PIN POLO UNIVERSITARIO CITTÀ DI PRATO SERVIZI DIDATTICI E SCIENTIFICI PER L'UNIVERSITÀ DI FIRENZE

LogisLab

Performance Measurement Systems for manufacturing companies: evidences from Italian case studies

La misura delle prestazioni nelle aziende manifatturiere: evidenze di una ricerca Italiana

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Agenda

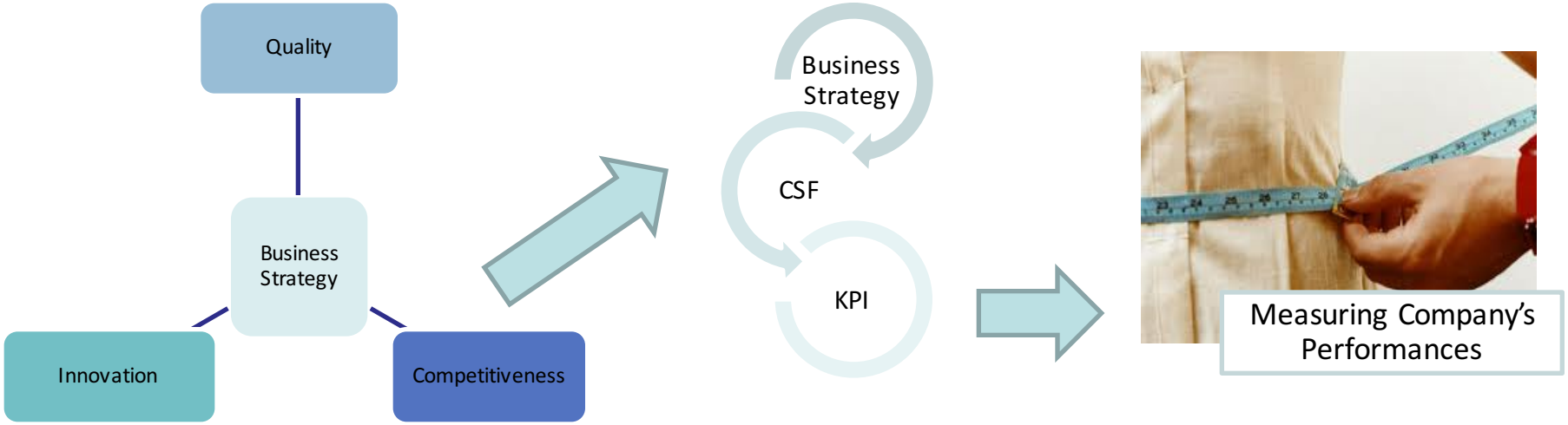
- Introduction
- Theoretical background
- Research Questions
- Methodology
- Findings
- Conclusion and further developments

Introduction

- “You can’t manage what you don’t measure”
- Performance measurement is vital in strategy formulation and communication and in forming diagnostic control mechanisms by measuring actual results’ (Wouters 2009).
- Gunasekaran and Kobu (2007) mention the following purposes:
  - Identifying success.
  - Identifying if customer needs are met.
  - Better understanding of processes.
  - Identifying bottlenecks, waste, problems and improvement opportunities.
  - Providing factual decisions.
  - Enabling progress.
  - Tracking progress.
  - Facilitating a more open and transparent communication and co-operation.

Introduction

- Companies need to improve their internal and external organization



A firm's value chain is a reflection of its history, its strategy, its approach to implementing its strategy and the underlying economics of the activities themselves (Porter, M.)

