

Managing Productivity in Welsh Firms:

Final Report 2020



Executive Summary

This Hodge Research Project Report on productivity gathers new evidence on management practices against the background of a low productivity economy.

Section 1 sets the scene. Seventy-four companies were interviewed to assess factors like: (1) the types of objectives firms set; (2) the strategies they use to achieve these objectives; (3) the performance measures they utilise; (4) the measurement techniques and management practices they employ; and (5) whether they foster innovation.

The key drivers of productivity were found to be correlated with factors like: levels of investment in human capital – particularly work-based skills and managerial skills; investment in innovation and in upgrading information systems and other technology; and also involvement in networking activity. Various other studies have identified poor management practices as a key reason for underperformance. Most firms, in Wales, are concentrated towards the lower end of the profitability and productivity range.

Key headline findings from the survey were: i) the majority of firms measure labour productivity (76%), but only 24% measure the productivity of IT; ii) only 37% of firms have a strategic plan in place, iii) leadership is regarded as important in terms of improving performance (86%) and driving innovation (80%); but iv) the majority of firms (75%) do not have staff reward schemes in place to promote innovation; and v) the key barriers to improved productivity were: management capacity; skills; regulatory bureaucracy; and access to information.

The survey identified some strategic limitations in innovation capacity and provides evidence of an ‘innovation paradox’ in Wales: i.e. despite being in receipt of significant public funding to support innovation, there is little evidence of improved performance. There is a *lack of absorptive capacity* to make good use of such funding. Addressing these issues will require enhanced business support in terms of management and leadership development and investment in intangible assets.

In Section 2, reflections from the interviewees provide some additional insights into a number of areas: i) sectoral issues, where manufacturing firms measure more productivity KPIs than other sectors; ii) stability of firm ownership; iii) the link between scale of operation and improvements in management performance; iv) characteristics of managers in frontier firms; v) the lack of technical skills; and vi) areas of performance where business support systems are most needed.

Section 3 analyses the networks in which firms participate and the business support services with which they engage. The involvement in networks and other collaborative activities is shown to help firms develop new products, processes and organisational methods resulting in productivity growth. The term ‘open innovation’ has been coined to describe these relationships.

In Section 4 we present some new quantitative results on statistically significant relationships between firm characteristics and measures of firm success - firms that have more measures of productivity also tend to score highly on controlling performance and setting strategy. The analysis found that size and age of firms are both significantly associated with the measurement of productivity. Also, a significant association is found between firms that export and those that use innovative techniques of management control - like lean production.

Section 5 summarises our policy recommendations in relation to Managerial Capacity, Skills Training, Networking, Regional Support Services and the Digital Deficit. First, it addresses the challenges for firms in making improvements in their management standards and developing the types of skills that raise productivity. It then highlights the relationship between rates of innovation and productivity performance and the need for effective networks to address these challenges.

Second, it looks at the role of public policy in facilitating productivity gains through regional policies that enhance business support systems and the ways in which the proposed policy changes in Wales can be most efficiently administered. Finally, it outlines the requirement for the business community to develop more digitally mature strategies and to assess the potential impact of Artificial Intelligence.

Acknowledgement:

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We would also like to thank the directors and senior managers of the firms that participated in the research, particularly those who were interviewed, whose input and honest reflection are an invaluable part of this Report.

The Hodge Research Project

Funded by the Hodge Foundation, the Hodge Research Project at Cardiff Metropolitan University's Creative Leadership and Enterprise Centre (CLEC) is a project that investigates the development of the Welsh economy. The main objective of the project is to identify the best measures and policy options for triggering transformational change in the Welsh economy.

The research into the productivity of Welsh firms is an enquiry into a fundamental area of the economy, and looks at ways to strengthen the capacity and competitiveness of firms. This is an ongoing project and the CLEC team are keen to receive responses to this report, its conclusions and recommendations.

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Managing Productivity in Welsh Firms

Final Report

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Introduction

1.1 Study Aims

This is the final report on productivity from the Hodge Research Project, which seeks to provide a better understanding of how firms’ management practices affect productivity in the context of Wales.

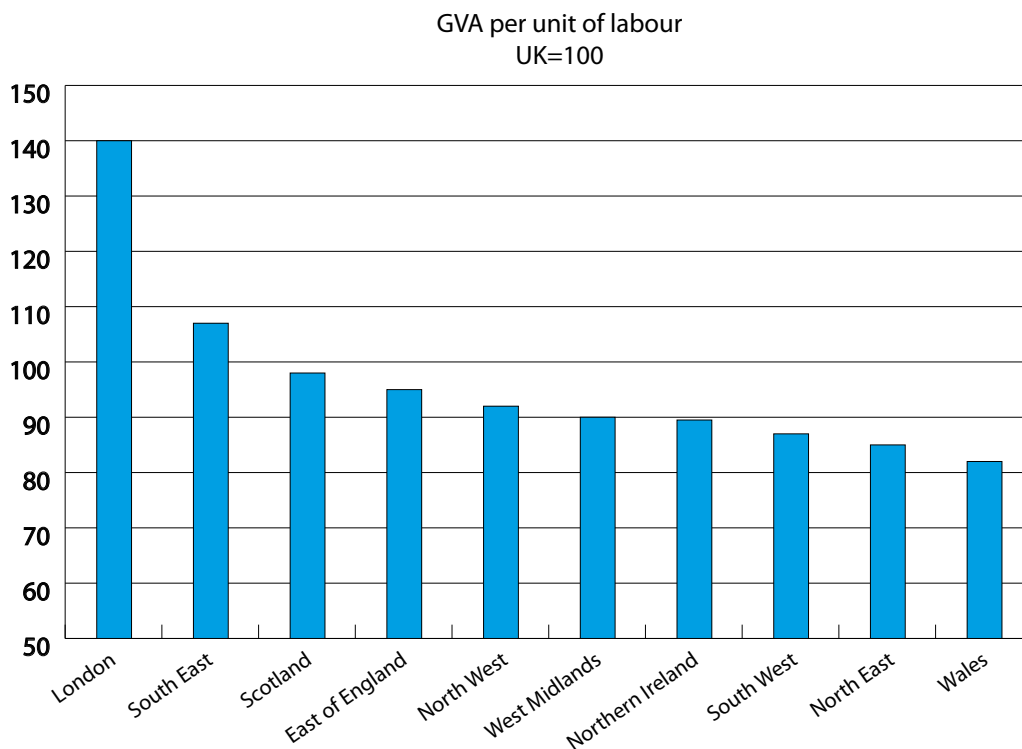
The report gathers new evidence on management practices against the background of a low productivity economy. It draws on the findings of a survey of a broad and diverse range of businesses in Wales seeking to find answers to why productivity is lower in Wales than elsewhere (see Figure 1). Whilst many other reports have dealt with productivity at an aggregate level, this report seeks to provide a better understanding of some of the more micro-elements of the ‘productivity puzzle’ in Wales.

The survey involved face-to-face interviews with seventy-four companies. The key focus of these interviews was on understanding how productivity in Welsh companies is related to:

- (1) the types of objectives firms set for themselves;
- (2) the strategies they use to achieve these objectives;
- (3) the performance measures they utilise to measure success;
- (4) the measurement techniques they employ to quantify their performance;
- (5) the management practices they employ to control outcomes;
- and (6) whether they attempt to foster innovation in the company.

Productivity is usually measured as the rate of growth of Gross Value Added (GVA) per person employed, which is essentially a measure of labour productivity. For many years, improvements in productivity have been the main source of increases in GDP per head, but recently the UK has performed worse than its competitors and in Wales productivity is even lower (Fig 1).

Figure 1: UK Productivity (2018)



Source: ONS (2020)

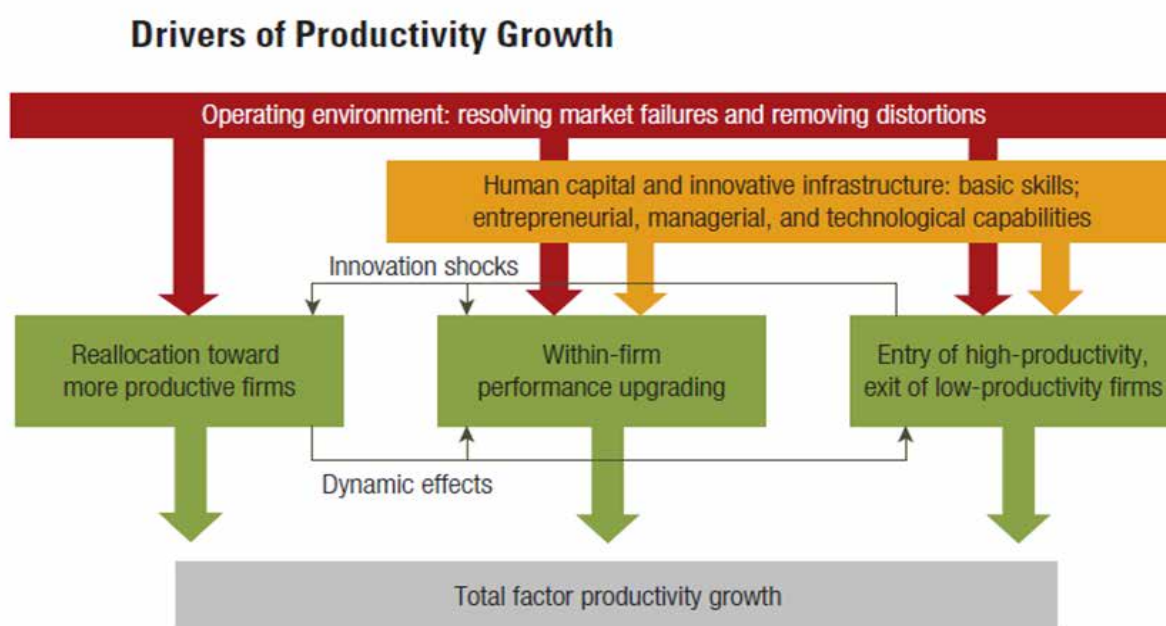
1.2 Context

Many factors can help raise productivity, such as technological progress; higher skill levels, including management skills; an effective institutional environment; and good infrastructure including digital connectivity. At the macroeconomic level, reasons put forward for a slowdown in productivity growth include: 'secular stagnation' (due to a lack of investment opportunities) and diminished rates of innovation; globalisation affecting the sectoral composition of the economy; and monopoly power.

Earlier research undertaken as part of the Hodge Research Project examined regional productivity differences across the globe¹. Productivity performance was found to be correlated with levels of investment in higher education; investment in innovation (R&D); as well as the proportion of employment in high-tech services.

A useful schematic has been produced by the World Bank, as shown by Figure 2, which argues that key drivers include: human capital – i.e. workplace skills including managerial skills; the innovation eco-system and the dynamic effects of diffusion; upgrading of performance within individual firms; and entry of high performing firms and exit of low performing firms².

Figure 2:



Various studies have identified poor management practices as a key reason for underperformance. e.g. studies by McKinsey have found a positive statistical correlation between management practices and productivity. Also, similar research, finds that "...there is a much larger variation between firms within countries with a long tail of extremely badly managed firms"³. In addition, McKinsey has highlighted other causes of low productivity, viz. low levels of competitive intensity; product market regulations and poor managerial practices, all of which can lead to companies pursuing under-performing business strategies.

