

**Publicly Funded Agencies and Institutions: Their Impact on Firm HR
Practices and Innovative Work Behaviours**

**Enda Hannon
Kingston Business School
E.Hannon@kingston.ac.uk**

**Katie Truss
Kent Business School, Medway**

**Kathy Monks, Edel Conway, Grainne Kelly and Patrick Flood
Dublin City University**

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Abstract

Various authors have argued that the adoption of an active industrial policy may promote strategic and consequently employment upgrading in liberal market economy contexts. A related observation is that contact with publicly funded agencies, industry associations or networks may facilitate the adoption of innovation/quality focused strategies and the dissemination of best practice general management and HR policies. However to date there has been limited research on these issues. This paper addresses this gap by analysing survey data obtained from senior managers in the British and Irish software and pharmaceutical sectors in 2009 and 2010. Survey responses were obtained from 177 companies in total. On the basis of an initial analysis, for the UK we find firm contact with individual 'General Business Support' agencies to have limited impact on HR practices and work behaviours. In contrast, contact with individual 'Knowledge Creating Organisations' is associated with higher levels of perceived adoption of development focused and employee centred HR practices, and higher incidence of innovative work behaviours among employees. For the whole sample the higher the number and intensity of contacts with external organisations, the more positive the outcomes in a number of respects. Further analysis of the dataset is required to explore these findings in more detail.

Introduction

The employment and HR literatures have historically paid relatively limited attention to the impact of external institutions and agencies on the employment and HR practices adopted by firms. While industry context, competitive trends and government employment regulations have been the subject of much research (Beer *et al* 1984; Kochan, Katz and McKersie 1986; Jackson and Schuler 1995; Boxall and Purcell 2008), relatively little is known about the impact of other external actors. Overall the primary focus has been on internal drivers of employment and HR practices, with management strategies and various forms of employee voice regulation examined in great detail (Guest 1999, 2007; Harley, Allen and Sargent 2007; Macky and Boxall 2007; Van de Voorde, Van Veldhoven and Paauwe (2009). While this has been particularly the case for HR research, the decentralisation of collective bargaining from sector to company level in countries such as the UK has contributed to a similar diminution of interest in external agencies and institutions on the part of employment relations scholars (Ackers 2005; Heery 2005).

This situation is problematic for a number of reasons. First from both theoretical and empirical perspectives, the potential for other actors and institutions to influence employment and HR practices needs to be considered. In this regard it is noteworthy that there is a growing recognition that insufficient attention has been devoted to the influence of context in these fields (Paauwe 2004; Edwards 2005). Firms have multiple external interactions on a daily basis, with customers, suppliers, industry associations, general business support and skills agencies, universities, schools, colleges etc (Grant 2002). However the potential impact of these organisations on employment and HR strategies remains largely unexplored.

Second, from a public policy perspective large amounts of money are spent on funding a range of organisations and institutions such as business advice and support and training agencies, industry networks, science parks, universities, research centres and institutes of technology. An important question is what is the impact of these organisations on employment practices, if any?

While the impact of external agencies has therefore not been a main focus for employment scholars, there is, nevertheless, a reasonable body of evidence on this topic. In particular, a number of authors writing from a political economic of employment or skills perspective have expressly examined the potential role and impact of external agencies on firm strategies and employment practices (Finegold and Soskice 1988; Finegold 1999; Lloyd 1999; Edwards et al 2002, 2010; Payne and Keep 2003; Wilson and Hogarth 2003). This paper reviews the research undertaken by these authors before presenting the findings from a survey of senior managers in the UK and Irish pharmaceutical and software sectors addressing this issue. We find that firm engagement with general business support agencies has some limited impact on the HR practices they adopt. In contrast, contact with knowledge creating agencies and institutions has much more significant employment effects.

The paper first considers the business case for external business support and advice agencies. Next it reviews previous research on the employment effects of external institutions and agencies. In addition to employment studies, research from the small business policy field is considered. This review facilitates the development of a number of specific propositions or hypotheses regarding the employment and HR practices associated with company engagement with external agencies and institutions. Next, the research methods used in the current study are outlined, before the results of the statistical analysis undertaken are presented. Finally, an analysis and conclusion is provided.

The Rationale for Business Support Agencies and Institutions

Guidance from the Entrepreneurship, Small Business Policy and Regional Development Literatures

The entrepreneurship and small business policy literatures outline how the provision of business advice or support is commonly justified on the basis of addressing market failures or promoting positive 'externalities' (Storey 2006; Greene, Mole and Storey 2008). In terms of the former, the provision of business advice or support can be justified on the grounds that owners of small firms may not appreciate the benefits to their business of engaging in particular activities (for example staff training) (Storey 2006: 254-255). Similarly, banks are commonly seen to be unable to accurately assess the risks of lending money to small firms and as a consequence may unnecessarily deny them access to funds. The provision of public support, for example in the form of subsidies for workforce training or state sponsored loan guarantee schemes, can address these so called 'market failures' (ibid.).

The main point with regard to the promotion of positive externalities is that firm engagement in particular activities (for example research and development), may result in benefits to the broader economy or society in addition to those that accrue to individual firms themselves. In such a situation, public policy interventions aim to stimulate or promote the activity in question at firm level (Greene et al 2008: 122-124). For example, in a US context Lerner (1999) argues that without public subsidies there would be sub-optimal formation and growth of technology based firms.

An additional rationale for business advice or support in this literature is that this constitutes a resource for businesses to draw on, and results in the transfer of both explicit and tacit knowledge from advisor to business owner or manager (ibid; Chrisman and McMullan 2004). This perspective is closely linked to the 'resource based' view of the firm (Barney 1991). A final rationale is that the provision of business advice or support tackles a problem of asymmetric information. This refers to the situation in which business owners or managers may underestimate the benefits from accessing business advice due to lack of experience or knowledge of the same, thereby resulting in them purchasing a sub-optimal level of advice. Publicly funded forms of support can help overcome this problem (Storey 2006; Greene et al 2008.).

