

# Management Practices & Productivity in British Manufacturing Firms

International MOPS Workshop

US Census Bureau

6 December 2017

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Office for National Statistics

# Purpose of MPS pilot

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## ❖ Feasibility

- Are UK businesses willing to answer these questions in a voluntary survey?
- Can we find a long term approach for collecting data on management practices?

## ❖ Results

- How much do responses vary?
- Do we see an association between management practices and productivity?

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# What are these management practices?

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1. In 2015, what generally best describes what happened at this business when a production problem arose?
2. In 2015, how many key performance indicators were monitored at this business?
3. In 2015, how frequently were the key performance indicators reviewed at this business?
4. In 2015, what best describes the time frame of production targets at this business?
5. In 2015, how easy or difficult was it for this business to achieve its production targets?
6. In 2015, how were employees usually promoted at this business?
7. In 2015, when was an under-performing employee moved from their current role?
8. In 2015, who made decisions over the hiring of permanent full-time employees?

# Survey Design - Sample

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- 1,026 businesses from the Annual Business Survey's sample for 2015
- Coverage:
  - Great Britain, i.e. excluding Northern Ireland
  - Reporting Units (enterprise) with employment of at least 10, where employment is employees plus working proprietors
  - Manufacturing (SIC 2007 section C, divisions 10-33)
- Stratified using employment and industry
  - Employment bands of 10-49, 50-99, 100-249 and 250+
  - Industry at division level (two digit SIC code)
- Final response rate of 68% (702 businesses)

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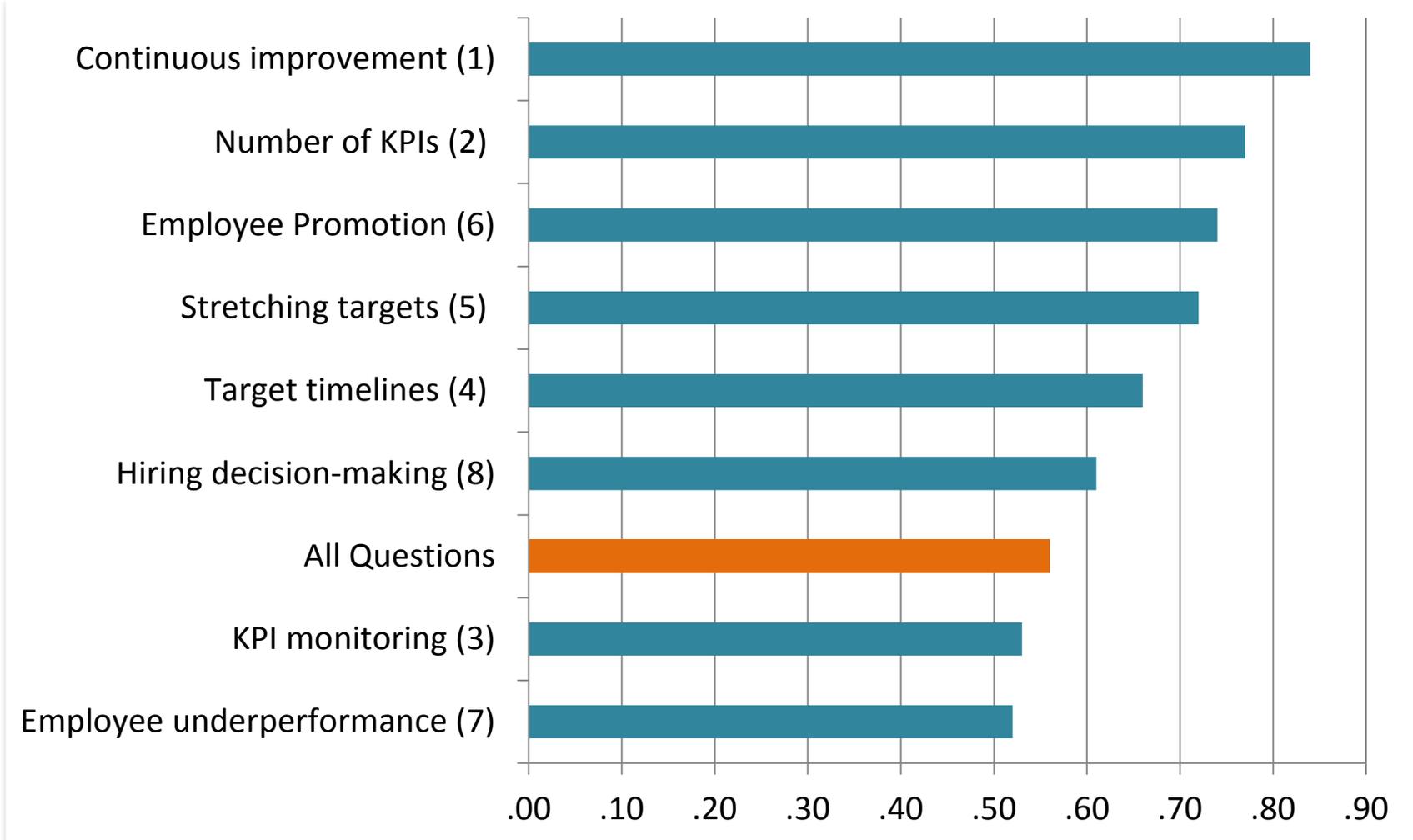
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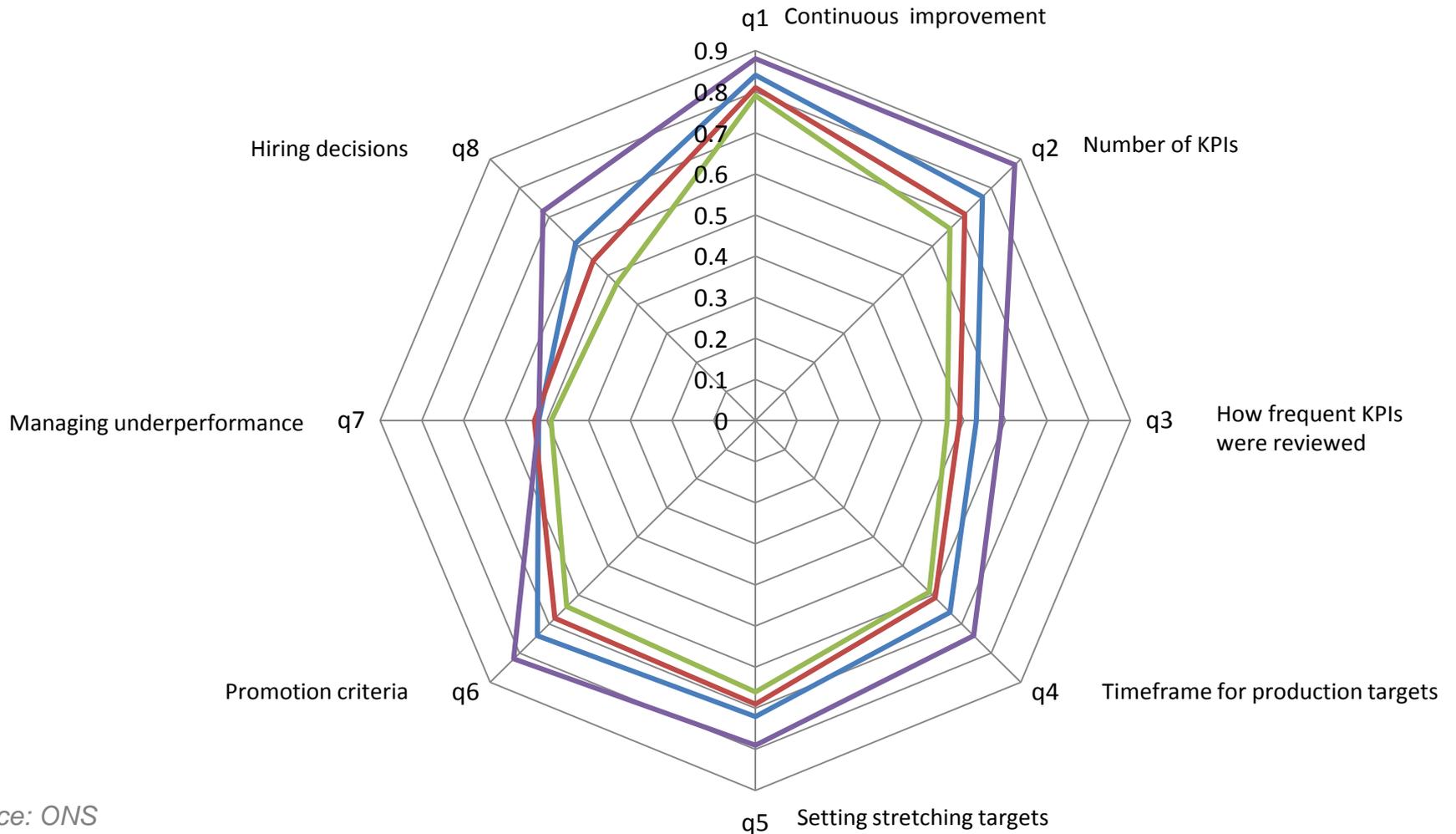
# Individual MPS scores - survey population



