The Impact of High Performance Work Systems on Innovation Performance: A Study of Irish Companies

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Declaration

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Abstract

Over the past two decades, there has been an explosion in the volume of research examining the impact of HR on company performance. A central theme of this research has been how High Performance Work Systems (HPWS) impact on the competitiveness and innovative capabilities of firms. The literature reveals a theoretical divergence between the 'universalistic' perspective and others including the 'contingency' approach. This study undertook to examine these issues by looking at the impact of HPWS on innovation performance in a multi-industry sample of firms in Ireland.

A survey was conducted on a sample of 1000 larger firms, yielding complete responses from 132 firms. Data from respondent firms was based on responses from both the general manager and the human resource manager. The impact of HPWS on three measures of innovation performance (workforce innovation, innovation revenues and innovation competitiveness) was examined, and HPWS was found to have a significant impact on innovation performance when controlling for a range of variables. The moderating roles of R&D strategy, dynamic environment and organisational culture on HPWS were assessed. No moderating effect was found for workforce innovation or innovation revenues, but a clear moderating effect was found for innovation competitiveness. Finally, a series of significant differences were found in relation to innovation performance and HPWS levels between Irish-owned firms and US and European firms. Implications arising from the findings for researchers, practitioners and policy-makers are considered.

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Chapter 1
The Innovation Imperative for Firms and National Economies

1.1 Introduction

As firms operating in developed OECD economies increasingly participate in and compete in global markets for goods and traded services, the search for a deeper understanding of the sources of competitiveness becomes ever more urgent. For most competitive firms, innovation is now established as an essential aspect of their business strategy. The ability to generate revenues through the sale of new or improved goods or services is fast becoming a *sine qua non* for firms that seek to compete on a sustainable basis in global markets.

Equally, innovation is being prioritised as a policy concern for governments concerned with improving the international competitiveness of their economies. The developed economies of the OECD are increasingly exposed to globalised competition, not only with each other but with emerging economic powers including China, Brazil and India. As developed economies continue to lose ground in terms of cost competitiveness and seek instead to compete through higher value-added activities, emerging economies, too, are investing heavily in the innovation agenda. For example, the OECD (2007) reports that between 1996 and 2004 the proportion of high technology goods in the overall trade figures for 'BRIC' economies (Brazil, Russia, India and China) had doubled to 30

per cent – just one indication that innovation-based competition is fast becoming as globalised and as intense as cost-based competition.

This narrative of increasingly globalised, innovation-led competition between economies and between firms sets the context for this study of firms operating in Ireland. This study examines the factors associated with innovation in a sample of leading firms in Ireland, and explores in particular the internal management characteristics of firms that have high levels of innovation (focussing on three key aspects of innovation performance: workforce innovation, innovation revenues and innovation competitiveness). It is hoped that this study will contribute to our understanding of how systems for human resource management (HRM) and employee involvement contribute to innovation performance in firms. In particular, I hope to contribute to the ongoing debate about the nature of high performance work systems, and examine the question of whether there is 'one best way' of managing firms – or more specifically, the employees in these firms – to obtain superior innovation performance. Ultimately, I seek to relate the implications of this firm-level research enquiry back to the important challenges facing companies and policy makers in Ireland today.

The remainder of Chapter 1 considers the international and national context in which enterprise policy and innovation policy is being shaped, and establishes the relevance of firm-level factors in innovation policy. Chapter 2 presents a wide-ranging literature review which develops the analysis of firm-level factors -

particularly strategic human resource management and employee engagement – and how they influence innovation within firms. Chapter 3 describes the methodology of the research undertaken for this study. Chapter 4 presents the analysis of the data. Chapter 5 undertakes a discussion and of the findings, and finally, Chapter 6 sets out the conclusions of the study.

1.2 The Macro-economic context for the 'Innovation Agenda'

Recognising the impossibility of competing solely on the basis of cost, governments across the OECD are committed to pursuing industrial development strategies that focus on the promotion of high value-added industries as the driver of sustainable economic growth (OECD, 2007).

Within the EU and other major global economies, the 'innovation agenda' is seen as the key means of promoting the emergence of high value-added industries. The EU has set out an ambitious innovation strategy, including the "Innovation Union" initiative (European Commission, 2010), which sets out targets for economic growth through innovation activities. This strategy asks the pertinent question: "*As public deficits are reined in to repair public finances and as our labour force begins to shrink, what will be the basis for Europe's future competitiveness? How will we create new growth and jobs? How will we get Europe's economy back on track? The only answer is innovation, which is at the core of the Europe 2020 Strategy*" (EC 2010: 6).