Theoretical background

- Different KPIs classifications

Beamon, 1999	Cai et al., 2007	Stewart, 1995 Gunasekaran et al., 2004 Shepherd and Günter, 2006
• Resources • Output • Flexibility	• Innovativeness • Information accuracy • Timeliness	• Plan • Make • Source • Deliver

Beamon, 1998 Chan, 2003	Bhagwat and Sharma, 2007 De Felice and Petrillo, 2013
• Quantitative measures • Qualitative measures	• Balanced Scorecard

Theoretical background

Process	Performance measure	References
Sourcing	Ability to respond to demand variations	Cai J. (2008), Gunasekaran A. et al. (2004), Shepherd C. and Gunter H. (2003), Beamon M. (1999)
	Extent of mutual planning cooperation with suppliers	Shepherd C. and Gunter H. (2006), Bhagwat R. (2007), Li S. et al. (2004), Kumar S. and Kumar J. (2013)
	Satisfaction with supplier relationship	Shepherd C. and Gunter H. (2006)
	Supplier delivery performance	Shepherd C. and Gunter H. (2006), Bhagwat R. (2007), Gunasekaran A. et al. (2004), Chan Felix T.S. (2003)
	Satisfaction with knowledge transfer with suppliers	Shepherd C. and Gunter H. (2006), Cai J. (2008)
	Supplier lead time	Bhagwat R. (2007), Gunasekaran et al. (2004), Shepherd C. and Gunter H. (2006)
	Supplier pricing against market	Gunasekaran A. et al. (2004)
	Information accuracy	Shepherd C. and Gunter H. (2006), Cai J. (2008)
	Information availability	Shepherd C. and Gunter H. (2006)
	Information timeliness	Shepherd C. and Gunter H. (2006), Cai J. (2008)
Production	Total cost of resources	Beamon Benita M. (1999), Shepherd C. and Gunter H. (2003), Chan Felix T.S. (2003), Bhagwat R. (2007), Stewart G. (1995)
	Manufacturing cost	Beamon Benita M. (1999), Cai J. (2008), Shepherd C. and Gunter H. (2006)
	Manufacturing lead time	Beamon Benita M. (1999), Chan Felix T.S. (2003), Shepherd C. and Gunter H. (2006)
	Work in process	Shepherd C. and Gunter H. (2006), Beamon Benita M. (1999)
	Number of SKU	Shepherd C. and Gunter H. (2006), Gunasekaran A. et al. (2004), Bhagwat R. (2007)
	Manufacturing flexibility	Cai J. (2008), Gunasekaran A. et al. (2004), Shepherd C. and Gunter H. (2003)
	Human resources productivity	Gunasekaran A. et al. (2004)
	Resource utilisation	Chan Felix T.S. (2003), Gunasekaran A. et al. (2004), Bongsu C. (2009)
	Capacity utilization	Bhagwat R. (2007), Gunasekaran A. et al. (2004), Otto A. and Kotzab H. (2002), Kumar S. and Kumar J. (2013)
	Percentage of defects	Gunasekaran A. et al. (2004)

Theoretical background

Process	Performance measure	References
Distribution	Inventory cost	Shepherd C. and Gunter H. (2003), Cai J. (2008), Beamon Benita M. (1999), Bhagwat R. (2007), Chan Felix T.S. (2003), Otto A. e Kotzab H. (2002), Stewart G. (1995)
	Inventory obsolescence	Beamon Benita M. (1999), Shepherd C. and Gunter H. (2003), Bongsug C. (2009)
	Inventory turnover ratio	Lapide L. (1999), Shepherd C. and Gunter H. (2006), Otto A. and Kotzab H. (2002), Schiraldi M. and Battista C. (2013), Papakiriakopolous D. et al. (2010)
	Total cost of distribution	Beamon Benita M. (1999), Cai J. (2008), Chan Felix T.S. (2003), Gunasekaran A. et al. (2004), Shepherd C. and Gunter H. (2006), Kumar S. and Kumar J. (2013), Otto A. and Kotzab H. (2002)
	Customer response time	Beamon Benita M. (1999), Chan Felix T.S. (2003), Shepherd C. and Gunter H. (2006), Bhagwat R. (2007), Cai J (2008), Gunasekaran et al. (2004), Kumar S. and Kumar J. (2013)
	Number of on-time deliveries	Chan Felix T.S. (2003), Shepherd C. and Gunter H. (2006), Beamon Benita M. (1999), De Felice F. and Petrillo A. (2013), Lapide L. (1999), Bongsu C. (2009)
	Delivery Lead Time	Shepherd C. and Gunter H. (2006), Gunasekaran A. et al. (2004)
	Percentage of urgent deliveries	Gunasekaran A. et al. (2004), Bhagwat R. (2007)
	Number of shipping errors	Bhagwat R. (2007), Chan Felix T.S. (2003), Shepherd C. and Gunter H. (2006)
	Logistics efficiency	Cai J. (2008)
	Compliance of delivered goods	Beamon Benita M. (1999)
	Logistics Flexibility	Cai J. (2008), Beamon Benita M. (1999), Chan Felix T.S. (2003), Gunasekaran A. and al. (2004), Shepherd C. and Gunter H. (2006)

