Global Best Practices Statistical Yearbook
2009 Edition

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B&M Analysts
powering competitiveness through performance analysis
BENCHMARKING ▪ CLUSTERING ▪ STRATEGY

Section 1 – Identifying the value of the Yearbook

To ensure that you fully understand the content and value of this Yearbook we strongly encourage you to start engaging with it here. This section aims to comprehensively outline the Yearbook's 2009 content and comprises five sub-sections. The first sub-section explores the importance of benchmarking and the merits of the market driver approach used in the composition of the **Global Best Practices Programme 2009 Statistical Yearbook** dataset. It takes the form of a short essay and is important in situating the scientifically valid nature of the Yearbook, as well as its intrinsic value to management teams. The second sub-section provides an overview of the market driver benchmarking methodology upon which the entire Yearbook is based, as well as the competitiveness measures underpinning each of the six market drivers. Importantly, the formulae attached to each of the competitiveness measures are also presented, thus ensuring a clear understanding of the measures included in Sections 2 through 7.

The third sub-section then briefly outlines the profile of firms included in the dataset. The size of each population group is made explicit as are the exact characteristics of the sets and sub-sets of firms – from their ownership to their location, to their operating profiles. This sub-section situates the parameters of the 377 firm dataset and makes explicit the manner in which a manager reading the Yearbook can differentiate their own firm's profile from that of the various categories of firms that have participated in B&M Analysts' global best practice benchmarking programme and that are therefore included in the dataset.

The fourth sub-section, introduced in the 2008 Yearbook and substantially bolstered in this edition, considers the comparative costs to firms of operating at an average (mean), as opposed to better (Upper Quartile) performer, within the Global Best Practices database. Depicted as a proportion of sales, the average performance of firms in the database is juxtaposed against the performance of Upper Quartile performers for the following 10 KPIs: Raw material, work in progress and finished goods inventory holding, customer returns, internal scrap rates, production lost to machine/tool changeovers, production lost to machine breakdowns, production lost to tooling breakdowns, production lost to materials unavailability, and absenteeism. Based on these 10 KPIs, and as depicted in this sub-section, the average automotive component firm in the Global Best Practices database has a wastage factor in their plants equivalent to 23.1% of their sales. This is relative to only 7.8% at the Upper Quartile level, a staggering difference of 15.3% of sales!

The final sub-section outlines the manner in which managers should engage with the statistics presented in the 2009 yearbook. Importantly, it outlines the manner in which the data is presented, explores the various statistics used, and provides an example of how the data can be interpreted and used to galvanise management action to effect positive change within automotive component manufacturing companies using this Yearbook as their primary benchmarking resource.

1.1. Contextualising the importance of benchmarking to the global automotive components industry

How did the Western automobile industry catch-up with the Japanese?
During the 1970s and 1980s, not only did the Japanese automobile industry sweep through global markets, even in the largest market of the USA they accounted for over 30% of sales. Many people predicted that the Japanese firms would completely drive out their American competitors. Yet this did not happen, with the US assemblers rapidly improving their performance standards to those close to (and in certain instances even equal to) the Japanese. The largest European automobile firms responded similarly.

In the beginning, many of the Western firms thought that the answer to the Japanese challenge was to invest in the most modern technology. Some did so, and burnt their fingers, badly! But they soon came to realise that the Japanese had not beaten them because of their superior technology, but rather due to their ability to produce with a new system, most often called lean production. So, after carefully comparing themselves with the Japanese, and with other automobile firms in their own markets and in Europe, the American producers have been able to restructure their operations, thus putting themselves in a stronger position to withstand further inroads by the highly proficient Japanese manufacturers.

How did they make this comparison with Japanese practices?
In turning around their operations, the Western automobile firms benchmarked themselves against all of their competitors, not just the Japanese. From this, they were able to identify their strengths and weaknesses – both in their performance, and in their processes and practices. At the same time they were able to identify the processes and practices that other firms used to achieve better results. Due to this benchmarking exercise they were able to take the necessary actions to regain their diminishing competitiveness.

Who to benchmark against?
Generally, the most useful firms to benchmark against are those operating in a similar sector. This is because certain performance indicators are conversion specific, such as internal reject or scrap rates. Alternatively, firms may wish to diversify, so that they would like to see how firms producing related, but not identical products, are faring. And, in some cases, firms even find it useful to compare themselves with firms in other sectors, to see whether anything new can be learnt from their behaviour and performance. Many traditional manufacturing firms have, for example, gained from benchmarking the supply chain dynamics of firms outside of the manufacturing sector, particularly retailers.

What to benchmark?

International experience suggests that there are a number of key variables to benchmark, across all industries. These are with respect to business strategy and performance; the organisation of production and inventory control; procedures to assure quality; procedures to ensure continuous improvement and human resource development; the design and development of new products and production processes; and systems of relations with suppliers. But, in addition to these general benchmarks, each industry also has a number of specific parameters, which need to be taken into account, hence the importance of sector (and even sub-sector) specific benchmarking.

Who should do this benchmarking?

The problem with benchmarking is that although firms are eager to find out how they are performing in relation to other firms, their competitors naturally do not want to let their secrets out. For this reason, it is generally very difficult for individual firms to gain access to their competitors. As a result, for benchmarking to be successful, neutral investigators are required. Neutral investigators collect the relevant data with the participation of the firms, on the understanding that firm-specific confidential information is not released to anyone without their written permission[1]. This information is then packaged in a manner that disguises the individual identity of participating firms without weakening the value of the knowledge created.

Relevance of benchmarking to the global auto components industry

The benchmarking of firm-level operations is as relevant in 2009 as it has ever been. Whilst substantial competitiveness advancements have been recorded across the global automotive assembly and components industry, operational pressures remain relentless with this evident in respect of new and ever increasing customer demands and developments, and the poor financial performance of the global automotive industry. For a detailed analysis of latest major trends and developments in the **Global Automotive Industry**, and thus the continued relevance and importance of benchmarking, please review **Appendix I**.

B&M Analysts' benchmarking tool

B&M Analysts' benchmarking tool has been created with the specific intention of supporting the advancement of firm-level competitiveness in line with global standards. Whilst it was not specifically designed for a particular sector and has been developed as a general continuous improvement tool to be used across various manufacturing enterprises of all sizes, it has been most widely used for the benchmarking of automotive component firms – with a significant amount of success since the inception of the tool in 1997. This success has been

[1] For example, when B&M Analysts completes a benchmarking exercise at a company, the company is at liberty to impose their own confidentiality agreement on us. Failing this, we have our own standard confidentiality agreement, which can be downloaded at www.bmanalysts.com and which guarantees the confidentiality of all benchmarking information received.

underpinned by the scientific rigour of the tool's development process and its ongoing refinement in line with changing automotive market requirements[2].

