BOOST YOUR COMPANY'S PRODUCTIVITY

A GUIDE FOR MANAGERS AND EMPLOYEES

Forfás

Preface

Today's businesses are facing increased competition and are under pressure to cut costs. They face escalating labour, energy or material costs and are concerned about their business's environmental impact. Productivity is a powerful tool to address these pressures and sharpen their competitive edge.

The aim of this guide is to highlight some well proven tactics for boosting productivity within industry. Additionally, since it is only possible to control what you can quantify, this publication explains how to measure current productivity levels and make these figures meaningful by tracking them over time.

An accompanying shorter practical guide for managers, entitled 'Boost Your Company's Productivity: Simple Steps', has also been produced.

This publication was developed on foot of the "*Report of the High Level Group on Manufacturing"*, 2008. This document is informed by a wide range of research on productivity at firm level. A full bibliography is available on the Forfás website. In addition, a number of agencies, employee and employer representative organisations, companies and individuals were consulted on the content of the Productivity Guide. Forfás would like to thank everyone for their help and guidance.

We hope this serves as a valuable guide to improving productivity and performance.

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1. What is productivity?

Productivity is a measure of your company's return on investment. Basically, it's an indicator of how efficiently you convert inputs to outputs – in other words, a ratio of what you put in (labour, raw materials or other resources) to what you get out in the form of end products or value added.

Partial productivity measures focus on the output achieved relative to one type of input, for example person-hours worked, capital invested or units of energy consumed.

In contrast, total factor productivity (TFP) combines all inputs and outputs involved in the production process. As a result, TFP tends to be a more useful measure, but it can also be more difficult to calculate.

An alternative is for companies to use a number of partial productivity measures, based on different inputs. This reflects the fact that productivity is a complex concept, embracing a wide range of influencers.

1.1 What are the benefits?

Productivity growth can;

- Increase profitability;
- Lower operational costs;
- Optimise the use of company resources;
- Reduce environmental impact;
- Increase competitiveness and market share; and,
- Provide opportunities for expansion.

1.2 How productive is Ireland?

Ireland's productivity growth rates were below the OECD average over the 2004-2007 period.

What's more, this low performance in growth was evident across modern as well as traditional manufacturing industries and in services businesses. We are not improving as fast as other countries. If left unchecked, this trend has implications for the competitiveness of Irish companies battling for survival in international marketplaces, as well as Ireland's living standards.

1.3 What influences productivity?

Productivity can be influenced by many different and complex factors, which can vary according to the nature of the company. The major drivers of productivity growth identified in this document are as follows:

Investment in ICT (information and communications technologies)

- ICT can help your firm to introduce new business models, develop new applications, improve and re-invent business processes and increase efficiencies.
- The uptake and integration of more sophisticated electronic business applications remains relatively limited in Ireland.
- In some cases, there can be an initial time-lag before ICT-related productivity gains materialise, due to the impact of additional expenses, such as up-skilling staff to use the new technology.
- You should factor such additional costs and training provisions into any planned ICT investment.

Investment in equipment

- You can make really significant productivity gains by investing in more efficient equipment and in technologies that facilitate automation.

Increasing energy efficiency

- More efficient use of energy can increase your productivity (and result in lower utility bills).
- 'Green' initiatives that contribute to sustainability can enhance your company's brand value
- Measures to increase energy efficiency in buildings can sometimes contribute to greater worker productivity by creating a more pleasant working environment.

Harnessing people power

- You can achieve really significant productivity growth by investing in skilled and educated workers and providing job-related training.
- To get the most benefit from investments in this area, you should identify a specific productivity-related problem and target training accordingly.
- Variable pay schemes (such as profit sharing) as well as goal setting and feedback for employees can also drive productivity growth.

Using benchmarking and 'world class business' tools

- Proven benchmarking and 'world class' business tools can dramatically drive productivity within your business. Benchmarking provides a 'diagnosis', allowing you to identify and prioritise productivity-related problems, while world class business (WCB) tools provide the 'curative' action.