While the above constitute general motivations for the establishment of business support agencies and institutions, the setting up of the same has been particularly common in economically underdeveloped areas or regions of particular economic significance. In such areas, the rationale on the part of politicians and policymakers has been to use these agencies to support and accelerate rates of economic development (Bennett 2008).

Guidance from the Strategy, Innovation and Industrial Policy Literatures

While the strategy literature has historically accorded preeminent importance to the deployment of internal firm resources in analyses of competitive advantage and innovation, there is now an increasing recognition of the importance of institutions and resources external to the firm. As mentioned above, this essentially involves an extension of the resource based view of the firm (Barney 1991). In one of his classic texts, Porter (1990) argued that while government policy was not the primary driver of competitive advantage, it did play a key role in influencing the development of particular industries and in particular in the strengthening of the 'factor conditions' required for competitive success. More recently, however, Porter has emphasised the importance of developing such public good institutional structures and, additionally, close links between private businesses, government and the same. He describes these as 'institutions for collaboration.' The importance of external engagement and a rich institutional environment is highlighted as follows:

In modern competition...improving competitiveness becomes a collaborative process involving multiple levels of government, companies, educational institutions and institutions for collaboration.

Porter and Ketels (2003: 30)

While the role and potential impact of business support organisations, industry associations and networks has only recently begun to attract much attention in the strategy literature, the potential contribution of these has long been recognised in the innovation, industrial policy and economic geography fields.

Although the state is no longer a central driver of economic activity, it is nevertheless seen by authors from these fields to play a key role in the development of competencies and capabilities facilitating successful performance in international competition. For regions or countries to compete successfully in high value, innovation focused activities, it is argued that individual firms need to be able to draw on various resources and capabilities from the institutional context that surrounds them (Porter 1990; Porter and Ketels 2003; Nickell and Van Reenen 2002; Cooke and Morgan 1998; Maskell and Malmberg 1999; Huggins and Izushi 2007).

For Bianchi and Labory (2006), the focus of government action has moved from industrial policy to 'industrial development policies' aimed at promoting investment in research, the enhancement of economic competencies, and cluster and network formation. Aiginger (2007) similarly argues that the central objective of the 'new industrial policy' is the generation of what he calls 'dynamic capabilities'. Bianchi and Labory (2006) explain that contemporary industrial policy comprises interventions of two broad types: those that are about the creation of rules, and those that concern the development of capabilities. The former include competition laws, intellectual property rights and product and labour market regulations. The latter refer to measures aimed at the provision and development of tangible assets such as infrastructure and finance and intangible assets such as knowledge and human capital.

The development of intangible assets is seen to be of particular importance in high-tech sectors (Bianchi and Labory 2006). Policies to enhance intangible asset creation include public investment in science and technology, education and training, and the promotion of linkages between firms,

universities and research institutes. There are close parallels here with recent work in the innovation and economic geography fields (Cooke and Morgan 1998; Etzkowitz and Leydesdorff 2000; Lundvall 2007).

The industrial policy literature also highlights the importance of promoting knowledge-based business formation and attracting and retaining foreign direct investment in knowledge intensive areas. Although typically not systematically addressed, it is implicit in this literature that these policies will be operationalised via publicly funded business support organisations as well as industry networks.

These trends and developments from the innovation, industrial policy and economic geography fields chime with current thinking in political science, in particular Cerny's work on the 'competition state' (Cerny 1997; Soederberg et al. 2005) and Jessop's (2002) concept of the 'Schumpeterian workfare state.'

Employment Scholars' Interest in the Employment and HR Effects of External Agencies and Institutions

A primary reference point for authors addressing the role of external agencies from a political economy of skills perspective is Finegold and Soskice's (1988) work on the British "low-skills equilibrium." On the basis of their review of the relationship between social, political and economic institutions and economic performance and skill outcomes in the UK, Finegold and Soskice (1988: 22) concluded that the British economy was trapped in a 'low skills equilibrium' in which 'the majority of enterprises staffed by poorly trained managers and workers produce low quality goods and services.' The central cause of this situation was identified as a 'self-reinforcing network of societal and state institutions which interact to stifle the demand for improvements in skill levels' (ibid.).

Specifically, the combination in Britain of, among other factors, short-term investment horizons on the part of senior company managers and financial institutions, a flexible labour market, poorly developed vocational training system and weak central employer and trade union organisations and systems of worker representation, was seen to lead to a predominant focus on the part of British firms on the production of low quality goods. In addition, the reluctance on the part of British governments to proactively shape the strategic performance and direction of British industry was given particular emphasis.

Finegold and Soskice (1988: 50) identified the importance and role of a supportive industrial policy in facilitating a move to a higher skills path:

The problem of moving companies from a low-skill to a high-skill equilibrium involves more than training and education. It requires changes in management style, R & D, finance, marketing etc., so training policy should be seen as *part of a wider industrial strategy*. (emphasis added).

Policies to change company approaches to training would therefore 'be one part of a coordinated strategy to help companies focus on marketing, product innovation, new technology, high-quality production and the provision of long-term finance' (ibid: 43). However the details of such policy interventions were seen to be outside the scope of their paper.

While not set out in a systematically comparative manner, the Finegold/Soskice thesis was clearly based on the authors' knowledge and experience of institutional structures and strategy, skills and training outcomes in continental European countries such as Germany, Denmark and Sweden, and in particular the fact that the existence of strong, dense institutional structures in these countries has been frequently highlighted as substantially accounting for 'better' skills and training outcomes.