As highlighted above, international experience suggests that there are numerous key variables to benchmark across all industries. But, in addition to these general benchmarks, each industry also has specific parameters that need to be considered. 'Like-with-like' benchmarks (i.e. comparative benchmarks between firms competing in the same or similar market segments) are consequently widely perceived to be the most useful performance-based benchmarks, particularly when the findings are being used to direct management action. For example, if two automotive foundry firms are benchmarked against one another, and the findings highlight that the one firm performs significantly weaker than the other in terms of its work in progress inventory holding and internal and external quality performance then there can be no excuses from that firm's management as to the relevancy of the benchmark findings. Getting management to accept the need for change is made far easier as excuses for poor comparative performance are rendered invalid by the matching profile of the benchmark 'comparator' (or dataset).

Unfortunately, whilst benchmarking is widely used as a management tool, most benchmarking internationally takes a broad composite index across either a number of sectors or across one broad sector. Firms then compare themselves with these sets of indicators. The problem with this is that firms do not receive sufficient specific information to assist them in directing management action to become more globally competitive. These tools have limited diagnostic value in uncovering the processes that are leading to a firm's comparatively poor or strong performance levels. This is obviously a key issue as explored below.

1.2. The market driver methodology and measurement formulae

The benchmarking data presented in this Yearbook is fundamentally different to the typical benchmarking data available globally. It is founded on what we term a quantitatively based 'Market Driver' benchmarking questionnaire that focuses not on indexed or subjective performance data, but rather actual performance levels. The uniqueness of the methodology that we have used extensively across the globe is that it allows the competitiveness variables of a specific firm to be directly benchmarked against broad sectoral standards, as well as a narrower range of firms matching its location profile, its ownership profile, its manufacturing sub-sector, its size (based on number of employees) and its market focus.

[2] Key academics associated with the initial development of the methodology include Prof. John Bessant (Imperial College, London), Prof. Raphael Kaplinsky (Institute of Development Studies, University of Sussex), Prof. Mike Morris (University of Cape Town) and Dr. Justin Barnes of B&M Analysts.

The six 'market drivers' against which our tool measures performance are outlined in the table below, as are the performance measures that are intrinsic to understanding how effectively firms are meeting these requirements. In addition, the table outlines the importance of each of the market drivers considered.

Market driver	Operational performance measures	Indicative value
1. Cost control	1. Total inventory levels 2. Raw material holding 3. Work in progress (WIP) levels 4. Finished goods holding	Measuring inventory is a sound proxy for the measurement of cost control at manufacturers. Firms with low inventory are operating just in time systems & thus are in control of their costs. Raw material, WIP & finished goods stock are all cost contributors.
2. Quality	5. Customer return rates (0km failures) 6. Internal reject rates 7. Internal scrap rates 8. Internal rework rates 9. Return rates to suppliers	Three quality areas are key: Customer returns, internal defects (rejects, reworks, scrap) & supply quality. Customer returns reveal quality satisfaction, but offer an insufficient indication of internal quality performance. Firms may have poor internal systems, but provide quality products by following stringent checks at the end of processes. Here quality costs! Low customer returns need to be supported by low defects & strong supplier quality if firms are to manufacture low cost, quality products.
3. Value chain flexibility	10. Customer lead times: From finished goods (domestic & international) 11. Customer lead times: From production (domestic & international) 12. Manufacturing throughput times 13. Production time lost to machine/tool changeovers 14. Supplier lead times (domestic & international)	Value chain flexibility is determined by the speed at which a firm accepts a customer order & converts this to a delivered product. Key value chain variables for any firm is the flexibility of its suppliers, the flexibility of its own operations & finally the flexibility of its customer interface. Each of these needs to be measured to ascertain the value chain flexibility of the firm. Some operational flexibility measures are included under other market drivers (e.g. WIP), but additional key measures are focused on here.
4. Value chain reliability	15. Deliveries to customers that are not on time and in full 16. Production lost to machine breakdowns 17. Production lost to tool breakdowns 18. Production lost to materials unavailability 19. Preventative maintenance as % of total maintenance time 20. Deliveries from suppliers that are not on time and in full	No firm can operate flexibly without performance consistency. Measuring the value chain reliability of firms is thus as critical as measuring their flexibility. Operational reliability is moreover a central OEM requirement, with on time & in full delivery a key demand. Measuring this indicator, along with the reliability of a firm's own operations & that of its suppliers is thus an essential part of any WCM benchmark.
5. Human resource development (capacity to change)	21. Training expenditure 22. Formal training by employee category 23. Employee suggestions received & implemented 24. Labour turnover rates 25. Staff turnover rates 26. Management turnover rates 27. Absenteeism rates 28. Accident frequency rates 29. Labour unrest downtime	OEM demands are becoming more onerous. Whether firms fail or grasp the opportunities afforded by these demands depends on their resource use, with the most critical of these their human resources. The four dimensions to change are manpower, machines, materials & methods, but it is the first that determines ability to deal with the others. Analysing whether firms are investing in employees, fostering continuous improvement, maintaining good industrial relations & generating worker commitment is thus critical.
6. Product development	30. R&D expenditure 31. Contribution of new products to total sales 32. Proportion of sales from products in growing phase of their lifecycle	A success determinant for any firm is its ability to bring new products to market. Component firms are no different, although the new product development process is complex given global lead sourcing arrangements. It is thus important to disaggregate R&D spending (an indication of investment in new product development) from the proportion of sales from new products (an indication of the life cycle of products being manufactured at firms).

As highlighted, the basic **quality**, **cost**, **delivery** and **speed** elements of any world class manufacturing template are covered, with **human resource** and **new product development** elements included as key indicators of future competitive potential.

As outlined above, the market driver methodology gives rise to 32 core measures, which automotive component manufacturers should be using to assess their global competitiveness on an ongoing basis. Achieving exceptional performance levels in each of these measures will guarantee that a firm remains at the forefront of international best practice in the automotive components industry. As such, it is these indicators that constitute the core focus of this 7th edition of the **Global Best Practices Statistical Yearbook,** although four financial performance indicators are also benchmarked as a means to contextualising the comparative financial well being of the firms that participated in B&M Analysts' Global Best Practices Benchmarking Programme through 2008. These four indicators are outlined below.

Focus area	Measurement
1. Turnover growth	• Indexed & inflation adjusted turnover growth from 2006 to 2008
3. Operating profits	• Operating profitability as a proportion of total sales
2. Employment growth	• Indexed employment from 2006 to 2008
4. Capital expenditure	• Capital expenditure as a proportion of total sales

The formulae/definitions underpinning each of the measures are outlined below, with the numbers in brackets matching the sequencing of the operational performance measures listed in the market driver table.