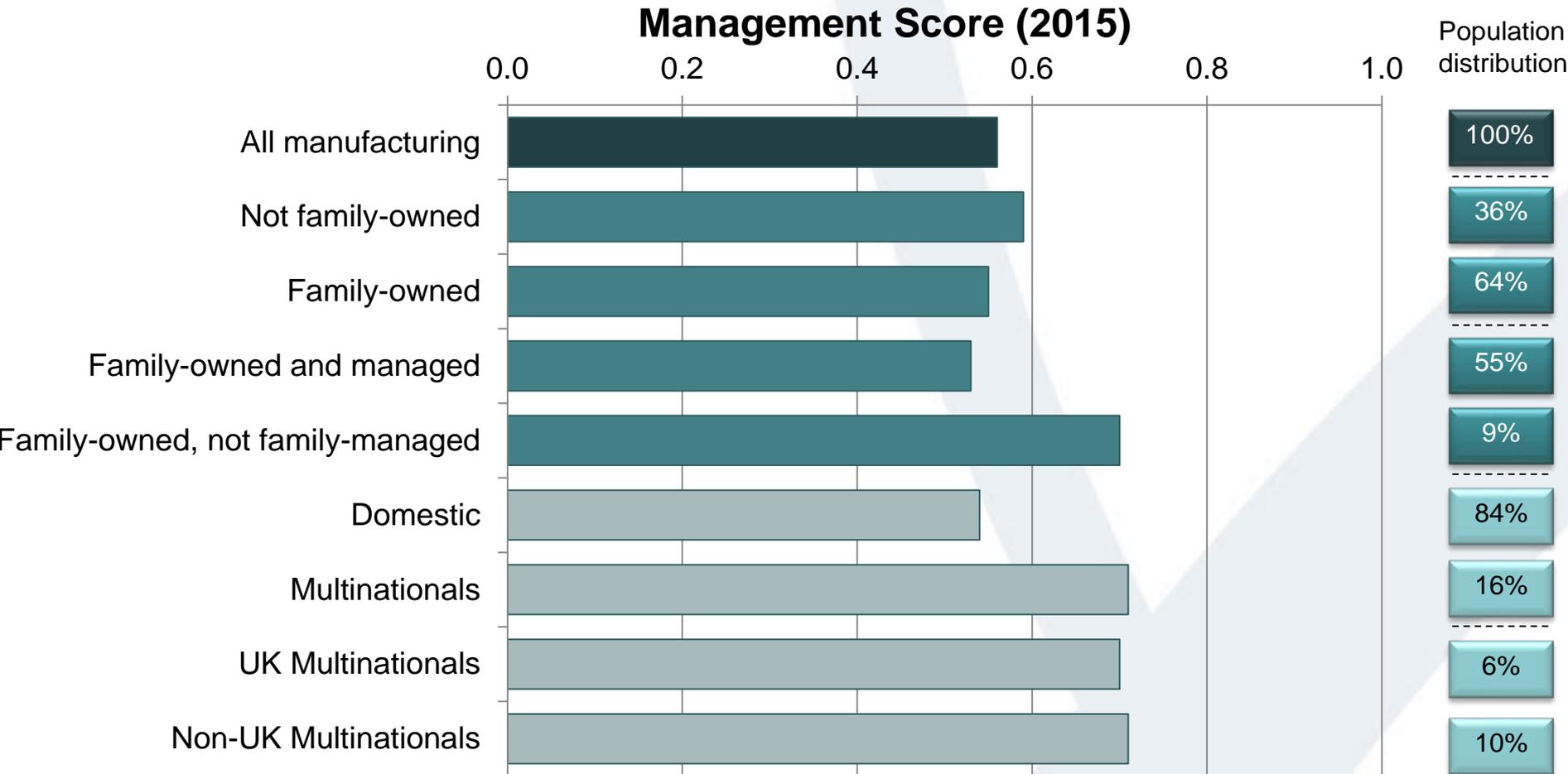
All manufacturing includes all manufacturing businesses with employment of at least 10 in Great Britain