This guide mainly focuses on production, but redesigning business processes (for example, the selling process) can also dramatically improve your company's effectiveness. Possible areas to target include information gathering and use, operational areas and managerial activities.

2. How to improve productivity

2.1 Technology adoption

Investments in ICT (information and communications technologies) can dramatically improve your company's productivity.

Consider this: researchers found that ICT adoption was one of the major factors underpinning the massive resurgence of national productivity in the United States in the second half of the 1990s. Incredibly, ICT-producing and -using industries were the sole contributors to national productivity gains, while industries that were not ICT-oriented made a negative contribution to the revival.

In Ireland, there is recognition of the benefits of ICT, and we are seeing increased ICT uptake. But the use of more sophisticated electronic business applications remains relatively limited.

ICT could be used, within your company, to introduce new business models, develop new applications, improve and re-invest business processes and raise efficiency.

Investments for commercial and retail businesses could include:

- Hardware such as computers, printers, mobile email;
- Software such as customer relationship and content management software tools, accounting software solutions; web-hosted software; enhanced phone systems including voice mail;
- Broadband and Internet use, for example, setting up a website; and
- Back-up data systems.

An Irish consultancy firm made immediate productivity gains and efficiencies, including large time and cost savings, by upgrading its accounting systems, increasing the efficiency of its back-up data system, and introducing mobile email. (For further information, consult your local Enterprise Board, see: www.enterpriseboards.ie)

Larger businesses and industry can benefit from more sophisticated solutions, such as customer relationship management (CRM) and enterprise resource planning (ERP) tools and computer aided design/manufacturing simulation packages. (For further information, go to Enterprise Ireland at: www.enterprise-ireland.com)

In many cases, you can make the best productivity gains by combining all three categories of ICT; i.e. network communications, software and hardware.

Sometimes it can take a while for productivity gains to materialise from ICT investments. This may be due to other associated expenses; for example, staff may need to be trained to use the new technology. Therefore, you should factor these additional costs and training measures into any planned ICT investment.

2.2 Investment in equipment

Your company could make massive productivity gains by upgrading existing equipment or investing in newer, more efficient plant. Productivity can also be boosted using automation technologies such as robotics, visual inspection systems and digital control networks.

2.3 Using benchmarking and 'world class' business tools

Benchmarking provides a powerful tool to diagnose productivity-related problems in your company, while 'world class' business strategies offer a path to address these problems. Five benchmarking and world class starter-tools particularly suited to Irish industry are outlined in section 3.

2.4 Efficient energy use

Does your company face high energy costs? If so, improving energy efficiency could provide a significant shot in the arm for your overall productivity. What's more, positive environmental messages, such as a reduction in the company's carbon footprint, will increase customer awareness of your company's responsible practices and generate goodwill.

The Government initiative, Power of One, has shown that businesses, as well as homes, can benefit from more efficient resource use. Bewleys Hotel, for example, invested €210,000 on solar collectors to heat water and, as a result, is now saving €15,000 per year in energy costs. (For further information, go to the Power of One at: www.powerofone.ie)

Practical, proven sustainable energy solutions, which can contribute to cleaner and more efficient energy use in your business, include the following:

- Energy monitoring, targeting and benchmarking;
- Using more energy efficient technology in buildings; for example better insulated windows or more efficient lighting;
- Integrating air-conditioning, heating, lighting, and ventilation into a single system to optimise energy use in large office buildings and industrial facilities;
- Exploiting efficient and innovative opportunities in transport;
- Using 'transparency-creating' products that educate users about the impact of their energy consumption; for example, smart electricity metering;
- Focusing on efficiency in boiler, cleanroom and refrigeration operations within industry; and

- Considering the use of combined heat and power (CHP) or renewable energy technologies.