1.2.1. Cost control measures

(1) Total inventory holding:

$$\frac{\text{Turnover for current year}}{\text{Average value of total inventory holding}} = \text{Stock turns per year, THEN}$$

$$\frac{\text{Operating days per annum}}{\text{Stock turns per annum}} = \text{Total inventory days}$$

For **(2) Raw Materials, (3) WIP** and **(4) Finished Goods** replace 'Average value of total inventory holding' with the average value of Raw Materials, Work in Progress (WIP) and Finished Goods respectively. The sum of these three inventory types will equal the value of total inventory holding. When differentiating the three forms of inventory, please note that Raw Material constitutes all stock that your firm is responsible for, but that has not undergone any manufacturing value added activity and/or process, whilst Finished Goods constitute all products classified as being finished or completed but that are still the responsibility of the firm (as opposed to the customer).

Example: If a firm turns over $100,000,000 and holds $10,000,000 stock in raw materials, WIP and Finished Goods at Year-End, its stock turn will be 10. Based on the firm operating 300 days in that year, its total inventory holding for the year will be 30 days, with this figure comprised of raw materials, work in progress and finished goods. If the firm's total inventory holding is evenly spread between the three inventory types (i.e. one-third of each inventory-type), it would hold 10 days of Raw Material, 10 days of WIP and 10 days of Finished Goods.

1.2.2. Quality performance

(5) Customer return rate:

$$\frac{\text{Number of units returned by customers in year}}{\text{Total number of units sold in year}} \times 1{,}000{,}000 = \text{Customer Return Rate PPM}$$

OR if an extremely wide range of products is manufactured and unit values vary so much that individual returns skew unit customer returns enormously then the following may be used:

$$\frac{\text{Value of units returned by customers in year}}{\text{Value of units sold in year}} \times 1{,}000{,}000 = \text{Customer Return Rate PPM}$$

Note: Firms are required to include intercepted quality failures at customers in their ppm figures, although customer returns only include 0km failures. This means that they exclude warranty (or on-the-road failure) claims.

(6) Internal reject rate:

$$\frac{\text{Number of manufactured units rejected through inspections in year}}{\text{Total units manufactured in year}} \times 100 = \text{Internal Reject Rate (\%)}$$

OR if an extremely wide range of products is manufactured and unit values vary so much that individual rejects skew unit reject rates enormously then the following may be used:

$$\frac{\text{Value of manufactured units rejected through inspections in year}}{\text{Total value of units manufactured in year}} \times 100 = \text{Internal Reject Rate (\%)}$$

(7) Internal scrap rate:

$$\frac{\text{Value of material scrapped during production in year}}{\text{Total value of material purchases in year}} \times 100 = \text{Internal Scrap Rate (\%)}$$

Note: This measure is based on the material purchase value and not the hypothetical selling or value added price of the scrapped product/material.

(8) Internal rework rate:

$$\frac{\text{Number of manufactured units reworked as a result of defects in year}}{\text{Total number of units manufactured in year}} \times 100 = \text{Internal Rework Rate (\%)}$$

Note: Internal reworks are extremely difficult to classify as many firms include reworks as part of their production process and view them as intrinsic to production. Conversely, many firms classify all non-value adding activities as reworks caused by the failure of previous processes to manufacture right the first time. Our definition takes the latter approach, which is 'reworks are any off-line activity carried out to correct production tasks that are not completed to specification during the course of the value adding production process'.

Example: One in five bumpers painted at a particular firm have inclusions in their finish due to dust entering the paint booth. As a result, these bumpers do not progress directly from painting to polishing, but rather to a rework area where the inclusions are removed and the blemishes corrected. The activity is not value adding and is carried out because of a failure in the firm's overall process. In this case the firm would register a 20% rework rate for the painting of its bumpers.

(9) Supplier return rate:

$$\frac{\text{Number of units returned to suppliers in year}}{\text{Total number of units purchased in year}} \times 1{,}000{,}000 = \text{Supplier Return Rate PPM}$$

OR if an extremely wide range of products is manufactured and unit values vary so much that individual returns skew unit supplier returns enormously then the following may be used:

$$\frac{\text{Total value of units returned to suppliers in year}}{\text{Total value of units purchased in year}} \times 1{,}000{,}000 = \text{Supplier Return Rate PPM}$$

1.2.3. Value chain flexibility

(10) Customer lead time performance – Finished goods: This represents the average time taken from the placement of an order by a customer to the delivery of the product (defined as the moment when the product becomes the property of the customer) when the product is already being held as finished goods stock. Domestic and international customer performance is separated for our calculations, but the formula remains the same. We would argue that this represents **false customer flexibility**, with buffer inventory holding masking the interface between the firm and its customers.

(11) Customer lead time performance – Production: This represents the average time taken from the placement of an order by a customer to the delivery of the product (defined as the moment when the product becomes the property of the customer) when the product has to be manufactured and no finished goods are available. Domestic and international customer performance is separated for our calculations, but the formula remains the same. We would argue that this represents **true customer flexibility**, with no buffer inventory holding masking the interface between the firm and its customers.

(12) Average manufacturing throughput time: This represents the average time taken to manufacture the five major products manufactured by the company from the start of production to the end of production. Start of production is defined as the moment value is added to incoming raw materials or components, whilst the end of production is defined as the packing of the completed product into lots ready for distribution.

(13) Production time lost to machine/tool changeovers:

$$\frac{\text{Total production time lost due to machine and tool changeovers in year}}{\text{Total production time in year}} \times 100 = \text{Machine \& tool changeovers as a \% of production time}$$

(14) Supplier lead time performance: This represents the average time taken from the placement of an order with a supplier to their delivery of the product to the firm. This measure therefore captures the average time taken from the supplier's acceptance of the order requisition sent to them to the delivery of the product/material to the firm, whether to stores or directly on-line.

1.2.4. Value chain reliability

(15) Customer delivery reliability:

$$\frac{\text{Number of deliveries to customer in year that are not on time and in full in year}}{\text{Total number of deliveries to customers in year}} \times 100 = \text{Deliveries not on time and in full (\%)}$$

Note: 'On time and in full' is determined by the service level contract with the customer. For an OEM customer this is likely to be an hour or two hour period in which deliveries must be made. Similarly, units required are likely to be exact. For example, if the customer demands delivery of 125 units between 13:00 and 15:00, then any deviation from this would be penalised. However, as an example, if delivery is specified for a day and units are contractually permitted to vary by 3% (either in excess or below the agreed upon quantum, as happens in the aftermarket) then this is the standard that needs to be adhered to and thus measured against.

(16) Production time lost to machine breakdowns:

$$\frac{\text{Total production time lost due to machine breakdowns in year}}{\text{Total production time in year}} \times 100 = \text{Machine breakdowns as \% of production time}$$

Note: This includes all production time lost due to machine breakdowns and not only the time taken to repair the machine.

