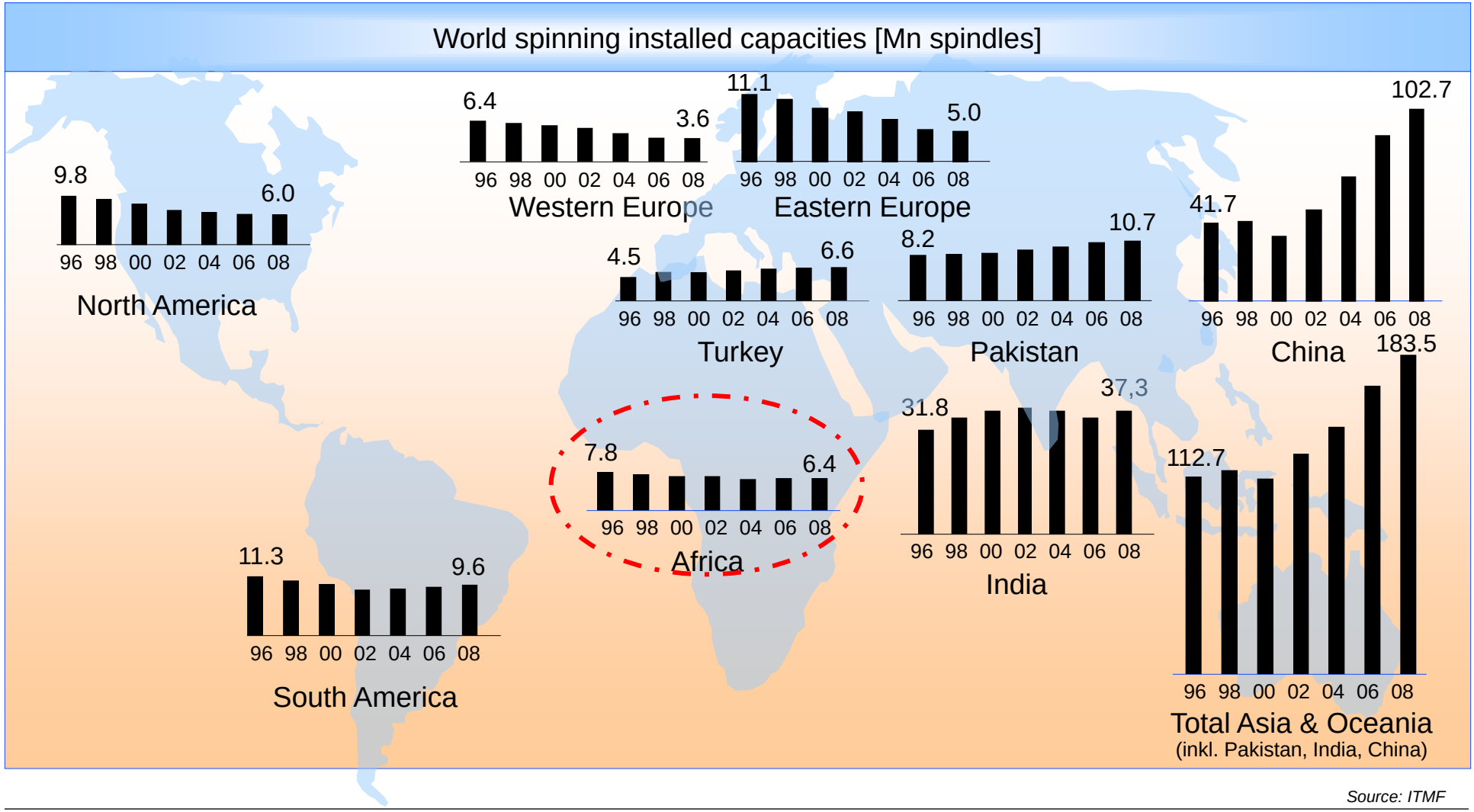
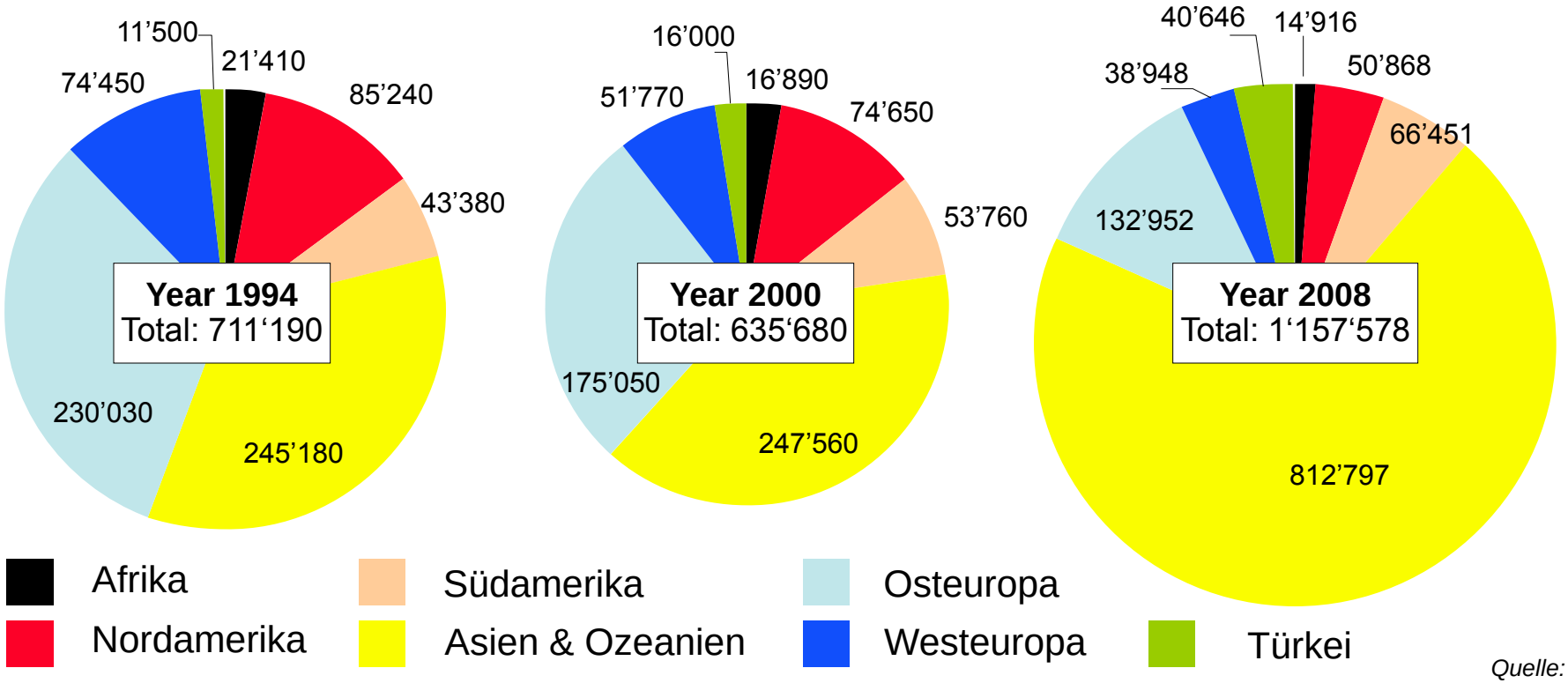
In the last 10 years Asia became the most important producer of short staple yarns while Africa‘s share declined