Source: ONS

# Individual MPS scores by firm type



# Average score by business type



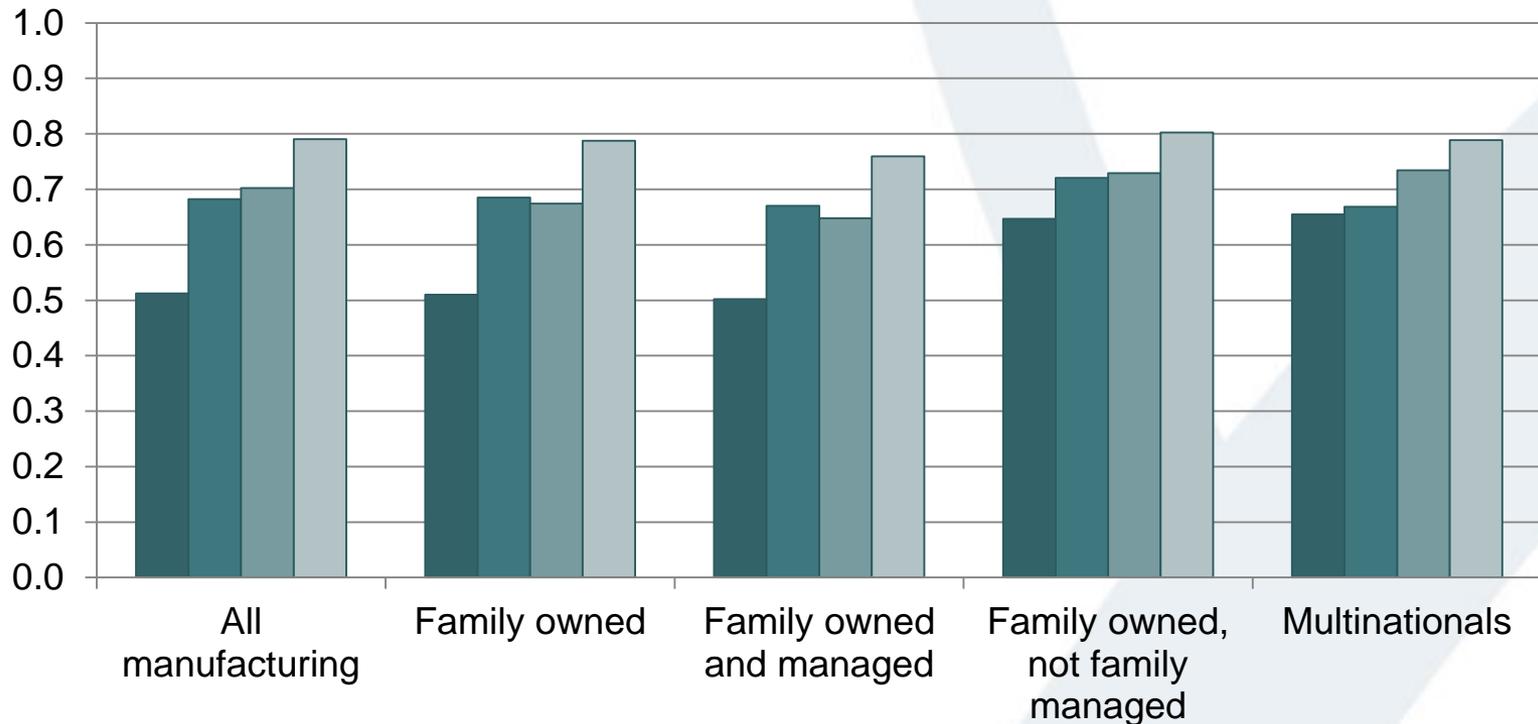
All manufacturing includes all manufacturing businesses with employment of at least 10 in Great Britain <sup>10</sup>