For example, in Germany the 'dual' system of vocational training in which apprentices are trained both in firms and public training schools, despite facing significant challenges in recent years, constitutes by far the most popular educational/career path for young persons to follow and provides clear occupational structures and career pathways (Wagner, 1999). The content of occupational qualifications in the dual system is jointly determined by representatives of employers and trade unions, while responsibility for supervising and testing apprentices and approving companies to train rests with chambers of industry and commerce, membership of which is compulsory (Streeck et al. 1987; Culpepper, 1999a). In addition, works councils have statutory rights of codetermination with regard to apprenticeship training at the level of the firm, as well as in relation to the organisation of production more generally. Further, the dual system operates against a context of industry/regional collective agreements between employers and unions that set comparatively high wages and conditions of employment and also close, cooperative relationships between companies and banks that are prepared to sanction substantial, long-term investments (Streeck 1992; Lane 1989).

The combination of these institutional/environmental characteristics has been argued to prompt and facilitate the adoption by German businesses of strategies of 'diversified quality production', in the form of the production of customised, high-quality products for niche markets (Streeck, 1992); resulting in what Culpepper (1999) describes as the 'German high skills equilibrium.'

Here external agencies such as industry associations and chambers of commerce constitute an important part of a broader institutional complex. There are close similarities between the analysis of the above authors and Crouch et al's (1999) work on the political economy of skill creation in advanced industrialised economies, which highlights how intermediary organisations and networks in corporatist systems such as Germany underpin a broad distribution of intermediate level skills. In contrast, industry associations and inter-firm networks are much weaker in market dominated economies such as the US and UK, which results in an uneven distribution of skills, with a significant minority of highly skilled workers alongside a large number of lower skilled workers (ibid; Crouch et al 2001).

Lloyd's (1999) case study comparison of the British and French aerospace industries similarly highlights the potentially beneficial effects of strong institutional structures – in this case a robust state led vocational training system as well as stronger employment regulation – for company employment and skills policies.

Other Employment Research on the Role of External Agencies

As Lloyd and Payne (2002: 375-6) note, while many skills researchers have highlighted the potential of an industrial policy to enable countries like the UK to move to a higher skills path (Ashton and Green 1996; Brown and Lauder 1996; Keep and Mayhew 1999), with some exceptions (Finegold 1999; Wilson and Hogarth 2003) they have typically not elaborated in detail on what such a policy might look like or how it would work. The general assumption made is that the introduction/adoption of an industrial policy, for example in the form of government funding of research and development, might enable firms to move into higher value market niches, and thereby facilitating upskilling or a move to a 'high skills equilibrium.' Therefore while various authors have referred to the potential role of organisations such as business support agencies in facilitating the adoption of development focused employment and HR practices, this issue has typically not been considered or conceptualised in a systematic way. This section summarises the studies that do consider the role of these agencies to some extent.

Finegold's (1999) Research on 'High-skill Ecosystems'

Finegold (1999) provides statistics demonstrating the high proportion of employment in high-tech, high skill industry clusters such as software, computer equipment and healthcare technologies in the US state of California in the late 1990s. In addition to being highly skill-intensive, he outlines how these sectors paid well above the average wage for the state.

Drawing heavily on theoretical frameworks and research in the knowledge creation, innovation and industrial district literatures, Finegold outlines how the development of these high tech clusters, or what he terms 'high-skill ecosystems', was attributable to a number of factors, principally the supply of a large number of highly skilled technical graduates and a favourable institutional context in the form of the existence of science or technology parks, world class university research capabilities, the ready availability of venture capital and lightly regulated labour markets. In addition, the presence within the geographic space of the region of strong networks between firms, collective business institutions and individuals, was identified as being of central importance.

While co-existing in California alongside large numbers of low paid, low skill jobs and rising income inequalities, Finegold emphasises the wealth-creating potential of such ecosystems and advocates the redistribution of some of this wealth via the creation of 'living-wage' jobs for lower skilled workers in public and private service activities (cf. Crouch *et al* 1999). Rather than attempting a wholesale economic/institutional transformation, Finegold is of the view that the evidence from California suggests that UK policymakers should arguably focus on developing similar high skill ecosystems. He is of the opinion that these could possibly be replicated in the UK due to its many similarities with the US, in particular the existence in the UK of similarly world-class university research capabilities and the flexible/deregulated nature of its labour market. Indeed, as noted earlier, Finegold highlights what he sees to be existing, highly successful high skill ecosystems in the UK in the form of the biotechnology, computers and healthcare technology related clusters located around the research focused universities in Cambridge, Oxford and London.

Despite these positive examples, however, he highlights a number of difficulties and weaknesses in the UK context that serve to undermine the potential for the (further) successful development of these and other ecosystems. In this regard, he makes three general policy recommendations: firstly, that funding for basic research and pre-venture capital should be increased; secondly that the 'supply of entrepreneurial skills' should be expanded; and thirdly, that both regional and individual networks should be fostered.

This research is very insightful, however it relies on indirect as opposed to direct assessments of the impact of external agencies and institutions on firm activities. Payne's (2005, 2007) research on the Finnish Workforce Development Programme and Australian government efforts to promote 'skill ecosystems' also highlights the potential for firm engagement with external agencies and programmes to prompt transformation in work organisation systems and employment practices, although he notes that it is too early to make a proper evaluation of these programmes.

Wilson and Hogarth's (2003) research in the Food Processing & Business Hotels sectors

Wilson and Hogarth and colleagues (2003) undertook case study research in the food processing and business hotel sectors in the East and West Midlands in order to examine key trends and possibilities for change within low-skill, low-pay sectors such as these.

Skill and wage levels were generally low for most workers in both sectors, reflecting the labour-intensive nature of the activities undertaken. Notably, the vast majority of firms in both sectors were not seeking to move up-market, but were instead focused on remaining in their existing product market niches while simultaneously seeking improvements in operating efficiencies or undertaking

minor product/service development. While existing strategies were evidently sustainable in terms of the profit margins obtained, strong obstacles in the way of the achievement of major step-changes in strategies pursued were identified. In both sectors the high level of competition from other companies was of prime importance, while in food processing *demand side* constraints, most notably the downward pressure on processors' profit margins exerted by large retailers as well as strong continuing consumer demand for basic products, were also critical.