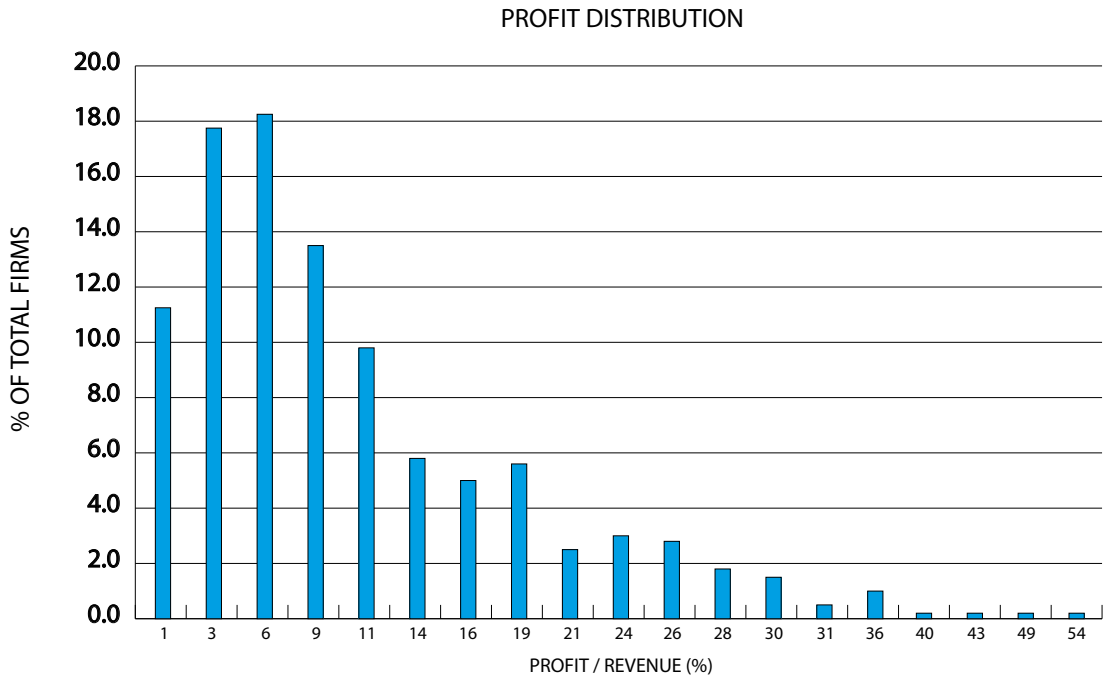
In Wales, most firms are concentrated towards the lower end of both the productivity range and the profitability range. (See Figures 3 and 4 below.) Figure 3 shows the profitability situation among firms large enough to report annual profits to Companies House. It shows, for different levels of the 'profit to sales ratio', the proportion of firms with that profitability. The average value of the profit ratio is about 10 ½ per cent. Over 60 per cent of Welsh firms are below the average. If smaller firms and single traders (who do not report profits) could be included, the situation would probably be even more skewed.

1 Holtham, G and Huggins, R (2017) 'What accounts for the success of regions? Examining the factors associated with economic development.' *Welsh Economic Review*, 25, 1–8. DOI: <http://doi.org/10.18573/j.2017.10193>

2 Cusolito, A P and Maloney, W F (2017) 'Productivity Revisited: Shifting Paradigms in Analysis and Policy,' World Bank

3 Bloom, N, and Reenen, J (2006) 'Measuring and Explaining Management Practices Across Firms and Countries' CEP Discussion Paper No 716; Bloom N and Van Reenen J (2010) 'Why do management practices differ across firms and countries?', *Journal of Economic Perspectives* 24(1), 203-224

Figure 3



(Source: HIA)

Among firms reporting profits, however, this pattern of a thick tail of low performers is found across the UK. Once we take account of firm size and sector, Welsh firms look much the same as others in the UK (see Annex). However, there is plenty of room for improvement. Indeed, given the relative concentration of Welsh firms in relatively low-productivity sectors, improvement is essential if Wales is to close the GVA gap with the rest of the UK.

Figure 4 The productivity distribution of UK businesses in 2015



(Source: ONS)

As shown in Figure 4, at the UK level the productivity distribution is similar to that for profits. A large proportion of firms are below the median which is £27,000 per worker. However, there are large differences in productivity across sectors. For example, average productivity in the pharmaceutical industry is around £153 per hour, compared with £25 per hour in retail. Moreover, low productivity businesses are found in all regions and across all sizes of business. But, there appears to be more variation within regions than between regions.⁴

⁴ Adapted from *Business Productivity Review* (2019) Industrial Strategy

1.3 Summary of Survey Findings

The key headline findings from the survey are:

- **Productivity Measurement** - The majority of firms measure labour productivity (76%), although some respondents said it was difficult to measure directly in their business or sector. Only (41%) of firms measure the productivity of Plant and Equipment, whilst only 24% measure the productivity of IT and 28% the productivity of buildings or physical space.⁵
- **Strategic Planning** – Only 37% of firms have a full strategic plan in place, these vary in form and function, and range from three-year plans to annual business plans. The majority of the respondents consider profitability and growth as the focus of the business, although competitiveness is also significant. The key barriers to improved productivity performance are considered to be: skills; management capacity; regulatory bureaucracy; and access to information.
- **Controlling Performance** – In total, 76% of firms have either monthly or quarterly board meetings, with 87% of firms having either monthly or weekly senior management team (SMT) meetings. The most popular forms of techniques and procedures used for management are KPI development (55% of firms use this across the business); project management (51%); and inventory control (49%). The importance of leadership is regarded as high by most firms in terms of improving performance (86% of firms), driving innovation (80%), and setting targets (80%)
- **Managing for Change and Innovation** – Firms most frequently use employee development and training, investment in technology, and management information as a means for managing change and promoting innovation. The majority of firms (75%) do not have any formal staff reward schemes in place to promote innovation. Whilst external networks are used by many firms to different degrees, they are rarely seen as transmitters for new ideas, and few firms are able to fully exploit such sources of information and to act upon them.

1.4 Analysing the Findings

A more detailed analysis of the findings indicates that many firms in Wales are poor at strategic planning and have *limited management information systems* in place for measuring performance. To some extent this could explain the productivity distribution in Wales which highlights the preponderance of underperforming firms.⁶ In particular, many firms acknowledge that they *lack the relevant expertise, skills and tools* to measure their efficiency at the relevant parts of their value chain.

A lack of knowledge within firms indicates an important role for public policy in the field of business support in Wales. There is a need to offer businesses access to education and training initiatives that provide sources of knowledge dedicated to better understanding and measurement of business performance. Although this is not an issue limited to Wales, it is the case that its industrial structure, especially with a preponderance of SMEs operating within non-tradable sectors, means that more firms in Wales are likely to lack this knowledge compared with firms in other regions.

One of the most telling findings of the study is the *lack of intangible capital* investment, such as recorded knowledge, processes, software and intellectual property. For example, only a few firms indicated the use of software in relation to productivity assessment, which is particularly surprising given that a sizable proportion of these firms are operating within technology-based sectors.

These issues are compounded by the fact that, within a significant number of businesses, management appears to have a fairly *ad-hoc approach* to controlling the direction of the business. This is an indication of the priority, or lack of, that some business leaders give to addressing strategic development. Clearly, the majority of business leaders consider themselves to be at the helm with regard to factors concerning improving performance, driving innovation, and target setting. However, the lack of a strong strategic orientation in a number of businesses draws into question the effectiveness of this leadership.

The findings further indicate that firms need to *grow in a context of stability* with regard to its ownership, leadership, and management. A limited number of takeovers may be positive by introducing fresh resources, but if ownership or management changes more frequently the firm is likely to go backwards.

Interestingly, some firms note that their key objectives relate to well-being and social returns to broader communities and employees, indicating that a cadre of firms in Wales are clearly *committed to welfare and well-being development*, not as an alternative to underpinning economic objectives, but operating in tandem. The focus of policymakers, especially the Welsh Government, has for a number of years sought to mobilise social entrepreneurship as a means of enhancing economic development and productivity.

⁵ But see private communication : 'Response from Robert Chapman MRICS'

⁶ IoD (2018), Lifting the Long Tail: The productivity challenge through the eyes of small business leaders <https://www.iod.com/news-campaigns/news/articles/Lifting-the-Long-Tail>

This study's findings suggest that this agenda is beginning to permeate strategies and objectives at the micro level.

More generally, the survey identifies a range of factors relating to business innovation in Wales, which indicate that it is evolving in a *'healthy'* and positive way, but also that there are some strategic limitations concerning innovation capacity and capability. This provides some evidence of an *'innovation paradox'* in Wales; i.e. as a result of its deep-rooted economic problems it has been in receipt of significant public funding targeted at fostering innovation and productivity gains but positive outcomes appear rare. Evaluations often indicate little in the way of improved performance.

The inability of regions such as Wales to effectively utilise the spending made available for innovation suggest there is a *lack of absorptive capacity*, in both the public and private sectors, to make good use of such funding. The lack of a motivation to grow across many firms could also be an issue. As a means of addressing these issues, this study indicates a range of pointers as to where firms in Wales can best reap productivity rewards from enhanced business support in areas such as management and leadership development, investment in intangible assets, and the promotion of business change and innovation. These issues and others are explored further in the remainder of this report.

Finally on Brexit. Not many firms stated they were worried about the UK leaving the EU, perhaps because we interviewed few firms in the automotive or agricultural sectors. Some mentioned the problem of rising import costs but not many were worried about loss of export share. Now that Brexit is happening and there are likely to be changes in 10 months' time to the availability of EU migrant labour, it would be useful to undertake a small follow-up survey to ascertain current views on the likely impact of Brexit on customers, suppliers and productivity. If cheap labour is more difficult to obtain from 2021 then it could lead to more capital investment and less labour employed in a number of industries with a consequent positive impact on labour productivity. However, there could be a negative effect if marginal firms are forced out of business. So the jury is out on whether or not a rise in productivity is likely to materialise in Wales. It will require another iteration of the current research project to corroborate the impact.

2. Reflections on the Research Interviews

Our team of researchers interviewed a diverse group of firms and in our Interim Report, we have gathered together and analysed the responses to these interviews. In these additional reflections we expand on those areas that are common across the seventy-four interviews and offer some insights that may not be covered elsewhere.

2.1 Sectoral Considerations

The firms included in the research were not allocated to interviewers solely on the basis of sector but tended to have various attributes in common such as: they were technology based, or in the food sector. In general, however, they were companies that were representative of their sector.

One set of firms could be characterised as technology based, high-tech, innovative companies with the capacity to raise the productivity and economic performance of their sector. A common characteristic for firms in this set was often high product or service standards in addition to a focus on work-life balance and job satisfaction. These firms demonstrated an understanding of the speed of development and the importance of deploying new ideas. For them, productivity meant the capability to use technology to work smarter, not necessarily harder, meeting innovation objectives and project targets within an adjustable timeframe.

Other firms defined productivity in terms of the capability to create wealth and value. These firms saw job satisfaction as important and their business model was less reliant on their current internal resources than is the case for traditionally structured firms. They appear to be much more inclined to use external freelancers, specialists, and collaborators to make specific contributions as and when they are required on a project rather than to try to maintain relatively wide-ranging in-house capabilities.

For these firms, the internal working culture is often a key success factor, and the firm's ethos depends largely on the personality of the CEO. The strength of a firm is often, therefore, a function of the capacity, capability, and attitude of the founding entrepreneur. For these firms, (who may be considered to be *'new economy'* firms), the nature of work is largely dependent on pitching for discrete projects. Winning an order often requires significant additional resource at short notice. The employment culture within the firm is, thus, important with employees given the responsibility and trusted to deliver. This approach was, however, not limited solely to *'new economy'* firms. Some more traditionally structured firms, such as pharmaceutical or project-based batch engineering may also operate within similar constraints and opportunities.

2.2 KPIs and Strategy

Manufacturing businesses, because of the nature of the work and product, and particularly those that produce relatively large runs of standard product, tend to have more KPIs than may be possible in other sectors. The production of a tangible product allows these businesses to develop explicit cost structures and productivity measures linked directly to output. Some of these firms actually linked their technical KPIs with the overall strategy of the company in terms of efficiency and outputs and were aware of the key drivers of their cash flow. However, not many firms participated in benchmarking their performance against other firms and similarly, only a minority of firms developed the linkages between technical KPIs, finance, and strategic planning. Many of the firms that did develop such links were engaged in exporting.