Source: ITMF

Majority of installed shuttleless weaving machines today are in Asia

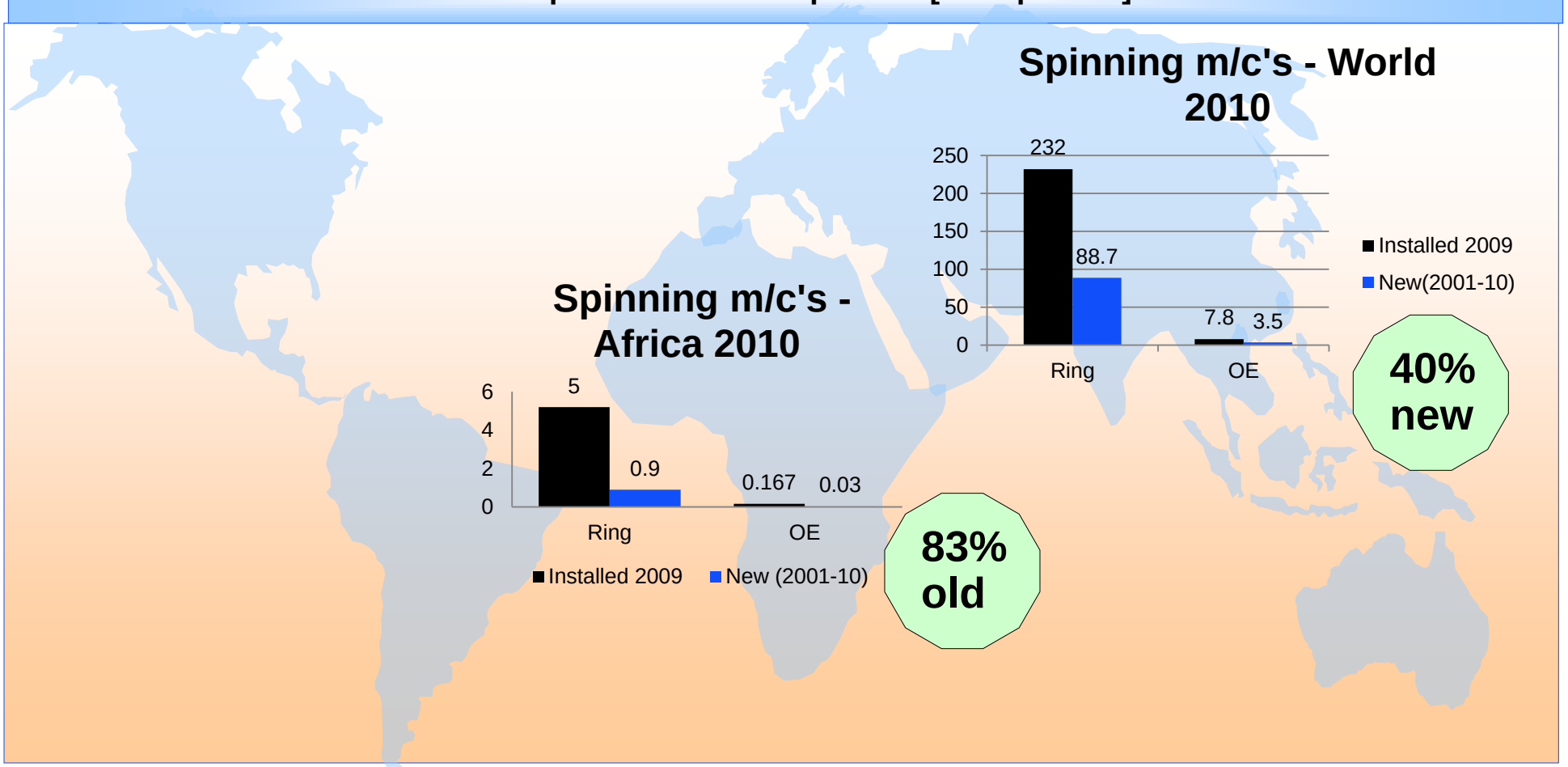
Development of installed shuttleless weaving machines (1994 – 2008)



Quelle: ITMF

Less than 1/5th of spinning machinery installed in Africa is below 10 years old

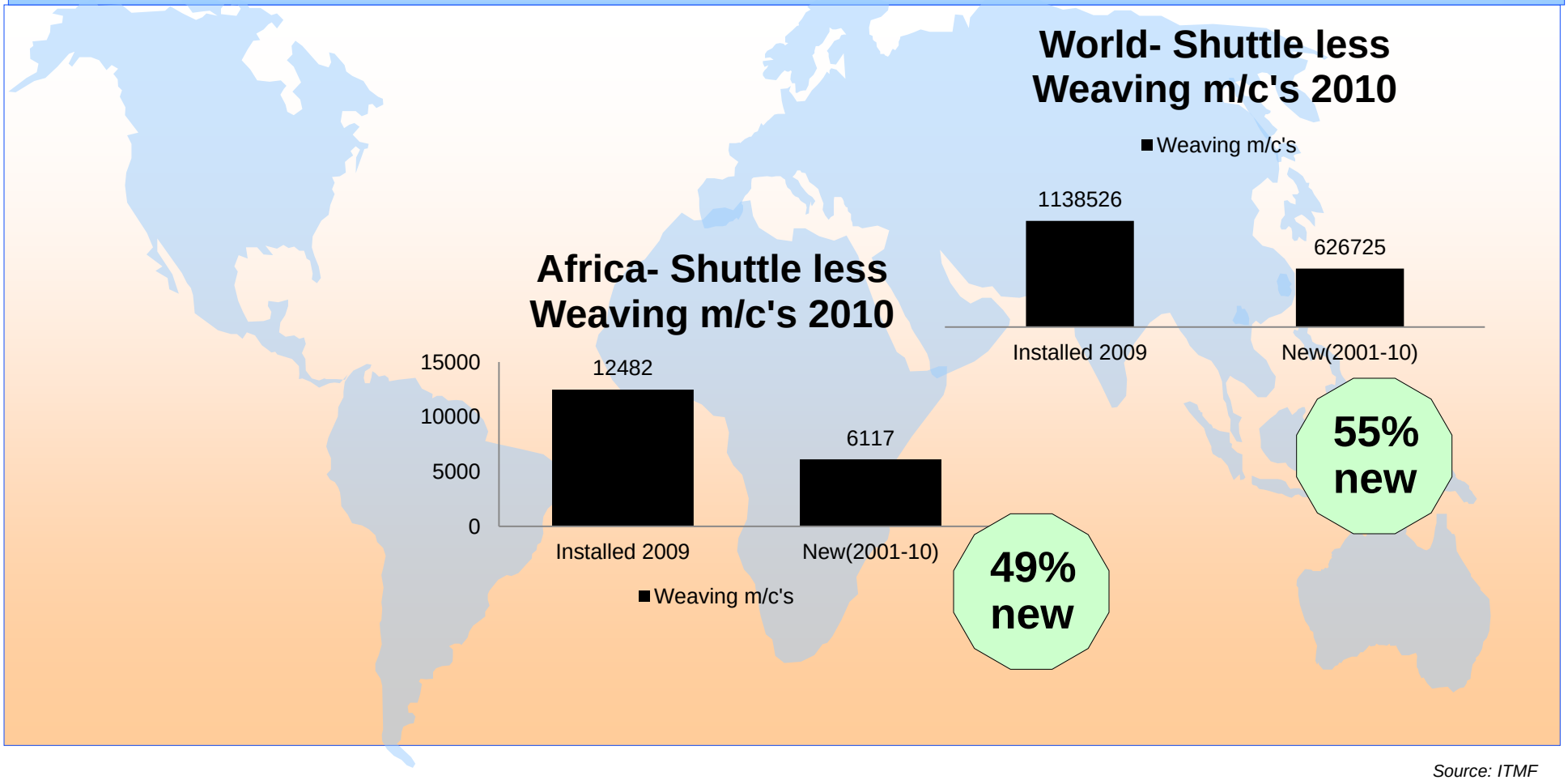
World spindle installed capacities [Mio spindles]