For a company starting out in energy management, it is possible to achieve a 20 per cent reduction or more in energy bills by simple, good housekeeping measures alone. (For further information, go to Sustainable Energy Ireland at: www.sei.ie). However, even when the capital investment in energy efficiency is high, dramatically reduced energy bills can make the payback period quite short. For example, a leading bank invested €550,000 on energy efficient measures in a new headquarters. These included daylighting (making use of light from natural instead of artificial sources); more efficient heating, ventilation and air conditioning, and a focus on the efficiency of the overall building. Remarkably, these energy measures paid for themselves in three months.

On top of financial savings, building designs that promote energy efficiency help benefit productivity in other ways. For example, the bank also found that features such as increased daylight in the building led to a more pleasant working environment, and absenteeism among employees dropped by 15 per cent.

2.5 Harnessing people power through education and training

Most businesses greatest asset is their people. What's more, investing in targeted training and hiring highly skilled or educated workers are proven ways to drive productivity.

Consider the evidence:

- Research has shown that increasing the percentage of those with university degrees in a labour market can increase productivity in that economy.
- Another study found that plants located in cities where the fraction of college graduates grew faster experienced larger increases in productivity than in cities where this concentration grew more slowly.
- Research has also shown that manufacturing plants with a higher ratio of skilled employees have higher productivity levels than plants with lower ratios.

The on-the-job and off-site training that you, as an employer, provide often has the biggest impact on productivity. A service company implemented a job training programme for staff at a cost of €7,800 and found that the team attending the training increased company revenue by €94,020, which equated to 25 per cent of its total monthly average increase in revenue. (For further information, go to FÁS at www.fas.ie or Skillnets at: www.skillnets.ie)

The quality of the training is important, not the quantity. To maximise benefits, it is important to identify specific productivity-related problems and target training appropriately to address these problems.

- In the manufacturing sector, formal, off-the-job training can be particularly effective.
- IT skills development can be very valuable for lower skilled workers, while on-the-job training has been found to be the most valuable type of IT development for university-educated workers.
- Investment in management development can yield large productivity and output returns for firms.

2.6 Human resource and pay strategies

A high-quality workplace contributes to a high-performance business. A survey of more than 130 leading Irish companies found that firms with high levels of employee involvement and engagement were 15 per cent more productive than their competitors. In monetary terms, this was equivalent to €12 million per annum in additional sales revenue for the average company in the survey. Employee turnover rates were also 7.7 per cent lower than other firms. (For further information, go to NCPP at: www.ncpp.ie)

The key to building a more productive workplace lies with high levels of employee involvement and engagement. By adopting innovative HR management policies and practices, you can make real gains in productivity and performance.

- For example, your workforce's productivity could be influenced by how you reward them. Variable pay schemes - such as incentives, on-the-spot bonuses, profit sharing and other pay-for-performance schemes can result in higher productivity than fixed pay schemes.
- There is particular evidence to suggest that profit-sharing is associated with good productivity and can have a stronger impact on performance than employee shares.
- Goal-setting and feedback will also lead to improved work performance and greater efficiency.

High staff turnover has a negative impact on productivity. Examples of high-performance HR practices that promote staff retention and drive productivity include:

- Good internal communications;
- High levels of information and consultation with employees;
- Team-working;
- Training and development;
- Performance management;
- Flexible work arrangements; and
- A commitment to work-life balance issues.

Building a culture of workplace partnership in your organisation will help you get the best from your employees and boost your productivity.

2.7 R&D and innovation

International studies have yielded mixed and often contradictory views on the contribution of R&D to productivity performance. For example, some research indicates that R&D has a positive impact on productivity; whereas, others suggest that it is not a significant factor.