Service-sector businesses, on the other hand, appeared to have fewer measures (compared to standardised manufacture), which are often tied more directly to income. For example, the number of customers and customer engagements were used as an indicator of revenue and efficiency. Similarly, serviced product-throughput, together with revenue was sometimes broken down by the hour so that the efficient growth of the business could be measured by customer sales. Strategy therefore was rarely linked to KPIs.

Other services companies, for example those focused on business-to-business markets, relied on external drivers (i.e. responses from customers) to help define what exactly 'value' means and what measures might improve performance. Historically, these firms have typically been focused around billing for project hours (an input measure). As the number of hours involved has decreased (due largely to information technology), these firms, which can often be labelled as 'new economy', have sought to 'educate' their clients regarding the real value of the intellectual property (IP) that is being produced. The ability to do this (and deliver upon it) appears a key success factor but is one that does not lend itself particularly well to those structures and metrics derived from manufacturing scenarios.



2.3 Firm Ownership

For those firms that are branch plants or operate as subsidiary firms to larger organisations, management freedom is limited by the degree that the parent organisation exerts control. This is particularly pertinent when considering the long-term strategy of the firm, but to some extent also determines the degree of importance put on the range of KPIs utilised - and the extent to which they are developed in order to fine-tune management control. In our sample, firms under foreign ownership often had a particular role to play within the wider corporate group - signified by significant local R&D commitment and the ability to develop new products in a competitive global marketplace. They also had access to group-wide resources and contributed to internal corporate knowledge flows.

Foreign ownership includes MNCs with HQs in the US, Japan, China, India, Sweden, and Germany, whilst those firms that are UK-owned are nearly all owned privately and based in Wales, including a couple of firms that had re-located to Wales. For founder or, entrepreneur-led firms, ownership has been diluted due to the equity investment they have received from venture capitalists and business angels - to some extent compromising the original approach of the founder, but also adding the required know-how necessary to manage a growing enterprise.

An aspect of ownership that was important in a number of examples was the influence of the stability of ownership. Although this did not always equate with high performance, there was a relationship with performance-measurement activity and with managerial experience. One researcher interviewed a firm that had decades of experience and was very profitable. It could be contrasted with another firm which had a ten-year track record and innovative technology but did not make as much money as might be expected.⁷ Another firm (that was also well established and based on a technical advantage) was lacking in new investment and barely made a profit at all. It had suffered from a history of unstable ownership - changing hands five times over its lifetime - and had an absentee owner who was not keen to invest.

⁷ This is a subjective judgment but one based on many years of experience by the interviewer.

2.4 Managerial Capacity

Inexperience in some project-oriented businesses, has led to managerial mistakes in pricing and in over-delivering on projects leading to lower performance.⁸ Learning by doing is very important in project-based, non-standardised businesses, and there is no substitute for experience. Managerial competence was highlighted as vitally important in pricing and estimating time spent on projects.

Some interviewers noted the fact that companies often needed time to reach a certain scale at which rapid improvements in management could be achieved. Greater awareness of productivity issues and managerial focus on measurement and control come with time and size, which may also be true of strategic direction. A firm based largely on technical advantage may be uncertain of the best way to deploy that advantage or the best markets to focus on. The importance of external mentors and investors with the requisite experience and contacts was seen as important for profitable growth.

Particularly for small firms, the management of finance and production control had improved as the firm had grown and been able to employ specialised managers. Issues with the bandwidth of management capacity was noted in a number of instances. This often led to a focus being applied to particular aspects of firm activities at the expense of others, for example, on distribution and marketing, as opposed to product development. As a result, some companies, who had excellent products, did not seem to generate much profit. It appeared that the process of developing the business in the face of limited management capacity had led to poor financial control – many firms have only gradually built up their management structures to measure KPIs and achieve better financial performance.

Interviewers also commented on the age and stage of development of the firms that they had met. The development of strategic plans and the ability to take a long-term view was variable. Few construction firms, for example, viewed developing a strategy as an important exercise or something that could produce benefits relating to employee engagement and succession planning. In some cases, where it was claimed a detailed Strategic Plan existed, it transpired that it had been developed by a very small internal group - in many cases by one individual - and not been shared widely through the firm.

2.5 Frontier Firms

A number of the firms that participated in the research were identified by interviewers as being 'leaders' or 'frontier' firms. Significant managerial activity in these firms was focused on KPIs and they exhibited a responsiveness to change, which distinguish them from other firms. They may also be defined as having:

- committed entrepreneurs continuously driving performance improvements;
- a relatively small number of KPIs that provided focussed feedback on ongoing performance and against articulated strategic scenarios; and
- regular discussion of KPIs in both informal and formal meetings of the Senior Management Team (SMT)

Frontier firms may be thought of as ones who have leaders and/or SMTs who engage with staff by:

- sharing KPIs across the business and making them explicit to staff;
- not only discussing KPIs but providing performance updates against the KPIs;
- communicating the ongoing performance of the business by displaying information in relevant areas; and
- inviting all levels to provide suggestions and ideas that can increase productivity or contribute to stated strategic aims.

In addition, they engage with their suppliers and customers through processes that:

- often feed into their internal continuous improvement systems;
- stimulate ideas for new products and services or enhance existing products and services;
- enhance customer retention by demonstrating ability to respond to customer needs;
- leverage good relationships to obtain new customers or contracts;

⁸ These comments are based on admissions and statements made by interviewed managers.

2.6 Learning from Customers

Many of the firms interviewed were quite dependent on customers for product improvement. Good customers breed good firms and there is an element of luck involved in finding them. Critical skills for managers of new businesses, therefore, include knowing which projects or orders to tender for: i.e. ones where they can both compete and make a profit within the constraints of the resources they have available. Finding good customers helps the firm raise its game and facilitates survival and growth, which in turn allows the firm to improve its capabilities and tackle a wider range of business opportunities. This highlighted the importance of patient investors, willing to allow management to consolidate and profit from their learning, and on the importance of the presence of clear-eyed finance managers who can operate with few illusions. The availability and use of timely management accounts was seen as an important success factor.

2.7 Training

While management capacity was an issue for the smaller firms, skill availability was a more general concern. Some firms had adopted a “hire for attitude, train for skills” approach, making a virtue of much lower staff turnover rates than elsewhere. For a number of the firms interviewed, the local labour market is tight for the kind of skills that they demand. At the heart of the issue for many firms is to ensure that the correct skill sets are in place across the business, as well as the skill required for any particular project (as is the case for project-oriented sectors), and the management of human capital is considered by all firms to be key to maintaining performance. However, while the issue is recognised not all firms are active in developing and maintaining an internal training culture. Very few of the construction firms interviewed, for example, had a training budget, and instead relied on meeting unplanned for requirements on an ad-hoc basis reflecting short-term horizons in many cases.

2.8 Location

A few firms noted that they had made a conscious choice to remain in Wales when, by some measures another location (e.g. in London) would make sense. These firms cited the advantages of their current location in providing access to a more stable workforce and avoiding high staff turnover (compared to similar enterprises in say London); links to local FE and HEI institutions that supplied them with suitably trained personnel; better prospects to gain visibility in Wales (compared to the more saturated markets in London); along with perceived superior quality of life.

This last factor links with some firms’ definition of productivity, and combined notions of work-life balance with staff engagement and commitment. As noted, the understanding of productivity issues and the measures needed to develop the firm and improve performance varies widely throughout the sample.⁹ Many firms struggle with a lack of human resource at different levels of the organisation; many work on short-term horizons sometimes from necessity or nature of the business; whilst many are well managed and profitable. For each, however, there is often a need to reassess performance and direction, and at this juncture it is their human resources that are the most important variable that can be flexibly managed in the short term.

2.9 Support Systems

Interviewers noted that a number of business leaders and managers had accessed government support for key areas of business development. These covered a range of areas and included support:

- to develop or enhance their product or service offering;
- to establish networks that bring them into contact with other firms that are also focused on new product development capabilities;
- to enable firms to discuss and share best practice through a peer support network that also acts as a ‘critical friend’;¹⁰ and
- to signpost them to R&D facilities and other knowledge centres that could provide diagnostic help with technical and product related challenges.

⁹ See comments and analysis in the Interim Report

¹⁰ Note the discussion elsewhere in the report on research participant’s use of currently available networks

BOX 1: Alternative Metrics

In recent years the idea that firms have social responsibilities has gathered support. Companies are increasingly aware that gender or racial discrimination or environmental depredation for example, is bad for the brand and therefore for business, quite apart from moral considerations. The idea of 'inclusive growth' has become increasingly popular within policy debates, with explicit recognition that both the pace and the distribution of economic development require consideration.

This has been driven by rising concerns about the inequality of economic outcomes, and the extent to which these are exacerbated by established patterns of growth.¹¹ These are of course not new concerns; as far back as 1958, JK Galbraith argued that one of the principal reasons why economics has been so concerned with production (and by extension productivity) is that constantly increasing volumes of output essentially allowed debates regarding inequality to be bypassed.¹² Following the economic recession of 2008, the relationship between growth and inequality has moved to the centre of the development debate, with studies highlighting that returns to capital have outstripped those accruing to labour, worsening inequality.¹³¹⁴ Moreover, growth itself has been questioned if its environmental consequences cannot be controlled.

However, given that the macro-economic outcomes of productivity are underpinned by its micro-level foundations (i.e. at the firm level), it is appropriate to consider what might be broader or more appropriate measures of performance at this level. This is particularly pertinent given that there is evidence suggesting that, particularly with regard to lower-skilled employment, increased productivity (measured in terms of output per head) is a driver of efficiency savings at the firm level. In other words, the increased output can be obtained with the same or fewer staff, rather than by employment growth.¹⁵

Linked to all this is a wider debate regarding what are appropriate conceptualisations of value and how might these be measured at the level of the firm.¹⁶ Ultimately being a 'better business' may require a different understanding of what meeting the needs of existing and new customers actually means. It might be growth per se but it might also include the increased public or social value accruing to the local economy or acting as a good employer by providing meaningful employment and good working conditions.

Applying more holistic measures of performance at the firm level is particularly pertinent for knowledge-economy firms and especially those within Creative Industries, for example, in Branding and Public Relations. These firms are likely to have fewer direct production-derived metrics (such as output per hour) which they can easily collect, as they typically produce bespoke products with multiple delivery channels. Furthermore the majority of their value will likely be held in intangible assets such as intellectual property, working culture, and network resources.¹⁷ As such, for these firms there is some blurring of what might be a useful measure of firm performance in the narrow sense of KPIs, and what are more appropriate measures of productivity more generally.

Research has shown that the channels for improving productivity are at their most effective when employees have more autonomy to decide how to do their jobs, more supportive line management, more meaningful appraisals, and when their views (and those of their colleagues) are heard.¹⁸

Finally, the Well-being of Future Generations (Wales) Act 2015 provides a useful framework to assess well-being and development in a more holistic way. There are 48 National Indicators for Wales as required by the Act, which are all derived from existing data sources.¹⁹ These indicators include the most typically used measure of productivity - Gross Value Added (GVA) per hour worked (relative to UK average) - as well as measures for the gender pay gap and other social and environmental outcomes. Moreover, the Welsh Government now requires businesses seeking financial assistance to demonstrate adherence with this wider set of metrics.²⁰

11 Lee, N., (2019) Inclusive Growth in cities: a sympathetic critique. *Regional Studies*, 53(3), pp.424-434.

12 Galbraith J.K. (1958) *The Affluent Society*, Boston: Houghton Mifflin.

13 Piketty, T. (2014) *Capital in the Twenty-First Century*, Cambridge, MA: Harvard University Press

14 Also questions as to what these alternative measures might be are particularly pertinent to our research on productivity, in relation to the Well-being of Future Generations (Wales) Act. The Act itself is not anti-growth nor is it opposed to enhancements in productivity.