Source: ONS

# Average score by employment size band



## Management Score (2015)



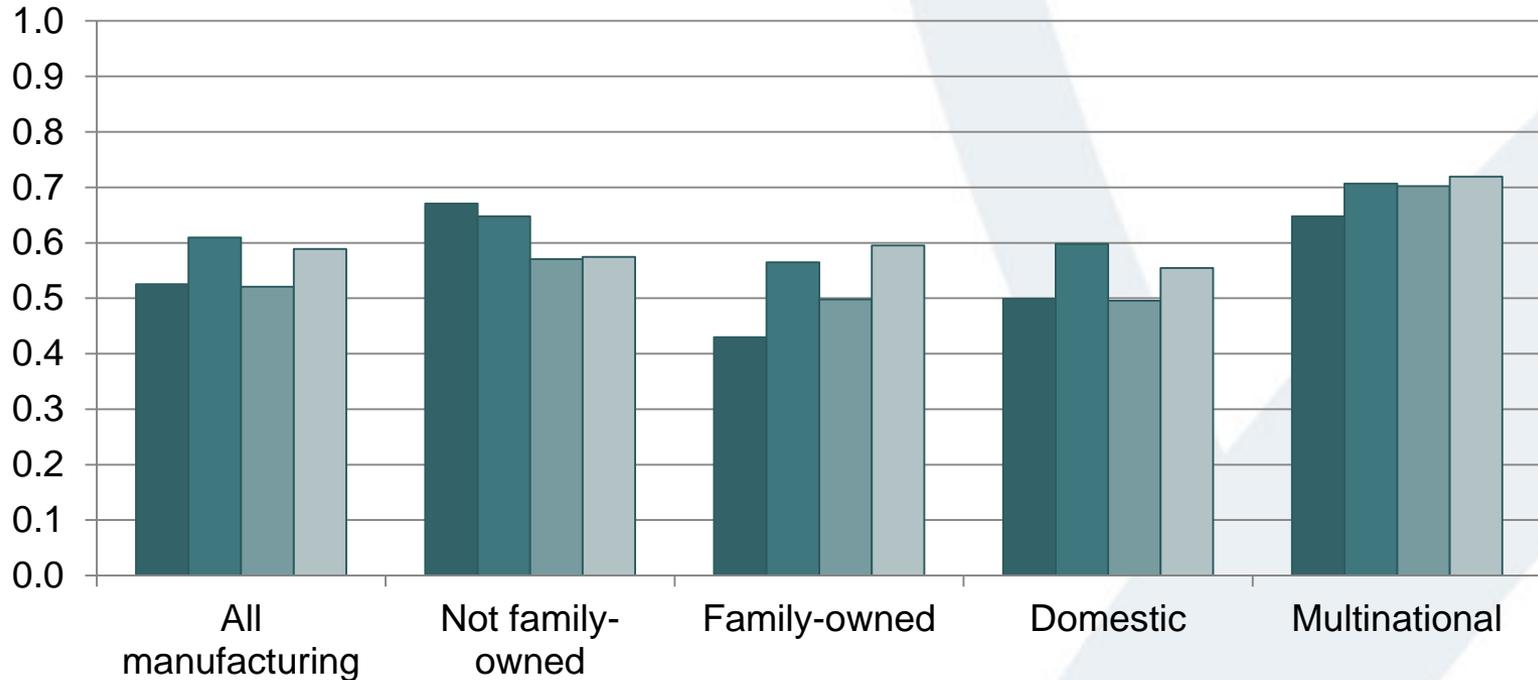
All manufacturing includes all manufacturing businesses with employment of at least 10 in Great Britain <sup>11</sup>

Source: ONS

# Average management score by business age



## Management Score (2015)



All manufacturing includes all manufacturing businesses with employment of at least 10 in Great Britain<sup>12</sup>

Source: ONS

# Multivariate analysis of management score – Ordinary Least Squares

|                                 | Management score (1) | Management score (2) | Management score (3) | Management score (4) | Management score (5) |
|---------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Log(employment)                 | 0.110***<br>(0.015)  | 0.107***<br>(0.014)  | 0.108***<br>(0.016)  | 0.105***<br>(0.014)  | 0.108***<br>(0.014)  |
| Family owned business           | 0.004<br>(0.049)     | 0.001<br>(0.051)     | -0.005<br>(0.054)    | -0.010<br>(0.056)    | -0.006<br>(0.058)    |
| Family-owned and non-family-run |                      |                      | 0.047<br>(0.032)     | 0.057<br>(0.033)     | 0.053<br>(0.033)     |
| Multinational                   | 0.016<br>(0.032)     | 0.013<br>(0.032)     | 0.008<br>(0.043)     | 0.003<br>(0.042)     | 0.004<br>(0.043)     |
| UK Multinational                |                      |                      | 0.002<br>(0.026)     | 0.002<br>(0.026)     | 0.002<br>(0.028)     |
| Age (years)                     |                      |                      |                      |                      | -0.000<br>(0.012)    |
| Age squared                     |                      |                      |                      |                      | -0.000<br>(0.000)    |
| Industry dummies                | No                   | Yes                  | No                   | Yes                  | Yes                  |
| $R^2$                           | 0.299                | 0.328                | 0.303                | 0.332                | 0.337                |
| Observations                    | 694                  | 694                  | 694                  | 694                  | 694                  |

Standard errors in parentheses, clustered by size band and industry. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: Office for National Statistics

Full results are available on request

# Multivariate analysis by employment size bands

## – Ordinary Least Squares

|                                    | Small businesses<br>(10-49 employment) | Medium businesses<br>(50-99 employment) | Medium businesses<br>(100-249 employment) | Large businesses<br>(250+ employment) |
|------------------------------------|--|---|---|---------------------------------------|
| Log(employment)                    | 0.201***<br>(0.034)                    | 0.149***<br>(0.011)                     | 0.117***<br>(0.015)                       | 0.102***<br>(0.007)                   |
| Family owned<br>business           | -0.006<br>(0.072)                      | -0.033<br>(0.039)                       | -0.082<br>(0.067)                         | 0.011<br>(0.038)                      |
| Family-owned and<br>non-family-run | 0.035<br>(0.045)                       | 0.058<br>(0.026)                        | 0.104<br>(0.069)                          | 0.037<br>(0.032)                      |
| Multinational                      | 0.056<br>(0.080)                       | -0.059<br>(0.068)                       | 0.018<br>(0.034)                          | 0.020<br>(0.035)                      |
| UK Multinational                   | -0.001<br>(0.081)                      | 0.055<br>(0.059)                        | 0.021<br>(0.053)                          | -0.038<br>(0.025)                     |
| Age (years)                        | 0.002<br>(0.016)                       | 0.014<br>(0.009)                        | 0.012<br>(0.014)                          | 0.024*<br>(0.008)                     |
| Age squared                        | -0.000<br>(0.001)                      | -0.000<br>(0.000)                       | -0.000<br>(0.001)                         | -0.001*<br>(0.000)                    |
| Industry dummies                   | Yes                                    | Yes                                     | Yes                                       | Yes                                   |
| $R^2$                              | 0.902                                  | 0.959                                   | 0.972                                     | 0.982                                 |
| Observations                       | 190                                    | 178                                     | 172                                       | 154                                   |