Source: ITMF

Although Africa still has shuttle looms, 49% of its shuttle less weaving m/c‘s are less than 10 years old

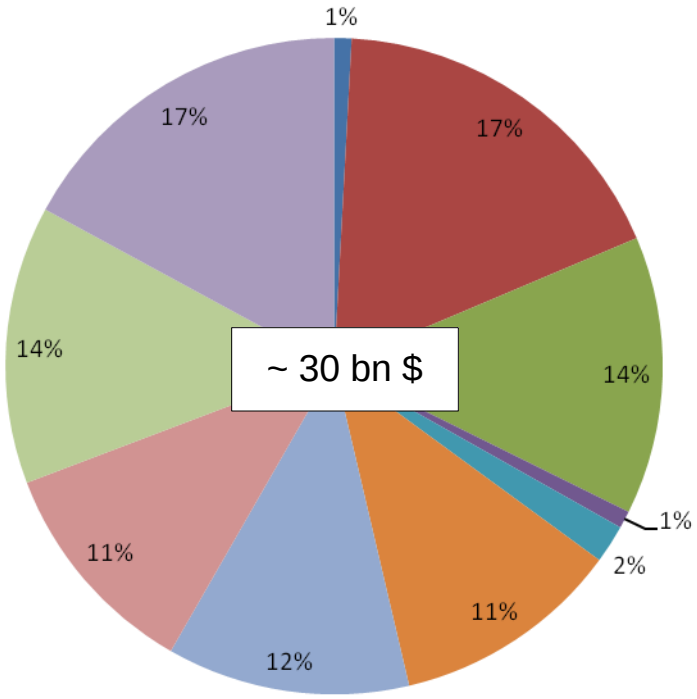
World shuttle less weaving m/c‘s installed capacities [No.]



Source: ITMF

Total world wide demand for textile machinery[1] was estimated at about US$ 30 bn in 2010

2010 Total Textile Machinery demand [1$=1.28CHF, 1€=1.4$]



Ginning	250 mn $	=	1%
Short staple spinning	5‘200 mn $	=	17%
Synthetic	4‘000 mn $	=	14%
Jute	250 mn $	=	1%
Testing equipment	550 mn $	=	2%
Weaving	3‘300 mn $	=	11%
Knitting	3‘500 mn $	=	12%
Finishing	3‘200 mn $	=	11%
Industrial stitching	4‘000 mn $	=	14%
Msc[2]	5‘000 mn $	=	17%

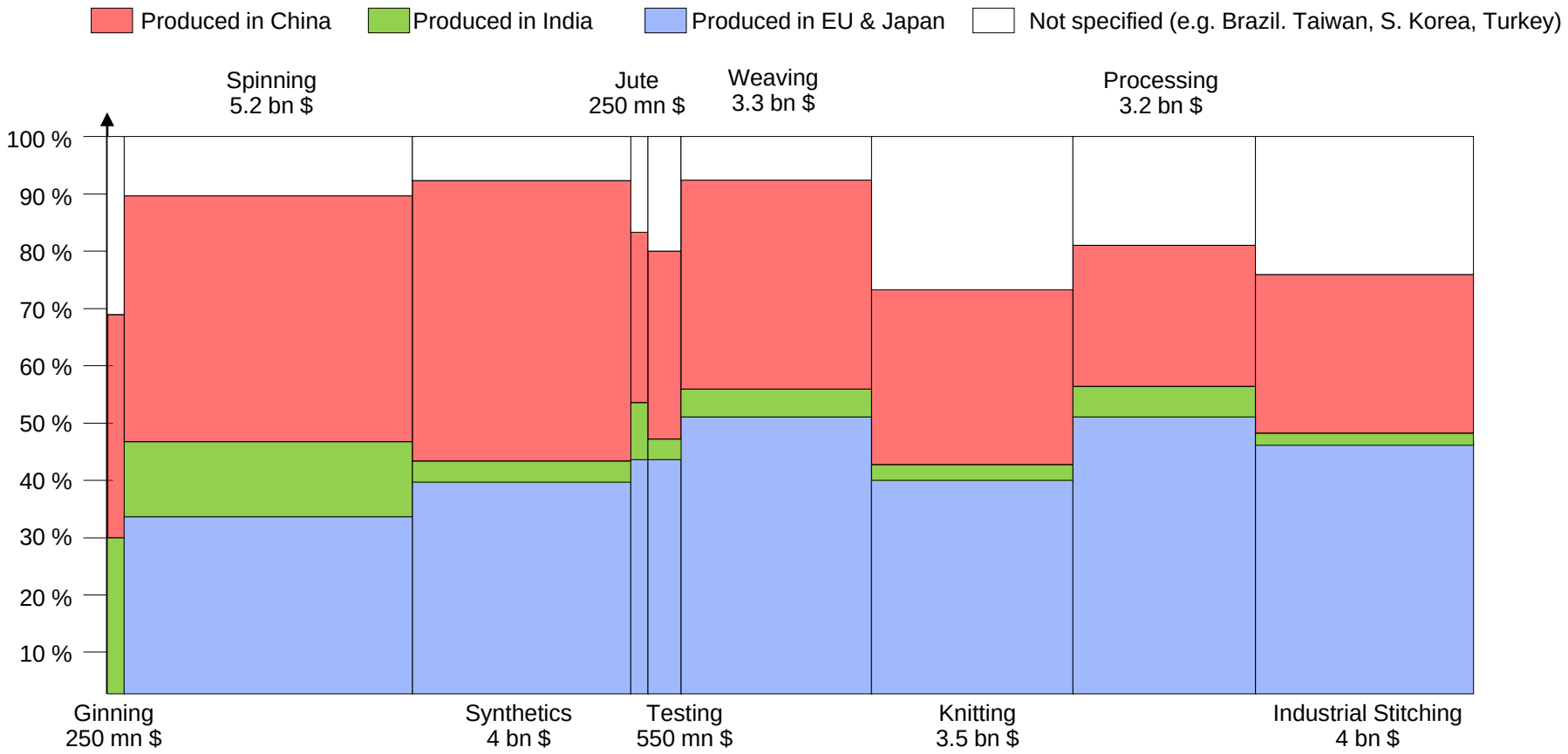
[1] not including spares, consumables and accessories as well as second hand machinery

[2] including nonwoven, webforming, longstaple, embroidery, braiding, trimming and other garmenting equipment (cutting, engraving, fusing, quilting, ironing, folding), other synthetic machinery (other than extrusion & texturizing), etc