15 Galsworthy, J. (2019) UK SME Productivity – Facing up to the Policy Challenge, Oxford Innovation, available at <https://insights.oxfordinnovationservices.co.uk/wp-content/uploads/2019/07/UK-SME-Productivity-%E2%80%93-Facing-up-to-the-Policy-Challenge.pdf>

16 Fisher, R., Francis, M., Thomas, A., Burgess, K. and Mutter, K., (2016) Conceptions of value as family resemblances, *Qualitative Market Research: An International Journal*, Vol. 19 No. 4, pp. 378-394

17 Cooke, P., De Laurentis, C., Tödting, F. and Trippl, M. (2007): *Regional Knowledge Economies: Markets, Clusters and Innovation*. Cheltenham: Edward Elgar.

18 Felstead, A, Gallie, D, Green, F and Henseke, G (2018) *Productivity in Britain: The Workers' Perspective – First Findings from the Skills and Employment Survey 2017*, London: Centre for Learning and Life Chances in Knowledge Economies and Societies, UCL Institute of Education

19 [https://www.assembly.wales/ministerial%20statements%20documents/how-measure-nations-progress%E2%80%93the-national-well-being-indicators-wales/the%20national%20indicators%20to%20be%20laid%20before%20nafw%20pdf%20\(english\).pdf](https://www.assembly.wales/ministerial%20statements%20documents/how-measure-nations-progress%E2%80%93the-national-well-being-indicators-wales/the%20national%20indicators%20to%20be%20laid%20before%20nafw%20pdf%20(english).pdf)

20 See: Welsh Government :Prosperity for All: Economic Action Plan, 2017

3. Looking Outwards: Networks and Support Systems

The focus of the research project was on how firms viewed and managed their own productivity. While that covered the way that resources were deployed internally it was also important to examine the relationships that firms maintained with other firms, other private sector organisations, training providers, and government services. We thus looked at the networks in which firms participated, and the business support services with which they engaged.

3.1 Networks and Collaboration

Many research participants indicated that they were members of some kind of network: forty-nine respondents specified associations or clubs with whom they are engaged, whilst others declared that they engaged in general unspecified networking activity. Construction Sector firms quoted the most specified network-involvement, followed by Manufacturing and Pharmaceutical. Many firms were members of government-supported networks including Aerospace Wales; EstNet; the Welsh Automotive Forum; the Life Science Hub; and MediWales, while cross-sectoral networks included CBI Wales, the IoD, the FSB, and Chambers of Commerce.

Continued membership of such bodies and organisations suggest that firms are persuaded of the effectiveness of such activity, however, evidence for this conclusion is variable. Some firms expressed positive opinions about their involvement in networks and trade association whilst others seemed content to utilise their membership in a more passive manner, not seeing such involvement as a source for new ideas or collaboration. In general, networks were used to different degrees, but were rarely seen as transmitters for new ideas. It appears that few firms are able to fully exploit such sources of information and to act upon them, whilst it is apparent that those networks that were quoted offered differing levels of support and service.

Some networking organisations focus on representing and promoting sector interests in various fora including directly with the government and indirectly via industry standards bodies. These organisations offer the opportunity for firms to access training; skill development; public financial support; and exporting advice; while some provide insurance and accountancy advice. Other organisations are more geared to facilitating a general network through which members may socialise informally. Whilst these bodies are used for differing purposes there is no sense, from the limited view of their activities provided by our research, that they form an essential component of the majority of firms' development.

However, networking and collaborative activity can be important for business growth, and can include the use of shared resources, joint working, and mutually supportive exchange of information and expertise, and examples of such interaction were quoted in survey interviews. Whereas large firms may be able to take advantage of internal economies of scale, and may operate with departments to manage innovation, marketing, and training needs, small firms lack these resources, with staff having instead to be generalists. A lack of size and bandwidth of expertise has been shown to be a barrier to expansion.²¹

Economies of scale maybe realised, for example, by sharing facilities in a way that allows firms to cut production costs but be able to retain and promote their own branding. The role of trade associations and similar networks to promote such collaborative opportunities for sharing resources and reducing overheads is often underexploited or not available. This is an area in which government policy and support may have worthwhile impact.

Successful networking activity is also likely to be positively related to innovative activities²². An over-reliance on local and informal contacts is associated with lower SME performance,²³ however, realising benefits from network usage are likely to be highly correlated to a firm's managerial capabilities in coordinating and maintaining them: both in terms of the quality of contacts that are available and also in being able to incorporate the resources they access into the business.²⁴

Targeted initiatives to improve the skills of SME owner-managers and other key staff could have a positive impact at both the level of the individual firm, as well as the wider locality within which they are applied. By developing their leadership and management skills to maximise internal capacity; by collaborating with other SMEs on certain business functions; and by sharing non-

21 Simon, M. Houghton, S. M. and Aquino, K. (2000) 'Cognitive biases, risk perception, and venture formation: how individuals decide to start companies', *Journal of Business Venturing*, 15 (2), 113-134.

22 Huggins, R. and Thompson, P. (2015). 'Entrepreneurship, innovation and regional growth: a network theory', *Small Business Economics*, 45, 103-128

23 Cooke, P. Clifton, N. and Oleaga, M. (2005) 'Social capital, firm embeddedness and regional development', *Regional Studies*, 39 (8), 1065-1077.

24 Pickernell, D. Packham, G. Jones, P. Miller, C. and Thomas, B. (2011) 'Graduate entrepreneurs are different: they access more resources?', *International Journal of Entrepreneurial Behaviour and Research*, 17 (2), 183-202; and Beckman, C. M. Burton, M. D. and O'Reilly, C. (2007) 'Early teams: the impact of team demography on VC financing and going public', *Journal of Business Venturing*, 22 (2), 147-173.



confidential knowledge, firms can overcome barriers caused by small size in a relatively costless manner.²⁵

Similarly, with regard to ‘harder’ skills (planning, finance, etc.), they may need to carefully allocate the use of resources, which is likely to further increase the importance of managerial skills and the capabilities of firms looking to innovate whilst maintaining their growth. Studies show that entrepreneurs’ ability to set their own objectives and priorities is both a blessing and a curse as it provides not only freedom, but also

a severe challenge, whilst planning will only be initiated successfully when a minimum level of time and financial resources are dedicated to it.²⁶ The presence of a formal **strategic plan** is positively associated with the creativity of businesses’ staff, which indicates that the importance of having a clear vision filters down through the firm to improve the efficiency of both management and staff activities.²⁷

Networking and collaborative activities are often performed on a relatively local scale, and although the internet provides a means of extending the spatial reach of networks, they are often dependent on face-to-face and informal contacts. Whilst there are examples of such interaction, as reported in our survey, they are far from universal. Firms, left to their own devices, are not necessarily good at searching out potential partners and often fail to realise the benefits of collaboration. Given that involvement in available networks is variable there appears to be a weakness in the way that a networking and collaborative ethos or culture is being promoted.

3.2 Business Support Systems

A more robust business ecosystem, based on active trade associations, that encourages better interaction between local firms is needed in Wales. Whilst there are examples of good practice in Wales they are far from broadly replicated. Examples of what we mean by active business ecosystems can be found elsewhere. In the Basque Region in Spain where, building on the Mondragon organisation, a number of co-operative business organisations and ventures have been set up. In Germany, membership of one of a network of Chambers of Commerce is compulsory for firms and the network thus represents over three and a half million firms. They provide advice on funding, business strategies, succession-planning, form a conduit to channel state funds, and provide a lobbying voice for business.

In 1990s, Denmark and Norway led the way in establishing facilitated network programmes. Independent network-brokers were introduced, with financial support from the government, and inter-firm cooperation expanded rapidly. These programmes were copied in Australia and Canada and hundreds of networks were developed with a similar impact on inter-firm cooperation. In the Australian system, the initial intervention led to the formation of many additional networks outside the initial (subsidised) programme. An evaluation later demonstrated that firms had established important commercial relations with other firms in the networks, either as subcontractors or in partnerships.²⁸

From comments made during our research interviews, the public sector business support system in Wales is not as well-focussed as it could be, nor does there appear to be a clear enough understanding of its role in supporting and developing Welsh businesses. In the past twenty years, various business support schemes have been introduced, changed, and abandoned and this churn has not helped to instil a sense of continuity of purpose. This situation is also applicable at the UK level:

Over the past decades, UK regional policy has been in constant flux. A tendency to abolish and re-create regional-policy institutions has impaired the build-up of meaningful institutional memory, and hampered attempts to make a dent into UK regional disparities through public intervention.²⁹

25 Almeida, P. and Kogut, B. (1997) ‘The exploration of technological diversity and geographic localization in innovation: start-up firms in the semiconductor industry’, *Small Business Economics*, 9 (1), 21-31; and Clifton et al., (2005)

26 Mueller, S. Volery, T. and von Siemens, B. (2012) ‘What do entrepreneurs actually do? An observational study of entrepreneurs’ everyday behaviour in start-up and growth stages’, *Entrepreneurship Theory and Practice*, 36 (5), 995-1017; and Harris, L. C. and Ogbonna, E. (2006) ‘Initiating strategic planning’, *Journal of Business Research*, 59 (1), 100-111.

27 O’Regan, N. and Ghobadian, A. (2002) ‘Effective strategic planning in small and medium sized firms’, *Management Decision*, 40 (7), 663-671

28 See *Enhancing SME Competitiveness: The OECD Bologna Ministerial Conference* (2004)

29 Haldane, A. *Regional Productivity Differences: An Evidence Review* (2020)

There is a need to create a system that works effectively, allowing it to develop some institutional memory and, as it evolves, to enhance rather than abandon it at each change of government or of minister.

A case in point is that of training support schemes. As a policy intervention for SMEs such schemes have had somewhat mixed results in relation to their impact on performance. A body of academic literature now exists that broadly supports the argument that training positively influences business performance through enhanced productivity, quality, labour turnover, and financial results.³⁰

Additionally, a more holistic understanding of the business development process, and the context within which this takes place, involves SMEs becoming 'active learning organisations', playing a key role in their own development via peer-to-peer learning and feedback to providers, rather than as passive receivers of top-down provision.³¹

Provision is an issue however. In contrast to larger organisations, the SME sector is characterised by fewer dedicated training departments and budgets, lower numbers of qualified employees, and lower participation in government training schemes. Adequate training within the SME sector is, thus, unlikely to occur without external intervention.³²

Research also suggests that SMEs often do not fully appreciate the potential value that training can have in relation to business productivity and profitability,³³ whilst training provided through government programmes is typically perceived by owner-managers as lacking in value towards increased business performance, not least due to a lack of tailoring to the needs of participating firms.³⁴

3.3 Open Innovation and Productivity

Interactions and relationship building derive from an openness by firms to network, collaborate, and co-operate. Doing so to establish and develop new products, processes, and organisational methods is known to result in productivity growth for many businesses. In recent years, the term 'open innovation' has been coined to describe those networks and relationships that facilitate changes within and across businesses.

As part of this open innovation phenomenon, businesses internationally are increasingly looking for the latest ideas outside of their corporate boundaries. Alongside traditional joint ventures and collaborations, many successful businesses across the globe are becoming more and more engaged in a range of new practices from corporate acceleration to open access innovation centres, innovation scouting, innovation competitions and the like. One feature of these developments is that large corporate businesses and multinationals are increasingly moving part of the burden, costs, and to some extent the risk, of innovation to start-up firms and SMEs more generally.