On the basis of these findings, Wilson and Hogarth (2003: 77-81) identify the need for the adoption of a 'whole business approach' to the skills problem, which would integrate government support for innovation and R & D investment with business strategies and also parallel support in the areas of organisational structures and people management systems. They argue for the Department of Trade and Industry (now DIUS) to take a lead role in strategically coordinating the cooperation and input of a number of relevant organisations, such as the Sector Skills Councils, Regional Development Agencies and Small Business Service. Again, however, more direct evidence on the impact of these organisations is not presented.

Employment Studies of Support Agencies and Industry Networks

Edwards et al (2002) researched the impact of the introduction of minimum wage and working time regulations on work organisation and management practices in the UK printing, clothing and hotel and catering sectors (with a focus on the West and East Midlands). Their analysis focuses on what they see as one of the principal determinants of the key finding of their empirical research - the absence of substantial 'shock' effects at firm level resulting from the implementation of the national minimum wage (and also the Working Time Regulations 1998) – namely, the limited and weak role of local business associations in the UK.

Although the majority of firms studied were members of industry or trade associations, these were in general little used to assist change management or business planning. Nevertheless, business associations are seen by Edwards et al (2002) to be in a position to assist firms in reforming work organisation systems and adopting efficient management practices in response to the introduction of regulatory changes. Illustrative evidence is outlined in the form of an overview of the activities of the Coventry Clothing Centre, which was set up by Coventry City Council in 1989 to support local clothing manufacturers, and which had evidently been successful in doing so and in both creating new and securing existing employment against the backdrop of general, industry-wide decline.

While emphasising the existence of some significant cross sectoral and regional diversity in the existence of effective business associations, Edwards et al (2002) make a general call for the economy-wide development of such supportive, intermediary institutions in the UK. They note that use of existing small firm support services such as Business Link is seen to be 'patchy', with the model adopted 'one of firms seeking specific pieces of advice rather than a more forward-looking approach which encourages firms to look beyond existing markets' (ibid: 18). In their view, 'a different approach would accept the value of an industrial policy', with new local associations or networks not likely to be a solution to issues such as weak technical expertise and backward working practices, 'unless they are embedded in an industrial policy' (ibid).

Edwards has subsequently undertaken research on small firms' relations with support agencies in the food manufacturing, ICT and media sectors of the West and East Midlands (Edwards et al 2010). This involved interviews at a total of 89 firms. The findings demonstrate how firm engagement with industry associations or publicly funded business support agencies was strongly dependent on a combination of sectoral and company context. The ICT firms researched had strong links with their customers and media firms strong links with two industry bodies, while the food manufacturing

companies had fewer links overall. Within these general patterns there were variations in external engagement linked to differences in market segment.

A statistical analysis of the relationship between a general measure of external engagement and impact on employee jobs, skills and training, highlighted few significant results. While for the ICT firms the presence of external links was associated with the extent of training and seeing the firm as a good place to develop skills, Edwards et al (2010: 554) conclude that overall external relationships in general 'were at the very best only weakly associated with employee resources.' Where firms had contact with government funded agencies such as Business Link or RDAs, perceptions of their effectiveness were largely negative. While not rejecting the potential role of publicly funded agencies in general and, in contrast, highlighting some ways in which they may have a positive impact, Edwards et al (2010: 561-562) emphasise the need for support mechanisms to have greater local and business context specificity.

In a survey of Californian workplaces, Erickson and Jacoby (2003) found firm participation in two or more formal networks (in the form of industry and cross industry associations or civic organisations) to be associated with more intensive adoption of high performance work practices and higher levels of training provision, than membership of one or no such networks. They also found more informal interactions with schools to be positively associated with the incidence of high performance work practices and staff training. Other research from the US also highlights the potential contribution of industry/regional networks. Parker and Rogers (1999) outline how the Wisconsin Regional Training Partnership involving unions, employers, public officials and education and training providers, has been successful in embedding an 'emerging norm of industrial governance' in which firms engage in benchmarking of their training efforts and 'administer their growing investments in human capital budgets' through joint labour-management committees.

Hoque and Bacon (2006) also examined the impact of network membership, focusing on its impact on training provision in SMEs in Great Britain. Their analysis of the 1998 Workplace Employee Relations Survey explored the significance for staff training of workplace membership of employers'/trade associations, chambers of commerce, the Federation of Small Businesses or 'some other similar body.' They found workplace membership of just one of these networks had a positive impact on training activity for managers/professionals only. In contrast, where there was membership of two networks, both non-managers and managers/professionals were more likely to have had two or more days training in the last 12 months. Like Erickson and Jacoby, Hoque and Bacon find a cumulative effect, as where workplaces were members of three networks it was considerably more likely that employees had two or more days training in the previous twelve months.

Employment related Findings from the Small Business Policy Literature

Evidence on the employment effects of firm engagement with business support agencies and networks from the small business policy literature appears to be rather limited. Mole et al (2009) found that firms benefiting from intensive support from Business Link were more likely to demonstrate significant employment growth than those obtaining other types of assistance. In contrast, other studies (e.g. Robson and Bennett 2000) find no relationship between SME engagement with government funded support agencies and employment growth (Robson and Bennett did however find trade and professional associations to have a highly significant influence on employment growth). Ramsden and Bennett's (2005) survey research found that a small majority of SMEs that had contact with publicly funded business advance agencies were of the view that this resulted in improved ability to manage and cope with problems, but their study did not contain findings of more direct relevance to employment and human resource management. Few studies in this area appear to have collected data on other dimensions of employment or HR practices.