Source: Gherzi

China has become the leading textile machinery producing country

2010 – Repartition of major textile machinery producing regions [1$=1.28CHF, 1€=1.4$]



Source: Gherzi

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Impact of technology and machinery on production in textile manufacturing process

- **Spinning**
- Weaving
- Processing
- Machinery evaluation criteria

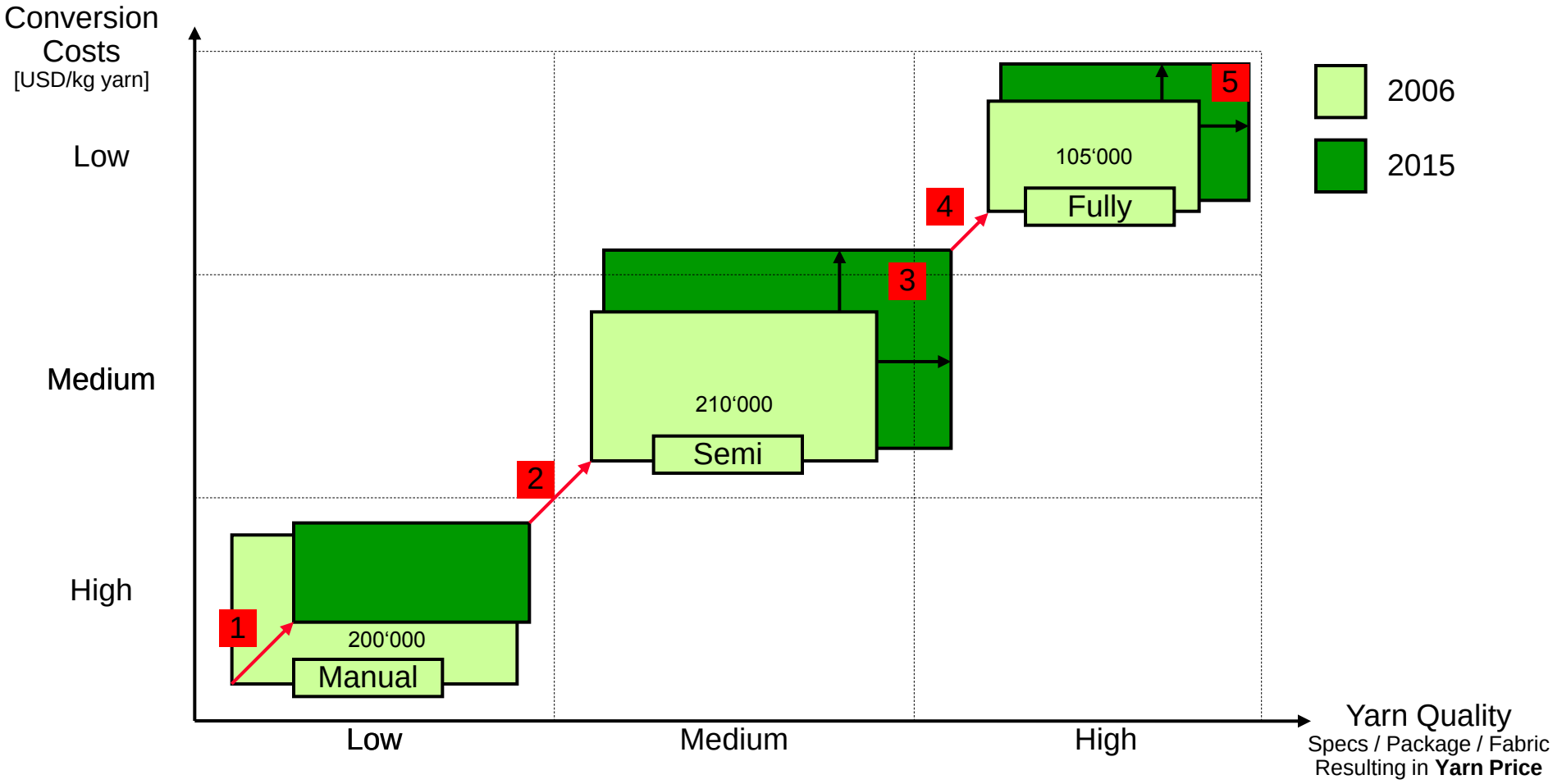
Segmentation, definitions and specifications: Ring Spinning

Premium	• State of art machine with high speed and high quality • M/c equipped with maximum spindles per machine (1632 / 1680) • Automatic doffing mechanism connected to automatic cone winder • Spindle speed > 22,000 rpm • Price range (200-225 US$ / Spindle)
High	• Modern machine with most of automation features • Machine equipped with automatic doffing mechanism • Spindle speed in the range of 20,000 rpm • Imported components (Texparts, Novibra) • Price range (90-120 US$ / Spindle)
Medium	• Ring frames with high speed up to 16000 rpm • Ring frames without auto doffer • Price range (60-75 US$ / Spindle)
Low	• Conventional machine with less features • Ring frames with high speed up to 13000 rpm • Machines with minimum spindles • Indigenous components • Price range (50-55 US$ / Spindle)

Significant differences between three generations of rotor spinning technology

	Automated		Semi Automated				Manual		
	Schlafh. AC 360	Rieter R 40	Schlafh. BD 380	Rieter BT 923	Rifa RFRS 30	Taitan TQF 268	Shanxi FA 601	Jingde F1603	Jingwei F1603
No. of rotors	480	400	352	320	240	240	200	192	192
Speed [rpm]	150'000	135'000	110'000	110'000	100'000	95'000	75'000	75'000	60'000
Delivery [mpm]	300	300	180	170	170	150	90	106	110
Piecing Automation	Fully	Fully	Semi	Semi	Semi	Semi	Manual	Manual	Manual
Tube Loading	Yes	Yes	No	No	No	No	No	No	No
Package Doffing	Yes	Yes	No	No	No	No	No	No	No

Rotor spinning technology is shifting towards semi and fully automatic m/c's



Air jet spinning, with its productivity and yarn quality, will revolutionize the future spinning

Significant strengths and opportunities at the running performances show the potential of Air jet spinning