These changes are having a potentially profound and complex impact on the relationship between innovation and productivity. For open innovation to be successful and beneficial, SMEs need to implement these practices through a considered strategic plan, in order to avoid potential pitfalls. Such strategic planning must take full account of the extent to which a business needs to invest resources into the networks and relationships that are required to access ideas.

Clearly, building and maintaining relationships is expensive. There are tangible costs in the form of events and the contracting of intermediaries,



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- 30 Jones, P., Beynon, M. J., Pickernell, D., and Packham, G. (2013) 'Evaluating the impact of different training methods on SME business performance', *Environment and Planning C: Government and Policy* 31 (1), 56-81
- 31 Gibb, A. A. (1997) 'Small Firms' Training and Competitiveness. Building Upon the Small business as a Learning Organisation', *International Small Business Journal*, 15 (13), 13-29.
- 32 Kitching, J. (2008) 'Rethinking UK small employers' skills policies and the role of workplace learning', *International Journal of Training and Development*, 12 (2), 100 -120; Kitson, M. and Wilkinson, F. (2003) 'Labour mobility, training and labour force flexibility', in *Enterprise Challenged*, Eds A. Cosh, A. Hughes, ESRC Centre for Business Research, Cambridge University, 32-44; Matlay, H. (2004) 'Contemporary training initiatives in Britain: a small business perspective', *Journal of Small Business and Enterprise Development*, 11 (4), 504-513; Jayawarna, D., Macpherson, A. and Wilson, A. (2007) 'Training commitment and performance in manufacturing SMEs incidence, intensity and approaches', *Journal of Small Business and Enterprise Development*, 14 (2), 321-328; and Rigby, M. (2004) 'Training in Spain: an evaluation of the continuous training agreement (1993-2001) with particular reference to SMEs', *Human Resource Development International*, 7 (1), 23-37.
- 33 Clifton, N., Huggins, R., Morgan, B. and Thompson, P., (2015) An appropriate tool for entrepreneurial learning in SMEs? The case of the 20Twenty Leadership Programme. *Local Economy*, 30(5), pp.534-556; Aragon-Sanchez, A., Barba-Aragon, I. and Sanz-Valle, R. (2003) 'Effect of training on business results', *International Journal of Human Resource Management*, 14 (6), 956-980.
- 34 Jones, P., Beynon, M. J., Pickernell, D., and Packham, G. (2013) 'Evaluating the impact of different training methods on SME business performance', *Environment and Planning C: Government and Policy* 31 (1), 56-81; Storey, D. J. (2004) 'Exploring the link, among small firms, between management training and firm performance: a comparison between the UK and other OECD countries', *International Journal of Human Resource Management*, 15(1), 112-130.

as well as intangible investment in terms of the time required by businesses to generate and sustain the relationships needed to develop open innovation ecosystems.

Alongside these inputs, research indicates that many external relationships developed by businesses do not result in fruitful outcomes in terms of innovations that lead to productivity improvements. A lack of compatibility and alignment between internal and external forces, as well as internal resistance, means that many funded ideas and innovations are never implemented. This begins to suggest that despite its undoubted capacity to combine and unleash new ideas, open innovation is not always a practice that leads to efficiency within the innovation process or results in productivity gains.

However, to ensure a higher potential chance of establishing successful open innovation practices businesses should not only undertake a cost-benefit analysis of these processes, factoring in both tangible and intangible costs, but also establish due diligence checklists to confirm and verify the credentials and expertise of potential innovation partners and collaborators.

Here, there is a potential role for government support systems in the establishment and verification of these collaborative partnerships in Wales. Joining and participating in established networks should be a key aspect of the strategic leadership and management of any business that seriously seeks to improve its productivity through innovation.

BOX 2 Executive Agencies

The aim of the UK's Industrial Strategy is to boost productivity and it notes that *"unless we improve productivity ... we cannot raise living standards."* It comes down in favour of the development of local growth strategies that *"are likely to result in meaningful and sustained increases in local productivity growth rates."*³⁵

In Wales, the response to the Industrial Strategy has been to introduce an Economic Action Plan (EAP). This has introduced three 'Chief Regional Officers' to underpin a new "Regionally Focused Model of Economic Development" aimed at, among other things, raising productivity. This arrangement will *"add value by bringing partners together to understand the issues in each region and the interventions needed from us."*³⁶ The EAP also establishes a new economic contract with firms who wish to access grants and loans. The aim is to get them to focus more on certain government objectives such as: fair working practices, decarbonisation, and exporting.

To some extent, this 'new model' creates another advisory body that will make plans and recommendations for interventions to foster economic development. It is not a delivery model and falls short of the advice given to the Welsh Government during the consultation period which emphasised the need for economic resources and decision making to be devolved to the regions in order to improve delivery.³⁷ In general, the advice highlighted the need for a co-ordinated economic development strategy, implemented through dedicated regional delivery agencies, which are one-step removed from the Civil Service. These agencies would need to possess the commercial and business skill sets that are absent from the Civil Service.

Following Brexit, the Welsh Government has proposed to give the new regional structure some resources to develop and implement policies. Cabinet has agreed *"that the delivery model we adopt must achieve the right balance between national, regional and local planning and delivery.....[and] has agreed to commit to the principle of some funding being allocated regionally and decentralised, in line with ... the proposals for regional working"*³⁸

This is an important step forward in terms of addressing the problem of low productivity. But will these new institutions have the right skills, and resources, without micro-management from the Civil Service, that are needed to deliver outcomes? To ensure consistency across government they would need to be set up and incentivised to have the same objectives as the Welsh Government. To ensure accountability, they could be given an annual remit letter by the Economy Minister highlighting the KPIs that will need to be achieved – e.g. for capital investment, productivity, jobs, growth, the environment etc. – and they could then be held to account. One of their key priorities would be to help raise productivity in Welsh firms.

OECD research suggests that well-resourced regional agencies would be best placed to identify firms with growth potential and help broker the relationships they need to fill the knowledge and skills gaps that are currently holding back business improvements.³⁹ These regional agencies should be resourced to develop and retain some 'institutional memory', which has been squandered with the all too regular changes in regional policy in recent years. Embedded in the local economy, this new regional structure could be the key to delivering the long-term economic goal of raising productivity in Welsh firms.

35 UK Regional Productivity Differences: An Evidence Review (2020) Industrial Strategy Council.

36 Welsh Government (2018): 'Prosperity for All: Economic Action Plan'

37 See, for example: CBI (2015): 'A Plan for Prosperity'

38 See Welsh Government: Regional Investment for Wales Steering Group (2019)

39 OECD (2019) "Making Decentralisation Work: a Handbook for Policy-Makers"

4 Further Quantitative Analysis

In the Interim Report we collated responses to the questionnaire to facilitate qualitative judgements on the importance of different factors in determining overall management performance. In this section we go a little further and ask whether we can find statistically significant relationships between questionnaire responses and firm characteristics and measures of firm success.

To do that we classified firm responses and boiled them down to a series of indices.⁴⁰ We arranged the questions into five groups relating respectively to:

- how do firms measure productivity;
- what measures they take to control performance;
- how they set strategy;
- what range of techniques including IT is used to manage performance;
- what measures are taken inward or outward-looking to foster innovation.

This produced the Productivity Measurement Index (PMI), Management Control Index (CPI), Strategy Plan Index (SPI), Technique and Procedures Index (TPI), and Innovation Index (CIIE).

The index scores are positively correlated. In particular, a company that has more measures of productivity also tends to score highly on other indices for controlling performance, setting strategy and managing innovation. The correlation matrix for index scores is shown in Table 1.

Table 1: Correlation Matrix for Index scores

Index Correlations					
	PMI	CPI	SPI	TPI	CIIE
PMI	1				
CPI	0.67	1			
SPI	0.67	0.50	1		
TPPI	0.33	0.21	0.05	1	
CIIE	0.81	-0.13	-0.11	0.58	1

4.1 Firm Characteristics

We stratified the sample according to five characteristics:

1. **Broad sector:** construction; manufacturing; and services (primary producers, agriculture and mining were omitted because the samples were too small).
2. **Age:** firms five years or less, 6 to 15, over 15 (the original classification of 5-10 resulted in unbalanced samples; most firms interviewed were over 10 years old).
3. **Size:** turnover below £2m annually, £2m-10m, above £10m
4. **Region:** North; Mid-Wales; South East; South West.
5. **Exporter:** not at all; mainly to rest of UK; UK and abroad

The analysis found that **size** and **age** of firms are both significantly associated with the measurement of productivity and, to a slightly lesser extent, with management measures to control performance. It is mainly the oldest and largest firms who make the difference.

The questions that seem to make the most difference are those relating to the frequency of meetings of the senior management team and whether they discuss financial results and KPIs at meetings. It could be that bigger firms have more managerial resources for monitoring but that does not explain the association with age. A tentative conclusion is that firms that have survived longer and grown bigger seem to be those where a senior management team has good measures of productivity, meets frequently, and keeps an eye on quantitative measures of performance. Enabling and encouraging this behaviour for a wider range of firms is thus a key priority for policy intervention. We develop this point in more detail later in the report.

⁴⁰ Details of index construction are in the Annex

The other significant association is between firms that export and techniques of management control. Techniques like lean production, standard costing and other benchmarking, and using IT and the cloud are not all relevant to all businesses but such state-of-the-art techniques were more likely to be used by exporting firms. We took this to show that competition raises management’s technical performance; it is obliged to follow the state of the art. Table 2 shows the significant associations.

Table 2: How answers differ by type of firm

Firm Characteristic	Management Field				
	Measurement	Control	Strategy	Technique	Innovation
Size	++	++			
Age	++	++			
Region					
Sector					
Exporter				++	

Note: ++ signifies positive association statistically significant with 95 per cent confidence, as indicated by two-tailed t-test

There is no significant effect of region or sector: management responses are similarly diverse across the four Welsh regions and broad industrial sectors.

4.2 HIA Database

To go beyond stratification of results and relate responses to measures of firm performance we accessed a proprietary database maintained by Henry Ivy Associates. Based on Companies House data but extensively cleaned and analysed, the data base gives value added, revenue, and profit data for all UK companies with assets or turnover above the threshold at which full income statements have to be filed.⁴¹

For some 700 Welsh-based firms in the database, we found a statistically significant relation between size of company and profitability. Evidently, the larger a firm’s revenue for a given number of workers employed the more profitable it is likely to be. The relationship is non-linear, implying that getting bigger is most important for profitability when a company is small. The association between size and performance monitoring (control) in our small sample is, therefore, quite likely to imply a relation between performance measurement and profitability

Of the 74 companies we interviewed, 22 had published profit data – earnings before interest, tax and depreciation (ebitda). For each of these companies we tried to control for factors outside management control by calculating a Z-score, which related a firm’s ratio of ebitda to revenue to the average for a peer group of similar firms across the UK.⁴² This Z-score turned out to have a positive association with the strategy index that was weakly significant (at the 90% confidence level). The dotted regression line is shown in Chart 1.



This may indicate that while measuring productivity is associated with size and age, having an explicit strategy is a positive discriminating factor when firms are compared with their peers.