However, R&D is vital for other reasons, and most studies find that value-added per employee is higher for R&D active firms. What's more, a firm that increases innovations sales per employee (this is equal to the log of innovation sales per employee) by 1 per cent, can experience an increase in productivity of 0.5 per cent. (For further information, go to Enterprise Ireland at: www.enterprise-ireland.com)

2.8 Investment and exporting

Having an international dimension to your business can influence its productivity. Firms that are active in foreign direct investment (FDI) are more productive than either firms that outsource overseas or are purely domestic. Likewise, exporting firms tend to be more productive than non-exporting companies. However, it is unclear whether this is because more productive firms export or that exporting increases a firm's productivity.

2.9 Plan and communicate to get the best results

When implementing productivity improvement measures, having a plan and setting aside funds will ensure your best chances of success. What's more, a well communicated strategy with clear goals and objectives can show you exactly how well your company is performing from year to year.

These are some of the main reasons why productivity improvement projects may fail:

- Lukewarm commitment and involvement by top management;
- An unplanned approach to improving productivity;
- Poorly trained supervisory personnel in the area of productivity related problems;
- Inadequate coordination among departments or units;
- Insufficient investment in workforce training;
- Poor organisation-wide communication; and,
- Poor employee relations.

3. Using benchmarking and 'world class' business tools

Benchmarking is a really powerful tool, as it allows you to compare your performance against both your competitors and the best in the game. It also enables you to monitor improvements over time.

Benchmarking has been described[1] as a diagnosis that provides you with an objective view of your operations, so you can prioritise areas that will have the greatest impact on your bottom-line. Meanwhile, 'world class business' (WCB) techniques provide the curative actions that can help you address these problems and improve your performance.

The information in this section is drawn from Keegan, R. and O'Kelly, E., "*Applied Benchmarking for Competitiveness: a guide for SME owner/managers*".

3.1 Five starter tools

The following five WCB and benchmarking starter-tools have been identified by Keegan and O'Kelly as particularly suitable for Irish industry:

- Operation flow analysis;
- Process flow analysis;
- Check-sheets;
- Run charts; and
- Team-working.

You can also adapt these tools to optimise business processes. (For further information, go to Enterprise Ireland at: www.enterprise-ireland.com)

Operational flow

An operational flow analysis centres on the physical movement of people and materials within your operation, from initial administration right through to the finished product in manufacturing. While most operations are laid out efficiently when they are first installed, changes in equipment or people, over time, can introduce inefficiencies.

[1] Keegan, R. and O'Kelly, E., 2004, Applied Benchmarking for Competitiveness: a guide for SME owner/managers, Oak Tree Press.

The objective of an operational flow analysis is to identify and remove or reduce any unnecessary movements. You can do this by sketching out the actual physical flow through the operation, comparing this with the theoretical optimum and then brainstorming.

Process flow

A process flow analysis focuses on the individual steps involved in a particular process, with the aim of eliminating wasteful, non-value adding items. You can get an accurate picture of process flow by asking each unit or department team to map out every step involved in their process area and use this to build a map of the entire operation.

By comparing the actual processes with examples of industry best practice or what should be happening, and, again, brainstorming, you can then pinpoint possible improvements.

Check-sheets

A check-sheet is a very simple tool designed to clarify what actually happens as a process runs – as opposed to what you might think is happening; for example, why a machine stops, how often this happens and how long interruptions last.

You can capture this type of information quickly and easily by recording a simple mark on the check sheet, showing the number and type of errors in a process or product.

The following is a hypothetical example of a check sheet for a company that makes small metal items:

Figure 1: Sample Check-Sheet

Check- sheet – week beginning X February 20XX							
Problem	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
Mis-feed	II			I		I	
Cut-off	I	II			II		
Footgap		I	II				IIII
Straightener	II		I	III		II	
Angle	III	I			I		II
Other			I				

Source: Keegan, O'Kelly and McCarron, Benchmarking: Best Practice for SME Owner/Managers, Irish Best Practice Forum.

A quick glance at the chart reveals that the straightener, the footgap and the angle are causing most problems. When identifying priority areas for action, however, it is important for you to consider the impact of problems (for example, time lost) as well as the number of occurrences.