Theoretical background

Process	Performance measure	References
Retail	Sales	Beamon Benita M. (1999), Cai J. (2008), Mattila H. (2002), Moore and Fairhust (2003), Shepherd C. and Gunter H. (2006)
	Number of stockout	Beamon Benita M. (1999), Cai J. (2008), Chan Felix T.S. (2003), Shepherd C. and Gunter H. (2006), Otto A. Kotzab H. (2002)
	Number of backorder	Beamon Benita M. (1999), Shepherd C. and Gunter H. (2006)
	Number of lost sales	Mattila H. (2002)
	Customer satisfaction	Beamon Benita M. (1999), Shepherd C. and Gunter H. (2006), Lapide L. (1999), Li S. et al. (2004), Otto A. and Kotzab H. (2002), Kumar S. and Kumar J. (2013), Chan Felix T.S. (2003), De Felice F. and Petrillo A. (2013)
	Extent of mutual planning cooperation with retailers	Brun A. and Castelli C. (2010)
	Product substitute percentage	Mattila H. (2002)
	Sell-through (%)	Mattila H. (2002)
	Rate of sales in new products	Cai J. (2008)
	Level of customer perceived value of product	Shepherd C. and Gunter H. (2006), Gunasekaran A. et al. (2004), Bhagwat R. (2007), Kumar S. and Kumar J. (2013)
	Flexibility of service system to meet particular customer needs	Bhagwat R. (2007), Shepherd C. and Gunter H. (2006), Kumar S. and Kumar J. (2013)

Theoretical background

Process	Performance measure	References
Governance	Accuracy of forecasting techniques	Bhagwat R. (2007), Lapide L. (1999), Shepherd C. and Gunter H. (2006), Bongsu C. (2009), Papakiriakopoulos D. et al. (2010), Gunasekaran A. et al. (2004)
	Forecasting volatility	Bongsu C. (2009)
	Total supply chain management cost	Cai J. (2008), Chan Felix T.S. (2003), Lapide L. (1999), Shepherd C. and Gunter H. (2006)
	Number of new products launched	Cai J. (2008), Chan Felix T.S. (2003), Shepherd C. and Gunter H. (2006)
	Number of new supply chain technologies used	Chan Felix T.S. (2003)
	ROI	Beamon Benita M. (1999), Shepherd C. and Gunter H. (2006), Bhagwat R. (2007), De Felice F. and Petrillo A. (2013), Otto A. and Kotzab H. (2002), Kumar S. and Kumar J. (2013)
	Profit	Beamon Benita M. (1999), Cai J. (2008), Shepherd C. and Gunter H. (2006), De Felice F. and Petrillo A. (2013), Bhagwat R. (2007)
	Fill rate	Beamon Benita M. (1999), Cai J. (2008), Chan Felix T.S. (2003), Lapide L. (1999), Shepherd C. and Gunter H. (2006), Kumar S. and Kumar J. (2013), Bongsu C. (2009)
	Ebit/ebitda	De Felice F. and Petrillo A. (2013
	Market share	Shepherd C. and Gunter H. (2006), De Felice F. and Petrillo A. (2013)
	Cash-to-cash cycle time	Bhagwat R. (2007), Lapide L. (1999), Kumar S. and Kumar J. (2013), Bongsu C. (2009), Stewart G. (1995)

Research Questions

- Objective
  - Investigate how companies belonging to different industries measure performance of their SC and manage the performance measurement process

- Research questions
  - RQ1: How companies are managing performance within the entire SC?
  - RQ2: What are the companies' features affecting their approach to performance measurement? And How?
  - RQ3: Which are the benefits and the drawbacks for companies when measuring performance?