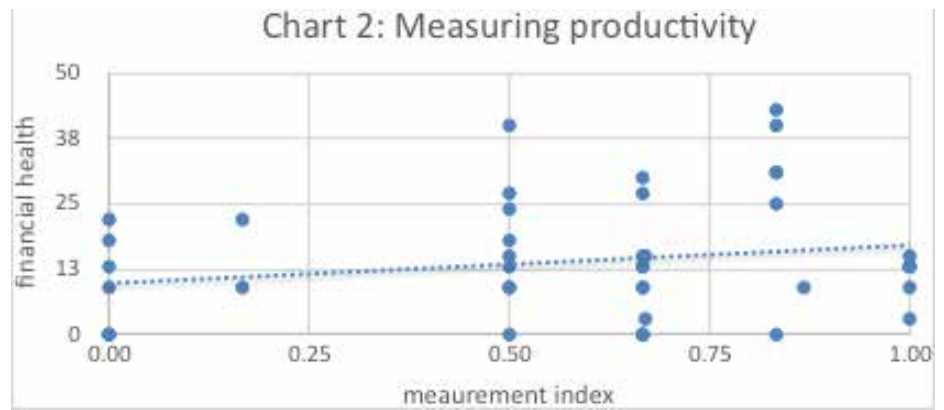
For smaller companies not filing income returns, HIA calculate a measure of company health based on balance sheet returns and

⁴¹ We acknowledge the generosity of HIA Associates in making this unique database available for our research. More detail on the HIA database and the statistical analysis is in the Annex

⁴² Details are in the Annex

their evolution over time. It was available for 49 of the companies in our sample⁴³. We therefore regressed their company health measure on the response indices. This is not a well-specified equation since it does not control for other influences on company health - so the results are suggestive at best.

One index had a positive association with the health score that was weakly significant: the measurement of productivity index. The regression line is shown in Chart 2



4.3 Conclusion

The data show that measuring productivity thoroughly for more than one factor of production is something that larger and older firms do more than others. The ‘measuring productivity index’ was also correlated, albeit with a large variance, with a measure of company health across a sample of 49 companies. We do believe that this index says something about management performance and underpins the common-sense view that it is necessary to measure something if you are going to improve it.

There is clear evidence that firms engaged in exporting use more sophisticated techniques of management control. That result was not because exporting firms are generally manufacturers where control methods may be easier to classify. Notably there was no correlation between sector and technique, as the blank cell in Table 2 shows. It is a pure export effect.

The significance of the other indices was less clear. It seems reasonable that a clear, explicit strategic plan would be an advantage compared with other very similar firms who do not have one and the data are consistent with that supposition. The ‘innovation index’ never showed up as significant in any of the analysis. We interpret that as showing the questions posed and the way they were made quantitative failed to capture the degree to which management was innovation minded or not.

BOX 3 Benchmarking and Productivity: An example from an earlier intervention

Our survey indicated that, while some firms conducted internal benchmarking, assessing their progress according to internal efficiency measures, the majority did not take advantage of the opportunity that external benchmarking offers for identifying performance gaps.

From 2014 to 2019, over 70 firms in the construction sector were benchmarked through the Construction Future Wales (CFW) programme using the ‘Balanced Scorecard’ – a combination of Financial KPIs alongside Customer, Process and employee indicators. KPIs were kept to a minimum to reduce the burden on firms. The performance of 12 firms was compared over a three-year period to initially identify the performance gaps and measure if the actions taken had been successful in closing those gaps.

The benchmarking process asked for items of information that could largely be found in a firm’s annual management accounts together with data covering the three other perspectives of the Balanced Scorecard plus measures of sustainability (or vulnerability):

Table 1

KPI	Change (%)
Turnover	+53
Employees	+36
EBIT	+13
Return on Assets	-2
Interest Cover	-27
Gearing	-25

⁴³ Details are in the Annex

The results indicate the success of the support model. Financial indicators have improved and, although Interest Cover had weakened, it remained very healthy. Gearing, (the percentage of long-term finance that is provided by long-term loans) was reasonably strong and indicated that growth had been achieved by ploughing back profit.

Calculating changes in Value Added

The ONS has produced a tool to measure labour productivity through Value Added (VA). Every firm has the information required to use this tool as part of their KPI control. The VA of the twelve firms that were re-benchmarked was calculated to determine if an increase in VA was matched by an increase in performance. Following the benchmarking intervention, VA, profit, and the number of employees all increased. It also calculated their relative position in their industry sector which is an important indicator of their competitiveness.

Table 2 : Value Added results from ONS calculator and benchmarking

Companies who showed:	
Increases in Value Added per employee	9
Reduction in Value Added per employee	3
Improvement in relative position	8
No change in relative position	3
Deterioration in relative position	1

5 Conclusions and Policy Recommendations

This final section seeks to draw together the key conclusions from the study and to propose some recommendations that can support improvements in rates of productivity across Wales.

First, it addresses the challenges that directly face businesses in relation to making improvements in their managerial capacity and overall management standards. Coupled, and allied with this, is a broader requirement to consider human capital development and the types of skills and training that will best promote increased productivity and efficiency in the future.

Alongside human capital, the study has also highlighted the relationship between rates of innovation and productivity performance, and in an era of open innovation many firms will increasingly require the need to source information and knowledge for innovation from external sources. Therefore, effective networks within Wales as well as across other regions and nations should form a more embedded feature of the industrial organisation landscape.

Second, this section addresses the role of government and public policy in facilitating productivity gains through regional level policies that enhance business support systems. In particular, the need for consistent and clearly structured interventions across space and time is stressed, and we consider some ways in which the proposed policy changes to economic development policy in Wales can be most efficiently administered.

Finally, the role and impact of ever-changing technology is considered, especially the requirement for the business community in Wales to address more digitally mature strategies and to give on-going consideration of the potential impact of developments in the area of Artificial Intelligence.

1. Firm Level Perspectives

i. **Managerial Capacity: How can management standards be improved in firms?**

In line with a number of studies, our research demonstrates a close link between more structured management practices and improved productivity. Measuring how the business is functioning in terms of basic financial and output indicators is the first step towards better management. Introducing a more general approach, like the Balanced Scorecard, would help to identify a broader set of KPIs that could improve things further. For example, in addition to financial metrics, managers should be assessing: *Employee Engagement; Employment Reviews; Percentage of Turnover spent on Training or R & D; Projects Delivered on Time; Responding to Customer Queries.*

These are some of the important “leading” indicators that can provide an early indication of the firm’s performance and should be monitored either monthly or quarterly as they have a direct causal link to turnover and profit.

For example, research has shown that companies with high employee engagement are more productive; e.g. typically, productivity can be 20% higher and staff 87% less likely to leave the firm. The research summarise four key “enablers” of employee engagement⁴⁴:

- Good leadership
- Good line managers
- Voice (talking to employees)
- Organisational Integrity

The recommendations of the report were fully supported by business organisations. The conclusion is that firms cannot expect their employees to be engaged if their managers are not. Consequently, leadership skills development programmes should have a focus on employee engagement.

44 MacLeod, D.; Clarke, N. (2009): ‘The MacLeod Review’, Office of Public Sector Information, Kew, London



Within a significant number of businesses, management appears to have a fairly *ad-hoc* approach to controlling the strategic direction of the business. The lack of a strong strategic orientation in a number of businesses in our research sample highlights the need for more effective leadership of the business. This could be tackled by improved education and training specifically targeted at Leadership and Management and the coordinated delivery of this training using the Apprenticeship Levy that is discussed in more detail below. The approach would be to encourage firms to invest in skills

development and work-based learning to develop a cadre of skilled managers within the Senior Management Team that can address productivity issues.

An important intervention will be to raise awareness of these issues and provide business support services to help firms measure the things that matter. In this respect it will be important to make firms aware of the control measures used to raise productivity by better performing firms. An important way forward would be to offer firms the opportunity to benchmark themselves against their competitors or peer group. The benchmarking intervention highlighted in BOX 1 illustrates the benefits of this approach to raising productivity.

Another important intervention will be to raise the intangible capital base of firms, such as recorded knowledge of internal processes, and intellectual property. This will require greater investment in software such as management information systems and related factors that will reduce the digital deficit in Welsh businesses. Interventions that support and help fund investment in intangible capital are discussed further below.

Management capacity can also be improved by managers becoming more engaged in networks and supply chains and by developing closer relations with customers. The benefits of collaboration are developed in Section 3.

Outside the food and drink sector, most manufacturing companies we interviewed produced customised products for specific orders. They were batch producers for specific orders, or project-oriented. Productivity measures and support interventions will need to be more firm specific to address issues related to customised products. This is likely to be a continuing issue given that it is hard for firms in Wales to compete purely on cost grounds with Asian countries in the production of large runs of standardised products.

Smaller Welsh companies often have an advantage in terms of design skills or adaptability that enable them to engineer products for specific requirements. Management therefore has to combine technical know-how with an ability to estimate costs and maintain tight control of them. These skills are difficult to bring together - inexperience in some project-oriented businesses, has led to managerial mistakes leading to lower performance. Learning by doing is very important in project-based, non-standardised businesses, and, as indicated above, this is particularly important in Wales.

A lack of knowledge within firms, however, indicates an important role for public policy in the field of business support in Wales. There is a need to offer businesses access to specialised training initiatives dedicated to improving business performance in non-standardised product markets. Although this is not an issue limited to Wales, its industrial structure, especially with a preponderance of SMEs operating within non-tradable sectors, means that more firms are likely to lack this specialised knowledge compared with firms in more advanced regions.

However, it is not simply the responsibility of the public sector to provide support and training schemes. Businesses themselves have to realise the importance of these issues and engage with those providers and business agencies that offer support. The role of trade associations and clubs is important in this process of raising awareness and fostering engagement.

- There is a continuing need for better access to business support initiatives that encourage firms to measure business performance.
- Firms should develop a broad range of KPIs by utilising concepts like the Balanced Scorecard, to provide an early indication of their performance and profitability.
- Improving employee engagement is an important leading indicator of upgrades in performance.

- The fairly *ad-hoc approach* to controlling strategic direction points to the need for training to be specifically targeted at improving Leadership and Management skills
- Firms should be given the opportunity to learn about and adopt the control measures used to raise productivity in better performing firms through opportunities to benchmark themselves against their competitors

ii. Skills Training: How can firms get better access to the skills they need? What is the Levy doing for firms in Wales?

When firms were asked what was the main restraint on their growth, the most common answer by far was they couldn't find people with the skills they needed. In an earlier survey of some 40 companies in 2017, fully two thirds of the companies said as much and the proportion was little different among the present sample.⁴⁵

In some parts of Wales this finding extended right down to unskilled workers who would turn up reliably and on time. Such workers, of course, were often on the minimum wage making the job not attractive relative to looking for other employment or even seeking benefits. In all parts of Wales, however, firms complained of a shortage of workers with technical skills.

A number of small firms trained their own workers via apprenticeships or less formal arrangements. Yet they complained that the general shortage meant they were quite likely to have workers poached once they had been trained.

The **training levy** was introduced in the UK in order to incentivize firms with payrolls above £3million to do their own training and not to attempt to free-ride on the training of others. While the levy at 0.5 per cent of payroll is common to England and Wales, the training delivery mechanisms are different in the two countries. The Welsh system puts more explicit emphasis on training to a qualification in order to keep up standards and stop claims for purely token training by companies. The English system gives training vouchers to firms and is more permissive in how these are used. Neither system is working ideally.

The Welsh system maintains standards, perhaps at the cost of some flexibility. Ways to speed up responses for specific training needs are needed, and systems of training credits need to be harmonised. Credits awarded on different training pathways are not uniform and this can result in bureaucracy and inflexibility. The Welsh system, unlike England, also excludes training to level 7 vocational qualifications. Given the importance of improving professional management in Welsh companies, this exclusion should be lifted.

The level and threshold of the training levy are currently not devolved matters. It may be that they could be tailored better to Welsh circumstances. It is possible, however, that devolution of the levy could reduce the resources available to the Welsh Government. There is a case for considering devolution but only if this risk can be avoided.

More generally, systems of technical education in the UK as a whole are less developed than in other countries. More could be learned from the approach in countries like Germany. Facilitating interaction between business and FE and HE institutions is not straightforward,⁴⁶ yet these relationships are vital if Wales is to stay abreast of the new and more competitive research and innovation agenda in the post-Brexit environment.⁴⁷



In the FE sector consolidation of colleges through merger, has reduced number of colleges from 25 to 14 over the past decade. This FE structure forms the basis for a regionalised system of provision – of higher-level skills as well as vocational education and training. That role needs to be more explicitly integrated into regional development policy with new modes of delivering training based on the recognised international best practice such as the German Dual System.⁴⁸

45 See; <https://www.welsheconomicchallenge.com/what-welsh-companies-say-survey-results/>

46 Marques, P and Morgan, K. 2018. The heroic assumptions of smart specialisation: a sympathetic critique of regional innovation policy.. In: Isaksen, A., Martin, R. and Trippl, M. eds. *New Avenues for Regional Innovation Systems - Theoretical Advances , Empirical Cases and Policy Lessons*. Springer, pp. 275-294.