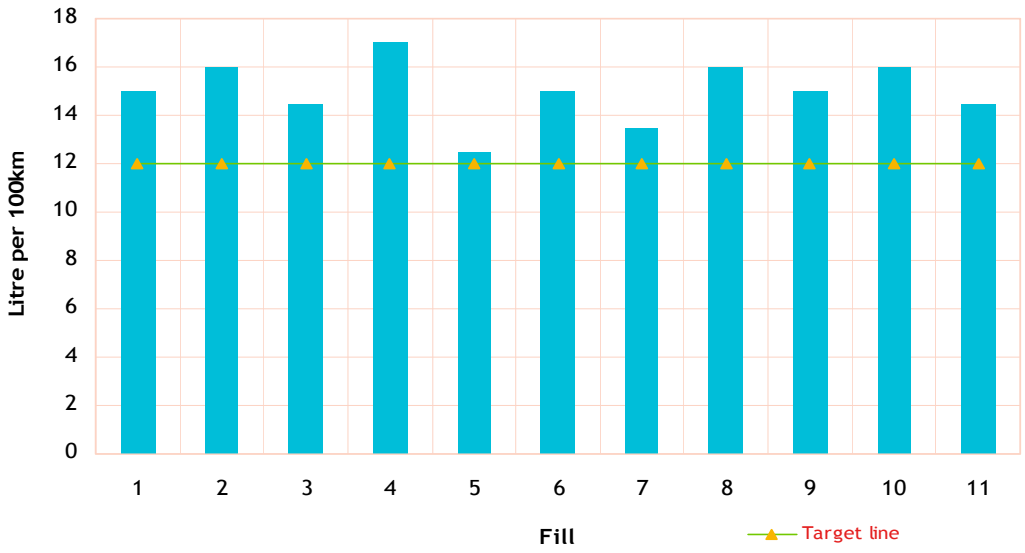
Run charts

Run charts record trends over time. They provide a really useful tool in determining the effectiveness of any productivity improvement project you undertake.

The inclusion of a target line will help you to challenge and motivate your team to reach their target.

The example below is of a run chart for a distribution company. It illustrates the litres of fuel used per 100km driven by the company's fleet of trucks. The target line, which represents the desired performance, is highlighted in red.

Figure 2: Sample run chart – Litre per 100km and Fill



Source: Based on table in Keegan, O'Kelly and McCarron, Benchmarking: Best Practice for SME Owner/Managers, Irish Best Practice Forum.

Team-working

Team-working can make a real difference in fostering a productive work environment. There are proven ways to bring a group of people together to work towards a common objective. In addition, it can be helpful to use a facilitator or a third party in teambuilding. An outsider or third party can sometimes raise issues and questions more easily than someone within the organisation/team.

3.2 Benefits

Using the WCB approach, a manufacturing firm took the following steps to increase efficiency:

- used process performance monitoring charts and employee performance check sheets;
- visited other firms to identify best practice; and,
- organised the workforce into teams.

As a result, raw materials usage was reduced by 50 per cent; work-in-progress and was reduced by 25 per cent, while stock turnover increased by over 60 per cent.

4. Measuring productivity

Productivity is a ratio of output to inputs. Partial productivity measures relate output to one type of input. Labour productivity, for example, is calculated by dividing the output of the company by the labour input (i.e. the total number of hours worked multiplied by the rate of pay per hour).

Given the complexity and range of factors that influence productivity, it makes sense to use a variety of partial productivity indicators. Labour and capital are the most common partial measures; others include material and energy consumption.

Total factor productivity (TFP) is more useful than partial measures as it includes all the combined outputs and inputs of a production unit. But it can be hard to calculate, particularly for firms with thousands of outputs, and for service companies where output can be difficult to measure.