Standard errors in parentheses, clustered by size band and industry. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: Office for National Statistics

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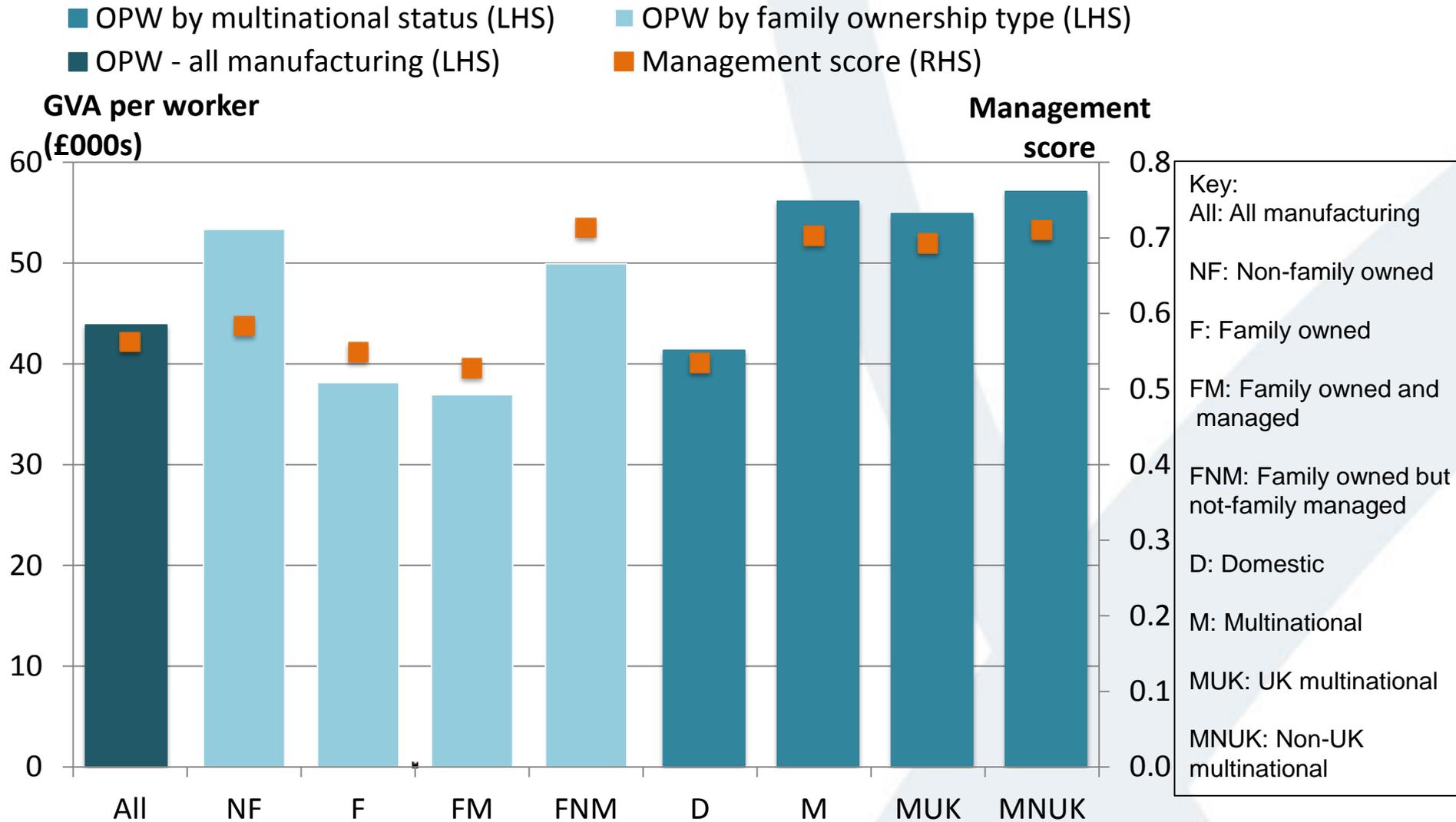
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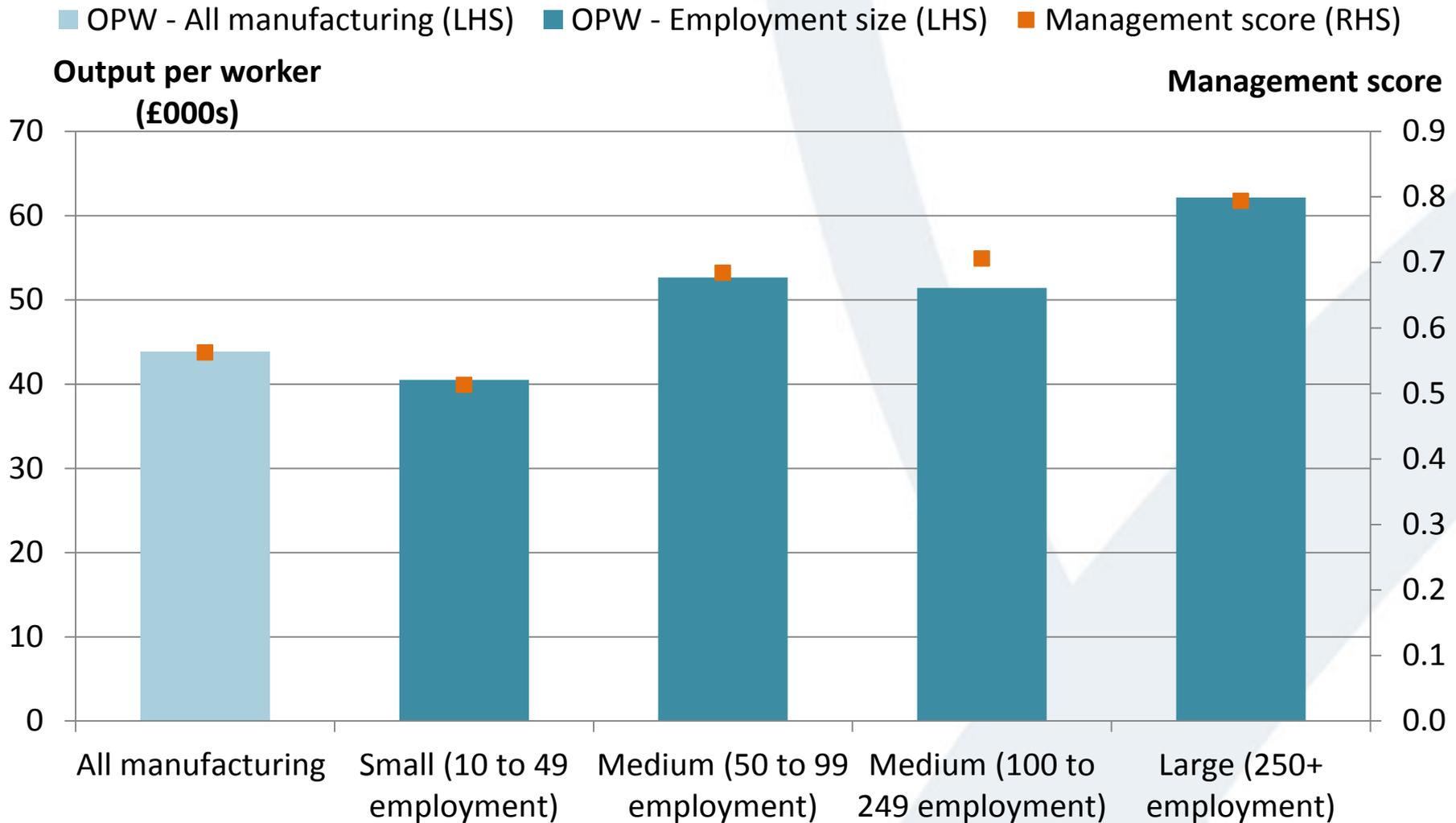
## ❖ Results