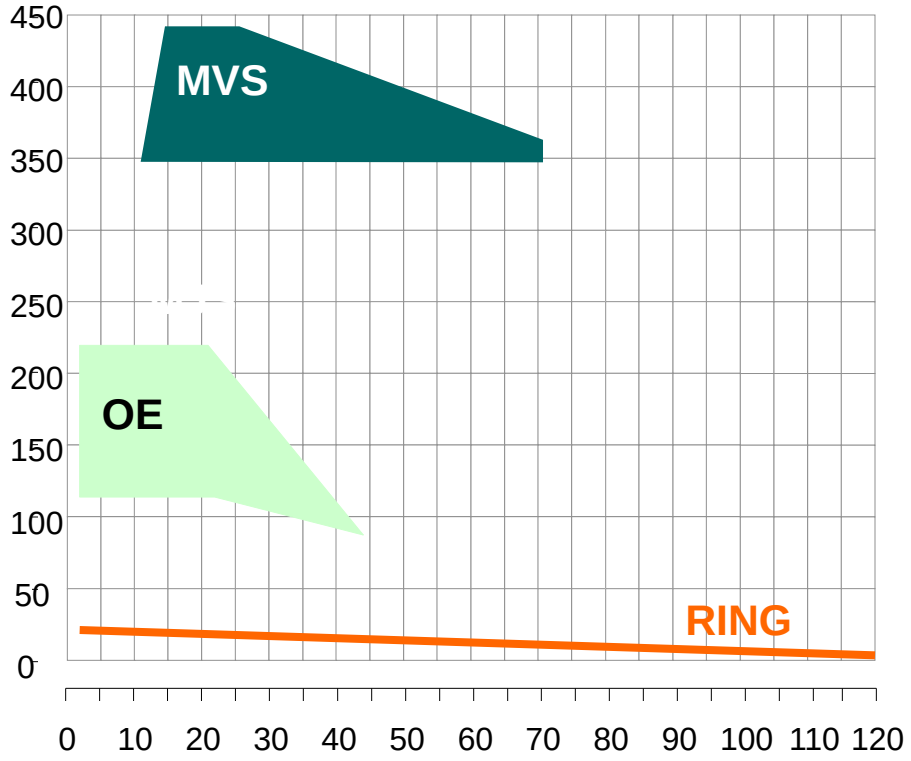
	Strengths of the Air Jet technology
Running performance	• High productivity (350-450 m/min) • High efficiency: KOB: 90-94% / BS: 95% • Low labour requirement compared to other systems • Less energy costs (less installed power per machine, less air condition and less space • Lower conversion costs than ring and OE (lower investment and higher productivity) • Yarn quality comparable or better than ring and OE in most of the necessary parameters • Higher pilling resistance and 40% less hairiness compared to ring yarn • Higher yarn strength compared to OE yarn, little lower than ring yarn • Yarn is bright, soft and shiny, due to its closed and smooth yarn surface (bright colors) • Lower investment costs (smaller building, no roving frame, no winders, 1 more drawer)

The dominant criteria of the Air jet technology are the high productivity and the lower investment costs compared to Ring- and OE-technology

	Comparison criteria	
	Air jet vs. Ring	Air jet vs. OE
Investment costs	• The total investment costs are **lower**	• The total investment cost about **equal**
Labour costs	• Abt. **50%** of operational staff is required	• Abt. **80%** of operational staff is required
Energy costs	• Savings **up to 30%** are proven	• Savings **up to 15%** are proven
Production space	• **Half** of the space (same prod-capacity)	• Space demand about **equal**
Process complexity	• **Much lower** process complexity	• **Comparable** process complexity
Yarn quality	• Lower hairiness • Higher pilling resistance	• Lower hairiness • Higher pilling resistance

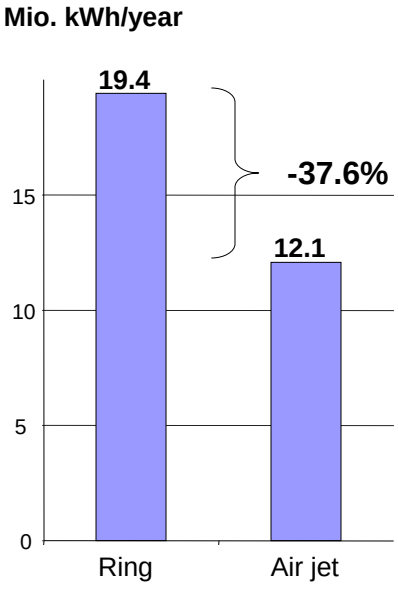
High speed and low energy costs lead to lower conversion costs in comparison to ring spin technology (e.g.: 4’000 MT p.a.,Ne 30 Combed)

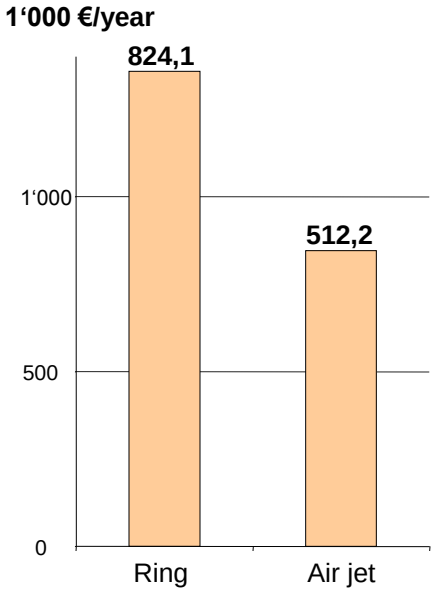
Spinning speed



Energy consumption

Yearly operation: 8‘000h
Energy load: 70%
Cost / kWh: 0.042 €





Source: Gherzi Research

Impact of technology and machinery on production in textile manufacturing process

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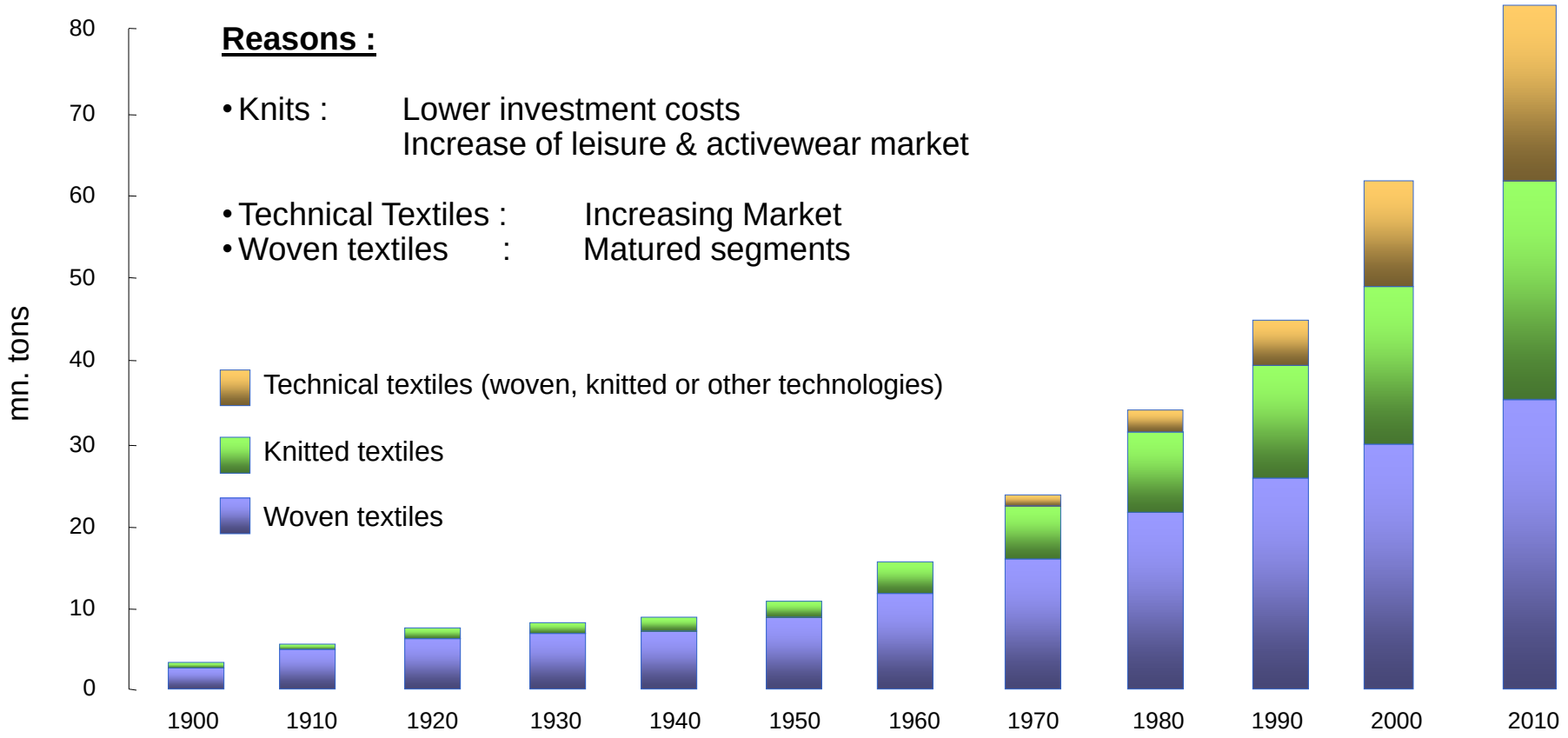
- **Weaving**
- Processing
- Machinery evaluation criteria