4.1 How to calculate your firm's total factor productivity and compare trends over time

You can calculate your business's total factor productivity using this equation:

Total productivity = (Output quantity x Output price) ÷ (Input quantity x Input price)

- To determine whether productivity is improving, not improving or remaining static, you will need to measure and compare your productivity levels at two different time periods e.g. at the start and end of the year, or before and after installing new equipment.
- Comparing the two measures gives you a 'productivity index', which allows performance to be tracked over time. A productivity index greater than 1 indicates that your productivity has improved.
- To obtain meaningful results, you may need to allow for the impact of inflation. This can be done by using the prices prevailing in the second time period (T2) when calculating the value of inputs and outputs during the first time period (T1) or vice versa.

Example 1: Comparing productivity between two time periods

The following worked example provides an illustration of this process.

XYZ company, SME, produces widgets, 15 employees, 4 products			
	T1 (Q1xP2)		**T2 (Q2xP2)**
Output (Q1xP2)	**€**	**Output (Q2xP2)**	**€**
Product 1 (200x3)	600	Product 1 (212x3)	636
Product 2 (150x1.35)	202.5	Product 2 (153x1.35)	206.6
Product 3 (400x.75)	300	Product 3 (407x.75)	305.2
Product 4 (120x1.2)	144	Product 4 (140x1.2)	168
	1246.5		**1315.8**
Input (Q1xP2)		**Input (Q2xP2)**	
Labour (125x3.3)	412.5	Labour (119x3.3)	392.7
Materials(20x1.60)	32	Materials(18x1.60)	28.8
Energy (250x1.3)	325	Energy (225x1.3)	292.5
Capital (90x2)	180	Capital (90x2)	180
	949.5		**894**
T1: O ÷ I = 1246.5 ÷ 949.5 = 1.313		**T2: O ÷ I = 1315.8 ÷ 894 = 1.472**	
Productivity Index = T2 ÷ T1 = 1.472 ÷ 1.313 = 1.121			
→ **Productivity Increase**			

To recap, the steps can be summarised as follows:

- The input figures for period one are calculated by multiplying the price of each input (using time period 2 prices) by the quantity used (for example, cost per hour by number of hours worked) and summing these values to get the total.

- Likewise, the value of each product is calculated by multiplying the quantity by the price (using time period 2 prices) and summing these values to get the total output of the company.
- The next step involves summing (∑) the values of all the inputs for period 1, and then dividing this by sum of the value of all the outputs during the same period.
- The process is then repeated for all inputs and outputs in time period 2.
- This gives the total factor productivity measure for each of the two time periods.
- Finally, the productivity improvement index is calculated by dividing the total factor productivity figures for period two by that for period one.

The process is encapsulated by the following equation:

$$\frac{[(\sum \text{output quantity in T2} \times \text{output price in T2}) \div (\sum \text{input quantity in T2} \times \text{input price in T2})]}{[(\sum \text{output quantity in T1} \times \text{output price in T2}) \div (\sum \text{Input quantity in T1} \times \text{input price in T2})]}$$

Example 2: Assessing productivity performance against targets:

Other measurement techniques allow you to benchmarking your performance against targets, as illustrated in the example below.

ACE Stationery Company employs nine people and produces a number of products, including customised business cards.

The table below notes the actual inputs used in the production process per box of 1,000 customised business cards. It also outlines the 'target' input per box and the degree of efficiency of input usage. All the results are below 100 per cent, which indicates that there is room for improvement:

	Target input per box (TQ)	**Actual input per box (AQ)**	**Efficiency of input (TQ ÷ AQ)**
Labour (€10 per hour)	1 hour	1.5 hour	67 per cent
Materials (€2.50 per unit)	20 units	20.5 units	97.5 per cent
Energy (€0.16 per unit	250 units	252.5 units	99 per cent
Capital (€0.02 per unit)	90 units	92.5 units	97 per cent

Productivity is calculated in the table below and is calculated by dividing outputs by inputs. It is shown that the total cost of inputs required to produce one box of business cards is €108.50. The output value is the price at which the box of business cards sells for on the market - in this case €250.