Methodology

- Fashion industry
  - Case study analysis
- Manufacturing industry
  - Literature review
- Food industry
  - Case study analysis

Methodology (Fashion industry)

- Multiple case study research
  - 7 cases
  - Questionnaire design
    - Section 1: general information
    - Section 2: KPIs
    - Section 3: benefits and drawbacks
- CSFs:
  - Product quality
  - Timeliness
  - Innovation

Methodology (Fashion industry)

- Sample's features

Cases	Main product	Turnover (Million €)	N° SKU	Fashion Market Segment	In-house activities	Interviewees' role
Case 1	Apparel	250	>1000	Diffusion	Purchase, Distribution	CIO
Case 2	Apparel	130	500-1000	Diffusion	Purchase, Distribution	CIO, CFO, COO
Case 3	Apparel	90	500-1000	Luxury	All	COO
Case 4	Apparel	143	500-1000	Luxury	Distribution	Buyer
Case 5	Apparel	10	100	Diffusion	All but production	CFO, CIO
Case 6	Apparel	2	<100	Diffusion	Purchase, Distribution	COO
Case 7	Leather goods	700	500-1000	Luxury	All	Logistic Director, CIO

Methodology (Manufacturing industry)

- Literature analysis of manufacturing case studies
  - 5 manufacturing companies
  - Big companies

- CSFs:
  - Product quality
  - Competitiveness
  - Innovation

Methodology (Food industry)

- Multiple case study research
  - 8 cases
  - Questionnaire design
    - Section 1: general information
    - Section 2: KPIs
    - Section 3: strategies
    - Section 4: drawbacks and future directions
- CSFs:
  - Product quality
  - Product traceability
  - Time to Market
  - Cost Reduction
  - Nutritional issues

Methodology (Fashion industry)

- Sample's features

Cases	Turnover (Million €)	N° of employees	N° SKU	In-house activities	Interviewees' role
Case 1	500	500	120	Distribution	CIO
Case 2	120	200	96	Distribution	CIO, CFO, COO
Case 3	500	>1000	2500	All	COO
Case 4	1000	500	600	All	Buyer
Case 5	240	300	110	All	CFO, CIO
Case 6	2000	>7000	10000	All but Production	COO
Case 7	10	<100	3	All but Production	Logistic Director, CIO
Case 8	3	<100	50	All	COO

Findings – RQ1 (Fashion industry)

Cases	Macro process	Main KPIs	Involved BU
Case 1	Distribution Retail	**Inventory costs**, inventory obsolescence, delivery lead time and costs of distribution Sales, **number of stockout**, **lost sales and sell-through**	Purchase Merchandising
Case 2	Sourcing Distribution Retail	Supplier lead time, **information accuracy**, supplier pricing against market and satisfaction with supplier relationship Inventory cost, costs of distribution, delivery lead time, **logistics flexibility** Sales, number of backorder, lost sales and sell through	Purchase Merchandising
Case 3	Governance Retail	**Satisfaction with supplier relationship**, satisfaction with knowledge transfer with suppliers Customer response time, level of customer perceived value of product	Purchase Merchandising Retail
Case 4	Distribution	Inventory costs, inventory obsolescence, inventory turnover ratio, costs of distribution, ROI, sell-through and sales **Web marketing indicators** (time spent on the website, number of visited web-pages, click rate and transaction rate)	Purchase Marketing
Case 5	Governance Retail	ROI, profit, fill rate, **cash to cash cycle time**, market share, manufacturing costs, sales, sell-through, **number of new products launched**	Finance
Case 6	Governance	Profit, Ebit, market share, cash-to-cash cycle time, supply chain management cost, sales, **number of new products launched** and warehouse cost per unit shipped	Merchandising Finance
Case 7	Production Distribution	**Capacity utilization**, manufacturing costs, cost of resources, manufacturing lead time and percentage of defects	Purchase Production, Planning & Control Operations

Findings – RQ1 (Manufacturing industry)