(17) Production time lost to tool breakdowns:

$$\frac{\text{Total production time lost due to tool breakdowns in year}}{\text{Total production time in year}} \times 100 = \text{Tool breakdowns as \% of production time}$$

Note: This includes all production time lost due to tool breakdowns and not only the time taken to repair the tool.

(18) Production time lost to materials unavailability:

$$\frac{\text{Total production time lost due to materials unavailability in year}}{\text{Total production time in year}} \times 100 = \text{Materials unavailability downtime as \% of production time}$$

Note: This includes all production time lost due to materials unavailability, irrespective of its cause – supplier non-delivery or internal logistics failure.

(19) Predictive and/or preventative maintenance as a % of total maintenance time:

$$\frac{\text{Total predictive and/or preventative maintenance hours logged in year}}{\text{Total maintenance hours logged in year}} \times 100 = \text{Predictive/preventive maintenance as \% total maintenance downtime}$$

Note: This is the proportion of total maintenance time logged at the firm that is predictive and/or preventative as opposed to breakdown oriented, e.g. if 2,000 maintenance hours are logged in a plant in a given year, with 1,000 of these preventative and/or predictive and 1,000 due to breakdowns, the proportional breakdown of performance will be 50%.

(20) Supplier delivery reliability:

$$\frac{\text{Number of supplier deliveries not on time and in full in year}}{\text{Total number of deliveries from suppliers in year}} \times 100 = \text{Deliveries not on time and in full (\%)}$$

Please refer to the note for **(15) Customer delivery reliability**, as the same definition applies.

1.2.5. Human resource development

(21) Training as a % of total remuneration:

$$\frac{\text{Total training expenditure at company in year}}{\text{Total remuneration (wages \& salaries) in year}} \times 100 = \text{Training expenditure as a \% of remuneration}$$

Note: The figure should include only pure training costs (course related costs, whether run in-house or by an external service provider) and dedicated training personnel costs. Firms should exclude any skills levy payments, loss of production time, travel or accommodation costs from the calculation. Remuneration includes both salaries and wages.

(22) Formal off-line training per employee category: This represents the number of days spent on formal off-line training by employee category, e.g. if production workers received an average of 40 hours formal off-line training in 2005 and worked 8 hours per day, then their formal off-line training would equate to a total of 5 days. It is important to note that formal off-line training excludes On the Job Training (OJT), but includes formal in-house, off the line, training courses run by the firm.

(23) Employee suggestions received and implemented:

$$\frac{\text{Total number of employee suggestions received in year}}{\text{Average number of employees in year}} = \text{Number of suggestions received per employee}$$

$$\frac{\text{Total number of employee suggestions implemented in year}}{\text{Average number of employees in year}} = \text{Number of suggestions implemented per employee}$$

(24) Labour turnover rate:

$$\frac{\text{Total number of labourers dismissed/resigned in year}}{\text{Average number of labourers employed in year}} \times 100 = \text{Labour turnover rate (\%)}$$

Note: Retrenchments and retirements must be **EXCLUDED** from this figure, as we are only endeavouring to capture labour commitment to the firm and not forced turnover due to business conditions or the aging profile of a firm's workforce. 'Labour' includes long-term contract labour (12 months or longer), but excludes casuals.

For **(25) staff and (26) management turnover** replace 'average number of labourers employed' with number of staff and managers respectively. Staff and labour are distinct insofar as labourers are paid weekly and staff members monthly.

(27) Absenteeism rate:

$$\frac{\text{Total number of man days lost due to employees not being at work in year}}{\text{Total number of man days available to company in year}} \times 100 = \text{Absenteeism rate (\%)}$$

Note: Only holiday leave should be EXCLUDED from the absenteeism figure – absenteeism therefore includes late-coming, early departures, and absence without leave (AWOL), as well as compassionate and sick leave.

(28) Accident frequency rate

$$\frac{\text{No. of accidents resulting in at least 1 hour production lost in year}}{\text{Total hours worked in plant in year}} \times 1{,}000{,}000 = \text{Accident frequency rate}$$

Note: A firm's Accident Frequency Rate (AFR) is based on accidents that have resulted in **at least** one hour of lost production for the employee. Not every accident is therefore recorded, only those that have had a negative impact on production.

(29) Labour relations downtime

$$\frac{\text{Total hours lost to industrial action by workforce in year}}{\text{Total production hours available to entire workforce in year}} \times 100 = \text{Labour relations downtime (\%)}$$

Note: 'Industrial action' includes any time lost as a result of disruption to production because of industrial relations issues. This therefore includes both firm specific labour relations issues (i.e. firm specific strikes), as well as broader industrial action, such as sympathy strikes or national strikes.

1.2.6. Product development

(30) Research and Development expenditure:

$$\frac{\text{Total Research and Development expenditure at firm in year}}{\text{Total sales of firm in year}} \times 100 = \text{R\&D spend as a \% of total sales}$$

Note: R&D expenditure should include all costs associated with new product development, including R&D staffing and facility costs. However, the figure should exclude royalty payments to parent companies and/or licensors, focusing as it does on own R&D activities only.

(31) Contribution of new products to past year sales:

$$\frac{\text{Total value of sales in year from products released over past 12 months}}{\text{Total value of sales in year}} \times 100 = \text{Contribution of new products to sales (\%)}$$

Note: 'New product sales' can be defined as the sales derived from any product that is materially different in application or form from products previously manufactured and sold by the firm, and that carry a separate identity (i.e. product number).

(32) Proportion of products in the growing phase of their lifecycle:

$$\frac{\text{Sales in year from products experiencing sales growth}}{\text{Total value of sales in year}} \times 100 = \text{Proportion of products in the growing phase of their lifecycle (\%)}$$

Note: This measure is derived from the literature on product lifecycle phases, where the first phase of a product represents its introduction and growth phase (increasing sales), the second its maturity (consistent sales), and the third its declining phase (represented by declining sales and eventual product removal from the market).

1.2.7. Financial performance findings

Apart from the competitiveness measures explored in the Yearbook, some attention is also given to the financial performance of the firms represented in the database. The measures explored are their sales growth from 2006 to 2008 (inflation adjusted for each firm's respective country), their operating profitability levels before income tax, their employment growth for the 2006 to 2008 period and finally their levels of capital expenditure. Whilst these findings are interesting to include in any benchmarking exercise in that they offer an indication of firm health (hence their inclusion), they simply reveal firm-level competitiveness performance and market conditions in previous years, and are a poor indication of present and future competitive capacity.

Their formulae are listed below:

(33) Sales growth over the last two years:

$$\frac{(\text{Sales in 2008* – Sales in 2006})}{\text{Sales in 2006}} \times 100 \quad = \quad \text{Sales growth over the last three years (\%)}$$

* Inflation adjusted to 2006 levels

Note: Sales growth over the period 2006 to 2008 has been indexed for each firm in their particular domestic currency. This represents real sales growth, with all firm-level figures inflation adjusted according to the Consumer Price Index deflator for each country represented in the database.