47 Graeme Reid 2018 "Review of government-funded research and innovation in Wales" (Reid Review) <https://gov.wales/review-government-funded-research-and-innovation-reid-review>

48 For a general description of the Dual Education System see: <https://www.dw.com/en/what-is-germanys-dual-education-system-and-why-do-other-countries-want-it/a-42902504>

Responses to specific training needs to be speeded up, and systems of training credits need to be harmonised.

- Responses to specific training needs to be speeded up, and systems of training credits need to be harmonised.
- Given the importance of improving professional management in Welsh companies, the exclusion of Level 7 training provision should be lifted.
- A regionalised system of provision of higher-level skills should be explicitly integrated into regional policy based on international best practice such as the German Dual System.

iii. Encouraging Industry Solutions for Effective Networking

There are a number of trade associations and business clubs in Wales offering different types of services to their members from lobbying policymakers; to providing business guidance; and providing advice for specific issues such as regulations, funding, and training. Our research, however, point to the under-utilisation of such associations by firms, while there is also a lack of appreciation of the benefits of collaboration and effective networking.

There appears to be a lack of urgency to address this lack of participation, not least by the trade associations themselves, although there are examples of organisations that provide valuable engagement and are pro-active in encouraging participation. At the same time, however, government-funded business support services appear to lack focus.



We recommend, therefore, that government-funded business support services should be explicitly tasked to facilitate more effective networking and collaborative activities, and to do this in combination with trade associations. Current good practice should be generalised across the board, whilst a long-term review should be taken of the kind of public-sector support that is available to businesses.

This recommendation for government action, however, does not mean that the private sector should not do more to improve their offer. Trade associations should become more active in engaging

with firms to address productivity and performance issues. Government support may be provided in establishing and verifying collaborative partnerships that may be organised via trade associations.

- Business support services should be explicitly tasked to facilitate more effective collaborative activities for firms to encourage sharing resources and joint working.
- In addition, trade associations should become more active in engaging with firms to address productivity and performance issues.

There is evidence of a dependency culture in Wales. A very high proportion of the firms we spoke to had applied to Welsh government for finance or support. Employers' association reflect this by spending a high proportion of their effort in lobbying government. Providing collective business services for members and facilitating training could be a more prominent part of their efforts relative to political lobbying.

5.2 Government Level Perspectives

i. The Flux of Regional Policy: Consistency of Government Policy

All businesses have to assess and manage risk. But government policies should not increase the risks faced by business through the introduction of too many policy changes. One risk that could easily be reduced in Wales is the inconsistency of government policy. By their nature all business decisions are concerned with the future and the more uncertain the future the less companies will be inclined to invest in capital equipment and upskilling staff and consequently affecting their future productivity.

A recent example in Wales was the commencement of a Welsh Government/CITB project delivered through Construction Futures Wales (CFW) to increase the competitiveness of the Welsh construction industry. The programme ran successfully for 4 years but ended abruptly in March 2019 with no replacement or modified programme being put in place. Evaluation and consistency appeared absent. Given the size of this sector in Wales and its potential for growth and increased productivity this decision appeared inconsistent with the original rationale for its introduction.

Government consultation with business was for years based on a sectoral approach with industry committees based around important companies. It is now moving to a more place-based approach and regional plans are being proposed. However, there was probably no need to completely abandon the sectoral focus as both a place-based and sectoral approach can work together in a regional context. It is certainly not the case that a sectoral and regional approach are incompatible. They could and should be co-ordinated. As ever the missing component in policy delivery has not been good intentions or even good ideas but a dedicated approach to implementation. A focus on outputs and outcomes has not been the priority. As a result, business representation at sectoral meetings has tended to decline as businesses came to regard them as talking shops.

- Greater stability and focus is needed in the Government's approach to industrial support
- A longer-term view should be taken of the delivery of public-sector business support services

ii. Regional Delivery Structures

A key policy initiative would be to set up an arms-length regional structure for delivering the high-end business support services needed to raise productivity. This will require integration of the regional development strategies being developed by the three City Deals across Wales on the one hand, with the Welsh Government's new Regional Economic Framework set out in its Economic Action Plan on the other.

- Create a new arms-length regional structure and integrate it with the City Deals
- Task the new CROs to work with the Local Authorities to produce a unified and well-resourced delivery vehicle in each region
- The Regional Delivery Structure should deliver high-end business support services focused on raising productivity in Welsh firms

The City Deals were the first 'place-based' initiatives to be resourced in Wales and tasked with the objective of raising GVA per head and hence raising productivity. The task now is to integrate these into a single delivery vehicle for each region - and one which is consistent with the Local Authorities own development plans. This will be an important task for the three new Chief Regional Officers, CROs. The funding promised by the Welsh Government to make this regional structure a reality is a welcome development and hopefully will help create an effective regional agency structure along the lines highlighted in BOX 3.

With the delivery vehicle in place a useful policy action would be to develop a data base in each region of all firms above a certain size. This would help to identify potential growth firms with the capacity to raise their productivity. The data base could be used to develop a distribution of productivity chart in terms of GVA per firm. It would help identify the challenge - i.e. the cluster of underperforming firms.

However, attempting to help all firms in their patch would be difficult and resources would be too thinly spread. Instead the focus for policymakers should be less on trying to improve productivity in underperforming firms and more about improving the performance of firms further up the distribution who are already doing some things right and are reasonably productive.

The focus should be on identifying firms with the capacity and desire to grow who are not that far removed from the productivity levels of frontier firms. In this way it should be possible to identify firms who have average or above average GVA per worker and have demonstrated some of the growth characteristics highlighted in the Hodge Project survey. ONS research has shown that if the average management performance is raised for firms with productivity levels around the median towards the 75th percentile then a 12% increase in productivity is likely to be achieved.



Another way of targeting resources on potential growth firms could involve focusing on improving the productivity of businesses in each region that are already exporting or seeking to develop their potential to sell outside their existing markets. In this way, regional business support systems could concentrate on improving the leadership and management skills of a targeted group of firms in order to help them develop the KPIs and control mechanisms highlighted in the survey.

- Develop a data base of firms above a certain threshold
- Identify firms in this cohort with at least average levels of GVA per worker who have management systems in place to measure productivity
- Concentrate on improving the management and leadership skills of this group of firms - particularly those who are engaged in exporting

A useful regional intervention would be to increase and encourage inter-firm collaboration as set out above. One additional and specific area of collaboration best undertaken at the regional level would be an intervention that focused on improving business – university interaction and collaboration. Similarly, it could help develop closer links between potential growth firms and local further education colleges.

The new regional agencies would be well placed to broker and develop the interactive knowledge networks that already exist between firms and the higher and further education sectors. A good example of this type of interaction is the Compound Semiconductor Applications Catapult in Cardiff, which offers the research facilities required by industry to accelerate the innovation process and develop new products, thereby enabling firms to target new markets. The regional agencies, working closely with the Development Banc for Wales, could also work with industry to assemble financial packages that would support them to create innovative, but risky, new products or services.

At present there is little help available for firms wishing to develop a working relationship with universities.⁴⁹ In the post-Brexit era, it could be an important function for the new regional agencies to work with universities and local firms (identified through the new regional database of potential growth companies) to harness the new funding package that will replace European funds – presently called the Shared Prosperity Fund. The regional agencies could work with universities and local FE colleges in their region to develop engagement programmes with potential growth businesses that could be funded from a combination of this new funding regime and the Development Banc.

- Task regional agencies to improve university-business interaction and collaboration
- Develop some (smaller) regional catapults based on the semiconductor model in Cardiff
- Use the Shared Prosperity Fund to develop a funding package to support university engagement with local firms and help develop innovative new products

5.3 Future Perspectives

i. The Digital Deficit and IP: What is the role of Broadband Investment in solving this issue?

The productivity challenge should pay particular attention to reducing the Digital and Technological Deficit. This remains of paramount significance as it is likely to remain a drag on the performance of the Welsh economy. This is despite the fact that Wales has competitive advantages in sectors like semi-conductor technologies, Fin Tech and Med Tech. A serious barrier is a lack of recognition by many firms that investing in state-the-art of ICT, especially superfast broadband enabled services, is likely to improve their productivity.

Of course, and at the same time, the public sector should continue to prioritise investments in broadband. Efforts such as Welsh Government's Superfast Broadband Business Exploitation (SFBE) project, part-funded by the European Regional Development Fund (ERDF), go some way to achieving these outcomes, but more needs to be undertaken in a sustained long-term manner.

- Introduce digital transformation and innovation as a core feature of the business support system across Wales
- Promote current fiscal incentives such as R&D tax credits as major lever to improve investments in digital infrastructure
- Champion those companies in Wales that have adopted a mature digital strategy and reaped significant gains in terms of their performance

Broadband and improved telecommunications also have an important role to play in enabling greater inclusivity and equality in economic development. Currently, provision in the Cardiff area is adequate as testified by the growth of internet-based businesses in the Capital Region. However, this is not true across Wales. Whilst extension of fast broadband and telecommunications generally is relatively expensive in rural areas, it is cheap compared with upgrading physical transport infrastructure.

ii. AI as a Future Challenge to Productivity

Of several categories of innovations identified as potentially offering prospects of productivity enhancement, artificial intelligence (AI) is currently attracting the most attention. Some proclaim that AI provides unprecedented productivity growth potential, but also the danger of massive job destruction. While predicting growth in productivity across large segments of the labour market, others suggest a moderately optimistic outlook on AI's impact on employment. In particular, the extent to which AI-based

⁴⁹ There used to be support from European funds for universities to engage with external partners in the private sector, but this hasn't been available in Wales since 2014.

innovations are complementary to high-skilled workers is not entirely obvious, and AI can help lift the productivity of low-skilled workers by offering expert knowledge to non-specialists.⁵⁰

Furthermore, any effects from labour-saving automation might be offset by increases in demand, if demand for products from the automated sector reacts strongly to falls in price. As for its impact upon management and research productivity, AI is generally expected to contribute to productivity growth in a complementary fashion. These trends suggest a number of recommendations concerning the productivity of firms in Wales. In particular, it indicates a number of challenges that firms need to address as part of their future strategies and plans.

- Integrate AI into the workforce and identify its role within human teams – the versatile intelligence of people will still be needed across a wide range of problems
- AI is unlikely to replace people in breakthrough strategies, since novel questions will be needed to prompt fresh insights.
- But AI can play a key role in the efficiency with which innovations are employed and adopted and will become an important part of the innovation ecosystem

In terms of management education and training, AI's conduciveness to prediction skills, places a greater emphasis on the judgement skills of people, indicating that firms will increasingly require workers with strong decision-making skills beyond senior staff and managers.

⁵⁰ Welsh Government: 'Delivering Economic transformation for a Better Future of Work; Review of Digital Innovation for the Economy and the Future of Work in Wales'; September 2019

Annex: Data and Methods

This Annex gives further detail on the data used in the analysis for the study and on the methods employed.

The quantitative analysis relied on reducing answers to questions to a quantitative form through the construction of indices. Each firm's responses could then be summarised by a set of index numbers. Given the necessarily crude methods used to reduce the complex and nuanced replies to our questionnaire to a series of numerical indices, some information was lost in the process, underlining the importance of the accompanying qualitative assessment. Construction of the indices is explained in the next section.