Summary

While the above review highlights a range of reasons for the establishment and funding of public advice and support agencies, from an employment perspective the rationale appears to be twofold. First, the provision of financial and other forms of support may help businesses shift to higher value market segments and thereby underpin an upgrading of employment to a higher pay and skills trajectory. Second, engagement with external agencies may promote the adoption of best practice HR and training policies. There has however been relatively little research on the employment and HR effects of firm interaction with external agencies and there is therefore a strong need for additional research on this topic. In this regard, a key contribution of the research by Edwards et al (2010) is that the role and impact of external agencies may be heavily contingent on contextual influences, in particular sector and market segment.

The Pharmaceutical and Software Sector Surveys

This paper addresses the identified gap in the literature by analysing survey data obtained from the British and Irish software and pharmaceutical sectors in 2009 and 2010. Pharmaceuticals and software are both knowledge-intensive sectors, which are seen to be increasingly important to governments' attempts to increase levels of economic and social welfare (Brinkley 2008).

Surveys, which were in the main completed by senior managers, were distributed and reminders subsequently sent in October-November 2009 in the UK software sector, January-February 2010 for both the Irish sectors, and March-April 2010 for the UK pharmaceutical sector. In total 177 usable responses were obtained (121 from the UK and 56 from Ireland). The total response rate was 14%, with response rates to the individual surveys ranging from 9-19%.

The majority of respondents in both the UK and Ireland employed less than 50 people, but a substantial number employed larger numbers of people in the ranges 50-99, 100-499 and 500+. The latter groups are therefore likely to be somewhat overrepresented. In the UK, nearly three quarters of respondents were from the South East, London and the East of England. While these regions account for a large proportion of UK pharmaceutical and software sector activity, this means that they are overrepresented. This needs to be kept in mind in analysing the results.

In terms of activities, the UK respondents largely comprised pharmaceutical, biopharmaceutical, contract research/manufacturing, software development and IT services firms. The Irish companies in the main comprised primary/secondary pharmaceutical firms, software developers and IT service providers, with a small number of medical device manufacturers and diagnostic firms also. Three quarters of the UK companies were indigenous owned and a quarter foreign-owned, whereas 43% of the Irish firms were either branches or subsidiaries of foreign multinationals, reflecting the high relative importance of MNCs in these sectors of the Irish economy.

In terms of content, the survey asked about firms' engagement with a number of national and sector-specific organisations, including publicly funded business support organisations and development agencies, industry networks and research sector institutions. It also collected data on human resource management practices adopted and the incidence of 'innovative work behaviours' (IWBs) in these knowledge-intensive sectors. In our analysis we examine possible relationships between external engagement, statements about HR practices and the incidence of IWBs.

Propositions Tested

Mindful of the need to tailor data collection strategies to the particular research context (Edwards et al 2010), in this paper we distinguish between two broad types of external agencies or organisations that knowledge-intensive firms in the pharmaceutical and software sectors might be expected to interact with. First, General Business Support (GBS) agencies whose role is to provide general business advice and support, i.e. to provide firms with information about possible sources of

funding, relevant training, available facilities etc. Examples of general business support agencies would be Business Link or RDAs in the UK and Enterprise Ireland or County Enterprise Boards in Ireland. The list of general business support agencies respondents were asked about is outlined in table 1 below.

Table 1: List of General Business Support Organisations

UK	Ireland
Business Link Regional Development Agencies Regional Industry Networks UK Trade & Investment	Enterprise Ireland IDA Ireland Intertrade Ireland FAS County and City Enterprise Boards

In the UK, Business Link and Regional Development agencies are well known general business support agencies. RDAs in the various English regions also fund a number of regional industry networks. For example the South East Health Technology Alliance which is funded by the South East England Development Agency, or BioNow, a biotechnology network funded by the North West RDA. UK Trade and Investment is another high profile agency that assists firms to enter international markets.

In Ireland, Enterprise Ireland provides a range of business supports to indigenous firms, while IDA Ireland does the same for multinational companies. Intertrade Ireland is a new agency promoting cross-border trade links. FAS is Ireland’s training and development agency, while County and City Enterprise Boards are locally based support organisations. Each of the organisations on these lists provide general advice and support to firms of different sizes and stages of development, providing relevant information, facilitating access to expert sources of advice and training, distributing and assisting with grant application processes etc.

Second, we ask about contact with Knowledge Creating Organisations (KCOs) such as universities, research institutes or development agencies with a particular focus on research and development and innovation (table 2). As outlined above, it is recognised that these organisations play an increasingly important role in supporting innovation and competitiveness.

Table 2: List of Knowledge Creating Organisations

UK	Ireland
Universities/colleges/research institutes Technology Strategy Board Technology Strategy Board Knowledge Transfer Networks (KTNs) Innovation Advisory Service	Irish universities Irish Institutes of Technology Research Centres for Science, Engineering & Technology Science Foundation Ireland Softest Ireland (software sector only)

In the UK, the Technology Strategy Board has assumed an increasingly important role in the promotion of private sector research and development and innovation, disseminating government funding for competitive collaborative research projects in high technology areas. The TSB also manages a number of knowledge transfer networks in particular sectors (including networks of relevance to pharmaceuticals and ICT). The Innovation Advisory Service was/is a publicly funded programme operating in the South East of England and the West Midlands.

In Ireland respondents were asked separately about their contact with universities, institutes of technology and research centres, because of the fact that in the Irish FE/HE sector institutes of

technology play a more dominant and distinct role than they do in the UK. The objective therefore was to collect separate data on these organisations in the Irish context. Science Foundation Ireland can be seen as the Irish equivalent of the TSB. SFI funds a number of research centres for science, engineering and technology. Softest Ireland is a part state funded network focusing on the sharing of knowledge regarding software testing. The wording of the question about contact with both GBS and KCOs was as follows: 'Please describe the extent of your company's contact with the following organisations or agencies.' Possible responses were 'no contact', 'occasional', 'frequent' and 'very frequent.'