(34) Operating profitability:

$$\text{Sales revenue – Cost of goods sold in year} \quad = \quad \text{Gross profit THEN}$$

$$\frac{\text{Gross profit – (Marketing + Administration costs) in year}}{\text{Sales in year}} \times 100 \quad = \quad \text{Operating profit (\%)}$$

(35) Employment growth over the last two years: Indexed employment growth over the period 2006 to 2008.

$$\frac{(\text{Average employment in 2008 – Average employment in 2006})}{\text{Average employment in 2006}} \times 100 \quad = \quad \text{Employment growth over the last two years (\%)}$$

(36) Capital expenditure as a proportion of sales

$$\frac{\text{Amount spent on capital equipment in year}}{\text{Sales for year}} \times 100 \quad = \quad \text{Capital expenditure as a \% of sales}$$

Note: Capital equipment expenditure is defined as expenditure on machinery, buildings and fixtures, vehicles and both Information Technology hardware and software.

1.3. Profile of firms in the database

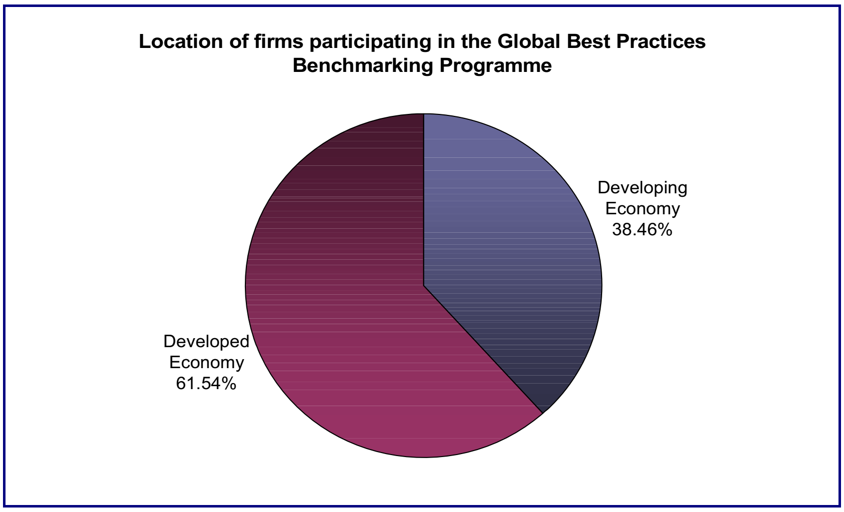
The total population included in the **Global Best Practices Database** as of the end of February 2009 is 377 firms. It is important to outline the profile of these firms as this highlights the representivity and biases of the dataset.

The population is disaggregated below according to the following six profile criteria:

1. Geographical location
2. Firm size (by employment)
3. Automotive sub-sector
4. Market focus
5. Ownership, and
6. Operating profile

Geographical location

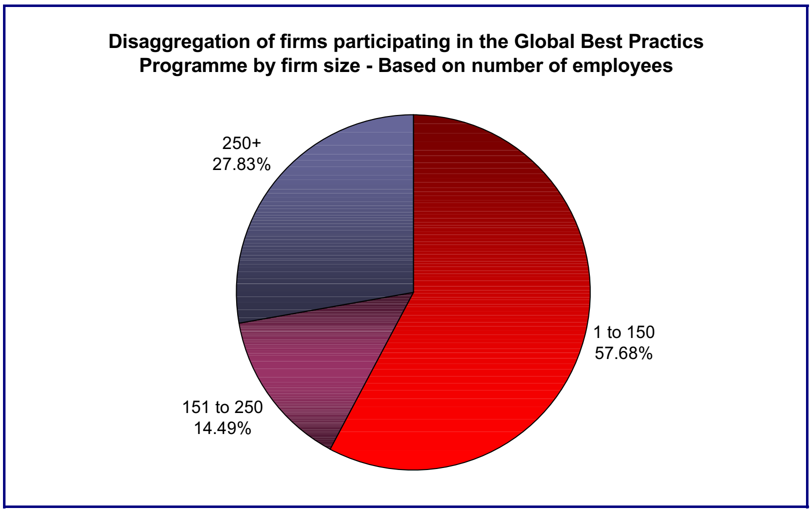
The 377 automotive component manufacturers[3] in the total population are based in eight economies – Western Europe, Central Europe, South Africa, Asia, Australia, North America and Latin America. The West European, North American and Australian-based firms are categorised as 'developed economy' in the database and total 232 or 61.5% of firms. The vast majority of these firms are based in North America. Of the total population, 145 firms (or 38.5%) are categorized as 'developing economy', with approximately half of these firms based in South Africa and the remainder in Central Europe, South and South East Asia, and Latin America. The proportion of the database comprised of developed and developing economy firms are presented in the accompanying figure.



[3] Note that questionnaires were completed and/or data supplied on a firm basis, with this usually inclusive of only one plant. In certain instances a firm is comprised of more than one plant and in these rare instances the data reflects the aggregated performance of the firm rather than simply the individual plants.

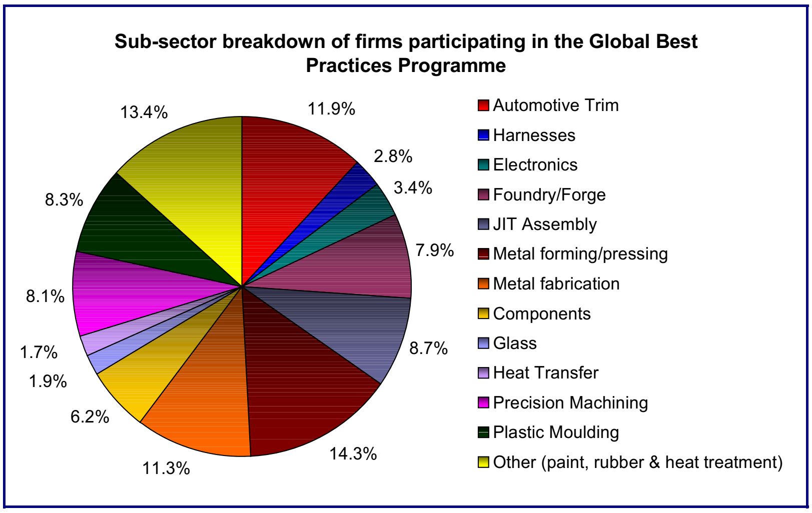
Firm size[4]

In terms of the population's total range, the lower quartile employment level for firms that participated in the benchmarking programme in 2008 is 48, whilst the upper quartile employment figure is 280. The range for sales turnover is similarly large with the lower quartile figure (US) $4.7 million in 2008, versus the upper quartile firm level of $33 million. If one disaggregates the total population by employment level, a clear spread is evident. As highlighted in the adjacent figure, 57.7% of the population employs 150 or less employees, whilst 14.5% employ between 151 and 250 and 27.8% employ 251 or more. Total employment for the population of 341 firms for which we have data is 75,213, giving an average of 221 employees per firm.