For small, open economies such as Ireland's, the innovation agenda is of unquestionable importance. For a considerable time now, sustainable economic

growth in the Irish economy has been increasingly dependent on the performance of firms in the exporting sectors. Since 1970, the value of exports to the Irish economy has multiplied in real terms over twenty five times (CSO, 2010). In the five years between 2004 and 2009, exports of goods and services increased at an average annual rate of 3.8 per cent (Forfás, 2010). Sectors that are engaged in high levels of innovation activity are at the forefront of this growth: in 2008, the Chemicals and Pharmaceuticals sector contributed 31% to total exports (Forfás 2010), while innovative internationally-traded services are becoming an increasingly significant component of export growth. According to the Irish Exporters Association (IEA, 2011), the value of services exports grew from €20 billion in 2000 to €67 billion in 2010, and it is estimated that computer services alone contribute over 30 per cent to total services exports (Forfás 2010).

The challenges and crises that have beset the Irish economy since 2008 accentuate the importance of increasing export-led growth as a key element in future recovery. There is clear evidence that the established exporting sectors have been more resilient than other sectors in the economy. The CSO (2010) reports that the output of industry in Ireland only fell by 1.6% in constant prices between 2007 and 2009. This despite significant falls in output in sectors including Construction (-38%), Distribution, Transport and Communications (-12%), and Agriculture, Forestry and Fishing (-4%). In contrast, the output of the sectors dominated by multi-national companies (Reproduction of recorded

media, Chemicals, Computers, and Electrical machinery and equipment) increased by 13%.

Clearly, the contribution of innovative foreign-owned multi-national corporations to export-led growth during recent decades has been and will continue to be highly important to the Irish economy. Recent statistics highlight the increasing importance of innovation activity among foreign multinational firms in the Irish economy. The Industrial Development Authority (IDA) reports that an increasing proportion of the investments made by foreign multinationals in Ireland are for research, development and innovation projects, which in 2009 saw a year-on-year increase of almost 20% to €500 million in (IDA, 2009). Meanwhile, the Central Statistics Office (CSO) reports that 72% of business expenditure on research and development (BERD) in 2007 came from foreign multinational corporations, with the balance coming from Irish-owned firms. Expenditure on research, development and innovation in the Irish economy – led by investments in innovative activities by foreign multinational corporations - is continuing to grow at a rate of more than 15% per anum (DETI, 2009).

Notwithstanding the strong performance of foreign-owned firms in the Irish economy, public policy is increasingly concerned with the relative underperformance of Irish-owned firms. In response to the structural adjustment underway in the Irish economy (with the collapse of sectors such as construction, and the chronic stagnation in the domestic service economy), enterprise strategy is seeking to broaden the range of sectors that are engaged

in innovation-based export growth (Forfás, 2010a). Ireland's enterprise policy is increasingly focussed on diversifying the enterprise base and supporting Irish-owned small and medium enterprises (SMEs) to improve their export performance (Forfás, 2010a). Key to this is productivity improvement and innovation. However, there is strong empirical evidence to suggest that efforts to boost Irish exports are being impeded by a deficit in the capabilities of its smaller indigenous firms, which consistently lag behind larger foreign-owned multinational enterprises in terms of their management capability (NCPP, 2003; Forfás, 2005; Guthrie et al, 2006; Gunnigle et al, 2007). This study provides an opportunity to examine the relative innovation performance of Irish-owned and foreign-owned firms, and to consider the evidence for a management deficit in Irish firms.

1.3 Firm-level factors in economic competitiveness, productivity and innovation

While a wide range of factors can be used to explain differences in competitiveness, productivity and innovation levels between national economies, there is a growing recognition that firm-level factors are an essential explanatory factor in these differences.

For example, Black and Lynch (2004) explored the growth in productivity in the US economy from the latter half of the 1990s through to early 2003 and found that the turnaround in productivity levels could be explained in part by changes in workplace organisation. They found that part of this change is associated with the increased adoption of technology, while another part is associated with the

increasing adoption of participative work processes (including team-work, employee involvement in decision-making and re-engineering activities, and profit sharing), where an increasing number of non-managerial workers became involved in problem-solving and innovation. They found that firms that re-engineered their workplaces to incorporate more high performance practices experienced higher productivity.