Cases	Main KPIs
Case 1	**Market share**, ROI, ROE, Productivity, **Manufacturing flexibility**, **number of patents**
Case 2	ROI, ROE, Cost efficiency, Product Quality level, Capability to improve manufacturing processes
Case 3	Cash turnover ratio, ROI, Number of patents
Case 4	Cash turnover ratio, ROI, Number of patents
Case 5	Market share, ROI, ROE , Manufacturing flexibility

Findings – RQ1 (Food industry)

Macro process	KPI
Sourcing	**Traceability** Suppliers delivery performance Supplier LT
Production	HR and material costs Production LT Capacity utilization
Distribution	Customer response time Distribution LT
Retail	Sales Perceived value of product Customer satisfaction
Governance	**Forecasting accuracy** ROI Profit **SC visibility**

Findings – RQ2

Approaches to PM

Financial

- Economic results

Productive

- Productive results

Behavioral

- Relationships company/supplier/customer

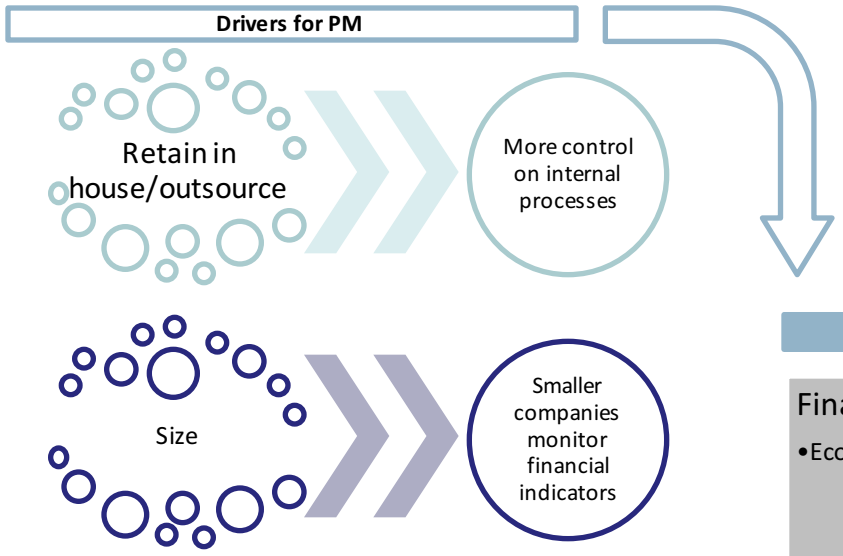
Distribution

- Control on distribution channel

Holistic

- Control on the entire set of SC processes

Findings – RQ2 (Fashion industry)