Indices

Eight indices were created from responses to the survey as follows:

- EI = Export Index
- PMI = Productivity Measures Index
- CPI = Controlling Performance Index
- SPI = Strategic Plan Index
- TPI = Techniques/Procedures Index
- CII = Controlling Innovation Index
- IPII = Internal Promotion of Innovation Index (subsequently omitted in favour of the more general IESII)
- IESII = Internal and External Sources of Innovation Index

Six indices have been used in analysis and they were created as follows:

Productivity Measures Index (PMI)

The PMI was constructed from respondents' answers to whether they measured the productivity of Labour; Plant and Equipment (P&E); IT; and Buildings (or Physical Space). A 'No' was assigned a value of 0, and a 'Yes' a 1, but in order to reflect the importance and bias toward Labour Productivity a 'Yes' for Labour Productivity was assigned a value 3.

The four scores were then summed and divided by 6.

Controlling Performance Index (CPI)

CPI was constructed from questions about the areas that were discussed during SMT meetings. Respondents were asked whether, at the SMT meetings they discussed Monthly Accounts; Set and/or Reviewed Targets; and Discussed KPIs.

Three options were offered for each area of discussion namely Virtually every Meeting; Occasionally; and Never. The options were assigned values of 1; 0.5; and 0 respectively.

The values for each area was then summed and divided by 3.

Strategic Plan Index (SPI)

The SPI was constructed from a question that asked about the degree to which the firm used a strategic plan to guide their operations and future development.

The survey asked whether the firm had the following approach and were valued as shown:

- 'A fully established strategic plan that is regularly reviewed' (Value 3)
- 'A partially articulated strategic plan that the company plans to develop' (Value 2)
- 'Strategic ideas but no detail' and/or 'No strategic plan as such: the MD sets current objectives' (Value 1)

The values assigned were summed and divided by 3.

Techniques/ Procedures Index (TPI)

Respondents were asked whether their firms implemented one or more of seven techniques or procedures and to what degree in the business.

- Lean
- Standard Costing
- Project Management
- Inventory Control
- KPI Development
- Benchmarking
- Defined Budget for Staff Development

Respondents were asked whether the techniques or procedure was applied as followed and valued as:

- Across the business (Value 1)
- In some areas of activity (Value 0.5)
- Not at all (Value 0)
- Or was not applicable (Value 0)

In addition, respondents were asked whether their firm used the following software or IT system, and each response was assigned a value of 1 if it was used, and a 0 if not:

- Cloud Computing
- E-Commerce
- Accounting
- Customer Relationship Management (CRM)
- Supply Chain Management (SCM)
- HR Management

The assigned values from each of the above thirteen techniques and procedures were then summed and the sum divided by 13.

Controlling Innovation Index (CII)

The CII was constructed from answers that detail the changes that had been made in the company over the previous three years. Changes were categorised into seven areas as follows;

- Operations Management Changes
- Employee Development and Training
- SMT and Leadership Development and Training
- Change in the Organisation's Structure
- Investment in Technology
- Improved Management Information
- Product Development

Respondents were asked to score on a Likert Scale the importance of each change (5= High; 1 = Low). These Likert Scale scores were then valued as follows:

- Likert Scale score 3-5 assigned a value of 1
- Likert Scale score 1-2 assigned a value of 0
- No reply/ not applicable assigned a value of 0

The values for each respondent was then summed and the sum divide by 7.

Promotion of Innovation Index

Two indices were originally produced namely an **Internal Promotion of Innovation Index (IPII)** and an **Internal and External Sources of Innovation Index (IESII)** that included the IPII. For simplicity, only the IESII is described.

Respondents were asked how they promoted innovation in their firms and how new ideas were generated or sourced. They were asked whether the firm had a formal reward scheme for new ideas, and/or whether the firm sourced new ideas via feedback from workers' meetings.

Firms were also asked whether they were members of business clubs or trade networks, or any other business association as proxy for external sources of new ideas or innovation for the business.

The responses were assigned values as follows, which reflect the degree of formality of the effort to promote innovation in the firm:

- Formal Reward Scheme assigned a value of 1
- Feedback from workers' meetings assigned a value of 0.5
- Membership of external networks and associations assigned a value of 0.25

The assigned values were summed and divided by 3.

A seventh index relating to exports was also calculated: **Export Index (EI)**

This was constructed from the geographical destination of companies' sales. Respondents had been asked to identify what percentage of their sales were made to Wales; The Rest of the UK; The Rest of the EU; and The Rest of the World. This range was narrowed by combining the 'Rest of the EU' with the 'Rest of the World' to indicate the degree that exports from the UK were important to companies.

To construct the EI, however, export was designated as being sales outside Wales, which in turn indicates level of capacity and orientation. Hence, the EI is formulated as:

$$[(\% \text{ of sales to RoUK}/100) + (2x \% \text{ of sales to RoW}/100)]/ 2$$

However in analysis it was decided that exports were more a characteristic of the firm than a dimension of management so exporting was treated like size, age and sector as a firm characteristic.

The HIA Data Base⁵¹

The study was given access to this proprietary data base which contains data on companies that have filed data at Companies House and which have:

- Revenues of more than £1 million in any year
- Gross assets of more than £0.5 million in any year since 2005
- A member of a group, the parent of which meets the criteria.

The data have been cleaned and analysed to separate out the returns of Welsh-based operations that are subsidiaries of entities consolidated elsewhere. It is important that these can be shown separately, so that the full activities and contribution to local GDP can be seen. It should be noted that internal transfer prices and other accounting treatments may mean that results of such entities are not as aligned with standard accounting practices, as maybe the case with their Parents.

Companies with revenue above £10 million annually file full accounts facilitating extensive analysis. Other companies can file abbreviated accounts with only summary balance sheet data. Many of the 74 companies interviewed in this exercise were too small to file full income statements. A couple were subsidiaries of international companies that did not file separate accounts at all. Some had not filed enough years of balance sheet data for company performance to be analysed. Some were too small to be included at all. Some 23 companies in the sample had full income statement while 49 companies altogether had balance sheet data that enabled some analysis to be conducted.

23 is obviously a very small sample and, given the many factors affecting profitability apart from the management practices revealed by the questionnaire, relating responses - and particularly our indices - to company results is a daunting task. HIA analytics, however, enabled us to attempt the exercise. HIA identifies a peer group for most companies returning an income

⁵¹ We acknowledge with gratitude the generosity of Sir Alan Cox and HIA Associates in providing free access to this resource.

statement⁵². The group is determined by six characteristics that are largely outside management control and are dictated by the nature of the business. They include capital intensity, including working capital requirements, nature of the labour force as revealed in average wage levels, and the ratio of value added to gross output or revenue.

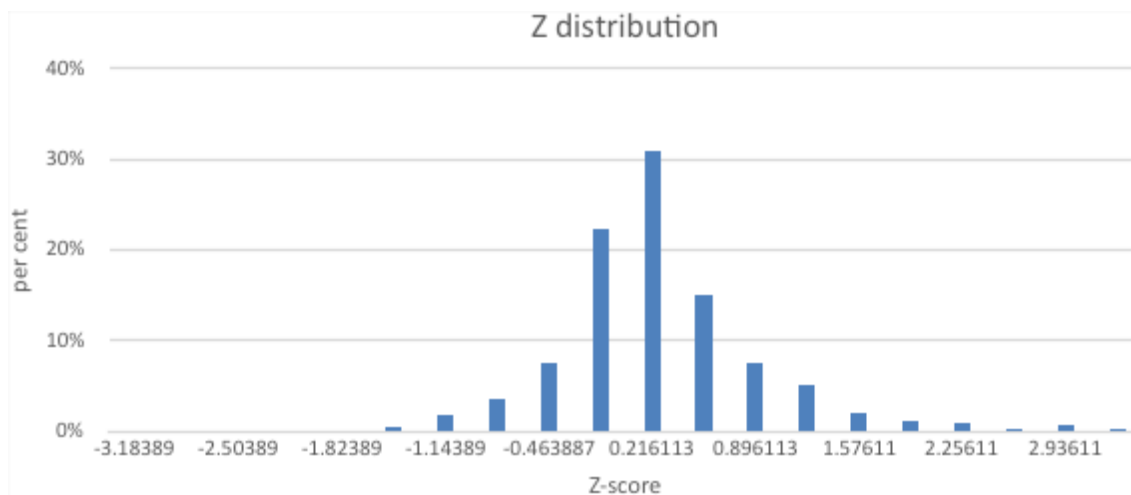
We took the difference between a company’s ratio of ebitda to revenue and the average of the same ratio for its HIA peer group and we divided that difference by the standard deviation for the group to calculate a Z score. This measure should control for many factors affecting the profitability of similar firms allowing the effect of management to be more nearly isolated. We then regressed the Z-scores on our indices with the results reported in the main paper.

For smaller companies providing only balance sheet data, HIA calculate number of indicators. One is a “health score”. Details of the calculation are not given for IP protection but the elements affecting the health score are as follows:

Health Score ⁵³
Interest Gearing
Cash Flow
Debt Gearing
Working Capital
Working Capital Gearing
Added Value Gearing
Cash Generation Score

Because the peer groups are UK-wide the Z-scores also give a picture of the relative performance of the 600-plus Welsh companies in the sample compared with peers elsewhere in the UK. Figure 1 shows that the sample of Welsh firms performs roughly as well as their UK peers. 308 of the companies have positive Z-scores showing they outperform their peer group average. Moreover, the distribution graph is broadly symmetrical with no tail of relative under-performers in Wales. The fact that many make modest profits is a UK, not a specifically Welsh, phenomenon. The relatively low productivity in the Welsh economy as a whole is a sectoral and size phenomenon; Wales has more small companies and they are mainly not in sectors with high measured productivity. Yet at the company level, at least among companies reporting profits, Welsh companies hold their own.

Figure 1: Welsh firms match UK peer groups



Effect of scale on profitability.

From interview discussions we formed the view that size of the firm itself was a factor affecting its productivity and profitability. A certain size was necessary to support specialised management. Also, profits generally tend to increase over the life cycle of firms and larger ones are more likely to be able to capitalise on higher productivity due to the cost saving from economies of scale. We looked at the effect of scale on the large HIA sample, which in this case was nearly 600 firms⁵⁴. Not having data on size

52 Entities would qualify for allocation to an HIA PeerGroup and therefore for inclusion in HIAPeerGroup statistics if: • There are more than 31 employees in any 2 years and • There is more than £5m Revenue in any one year • There are at least 2 valid datasets as defined by HIA

53 The health score statistic was available for 49 of the companies in our sample, enabling this statistic to be compared with indices of questionnaire responses, with results shown in the main paper.

54 Employment data were not available for all firms and some non-commercial or third-sector entities were also omitted

of management teams, we used the number of employees as a proxy for the size of the firm and regressed the percentage ratio of ebitda to revenue on employees. The regression is a poor fit since it does not account for many influences on profitability. That may bias the estimated relationship, which turns out to be very small and non-linear. Size tends to go along with profitability but at a diminishing rate.

Variable	Estimated coefficients	Standard error	T statistic
Constant	9.8317	0.4708	20.8846
Employees	0.0021	0.0010	2.0169
Employees squared	-0.0000	0.0000	-2.0427

Taken at face value, these coefficients imply that the scale effect runs out when a firm has 10,000 employees. This value is almost outside our sample, however, and that implication is not to be taken too seriously.

Z-scores do not show a pure scale effect but, unsurprisingly, they are related to labour productivity. In this case, the relationship is also non-linear and a semi-log form fits best.

Variable	Estimated coefficients	Standard error	T statistic
Constant	0.4447	0.1106	4.0193
Logged revenue	0.0712	0.0283	2.5137
Logged employment	-0.1124	0.0301	-3.7303

These exercises were preliminary and the data should repay more thorough analysis.



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