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# Management Practices and Productivity



# Management Practices and Productivity



# Multivariate Analysis of Management Score and Productivity

|  | (1)                | (2)                | (3)                  | (4)                  | (5)                  |
|--|--------------------|--------------------|----------------------|----------------------|----------------------|
|  | Log(OPW)           | Log(OPW)           | Log(OPW)             | Log(OPW)             | Log(OPW)             |
| Management score                             | 0.855**<br>(0.312) | 0.608**<br>(0.290) | 0.609**<br>(0.223)   | 0.629**<br>(0.239)   | 0.669***<br>(0.226)  |
| Log(employment)                              |                    | 0.049*<br>(0.027)  | 0.060<br>(0.038)     | 0.060<br>(0.037)     | 0.047<br>(0.042)     |
| Family-owned business                        |                    |                    | -0.188***<br>(0.051) |                      |                      |
| Family-owned and family-managed business     |                    |                    |                      | -0.162***<br>(0.055) | -0.184***<br>(0.067) |
| Family-owned and non-family-managed business |                    |                    |                      | -0.271***<br>(0.094) | -0.265***<br>(0.095) |
| Multinational (MPS data)                     |                    |                    | -0.136<br>(0.124)    | -0.086<br>(0.112)    | -0.090<br>(0.105)    |
| UK Multinational (MPS data)                  |                    |                    |                      | -0.072<br>(0.114)    | -0.080<br>(0.115)    |
| Age (years)                                  |                    |                    |                      |                      | 0.017<br>(0.068)     |
| Age squared                                  |                    |                    |                      |                      | -0.000<br>(0.002)    |
| Industry dummies                             | No                 | Yes                | Yes                  | Yes                  | Yes                  |
| $R^2$  | 0.079              | 0.184              | 0.203                | 0.205                | 0.216                |
| Adjusted $R^2$                               | 0.077              | 0.171              | 0.188                | 0.187                | 0.195                |
| Observations                                 | 591                | 591                | 591                  | 591                  | 591                  |

Source: Office for National Statistics

Notes:

1. Standard errors in parentheses are clustered by industry and employment size band, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Multivariate Analysis of Individual Management Score and Productivity

|                                    | (1)                    | (2)                    | (3)                    |
|------------------------------------|------------------------|------------------------|------------------------|
|                                    | Log(Output per worker) | Log(Output per worker) | Log(Output per worker) |
| Monitoring Management score        | 0.068<br>(0.143)       | 0.064<br>(0.620)       |                        |
| Monitoring score x Log(employment) |                        | -0.008<br>(0.174)      |                        |
| Employment Management score        | 0.575**<br>(0.219)     | 1.396**<br>(0.590)     |                        |
| Employment score x Log(employment) |                        | -0.251*<br>(0.134)     |                        |
| (1) Continuous improvement         |                        |                        | 0.527**<br>(0.194)     |
| (2) Number of KPIs                 |                        |                        | 0.221<br>(0.174)       |
| (3) Frequency of KPI monitoring    |                        |                        | -0.250<br>(0.238)      |
| (4) Target timelines               |                        |                        | 0.090<br>(0.103)       |
| (5) Stretching targets             |                        |                        | -0.102<br>(0.108)      |
| (6) Promotions Score               |                        |                        | 0.415***<br>(0.099)    |
| (7) Underperformance Score         |                        |                        | 0.038<br>(0.084)       |
| (8) Hiring Score                   |                        |                        | 0.000<br>(0.180)       |
| Industry dummies                   | Yes                    | Yes                    | Yes                    |
| $R^2$                              | 0.233                  | 0.242                  | 0.302                  |
| Adjusted $R^2$                     | 0.211                  | 0.219                  | 0.274                  |
| Observations                       | 591                    | 591                    | 568                    |