Approaches to PM

Financial
- Economic results

Productive
- Productive results

Behavioral
- Relationships company/supplier/customer

Distribution
- Control on distribution channel

Holistic
- Control on the entire set of SC processes

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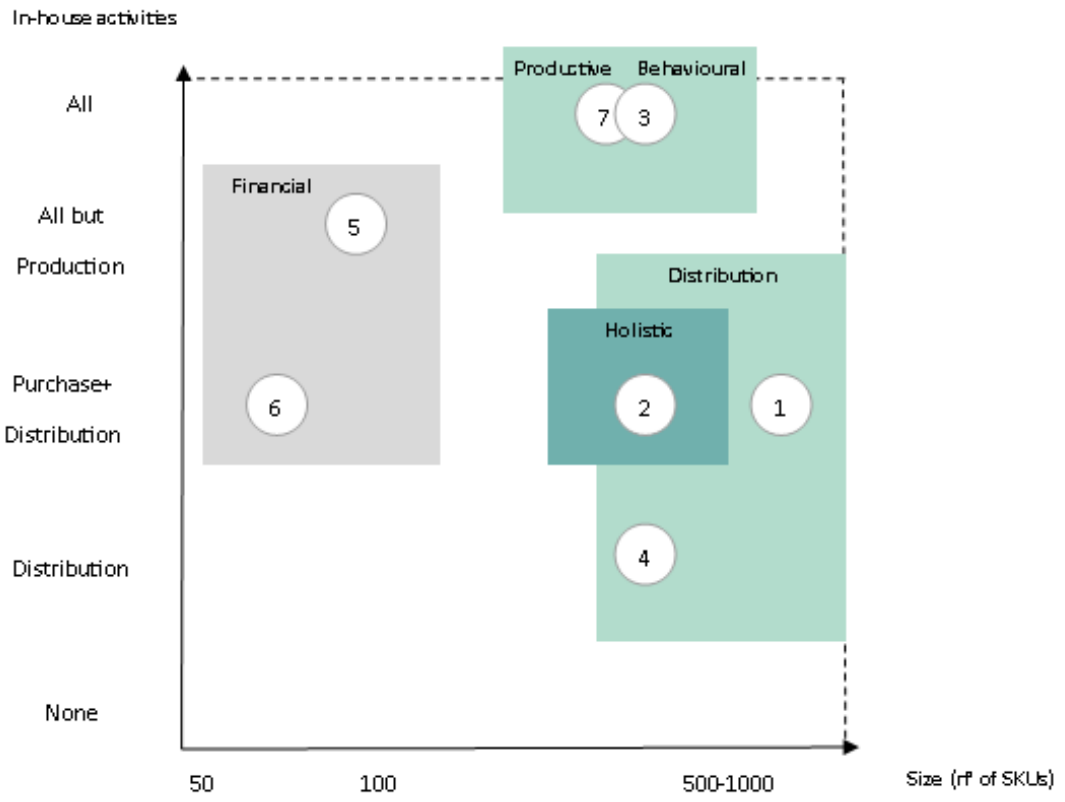
Findings – RQ2 (Fashion industry)

- Smaller companies monitor only financial KPIs, disregarding the activity they perform in-house
- Big companies have different approaches influenced by the activity they perform in-house
- One company uses an holistic approach, whichever the value of the drivers. Why?