Theoretically we might expect that firms will benefit from contact with individual GBS or KCO organisations. However given the centrality of knowledge and innovation to the pharmaceutical and software sectors, we might expect levels of innovation and development-focused HR practices to be higher in firms engaging with both general business support and knowledge creating agencies. Following Erickson and Jacoby (2003) and Hoque and Bacon (2006), the more organisations (of either or both types) firms engage with, the stronger the performance effects may be.

These considerations lead to the following propositions to be tested:

P1: that firm contact with individual general business support (GBS) or knowledge-creating organisations (KCOs) will have beneficial impacts on performance and management practices (e.g. as manifested by level of R & D expenditure or adoption of innovative work behaviours)

P2: the greater the number of individual organisations of one type firms engage with the stronger the performance effects

P3: Firms having contact with both GBS and KC organisations will demonstrate superior outcomes than those only having contact with one type of organisation

P4: For firms having contact with both GBS and KC organisations, the greater the number of these contacted, the better the performance effects will be

Independent and Dependent Variables

The independent variable used for analysis is firm contact with the individual organisations listed above, categorised 1 = no contact, 2 = contact. In addition to examining contact with individual named organisations as an independent variable, we also examine the significance of the general nature of individual contacts, as well as the number and intensity of firm contact with external organisations. Specifically, in order to address propositions 1-4 above, individual organisations are assigned to the categories GBS (general business support agencies) and KCO (knowledge creating organisations). We create a variable consisting of the total number of these types of organisation firms have contact with, as well as the sum of these two variables and the overall nature of individual firm contact (e.g. none, GBS, KCO or both). In addition, because contact was measured on a four point scale comprising no contact/occasional/frequent/very frequent, we are able to construct a variable measuring the intensity of firm contact with external organisations. Intensity is calculated by combining the number of contacts with the frequency of the same to give overall measures of contact intensity with GBS, KCOs and both types of organisation.

While the survey collected data on levels of R & D expenditure and predicted levels of organic growth, in this paper for dependent variables we focus on HR policies and work practices. Respondents were asked to express their agreement or disagreement on a five point Likert scale with eight statements about HR policies and practices (see table 3). These statements enable information to be collected on the extent of adoption of development focused practices, the degree

to which employees have an input in decision making and the extent of knowledge sharing and innovation.

Possible relationships are explored by undertaking tests of association (independent samples t tests) and for correlation (Pearson Correlation) in SPSS. Significant results are highlighted at the $p < 0.1$, $p < 0.05$ and $p < 0.01$ levels.

Table 3: Statements about HR Practices

Statement
1. Most higher level positions here are filled by internal promotions
2. It is common for employees in this organisation to step back from day-to-day activities in order to undertake training and development
3. The performance of individual employees is formally appraised at least once a year
4. When assigning tasks managers in this company consider the potential for employees to develop their skills and abilities
5. Employees in this company have a lot of input in deciding what tasks or parts of tasks to do
6. Employees in this company have a lot of input in deciding how to go about doing their jobs (e.g. the methods to use etc)
7. Employees in this company frequently exchange information and learn from one another
8. Employees in this company are rewarded for new ideas or innovations

In addition, the survey asked about the proportion of employees engaging in five specific innovative work behaviours (table 4) as well as the number of days of formal training they receive on average each year.

Table 4: List of Innovative Work Behaviours

Proportion of employees that:
a. Exchange information with and learn from their fellow employees on a regular basis
b. Search out new work methods, techniques or instruments on a regular basis
c. Generate original solutions for problems on a regular basis
d. Evaluate the utility of original ideas on a regular basis
e. Introduce innovative ideas into the work organisation in a systematic way on a regular basis

Control variables

Note that in the analysis below we have not yet controlled for factors such as country, size, sector etc. This will be the next stage of the analysis.

Findings

Firm Contact with Individual General Business Support Organisations

Table 5 below outlines the extent of firm contact with individual general business support organisations. In the UK, 50% of firms had contact with the four GBS organisations listed, with over two thirds engaging with UKTI. Notably, involvement in regional industry networks appears to be high. In Ireland, there is very high levels of contact with Enterprise Ireland, the development agency for indigenous firms, as well as substantial contact with IDA Ireland, which primarily deals with multinationals. In addition, many firms engaged with FAS, the training and development agency. A significant minority had contact with the locally based Country and City Enterprise Boards and the new cross border agency Intertrade Ireland.

Table 5: Extent of Contact with Individual General Business Support Organisations

Country/Organisation	% Having Contact	Number of Respondents
UK Organisations		
Business Link	50	118
Regional Development Agencies	51	118
Regional Industry Networks	55	115
UK Trade & Investment	67	118
Irish Organisations		
Enterprise Ireland	74	54
IDA Ireland	41	51
Intertrade Ireland	29	31
FAS	48	48
County and City Enterprise Boards	25	51

Firm Contact with Individual Knowledge Creating Organisations

Table 6 summarises the extent of contact with individual knowledge creating organisations. The most striking finding for the UK is that nearly 90% of firms there reported contact with universities/colleges/research institutes. Given the knowledge-intensive nature of the pharmaceutical and software sectors, this is arguably not too surprising. Over a third of respondents reported contact with the TSB and nearly 40% with the TSB's knowledge transfer networks. Only a small proportion had contact with the Innovation Advisory Service, reflecting the limited regional coverage of this organisation.

In Ireland, there were high levels of contact with universities and institutes of technology. While a significant proportion of respondents engaged with Science Foundation Ireland and research centres for science, engineering and technology, these were in the minority.