At an industry sector level, MacDuffie (1995) demonstrated how the introduction of flexible production systems and just-in-time processes in the automobile manufacturing industry is dependent on new work practices. For example, moving to flexible working systems required significant decentralisation of production responsibilities from specialized inspectors and engineers to shop floor teams, a challenge which required upskilling, job demarcation, job rotation, and off-line problem-solving groups such as employee involvement groups or quality circles. Central to this workforce development is a high involvement/high commitment culture, where a strong psychological contract sees workers motivated to participate in a reciprocal relationship with employers. Similarly, Ichniowski et al (1997) found that steel plants that introduced innovative employment practices had higher productivity rates, and that these improvements were significantly higher where the practices were bundled as systems.

In the literature on national systems of innovation, Lundvall (2007) argues that firms are at the ‘core’ of national systems, and that the way in which firms

organize themselves is important for innovation and the impact of innovation on economic performance. Similarly, Arundel et al (2007) argue that, in order to understand national innovation systems, and the innovation performance of national economies, it is necessary to consider the role of the firm, and in particular the organisation of work. Their work explored national aggregate data on innovation across the EU Member States, and related this data to the organisation of work. They find that in nations with a tendency to organise work to support high levels of employee discretion in solving complex problems, firms tend to be more active in their in-house development of innovations. In contrast, they find that in countries where there is less employee discretion, and less scope for on-the-job learning and problem-solving, firms tend to engage in a supplier-dominated innovation strategy. They highlight the need to develop analytical concepts that can link workplace organization and the dynamics of innovation at the level of the firm.

Ramstad (2009) profiles the emerging policy focus on organisational innovation within a broad approach to innovation policy in countries such as Finland, Germany, Norway and Sweden. Public policy in Ireland also recognises the role that innovation at the level of the firm has in restoring competitiveness to the economy, with an emphasis on the need for indigenous firms to increase their level of innovation activity (Department of Enterprise Trade and Innovation, 2010; National Competitiveness Council, 2009). In fact, the National Competitiveness Council (2007) attributes some of the differential in economic growth rates between the US and the EU to the greater adoption of information

and communications technology in the US, enabled by greater absorptive capacity in firms.

Forfás (2005) highlights the need to develop absorptive capacity in firms, particularly those with low technological capacity by developing, *inter alia*, human resource capabilities, management of organisation and routines, and the development of learning processes within firms. Such organisational capabilities are not just issues for high-tech firms with a strong focus on R&D and science and technology innovation. Arundel *et al* (2008) report on an analysis of the 2007 EU *Innobarometer* survey, in which they focus on what they describe as 'neglected innovators' - those firms which do not engage in R&D innovation activity but are still involved in innovation such as technology adoption, incremental change, imitation and combining existing knowledge in new ways. These types of innovation are important paths towards developing a firm's innovation capabilities and depend on creative effort on the part of the firm's employees. The findings highlight that a higher proportion of non-R&D innovators are likely to be smaller firms (with less than 50 employees), active in low-technology service sectors. These 'neglected innovator' firms are more likely to focus on process innovation and to source ideas within the firm, to spend less on innovation than R&D innovators, and are relatively more dependent on the diffusion of knowledge from other firms.

The EU Commission (2007) highlights the importance of what it refers to as the 'human factor' for the development of innovation in services, where the quality

and innovativeness of services depends on the knowledge and skills of the people involved in the production process and in on-going service improvement. They describe the 'double challenge' for service innovation – well-trained, knowledgeable in-house expertise to develop innovative service concepts, and then, a broader workforce with the skills to implement these innovations. The workforce skills it identifies as important include communication skills, skills to interact with clients, creative thinking and problem solving, as well as an entrepreneurial mindset. It also highlights the importance of management skills for service innovation, and reflects on the perceived limitations of management skills, particularly for innovation management, among managers in European firms. It observes that the management of innovation in service industries in particular needs to be cognisant of organisational change and new working structures that can best enhance the skills, competences and motivation of service workers.

1.4 Conclusion

This chapter has highlighted the imperative for developed economies to improve productivity and innovation levels as a path to sustainable competitiveness and economic growth. The competitiveness challenge for national economies – in terms of improving productivity levels and innovation performance – must ultimately be addressed by firms operating within these economies. In the case of Ireland, economic growth is increasingly dependent on the competitiveness of the exporting sectors, and the critical challenge for public policy is to increase

innovation performance among exporting firms, and to increase the range of firms and sectors that are successfully exporting.

While this challenge arises across all sectors of the economy, there is clear evidence of particular challenges for smaller, indigenous firms. The chapter reveals a clear link between high-level policies in relation to productivity and innovation, and firm-level imperatives regarding human resource development, innovation and knowledge management.