Automotive sub-sector

The manufacturing diversity of the global automotive components industry is consistent with the range of sub-sectors represented in the Global Best Practices database. As highlighted in the adjacent figure, for the purposes of more precise classification, the 377 firms in the survey population have been disaggregated into 13 sub-sectors. The largest of these is 'metal forming/pressing, which constitutes 14.3% of the population, whilst the second largest sub-sector is the 'other' category, at 13.4% of the population. The



[4] Note that a few firms in the database did not provide their employment breakdown. As such, this figure does not relate to the entire population set, but rather a total of 345 firms.

next three largest sub-sectors are ‘automotive trim’ (11.9%), ‘metal fabrication’ (11.3%), and ‘JIT assembly’ (8.7%). The remaining eight sub-sectors constitute 40.3% of the total population. In order of size, these are ‘plastic moulding’ firms (8.3%), ‘precision machining’ (8.1%), ‘foundries/forges’ (7.9%), ‘components’ (6.2%), ‘electronics’ (3.4%), ‘harnesses’ (2.8%), ‘glass’ (1.9%), and ‘heat transfer’ (1.7%). Each of these sub-sectors is scrutinised separately in this yearbook.

Some of the core products covered under each of these sub-sector headings are outlined below:

1. Trim: Door panels, parcel trays, arm rests, floor mats, sun visors, headlinings, moulded carpets, seats, seat fabric, high density foam, wheel arch carpets – basically all textile/leather-based automotive components

2. Harnesses: Wiring harnesses (body, cowling and standard types), as well as battery cables

3. Electronics: Alarms, immobilisers, central locking mechanisms, electric window regulators, engine management units, vehicle entertainment systems, instrument panels

4. Foundries/forges: Cylinder heads, manifolds, raw castings (forged and cast products), aluminium wheels, drive shafts. Both ferrous and non-ferrous foundries are included in this sub-sector

5. JIT Assembly: Any product supplied on a Just in Time or Just in Sequence basis to an OEM, and where only assembly takes place. In addition, raw materials must constitute at least 70% of the cost of sales of the product being manufactured. The product being manufactured at these firms is immaterial; what is critical is their ability to manage complex supply chains and to assemble a myriad of components into a discrete product for OEM customers, often within very short lead times. Examples in the dataset include front end systems, dashboards, axle systems, seats, door assemblies, HVAC systems, etc.

6. Metal forming/pressing: Body in White stampings, fuel tanks, springs, torsion bars, exhaust systems, exhaust components, catalytic converter shells, steel wheels, fasteners and rivets

7. Metal fabrication: Roll bars, bull bars, gear and bonnet locks, spare wheel carriers, seat frames, rear and front drive axles, prop shafts, jacks, impact beams

8. Components: These are discrete, complex components that are generally sold in volume into the aftermarket, with OEMs generally constituting only a small proportion of sales for firms. Typical products include oil, air and fuel filters, spark plugs, shock absorbers, brakes, clutches and bearings (and their associated components). This sub-sector is brought together not by conversion process, but rather the complete nature of the products produced and their general aftermarket orientation

9. Glass: Laminated windscreens, toughened side glass, rear lights and side vents

10. Heat transfer products: Radiators, heaters, condensers, evaporators

11. Precision machining: This category of firms is grouped not by the products they manufacture, but rather by the precision nature of the machining processes they complete for their customers. Examples include gear cutting and the precision machining of castings and forges for axle, propshaft and steering gear assembly, as well as clutch and disk brake assembly

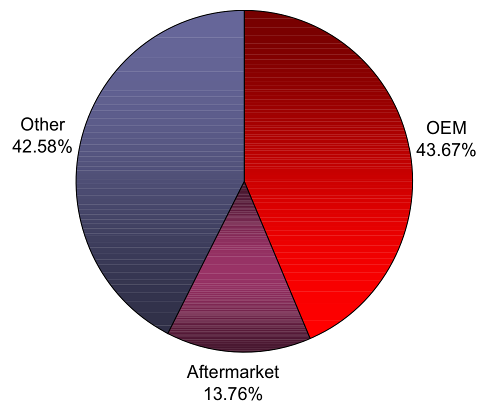
12. Plastic Moulding: Injection, blow and rotationally moulded components – either for internal or external trim, or mechanical, applications

13. Other: Rubber mouldings, passenger and commercial vehicle tyres, water and solvent-based paints, heat treatment plants

Market focus

The majority of the firms in the Global Best Practices Database are focused on supplying either Original Equipment Manufacturers (OEMs) or are principally second tier suppliers to first tier automotive component firms, with the remaining firms focused on the aftermarket. As revealed, in the adjacent figure, the 377 firms in the dataset can be categorised into a market focus population of 458 firms, with certain firms operating as both Tier 1 and Tier 2 operations. In total, 43.7% of the population (200 firms) are OEM focused, with 13.8% (63 firms) principally aftermarket focused and 42.6% (195 firms) suppliers of components to other component manufacturers (i.e. 2nd tier automotive component manufacturers).

Market focus of firms participating in the Global Best Practices Programme



Ownership

Given the rapid globalisation of the automotive industry, it is perhaps unsurprising to note that a high percentage of Multinationals are represented amongst the firms in the Global Best Practices database. Of the 345 firms for which we have definitive ownership profiles 37.7% (130 firms) are either fully or majority owned by Multinational Corporations, whilst the balance (62.3% or 215 firms) is comprised of locally owned firms that are either completely independent operations, a part of national holding companies or majority locally owned firms that have an equity relationship with a Multinational. This breakdown is highlighted above.

Operating profile

The operating profile of the firms represented in the Global Best Practices Programme database is presented in the table below. Detailed profile information was secured from a majority of the firms that participated in the Global Best Practices Benchmarking Programme for each of the areas. The firms operated for an average of 260.4 days in 2008, with their average shift configuration being 2.3 shifts per day of 8.2 hours duration (meaning they operated for an average 4,954 hours in 2008). In addition, the firms exported an average of 11.9% of their sales, whilst importing 20.4% of their total purchases. Finally, the average level of employee unionisation amongst the firms was 27.3% in 2008.