Table 6: Extent of Contact with Individual Knowledge Creating Organisations

Country/Organisation	% Having Contact	Number of Respondents
UK Organisations		
Universities/colleges/research institutes	88	118
Technology Strategy Board	35	115
Technology Strategy Board Knowledge Transfer Networks (KTNs)	39	114
Innovation Advisory Service	14	116
Irish Organisations		
Irish universities	64	52
Irish Institutes of Technology	47	51
Research Centres for Science, Engineering & Technology	25	52
Science Foundation Ireland	18	51
Softest Ireland (software sector only)	12.5	32

Average Number of Organisations Contacted

On average, respondents reported having contact with 2.1 general business support agencies and 1.7 knowledge creating organisations, giving a total of 3.8 organisations or agencies in total. The UK firms on average had a greater number of external contacts than their Irish counterparts (3.9 compared to 3.5), with pharmaceutical firms reporting higher contact levels than software firms (4.5 compared to 3.2). These findings echo those from previous research identifying significant differences in external engagement on a sectoral basis (Edwards et al 2010).

Exploring the Impact of General Business Support Agencies on HR Practices and Innovative Work Behaviours

Here we examine possible relationships between companies' contact with external agencies and managers responses to statements about HR, work organisation and training practices as well as a question about the incidence of innovative work behaviours. The focus here is on the UK only. Table 7 presents the results of the analysis regarding contact with four UK general business support agencies, Business Link, RDAs, Regional Industry Networks and UK Trade and Investment.

As is evident from the table, contact with Business Link was not associated with managers' responses to the questions on HR, work organisation or training practices or about the incidence of innovative work behaviours to any significant extent. The relationship between firm activities in these areas and contact with RDAs was also evidently weak. However those reporting contact with RDAs were statistically more likely (at the $p < 0.1$ level) to report higher average days of formal training per employee and that employees were rewarded for new ideas or innovations. Contact with UK Trade and Investment also appears to matter little for management practices, with the only significant association here with a policy of rewarding employees for new ideas or innovations (again at the $p < 0.1$ level).

In contrast, firm contact with regional industry networks was associated with a range of HR and IWB outcomes. Interestingly, firms having less contact with RINs were more likely to report a policy of internal promotion, that it was common for employees to step back from day-to-day activities in order to undertake training and development, and that when assigning tasks managers consider the potential for employees to develop their skills and abilities. These results suggest that these firms may be using their involvement in industry networks as a source of new talent, and also that operationally these organizations are strongly focused on day-to-day activities.

On the other hand, firms reporting contact with regional industry networks were more likely to report that a higher proportion of their employees engaged in three of the five innovative work behaviors than those that did not, namely regular information exchange and learning between employees, regular generation of original solutions for problems, and the introduction of innovative ideas into the work organisation in a systematic way on a regular basis. Contact with RINs was therefore associated with higher incidence of innovative work behaviours on the part of employees.

<insert table 7 about here>

The Impact of Knowledge Creating Organisations on HR Practices and Innovative Work Behaviours

Table 8 below outlines the findings relating to possible relationships between the UK firms' contacts with knowledge creating organisations and their HR, work organisation and training practices as well as adoption of innovative work behaviours.

Contact with the Innovation Advisory Service has no discernible impact on the dependent variables. Contact with the TSB appears to have some impact, with companies have contact with the TSB more likely to reward employees for new ideas or innovations and to report higher proportions of employees evaluating the utility of innovative ideas on a regular basis and implementing the same on a regular basis (with each item significant at $p < 0.1$ level). In contrast, firms having contact with universities/colleges/research institutes and TSB Knowledge Transfer Networks were significantly more likely to report adoption of development focused and employee centred HR practices as well as higher proportions of employees engaging in innovative work behaviours (note it was not possible to analyse the latter in relation to universities etc).

<insert table 8 about here>

Impact of Multiple Contacts and Contacts at Higher Levels of Intensity

As outlined above there is evidence from previous research that firm contact with multiple instead of single organisations or networks is associated with more positive outcomes in terms of HR and training practices adopted. In this section we examine this issue in relation to our survey data.

Table 9 outlines how the greater the number of general business support organisations firms interacted with and the higher the intensity of this contact, the greater the agreement that employees are rewarded for new ideas and innovations and the higher the number of training days. In contrast, an increase in number and intensity of GBS contact was correlated with lower levels of agreement that higher level positions are filled via internal promotion.

In comparison, there was a strong correlation between the number and intensity of contact with knowledge creating organisations and agreement with the statements on HR practices. With the exception of internal promotion, for each of the HR practice statements, the higher the level of contact with KCOs the higher the level of agreement regarding the adoption of the development focused and employee friendly HR practices. It is notable that four of these correlations were significant at the $p < 0.01$ level.

<insert table 9 about here.

In contrast, the number and intensity of contacts with knowledge creating agencies was evidently not related to the proportion of employees engaging in innovative work behaviours (table 10). Nevertheless of interest here is that higher levels of contact intensity with general business support organisations were correlated with higher incidence of IWBs.

<insert table 10 about here>

Limitations, Analysis and Conclusion

It must be stressed that the above constitutes a first analysis of the survey results and there is a need to redo the analysis including relevant control variables etc. With this in mind, the results appear to generate some interesting findings. First, among the pharmaceutical and software firms studied, company contact with individual general business support organisations appears to have limited impact on HR practices and the incidence of innovative work behaviours. However higher level of contact intensity with these organisations appear to be correlated with greater adoption of development focused and employee centred HR practices and a higher incidence of certain innovative work behaviours.

In comparison, firm contact with knowledge creating organisations appears to have beneficial effects on a wide range of HR and IWB practices. In contrast, firm contact with multiple KCOs appears to make little difference to management practices and work behaviours.

It should however be noted that the nature of the data and analysis conducted mean that it is not possible to draw definitive conclusions regarding causality. In particular, the possibility that firms that adopt development focused HR practices are more likely than others to engage with external agencies must be considered, in which case contact with such agencies may not constitute a determining influence on the HR practices they adopt.

Overall however the paper provides important new evidence regarding the impact of publicly funded organisations on employment and HR practices, highlighting a number of important potential relationships and links, which should be the subject of further research.