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# Management and Expectations Survey

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- The ONS has teamed up with the ESCoE to run an expanded survey covering management and organisational practices and expectations (uncertainty)
- Wider coverage of Manufacturing and Services
- Sample size of 25,000 businesses (enterprise level)
- Sample stratified by size, industry and region
- Survey despatch in July 2017, and initial analysis planned for Q1 2018

# Thanks for listening !

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- Any questions?

Contact details:

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[Productivity@ons.gsi.gov.uk](mailto:Productivity@ons.gsi.gov.uk)

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# **EXTRA SLIDES**

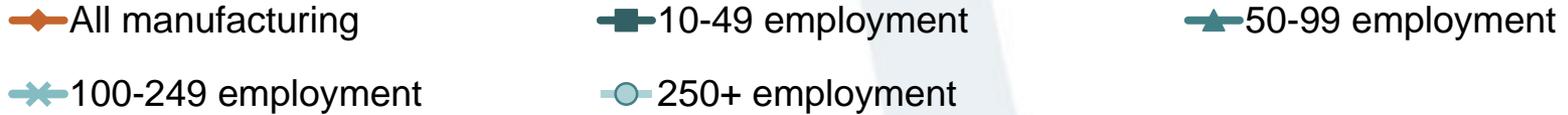
# What are these management practices?

|          | Question   | Score |
|----------|--|-------|
| <b>1</b> | <b>In 2015, what generally best describes what happened at this business when a production problem arose?</b>  |       |
| a        | We fixed it but did not take further action  | 1/3   |
| b        | We fixed it and took action to make sure that it did not happen again  | 2/3   |
| c        | We fixed it and took action to make sure that it did not happen again, and had a continuous improvement process to anticipate problems like these in advance | 1     |
| d        | No action was taken  | 0     |
| <b>2</b> | <b>In 2015, how many key performance indicators were monitored at this business?</b>   |       |
| a        | 1 to 2 key performance indicators  | 1/3   |
| b        | 3 to 9 key performance indicators  | 2/3   |
| c        | 10 or more key performance indicators  | 1     |
| d        | No key performance indicators  | 0     |
| <b>3</b> | <b>In 2015, how frequently were the key performance indicators reviewed at this business?</b>  |       |
| a        | Annually   | 1/6   |
| b        | Quarterly  | 1/3   |
| c        | Monthly  | 1/2   |
| d        | Weekly   | 2/3   |
| e        | Daily  | 5/6   |
| f        | Hourly or more frequently  | 1     |
| g        | Never  | 0     |
| <b>4</b> | <b>In 2015, what best describes the time frame of production targets at this business?</b>   |       |
| a        | Main focus was on short-term (less than one year) production targets   | 1/3   |
| b        | Main focus was on long-term (more than one year) production targets  | 2/3   |
| c        | Combination of short-term and long-term production targets   | 1     |
| d        | No production targets  | 0     |

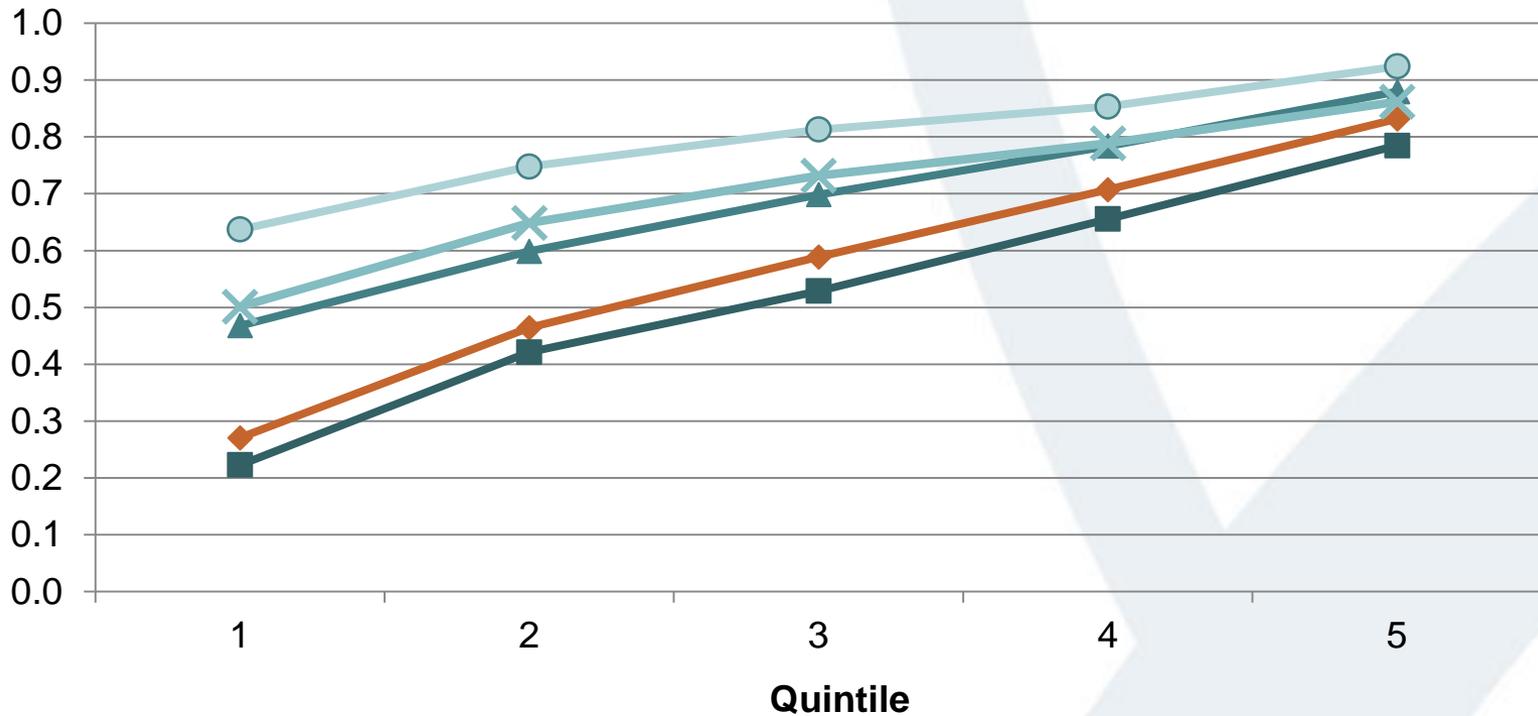
# What are these management practices? cont'd..