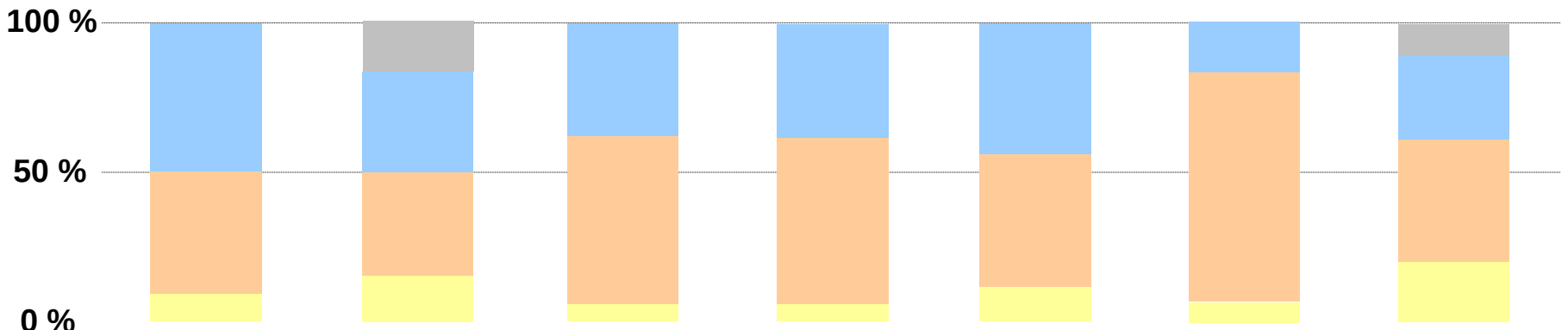
Knits are growing faster than woven products while the latter reached a maturity phase in product life cycle

Evolution of the woven, knitted and technical textile fabric consumption



Source: PCI Fibres, Gherzi estimates

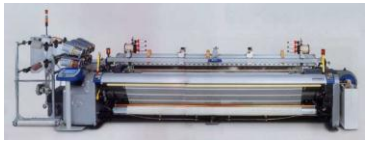
Different woven fabric types require different weaving technology



Standard Fabrics	Technical Textiles	Denim Working Cloth	Dobby & Jacquard	Terry Towels	Wool	Leno Fabrics
45-50%	15-20%	5-10%	15-20%	5%	2%	1%

Estimated shares from the worldwide woven fabric production of total 130 bn linear meters

Projectile Rapier Air-jet Waterjet



Vamatex Leonardo Silver

Segmentation specifications: Rapier Technology

Premium	• Robustly engineered • Heavy fabrics – conveyor belt , hard ballistic and technical textiles • Neckties, tapestry and upholstery from silk • Finest fabrics like filter fabrics and airbags • High quality fabric with dobby styles upto 28 shafts, 12 and 16 color
High	• High productivity (650 rpm) , optimum fabric quality and minimum waste • Mechanical components and advanced electronics, microprocessor control • Wide range of yarns, up to 12 color , 24 shaft electronic dobby • free flight rapier insertion • Apparels and furnishing
Medium	• Up to 500 rpm • Up to 8 color, 20 shaft electronic dobby / Jacquard, Guided rapier system • Furnishing and terry towel in SME
Low	• Low productivity (up to 300 rpm), 2 color • Standard fabrics with simple construction • Mainly serving the domestic market • All segments but concentrating on simple styles and cheap raw material

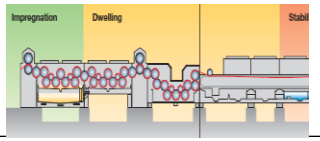

Toyota
JAT 710

Segmentation specifications: Airjet Technology

Premium	• Heavy fabrics and technical textiles e.g. air bag fabrics and awning • QSC, warp stop motion without drop wire and easing motion • Bidirectional communication
High	• High productivity (900 - 1000 rpm) and optimum fabric quality, • Mechanical settings wherever possible been replaced with electronic ones • Versatile application, sophisticated high end products • Automation with microprocessor • Suitable for shirting, trousering ,denim, sheeting and terry towel • Upto 8 color, cam motion10 shafts or electronic positive dobby
Medium	• Low productivity (800 rpm) • Automation with microprocessor • 2 to 4 color selection • Reed motion – central 4 bar linkages • Crank drive 4 shaft or cam motion 8 shaft or negative electronic dobby • Manual pick finding
Low	• Low productivity (600 – 700 rpm) • little automation • Standard fabrics with simple construction • Mainly serving the domestic market

Impact of technology and machinery on production in textile manufacturing process

- Spinning
- Weaving
- **Processing**
- Machinery evaluation criteria



Segmentation specifications: Open Width Processing- Mercerizing Range

Premium Capacities: 80,000 meters / day Speed: 80 meters / min	• PLC with touch Screen / Tele services and Optimized Liquor Level • Uniform impregnation • Tensionless & crease-free fabric transport, tight strand passage • Heat recovery / Automation/Ideal conditions for water recycling • High end applications for home textiles and apparel fabrics for exports
High Capacities: 50,000 meters / day Speed: 50-60 meters / min	• Heat recovery optional • Hot and cold mercerization- optional • Less automation
Medium Capacities: 30,000 meters / day Speed: 30 - 40 meters / min	• In built heat recovery system – optional • Recipe control & fabric details data - optional • pH controlled by manual method • Cold mercerization
Low Capacities: < 15,000 meters / day Speed: 20 meters / min	• Preferred by small & decentralized units

Source: Gherzi research

Besides productivity, utility consumption factors give a 25% cost advantage to Premium segment m/c over other high/mid segment machines

Features	Premium	High	High	Mid	Low
Technical Specification					
Practical Speed (Mtr / Min)	+80	50	60 - 65	50	40
Utility Consumption					
Water (Lts / Kg)	8 - 10	10 - 12	NA	10 - 12	10 - 12
Steam (Kg / Kg)	2 .0	2.5 - 3	NA	2.5 - 3	2.5 - 3
Power (Kwh / Kg)	0.1 – 0.12	0.12 – 0.15	NA	0.12- 0.16	0.12 - 0.15