Operating element	Average performance in 2008
Operating days per annum	260.40 days
Shifts per day	2.32 shifts
Hours worked per shift	8.21 hours
Exporting levels (as % of sales)	11.88%
Importing levels (as % of total purchases)	20.41%
Unionisation of workforce	27.34%

Summary

As revealed above, the population group represented in the **Global Best Practices Programme** database is heterogeneous, with this evident in terms of all the profile areas explored. There is clear differentiation in terms of geographical location, firm size and ownership, as well as in terms of sub-sector of operation and market orientation. The diversity of the total population is however simply reflective of the general heterogeneity of the global automotive components industry. Whilst the detailed statistical findings presented later in this Yearbook are, we believe, an invaluable indication of performance standards evident in the automotive components industry, they do need to be understood with the variance and average operating profile of the total population in mind. This is the main reason for the disaggregation of the findings in Sections 3 through 7, with the sub-sector categorisations presented in Section 3 of particular importance.

1.4. Calculating the cost of World Class Manufacturing non-adherence

Since the advent of the Global Best Practices Statistical Yearbook series, clients have requested that we unpack the direct financial costs of the various Key Performance Indicators (KPIs) we capture as proxies for WCM adherence. Our response to this previously was that adherence to WCM standards was a non-negotiable and that instead of focusing on the cost advantages to be realised through waste reduction, the process should be readily embraced as a necessary condition for doing business in the global automotive industry. Basically, we argued that because customers were demanding it, and competitors aligning their operations with these new requirements, automotive component manufacturers had no alternative. Trying to cost WCM we argued, was simply missing the point! By eliminating the eight inter-linked wastes identified in the WCM/lean production literature[5], we argued with these clients that substantial cost reduction would inevitably occur, whilst at the same time delivering better quality products to customers, more reliably and within shorter response times, etc. Our argument was rather crude: *'Do the right thing over an extended period, shift the plant towards true WCM adherence, and ultimately the plant's cost base will look after itself'.*

Notwithstanding our arguments, the request from clients continued unabated. Most persuasively, the refrain from our clients has been:

> *You may be right, but remember that the point of the Global Best Practices Yearbook series is to convince us of the need to change. If we are overly fixated on cost reduction and do not really understand WCM, link the two concepts together and persuade us that the two do mutually reinforce one another. What better way of convincing us that WCM does represent the ideal operating model for automotive component manufacturers?*

Arguing against this type of logic is extremely difficult; hence our capitulation and inclusion of the WCM costing exercise in the 6th edition of the Yearbook. The

[5] The eight wastes are: Overproduction, excessive inventory holding, unnecessary waiting time, excessive transportation, over-processing, quality failures, excessive motion, and underutilised human potential.

exercise has now however been extensively refined for the 2009 edition as will be outlined below. Based on the data presented in Sections 2 through 7 of this Global Best Practices Yearbook we are able to calculate the direct financial costs of performing as an average performer within the database, as well as the costs associated with being a leading performer.

In this regard, an average performer means performing at the mean (average) level of the database for ten selected KPIs, whilst a leading performer equates to performing at the upper quartile level for the same ten KPIs. Based on the 'typical' profile of the 377 automotive component manufacturers in the database, we have calculated that the average waste factor as a percentage of sales for firms is 23.1% versus only 7.8% for upper quartile firms. This means that average performing firms manufacture their components at a 15.3% higher cost than their upper quartile counterparts - a staggering figure given the extremely low profit margins generally being secured in the automotive components industry (see Appendix I).

What then are the steps that need to be followed to secure these cost figures? As importantly, what is the process that needs to be followed by an individual firm wishing to undertake a similar cost exercise?

First, we calculated the average profile of the firms in the database. This revealed that the average firm operated 260.4 days per annum, securing operating profitability levels of 9.7%, against a cost of sales breakdown encompassing 62.9% for materials[6], 15.0% for direct labour[7], and 22.2% for manufacturing overheads[8].

Second, we selected the ten KPIs that we believed most directly impacted on the cost base of firms and for which a cost value could be calculated. These are the three key inventory holding measures of raw material, work in progress and finished goods, customer returns, internal scrap rates, production lost to machine/tool changeovers, production lost to machine breakdowns, production lost to tool breakdowns, production lost to materials unavailability (comprising internal and external material downtime), and finally absenteeism.

Third, we calculated the average cost of each of the ten KPIs to firms:

1. The cost of inventory holding is calculated at 25% of the inventory value on hand at firms, with this holding cost derived from working capital costs,

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[6] **Materials:** The cost of all materials that are an essential part of the manufactured product. An exception is when the value per item manufactured is so low that its value cannot be calculated and is included as indirect material (overhead).

[7] **Labour:** Only includes direct labour used for manufacturing, including contractees

[8] **Manufacturing overheads:** Are incurred in manufacturing e.g. factory rent, machinery depreciation/ maintenance, factory tools, water/electricity, indirect materials, indirect labour, etc. Items must be production associated e.g. administration costs, office rental, office furniture depreciation. *Sales/marketing personnel salaries are not manufacturing associated and thus not part of overheads.*

warehousing requirements, insurance costs, handling on the part of personnel, and an obsolescence factor
2. Cost of customer returns is calculated as direct customer claims against turnover
3. Scrap cost is calculated against materials costs, but with the assumption that no value is redeemed against scrapped material
4. Production losses (for changeovers, machine and tool breakdowns and materials unavailability) are calculated as a proportion of lost turnover
5. The cost of absenteeism is calculated against direct labour costs

Fourth, based on the ten KPIs and the average firm profile, we created a spreadsheet to calculate the overall waste factor of the average and leading performing automotive component manufacturers in the database.

Fifth, we inputted the average (mean) and leading (upper quartile) performance variables of the Global Best Practices Yearbook firms into the spreadsheet and compiled the results for inclusion in the Yearbook in Sections 2 through 7.

In terms of analysing the cost benchmark performance findings contained in the Yearbook, let us consider average firm-level performance here. As revealed below, if your firm was the typical, average performer within the Global Best Practices Yearbook database, your waste factor would be 23.1% of your sales, or on $100 of sales – a full $23.11. The five biggest contributors to this waste, each accounting for over 10% of the total calculated figure (in order of importance) would be:

- Production lost to machine/tool changeovers (6.7%)
- Production lost to machine breakdowns (4.3%)
- Production lost to materials unavailability (4.2%)
- Production lost to tooling breakdowns (3.0%)
- Total inventory holding – raw material, work in progress and finished goods (2.9%)

GBPYB KPI	Average	Cost as % sales	Cost % breakdown
Raw material inventory holding	16.90 days	1.62%	7.02%
Work in progress inventory holding	5.40 days	0.52%	2.24%
Finished goods inventory holding	8.01 days	0.77%	3.33%
Customer returns	1,316ppm	0.13%	0.57%
Internal scrap	2.31%	1.31%	5.68%
Production downtime: Machine/tool changeovers	6.67%	6.67%	28.86%
Production downtime: Machine breakdowns	4.31%	4.31%	18.65%
Production downtime: Tooling breakdowns	3.03%	3.03%	13.11%
Production downtime: Materials unavailability	4.23%	4.23%	18.31%
Absenteeism	3.79%	0.51%	2.22%
Total cost as % of sales:		**23.11%**	**100.00%**