The next chapter describes in more detail the literature relating to the internal characteristics of the firm – the management systems and the way in which employees are managed – and considers some of the contending theoretical perspectives regarding the impact of these factors on firms' levels of productivity and innovation.

Chapter 2
Literature review

2.1 Introduction

The previous chapter established the importance of innovation to the competitiveness of national economies, and briefly identified some of the firm-level factors that are considered to impact on the ability of firms to improve their innovation levels.

This chapter aims to introduce the key topics of concern to this study by reviewing the extant literature and identifying key issues of debate. The chapter presents a review of the literature on innovation and examines the role of human resource management (HRM) in the innovation capacity of enterprises. It seeks to build towards a rationale for the hypotheses that are tested in this study. Section 2.2 examines the nature of innovation, the characteristics of innovative firms and the theoretical perspectives and empirical evidence regarding the role of employees – and the enabling role of HRM - in achieving competitive advantage through innovation. Section 2.3 examines the literature regarding the HRM – performance link in more detail, and describes the challenge facing researchers in unlocking the HRM "black box" to develop a credible and robust theoretical account of how HRM impacts on firm performance. Finally, Section 2.4 examines some of the most significant theoretical perspectives and debates on the HRM – performance link.

2.2 Innovation and the characteristics of innovative firms

2.2.1 Defining Innovation

The Oslo Manual (3rd Edition, OECD/Eurostat, 2005) defines innovation as the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations. This is a broad use of the term innovation, and includes the following aspects:

- **Product innovation**, described as the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.

- **Process innovation**, described as the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.

- **Marketing innovation**, described as the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.

- **Organisational innovation**, described as the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations.

It is this broad interpretation of innovation, as described in the Oslo Manual, which informs innovation policy across EU member states, including Ireland.

2.2.2 Measuring Innovation

Given the myriad definitions of innovation in use, it is unsurprising that the research and policy-making communities have a broad range of measures of innovation. From a policy perspective, one commonly-used measure of innovation at the level of the firm is an input measure – the spend on research, development and innovation. While this measure is useful in comparing investment levels by firms engaged in R&D activities, it is increasingly recognised as an inadequate measure of firms' innovation performance. Quantitative measures relating to innovation performance, or innovation outcomes, focus on the capacity of firms to generate revenues from new or significantly-improved goods or services. Examples of such measures include *workforce innovation* (the per-capita level of revenues generated from innovative goods or services) and *innovation-related revenues* (the proportion of total revenues derived from innovative goods or services), both derive from verifiable data on revenues generated during a specified time period.

2.2.3 Organisational aspects of innovative firms

There is an extensive literature on innovation management which describes the characteristics of successful innovative firms. In describing the internal organisational characteristics of successful innovators, Lundvall (2007) describes the DISKO project, a large-scale survey conducted in 1996 on a sample of 2000 firms in Denmark. This survey found that characteristics associated with 'learning organisations', such as interdivisional teams, job rotation, autonomy in work, and investment in training, seemed to have a significant impact on innovation. Jensen et al (2007) found that firms that operated science and technology innovation in conjunction with experience-based innovation were significantly more likely to be engaged in product or service innovation. They conclude that firms that focus exclusively on developing their science and technology capabilities as their strategy for innovation are foregoing important capabilities in the workforce.

In an extensive review of data on innovative firms, Barczak et al (2009) highlight that, while formal processes for new product development are now the norm, the areas in need of improved management within firms include idea management, project leadership and training, cross-functional training and team communication support, and innovation support and leadership by management. They find that the best firms have an innovation strategy that is successfully integrated across all the levels of the firm, provide better support to their staff and team communications, conduct extensive experimentation, and

use numerous kinds of new methods and techniques to support new product development.

2.2.4 The Dynamic Capabilities perspective on Innovative Firms

Taking a different approach to innovation and competitive advantage, Teece (2007) describes the role of dynamic capabilities in competitive knowledge-based firms, explaining dynamic capabilities as those capabilities that a firm requires to adapt to changing customer and technological opportunities, to shape the ecosystem it occupies, develop new products and processes, and design and implement viable business models. Dynamic capabilities encompass a broad range of processes through which firms evolve, adapt and survive (Bognor and Bansall, 2007). In competitive, knowledge-based firms, competitive advantage ensues from the firm's ownership of scarce, relevant and difficult-to-imitate assets, particularly know-how. Teece (2007) argues that sustainable competitive advantage depends on those dynamic capabilities which can ensure knowledge assets are protected and developed. He describes work organisation and organisational processes as "micro-foundational elements" of the dynamic capabilities within the firm. Sustainable dynamic capabilities require firms to shift from centralized, hierarchical management structures to decentralized models that bring the management closer to the customer. He identifies the organisational challenges that are associated with the development of dynamic capabilities in firms, and describes the role of leadership in communicating goals, values and expectations and in motivating employees, such that high

levels of organisational identification and commitment can dramatically augment enterprise performance.