Standard Productivity Measurement for ACE Stationery:

Input (I)	**(Target Quantity * Price)** **€**	**(Actual Quantity * Price)** **€**
Labour (Q*€10)	10	15
Materials (Q*€2.50)	50	51.25
Energy (Q*€0.16)	40	40.40
Capital (Q*€0.02)	1.8	1.85
Input	**101.80**	**108.5**
Output (O)	**(Target Quantity * Price)** **€**	**(Actual Quantity * Price)** **€**
Box of business cards (1*250)	250	250
Productivity		
Outputs ÷ Inputs	**250 ÷ 101.8 = 2.45**	**250 ÷ 108.5 = 2.30**

The actual productivity score (the ratio of outputs to inputs) for ACE for one box of business cards is 2.30. This compares to the target productivity score of 2.45. The 'efficiency of input' column in the previous box provides an indication of the areas that ACE could prioritise to move closer to the target figure.

Expressing ACE Stationery's productivity performance in accounting terms, the target gross margin is as follows: (2.45 - 1.018) ÷ 2.45 = 58 per cent. The actual gross margin equals: (2.30 - 1.085) ÷ 2.30 = 53 per cent.

Other examples of productivity and key performance measures include:

- **Overall equipment efficiency:** this measures how effectively a manufacturing operation is utilised. OEE = Availability (available time ÷ scheduled time) X Performance (actual rate ÷ standard rate) X Quality (Good Units ÷ Units Started);
- **Total effective equipment performance:** this reports overall utilisation of facilities. TEEP = Loading (scheduled time ÷ calendar time) X OEE (see above);
- **Total productive maintenance:** this measure improves on the OEE measure by quantifying the losses identified and allowing a company to give priority to the most important ones;

- **Absolute waste:** this is also known as zero waste. It involves introducing changes to processes at production level to achieve zero levels of waste, or to minimise waste levels;
- **Turnover per employee:** turnover ÷ number of employees;
- **Value added per employee:** output ÷ number of employees;
- **Comparing labour efficiency** against competitors or industry standards;
- **Output versus employee hours:** output ÷ hours worked per employee;
- **Output versus capital costs:** output ÷ cost per unit capital;
- **Cost per unit**; and
- **Material yield:** output ÷ cost per unit material.

These indicators will allow you to benchmark your performance against competitors and to monitor improvements over time, so as constantly do better and remain competitive in ever tougher markets.

5. Conclusions

Productivity growth provides a powerful means for your firm to address a whole spectrum of challenging pressures, including cost-competitiveness, environmental performance and escalating raw material, labour or energy costs.

Currently, Ireland's productivity levels are not growing as fast as many other countries, which means that, unless action is taken, Irish businesses could get left behind.

This guide highlights some well proven strategies for boosting your firm's productivity, and it also explains how to measure, monitor and benchmark your performance.

Important drivers of productivity growth include:

- Investment in ICT (information and communications technologies) and related training;
- Investment in more efficient plant and in automation technologies;
- Increasing the efficiency of energy use;
- Hiring skilled and educated workers and investing in appropriate, well targeted training;
- Using 'smart' HR strategies such as performance-related pay, goal setting and feed-back, good communications and team working; and,
- Using proven benchmarking and world class business tools.

When planning a productivity improvement project, you can ensure the best chance of success, if you follow these steps:

- Assess your firm's productivity performance;
- Develop a productivity strategy;
- Inform and consult with employees;
- Communicate productivity goals across your organisation;
- Benchmark your performance with leading companies in your sector;
- Investigate grants/incentives available from the State support agencies;
- Talk to supervisory personnel about productivity improvements; and,
- Coordinate plans among departments or functional areas.

Remember, your competitors are also likely to be increasing their productivity, and, to remain cost-competitive, you will have to constantly drive further productivity growth. So, to stay in the game, review your productivity strategy at least once a year and set further targets.