In striking comparison to these average industry figures, if your firm was a leading performer (i.e. performing at the upper quartile level for each of the ten measures) your total waste factor would be equivalent to only 7.8% of your sales, or $7.81 on every $100 of sales. The five main contributors to this waste would also be different from the average performers, not only in terms of actual levels (which are substantially lower), but also order of importance:

- Production lost to machine/tool changeovers (2.4%)
- Production lost to machine breakdowns (1.8%)
- Total inventory holding – raw material, work in progress and finished goods (1.3%)
- Production lost to materials unavailability (1.1%)
- Production lost to tooling breakdowns (0.7%)

GBPYB KPI	Upper quartile	Cost as % sales	Cost % breakdown
Raw material inventory holding	8.99 days	0.86%	11.06%
Work in progress inventory holding	2.21 days	0.21%	2.72%
Finished goods inventory holding	3.03 days	0.29%	3.73%
Customer returns	20ppm	0.00%	0.03%
Internal scrap	0.30%	0.17%	2.18%
Production downtime: Machine/tool changeovers	2.36%	2.36%	30.23%
Production downtime: Machine breakdowns	1.76%	1.76%	22.55%
Production downtime: Tooling breakdowns	0.70%	0.70%	8.97%
Production downtime: Materials unavailability	1.13%	1.13%	14.48%
Absenteeism	2.35%	0.32%	4.07%
Total cost as % of sales:		**7.81%**	**100.00%**

A comparison of the two tables presented in this sub-section reveals that adherence to WCM standards most certainly does substantially reduce cost within an automotive component manufacturing plant. Conversely, non-adherence significantly raises costs. The difference in 15.3% of sales between average and upper quartile performance is not incidental – it is significant enough to differentiate successful from unsuccessful plants. When considering the statistical findings presented in the remaining sections of the Yearbook, remember this difference. WCM variables are not simply interesting academic-type indicators; they reveal the difference between success and failure in plant level competitiveness – in terms of meeting customer requirements, and keeping costs under control. This is further illustrated by the cost benchmark performance analysis included in Sections 2 through 7 in the Global Best Practices Yearbook for 2009.

Lastly, is its important to note that while the apparent direct cost implications of customer returns as well as absenteeism do not appear significant, the indirect costs associated with each of these will be substantially higher than calculated (possibly up to ten times). However, considering the complexities associated with ascertaining these additional costs, only the direct costs are presented.

1.5. Reading the statistics presented in Sections 2 through 7

The data presented in the following sections of this Yearbook are analysed in terms of their spread, with the aggregated performance data analysed by percentile, quartile, median and mean (average). By presenting the data in this manner, firm representatives reading this Yearbook will be able to clearly ascertain where in the spectrum of best practice performance their particular company is situated.

Explanation of statistics used

Average (mean): This refers to the specific point of the database calculated by adding each of the company performance findings together and then dividing the total by the number of firms in the database that supplied their performance data.

Median: This refers to the mid-point of the database obtained by looking at each of the company performance findings in the database and identifying the number that sits exactly in the middle of the performance spread. (i.e. the point that separates the top-half of the database from the bottom-half)

Percentiles: Like the median, this is also based on performance spread in the database. The focus is not, however, on the mid-point, but on unit values at the extreme end of each dataset, e.g. the 90th percentile refers to the unit value separating the top 10% of performers in the database and the rest. Similarly, the 10th percentile represents the point marking the performance that separates the bottom 10% of firms in the database from the rest. We would argue that this represents ***best*** and ***worst practice*** standards respectively.

Quartiles: This works in the same way as percentiles, except the disaggregation point is less extreme. The upper quartile refers to the point separating the top 25% of performers from the rest, whilst the lower quartile refers to the point separating the bottom 25% of performers from the rest. We would argue that this represents ***better*** and ***weaker*** practice standards respectively.

Using total stock holding as an example: The average (mean) performance level for the dataset is 30.31 operating days, with the median sitting at 26.10 operating days. These mid-point indicators illustrate at what point your company needs to be performing to be considered an 'average performer'. If your performance is well ahead of this, at say 15 days, then you will be intrigued to find out where you stand in relation to the top performing firms in the dataset. In this example, you would be sitting at somewhere between the upper quartile (18.00 days) and the 90th percentile (11.20 days), meaning your performance is ahead of 75% of the firms in the database.

Whilst this admittedly suggests strong performance, to be a true leader, you would need to perform at 11.20 days, which is the 90th percentile mark, i.e. the level at which you would be ahead of the performance of 90% of the firms in the database. The purpose of the Yearbook is to identify what the level is and to give you a target against which you can drive management action.

Using a negative example, you may discover that your total inventory holding is 50 operating days, thus placing you in the bottom 25% of firms. What then? Well, the data will give you a clear reference point against which you can motivate for change and more importantly provide your management team and/or colleagues with improvement targets to move to the lower quartile (40.20 days) and then the median or mean target over a given time period.

There may of course be mitigating factors for particularly weak or strong performance against the overall database averages. For example, internal scrap rates are generally much higher in a glass manufacturing plant than in a JIT assembly plant. There is therefore a need to analyse your performance in relation to not only overall performance levels (**Section 2**), but also in relation to those firms in your sub-sector (**Section 3**), your ownership type (**Section 4**), the type of economy in which you operate (**Section 5**), your market-focus (**Section 6**), and finally your firm-size (**Section 7**). For these disaggregated categorisations, the statistical interrogation of data is less extensive due to the reduced population sizes. This similarly holds for the cost benchmark performance analysis.

By interrogating your performance in relation to the aggregated statistics, as well as the disaggregated data, your comparative competitiveness in relation to each measure should be made unequivocal. You will know exactly where you stand and what the performance targets are if you are to elevate yourself to the next level. By aggregating your individual performance in relation to each of the core competitiveness measures explored in the Yearbook you should find yourself in a position whereby you can evaluate your competitiveness at a market driver level, (i.e. whether your company strength lies in cost control, quality performance, or value chain or operational flexibility, etc.), as well as in relation to your cost/waste profile.

An insightful one-page **Competitiveness Self-Assessment Sheet** is attached as an appendix to the yearbook to enable you to start to analyse your firm's competitiveness profile. This tool should guide managers through a systematic interrogation of their own company's performance relative to the Yearbook's findings – revealing both the comparative strengths and weaknesses of the firm. It is important to note that firms that have completed this exercise have found it to be very useful. We therefore encourage you to use it.

If any firm that has purchased the Yearbook requires assistance in completing the self-assessment sheet and assessing their comparative operational performance, or would like to participate in the **Global Best Practices Programme**, they are encouraged to contact B&M Analysts' London office at London@bmanalysts.com.