Bessant (2005) distinguishes between the dynamic capabilities required of firms to implement steady-state (or incremental) innovation and discontinuous (or radical / disruptive) innovation, and wonders whether organisations have the capability to develop ambidextrous innovation management capabilities, or whether they are typically constrained by the difficulties of working within established routines and organisational frameworks, and whether the status-quo of the organisation in terms of its established learning and innovation management styles determines the parameters of its engagement with steady-state or discontinuous innovation. Teece (2007) suggests that path-dependency is a feature of firms that have enjoyed commercial success, and given that changing routines is costly, the prospect of departure from routines is a source of heightened anxiety within the firm, unless the culture is conditioned to accept high levels of internal change. Such constraints would clearly apply to the innovation management style of firms, unless, as Bessant (2005) suggests, the firm can implement sophisticated measures to allow two innovation management styles (steady-state and discontinuous) to be implemented in parallel.

2.2.5 Absorptive Capacity in Innovative Firms

Another important perspective holds that innovation management capabilities are a function of firms' absorptive capacity (Bessant, 2005; Adams et al, 2006;

Zahra and George, 2002). Cohen and Levinthal (1990: 128) define absorptive capacity as a firm's "ability to recognize the value of new information, assimilate it, and apply it to commercial ends". Minbaeva et al (2003) explored the transfer of knowledge and the absorptive capacity of subsidiary enterprises in multinational corporations (MNCs). They found that MNCs have a higher level of knowledge transfer where the absorptive capacity of the subsidiary enterprise is higher. They found that both employee ability and motivation are needed to facilitate the transfer of knowledge from other parts of MNCs. Their research reiterates the connection between HRM and knowledge-based sources of competitive advantage, arguing that firms can improve their absorptive capacity by investing in HRM practices targeting employees' abilities (training and performance appraisal) and employees' motivation (internal communication and performance-based compensation). This proposition that HRM can impact on firms' absorptive capacity resonates with the distinction by Zahra and George (2002) between firms' absorptive capacity potential and their realised absorptive capacity, which depends on internal capabilities including HRM systems.

Thus, there is an extensive literature that recognises the importance of employees – and the HRM systems to which they are subject – in the management of innovation in its broad sense. The next section examines this in some more detail, and considers the impact of HRM on innovation performance.

2.3 HRM and Firm Performance

2.3.1 The HRM Lexicon

The central concern of this study is the role played by HRM in the innovation performance of firms. It is useful first to address the fact that there is a wide and overlapping lexicon in relation to human resource management. Terminology includes, but is not limited to, "human resource management" (HRM); strategic human resource management (SHRM); "high-performance work systems" (HPWS); "high-performance work practices" (HPWP); and "high-involvement work systems" (HIWS). For some researchers, these terms are used interchangeably, while for others they represent important distinctions that emphasise or de-emphasise particular features of HRM such as employee involvement.

There is no universally agreed meaning for the term high performance work system (HPWS) due to its wide and varied usage (Boxall, 2003; Boxall and Macky 2009). Despite this, a HPWS can be described as a specific combination of HRM practices, work structures and processes which maximise employee knowledge, skills, commitment and flexibility (Nadler et al, 1997). Appelbaum et al (2000) describe the central feature of HPWS as organising the work process so that non-managerial employees have the opportunity to contribute discretionary effort. The HPWS emphasises decentralisation of the gathering and processing of information to non-managerial employees, enabling problem-solving and decision-making at the location closest to the problem – the principle of subsidiarity. It is the implementation of this principle, rather than the specific

arrangements regarding what type of forum that the behaviour takes place in, that is important.

In this study, I use the term "HRM" as a generic description of the human resource management system within a firm. I refer to "HR practices" as the individual practices that collectively constitute a firm's HRM system. I refer to high performance work systems (HPWS) in describing the contended concept of an optimal bundle of HR practices associated with firm performance.