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Tables

Table 7: Contact with UK General Business Support Agencies, HR Practices, Training Days & Innovative Work Behaviours

Statements about HR Policy	Business Link	RDA	Regional Industry Networks	UKTI
1. Most higher level positions here are filled by internal promotions	0.749	0.418	0.000***	0.196
It is common for employees in this organisation to step back from day-to-day activities in order to undertake training and development	0.628	0.808	0.017**	0.862
The performance of individual employees is formally appraised at least once a year	0.225	0.739	0.125	0.465
When assigning tasks managers in this company consider the potential for employees to develop their skills and abilities	0.661	0.580	0.059*	0.518
Employees in this company have a lot of input in deciding what tasks or parts of tasks to do	0.514	0.887	0.495	0.167
Employees in this company have a lot of input in deciding how to go about doing their jobs (e.g. the methods to use etc)	0.684	0.848	0.364	0.111
Employees in this company frequently exchange information and learn from one another	0.459	0.996	0.268	0.178
Employees in this company are rewarded for new ideas or innovations	0.416	0.064*	0.520	0.084*
Number of days of formal training employees on average receive per year	0.149	0.082*	0.219	0.133
Proportion of employees that:				
Exchange information with and learn from their fellow employees on a regular basis	0.907	0.815	0.029**	0.749
Search out new work methods, techniques or instruments on a regular basis	0.569	0.714	0.834	0.987
Generate original solutions for problems on a regular basis	0.350	0.514	0.071*	0.958
Evaluate the utility of original ideas on a regular basis	0.144	0.793	0.177	0.555
Introduce innovative ideas into the work organisation in a systematic way on a regular basis	0.204	0.775	0.001***	0.550

*Significant at $p < 0.1$ **Significant at $p < 0.05$ *** Significant at $p < 0.01$

Table 8: Contact with UK Knowledge Creating Organisations, HR Practices & Training Days

Statement about HR Policy	Innovation Advisory Service	Technology Strategy Board	Universities/colleges/research institutes	TSB Knowledge Transfer Networks
1. Most higher level positions here are filled by internal promotions	0.247	0.982	0.259	0.749
2. It is common for employees in this organisation to step back from day-to-day activities in order to undertake training and development	0.348	0.819	0.043**	0.078*
3. The performance of individual employees is formally appraised at least once a year	0.821	0.352	0.033**	0.296
4. When assigning tasks managers in this company consider the potential for employees to develop their skills and abilities	0.567	0.708	0.036**	0.026**
5. Employees in this company have a lot of input in deciding what tasks or parts of tasks to do	0.961	0.344	0.023**	0.016**
6. Employees in this company have a lot of input in deciding how to go about doing their jobs (e.g. the methods to use etc)	0.200	0.264	0.067*	0.619
7. Employees in this company frequently exchange information and learn from one another	0.895	0.336	0.018**	0.012**
8. Employees in this company are rewarded for new ideas or innovations	0.745	0.086*	0.014**	0.003***
Number of days of formal training employees on average receive per year	0.222	0.271	0.437	0.956
Proportion of employees that:				
Exchange information with and learn from their fellow employees on a regular basis	0.640	0.401	n.a.	0.014**
Search out new work methods, techniques or instruments on a regular basis	0.996	0.279	N,a,	0.072*
Generate original solutions for problems on a regular basis	0.804	0.134	n.a.	0.036**
Evaluate the utility of original ideas on a regular basis	0.969	0.096*	N,a,	0.030**
Introduce innovative ideas into the work organisation in a systematic way on a regular basis	0.116	0.096*	n.a	0.004***

*Significant at $p < 0.1$ **Significant at $p < 0.05$ *** Significant at $p < 0.01$

Table 9: Correlations between Number & Intensity of Contacts and Agreement with HR Practice Statements

	No. Contacts GBS	No. Contacts KCO	Total Contacts	Intensity Contact GBS	Intensity Contact KCO	Total Contact Intensity
Most higher level positions here are filled by internal promotions	-.141*	.072	-.036	-.163**	.072	-.040
It is common for employees in this organisation to step back from day-to-day activities in order to undertake training and development	-.058	.152***	.059	-.051	.173**	.083
The performance of individual employees is formally appraised at least once a year	-.003	.219***	.130*	-.025	.197***	.113
When assigning tasks managers in this company consider the potential for employees to develop their skills and abilities	.054	.232***	.170**	.034	.179**	.133*
Employees in this company have a lot of input in deciding what tasks or parts of tasks to do	.098	.226***	.191**	.096	.205***	.183**
Employees in this company have a lot of input in deciding how to go about doing their jobs (e.g. the methods to use etc)	.021	.141*	.097	.004	.164**	.107
Employees in this company frequently exchange information and learn from one another	.038	.238***	.165**	.043	.232***	.171**
Employees in this company are rewarded for new ideas or innovations	.209***	.333***	.318***	.160**	.306***	.282***
Please state how many days of formal training (both in-house and external) employees in your company receive on average each year:	.227***	.029	.146*	.239***	.002	.126

*. Correlation is significant at the 0.1 level (2-tailed). **. Correlation is significant at the 0.05 level (2-tailed).

***. Correlation is significant at the 0.01 level (2-tailed).

Table 10: Correlations between Number & Intensity of Contacts and Incidence of IWBs

Proportion of employees that:	No. Contacts GBS	No. Contacts KCO	Total Contacts	Intensity Contact GBS	Intensity Contact KCO	Total Contact Intensity
Exchange information with and learn from their fellow employees on a regular basis	.124	.043	.092	.149	.141	.170*
Search out new work methods, techniques or instruments on a regular basis	.084	.018	.055	.195**	.085	.154
Generate original solutions for problems on a regular basis	.151	.086	.133	.212**	.135	.197**
Evaluate the utility of original ideas on a regular basis	.135	.071	.115	.129	.139	.158*
Introduce innovative ideas into the work organisation in a systematic way on a regular basis	.193**	.054	.135	.215**	.086	.163*

*. Correlation is significant at the 0.1 level (2-tailed). **. Correlation is significant at the 0.05 level (2-tailed).