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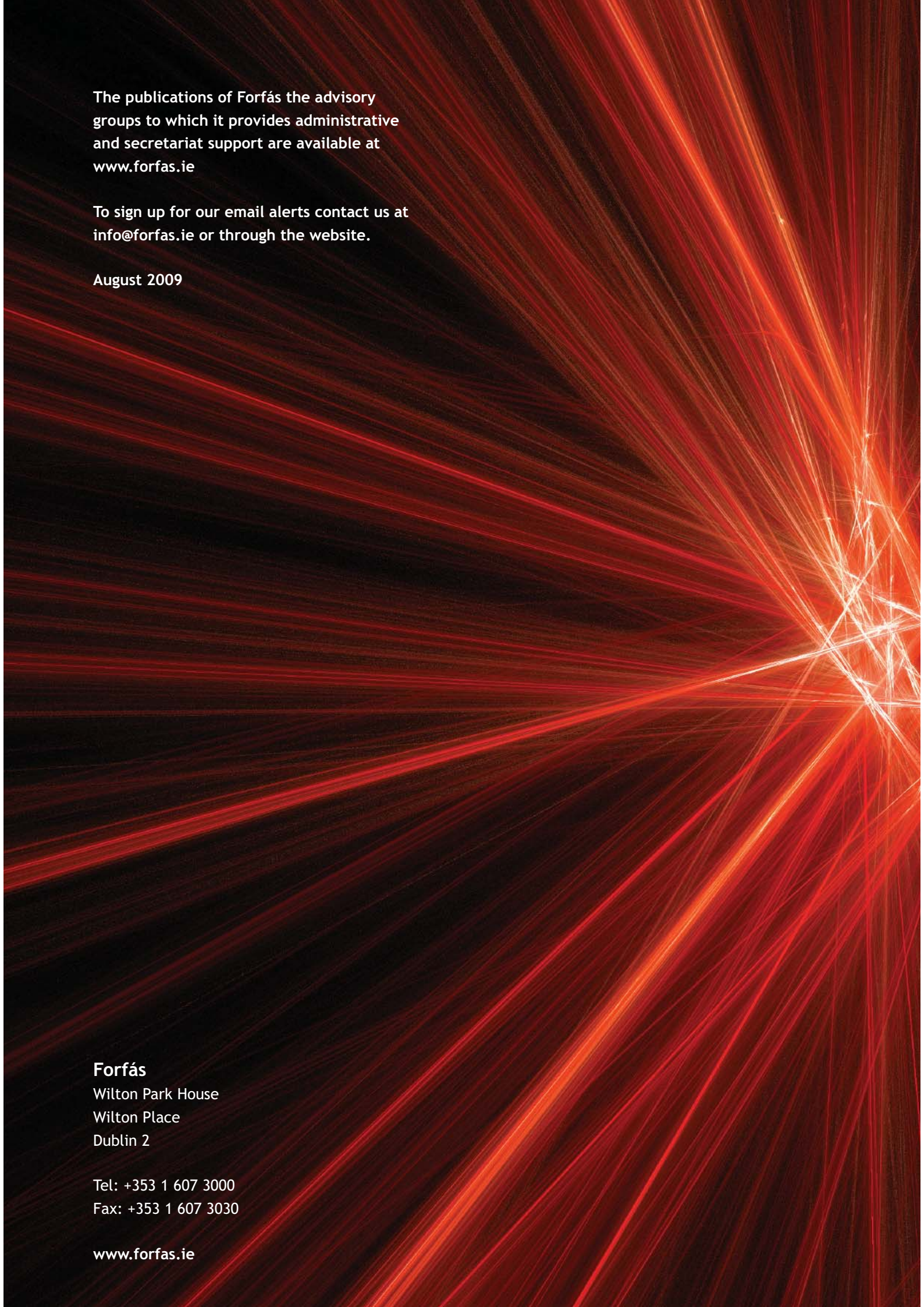

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