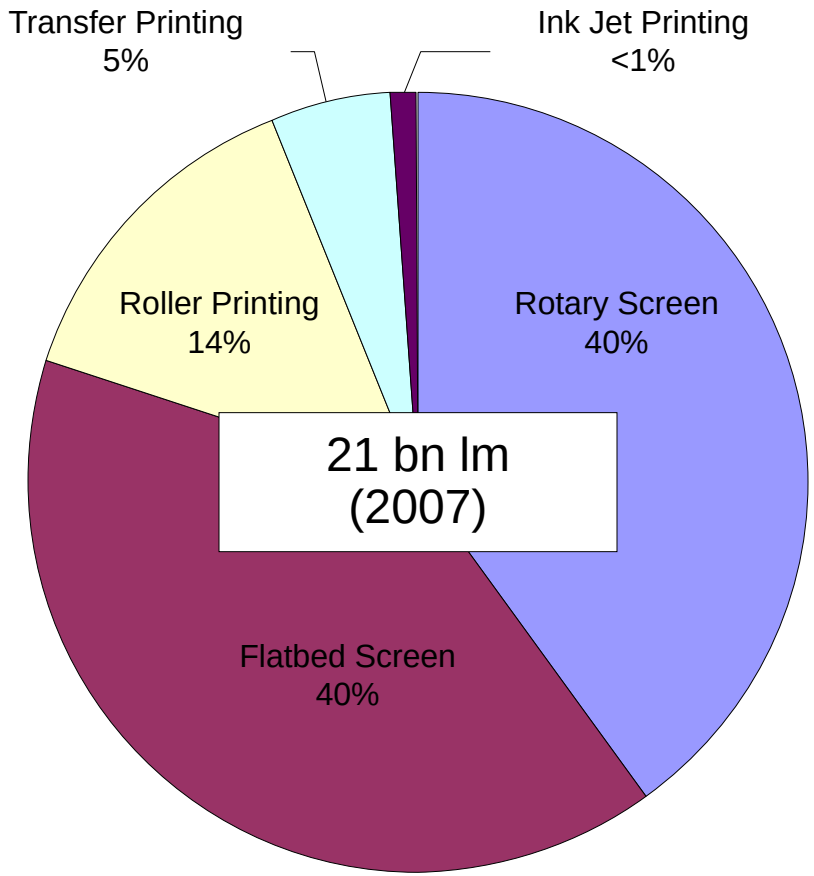
Note : Some parametres,especially from locally produced mc's may not be taken at face value due to lack of reliable data base and insufficient references

Source: Gherzi Research

Segmentation specifications: Hot air drying, heat setting, and finishing – Stenter

Premium	• Automation • Electronic control system • Latest electronic and software • Available best metallurgy and technology • Highest drying performance and air circulation system. • Energy saving and economical heat recovery and energy saving concepts.
High	• Modern machine with less advanced features
Medium	• Less features in design system, monitoring system, software, etc.
Low	• Basic machine with no automation

Screen printing is still the dominant printing technology:



Source: Industry

……However several factors do favour the growth of digital textile printing which is growing at 20% p.a.

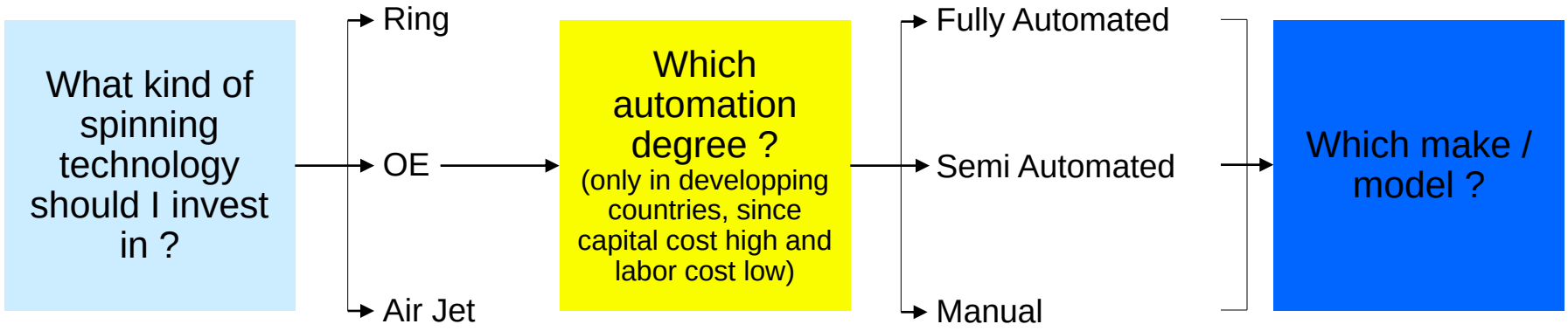
There are important advantages against screen printing		
Factor	**Ink Jet**	**Screen Printing**
Setting time (design to print)	Few hours	Several days
Energy consumption	low	medium
Waste water production	Ø 2 liters per m fabric	Ø 25 liters per m fabric
Consumption of Chemicals	Depending on substrate type and ink type in use	Ø 300g per m fabric
Style preparation cost	Low, however depending on design data format (100 - 500€ per design)	Ø 350 Euro per screen rotary Ø 85 Euro per screen flatbed
Flexibility	high	Limited since cost and time consuming

Source: Gherzi Research

Impact of technology and machinery on production in textile manufacturing process

- Spinning
- Weaving
- Processing
- **Machinery evaluation criteria**

The decision process differs from high to low wage country:



Decision Criteria

1. End Use (product)
2. Raw Material
3. Market Trends
4. Yarn Price

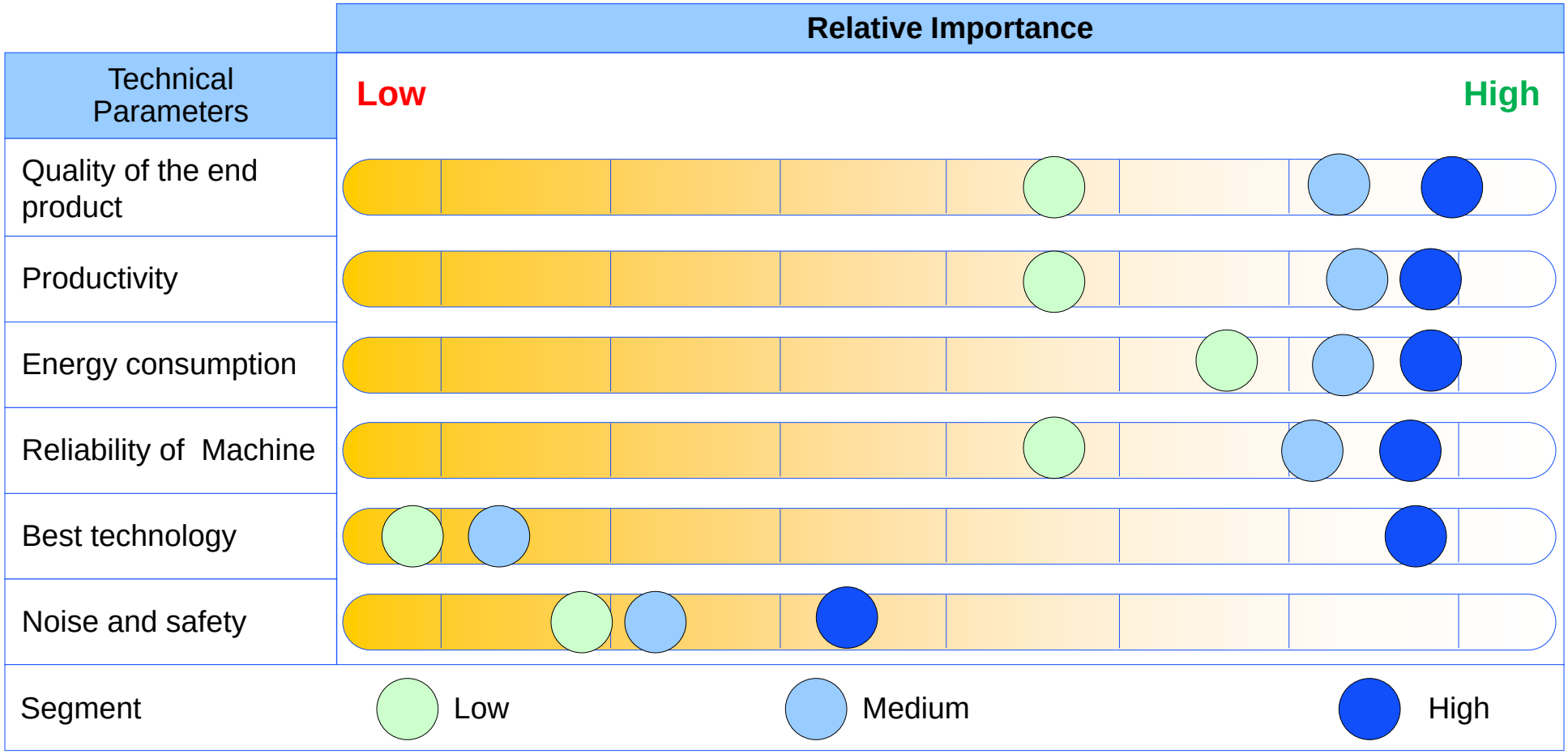
Decision Criteria

1. Sufficient yarn quality
2. Available Capex / Payback
3. Yarn Price
4. Conversion Costs
5. Strategic Positioning

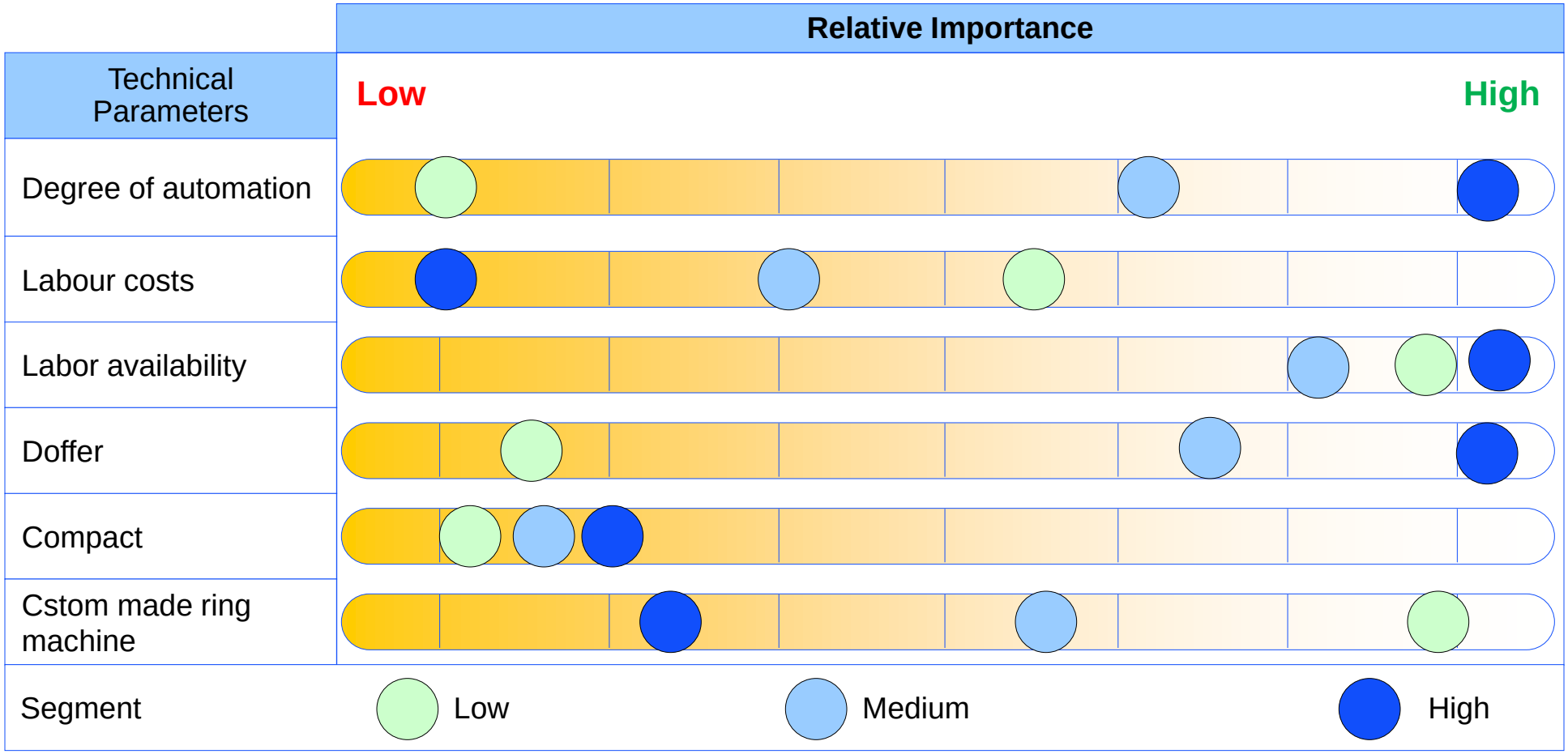
Decision Criteria

1. Financial
2. Technical
3. Service
4. Others
   References, experience, etc

Machine productivity and degree of automation will become critical purchasing criteria in future(1/2)



Machine productivity and degree of automation will become critical purchasing criteria in future(1/2)



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Conclusions & Way forward

- African textile industry lacks technological competitiveness due to obsolete machinery
- Production capacity in Africa has declined in last 10 years
- There have been selective new investments in spinning,weaving,knitting and processing in Ethiopia and Nigeria in the last 5 years
- Productivity in most African countries continues to be low due to :
  - Infrastructural deficiencies (power)
  - 20% fewer annual operating hours compared to Asia (7500/8700)
  - Lack of skilled manpower
  - Obsolete machinery
  - Poor maintenance practices
  - Lack of an enabling environment

Conclusions & Way forward

Following measures are suggested to narrow the technological gap between Africa and RoW to improve competitiveness of the textile industry

- Government policy support in the form of
  - Investment incentives (concessional funding)
  - Fiscal policy (0% duty on import of machinery and spares)
- Infrastructural improvement (adequate power supply)
- Capacity building (skill development)
- Enabling environment (cost of doing business)

Asante sana Mon gode **Thank you** Merci **አመሰግናለሁ**