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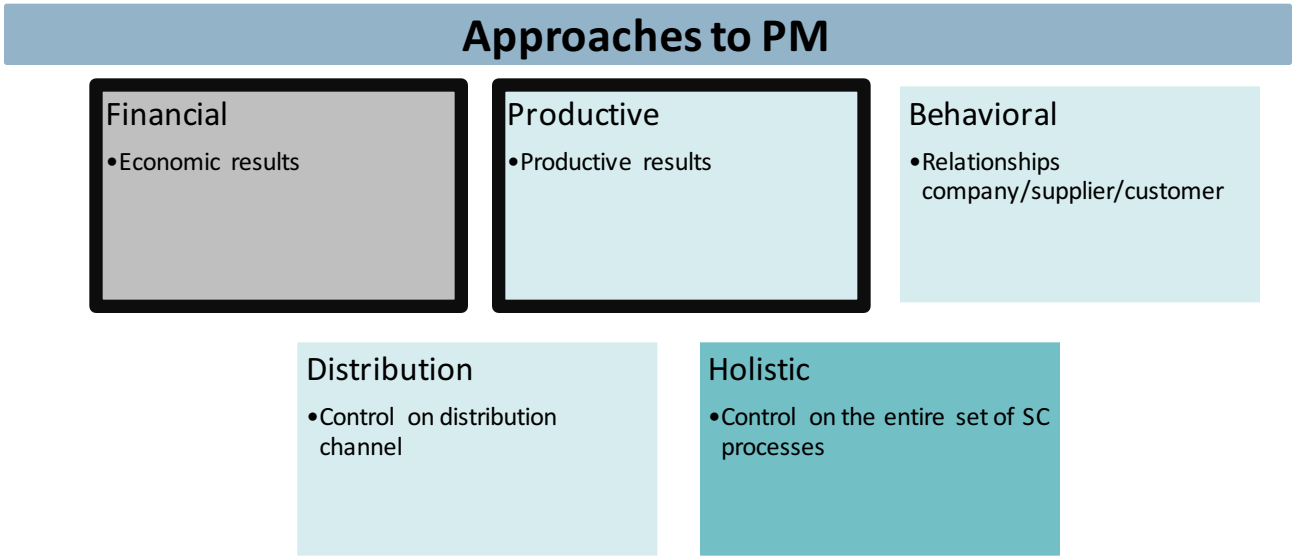
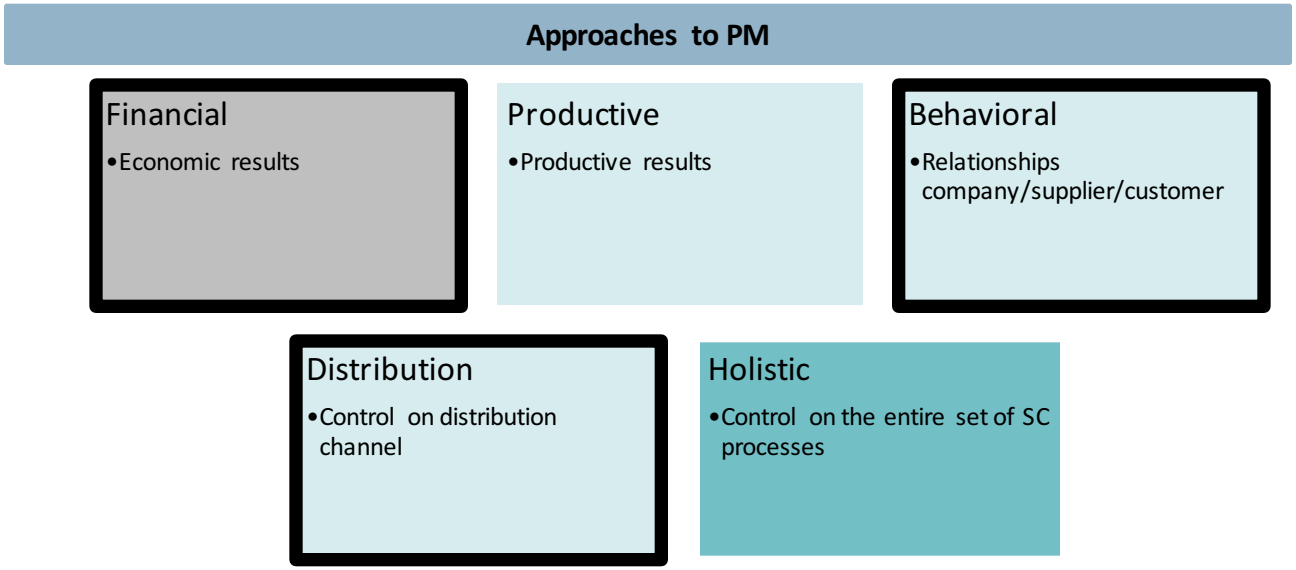
Findings – RQ2 (Manufacturing industry)

- Importance of:
  - Financial performances
    - Market share
  - Manufacturing capabilities
    - Cost efficiency
    - Productivity



Findings – RQ2 (Food industry)

- Importance of:
  - Sourcing/Distribution performances
  - Financial results



Findings – RQ3

- Benefits and drawbacks when measuring performance
  - ↑ The alignment of process management with strategic goals
  - ↑ The support to complexity management within SC
  - ↑ The identification of improvement areas within SC
  - ↓ Lack of the organizational and cultural attitude to measure performances
  - ↓ Issues in identifying criteria to select indicators for disagreement in BUs
  - ↓ Issues in identifying indicators representing long-term objectives
  - ↓ Issues in updating the indicators whenever the economic environment change
  - ↓ Computer systems issues occurring during implementation of the measures