|          | Question   | Score |
|----------|--|-------|
| <b>5</b> | <b>In 2015, how easy or difficult was it for this business to achieve its production targets?</b>    |       |
| a        | Possible to achieve without much effort  | 0     |
| b        | Possible to achieve with some effort   | 1/2   |
| c        | Possible to achieve with normal amount of effort   | 3/4   |
| d        | Possible to achieve with more than normal effort   | 1     |
| e        | Only possible to achieve with extraordinary effort   | 1/4   |
| <b>6</b> | <b>In 2015, how were employees usually promoted at this business?</b>                                |       |
| a        | Promotions were based solely on performance and ability  | 1     |
| b        | Promotions were based partly on performance and ability, and partly on other factors, such as tenure | 2/3   |
| c        | Promotions were based mainly on factors other than performance and ability, such as tenure           | 1/3   |
| d        | Employees are normally not promoted  | 0     |
| <b>7</b> | <b>In 2015, when was an under-performing employee moved from their current role?</b>                 |       |
| a        | Within 6 months of identifying employee under-performance  | 1     |
| b        | After 6 months of identifying employee under-performance   | 1/2   |
| c        | Rarely or never  | 0     |
| <b>8</b> | <b>In 2015, who made decisions over the hiring of permanent full-time employees?</b>                 |       |
| a        | Only the owner(s)  | 0     |
| b        | Mostly the owner(s) with some input from other employees   | 1/3   |
| c        | Jointly the owner(s) and other employees   | 2/3   |
| d        | Other employees  | 1     |

# Average score by quintile and size band



Management Score (2015)

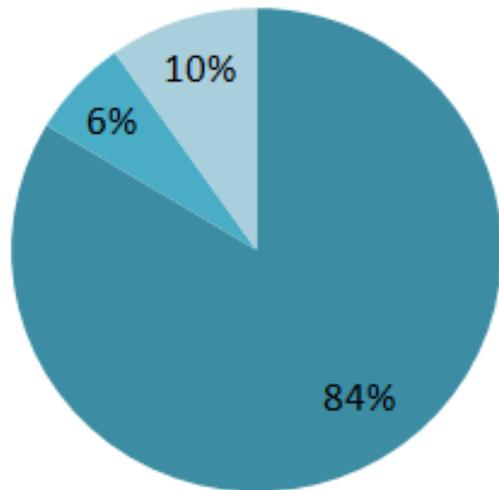


*All manufacturing includes all manufacturing businesses with employment of at least 10 in Great Britain*

Source: ONS

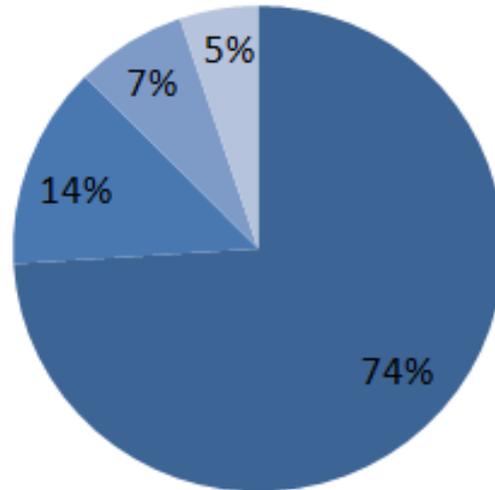
# Manufacturing environment in Great Britain

## Multinational Status



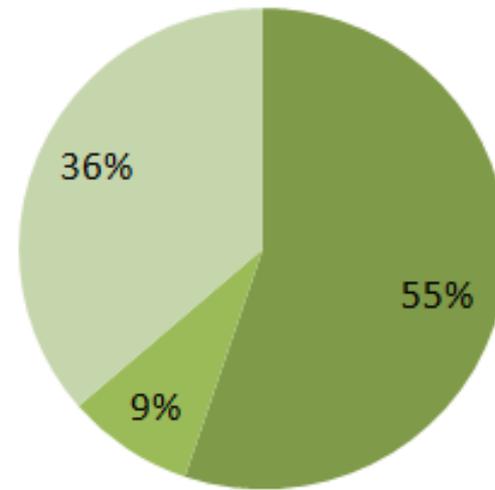
- Domestic
- UK Multinational
- Non-UK Multinational

## Size



- 10 to 49 employment
- 50 to 99 employment
- 100 to 249 employment
- 250 or more employment

## Family Ownership



- Family-owned and family-managed
- Family-owned and non-family-managed
- Not family-owned

Percentage of at least 10 in Great Britain