Conclusion and further developments

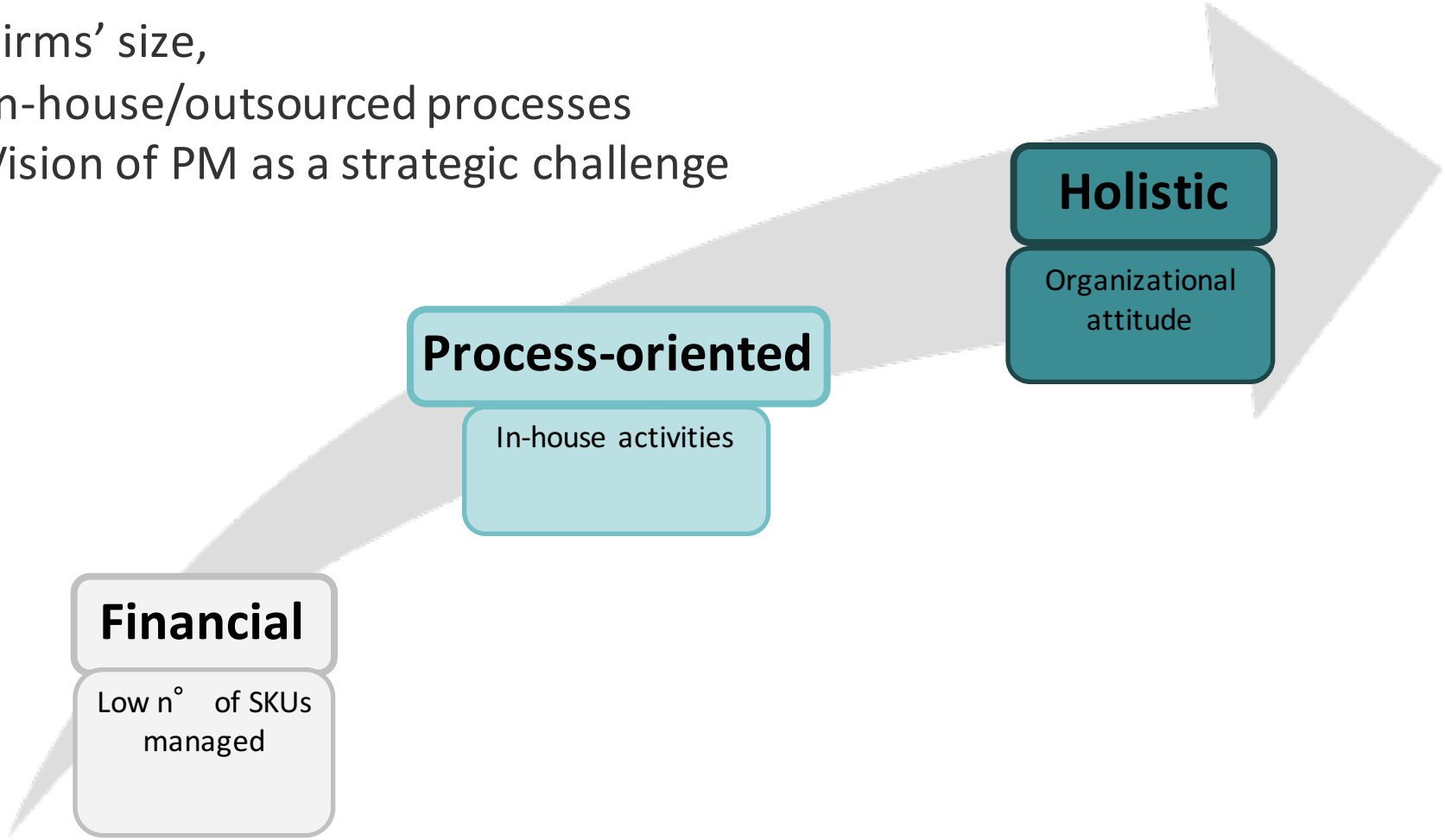
- The proposed list of KPIs is exhaustive and representative of the SC requirements in terms of PM
- Quantitative measures exceed qualitative ones -> not used to support strategic decisions
- Industry specific CSFs and strategies lead to different drivers for PM and to different PM approaches

Conclusion and further developments

- Future research directions
  - Fashion industry
    - Enlarge the sample
    - Role of ICTs supporting PM
    - Identification of other fashion-specific KPIs
    - Focus on Product Development KPIs
      - Number of manufactured items, prototype cost, sample cost, engineering cost, bulk production cost, number of fitting sessions, percentage of carry over
  - Manufacturing industry
    - Conduct case study research
    - Investigate the main drivers for PM
    - Validate the approaches to PM
  - Food industry
    - Enlarge the sample
    - Role of ICTs supporting PM
    - Identification of other food-specific KPIs

Conclusion and further developments

- Approaches to PM in the research
  - Firms' size,
  - In-house/outsourced processes
  - Vision of PM as a strategic challenge



Thank you for your attention
Any question?

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