2.3.2 Early Findings regarding the HRM – Performance link

The study of the link between HRM and firm performance has generated a significant volume of empirical research, and the topic remains a rich source of dispute and contention regarding the empirical evidence and theoretical interpretation of the association.

Wright and McMahan (1992) defined strategic human resource management (SHRM) as 'the pattern of planned human resource deployments and activities intended to enable an organization to achieve its goals". Pioneering empirical research including Lawler et al (1992), Arthur (1994), Huselid (1995) and MacDuffie (1995) elaborated on the associations between HRM practices and firm outcomes.

Lawler et al (1992) differentiated between those Fortune 1000 companies that use 'high performance' work practices to a limited extent and those that use these practices extensively, and found that firms making extensive use of employee involvement practices reported significantly higher financial success

than organizations making limited use of the high performance practices. Arthur (1994) developed a typology of HRM based on two distinct systems, which he labelled 'control' and 'commitment' approaches to shaping employee behaviours and attitudes at work. Using this typology in the context of steel mills, he found that 'commitment' approaches, which forge psychological links between employee goals and organisational goals, were associated with higher productivity, lower scrap rates, and lower employee turnover than those with control systems. MacDuffie (1995) examined the link between HRM systems and firm performance across 62 car assembly plants, and found that flexible production plants with team-based work systems and high-commitment HR practices consistently outperformed mass production plants.

In what is considered a seminal paper on the impact of HRM, Huselid (1995) examined the association between what he termed 'high performance work practices' (HPWP) and firm performance. Using a large sample of firms, his main finding was that greater use of these types of HR practices was associated with decreased employee turnover and higher levels of productivity (measured as sales per employee), and improved corporate performance (in terms of profitability and market value).

2.3.3 Bundles of Practices

One of the key propositions relating to HRM and firm performance to emerge from Huselid (1995) was the importance of a systems approach to HRM, whereby complementary bundles of HR practices are more strongly associated

with performance outcomes than individual practices. Key features of HRM bundles are typically thought to include team working, job flexibility, the extensive use of communication and various employee involvement initiatives (Godard and Delaney, 2000; Wood, 1999).

In a similar vein to Huselid (1995), Milgrom and Roberts (1995) argued that the impact of a system of human resource practices will be greater than the sum of its parts due to the synergistic effects of bundling practices together. MacDuffie (1995) highlighted the importance of bundles of employment practices by showing that car assembly plants that combined teamwork, job rotation and employee involvement had higher levels of labour productivity and lower levels of product defects. Ichniowski et al (1997) found that, while steel plants that introduced innovative employment practices had higher productivity rates, these were significantly higher where the practices were bundled together as ''systems''. More recently, Subramony (2009) provides a meta-analysis of the impact of HRM bundles on firm performance, examining the impact of three distinct bundles - empowerment, motivation, and skill-enhancing – on business outcomes including employee retention, operating performance, financial performance and overall performance ratings. The analysis shows that HRM bundles have magnitudes of effect significantly larger than the individual practice components which constitute the bundles.

This emphasis on optimal, synergistic bundles of HRM practices has been a central and contentious feature of research into the HRM – performance link, and informs the enquiry that the present study is concerned with.

2.3.4 Contemporary Research Findings

Following the pioneering studies in the first half of the 1990s, the past two decades have seen a significant growth in empirical research examining the association between HRM and performance (Combs et al, 2006; Subramony, 2009). The literature draws on a range of types of empirical evidence, for example Sung and Ashton (2005) provide 10 case studies of UK firms; Appelbaum et al (2000) provide an analysis of HRM in the context of specific industry sectors (steel, apparel, and medical electronics and imaging plants); Bardi and Bertini (2005) look at the regional context in a study of the Emilia-Romagna region of Italy; while authors such as Black and Lynch (2001) provide statistical analyses of cross-sectional and longitudinal data from economy-wide or sector-specific research.

Though there are multiple theoretical perspectives underpinning this research (see Guest, 1997; Fleetwood and Hesketh, 2008 for descriptions of the range of perspectives), the central focus has been on exploring the role of employees as a source of competitive advantage, and developing explanatory models of the management practices and new forms of work organisation that are associated with higher performance levels in the firm (Boselie et al 2009; Hoobler and Brown Johnson, 2004; Becker and Huselid, 1998).

The study by Appelbaum *et al* (2000) took a comprehensive multi-method approach to investigating the effects of HPWS on firms' competitive advantage in 44 plants across three industries – steel, apparel, and medical electronics and imaging. Their study specifically explored how firms with extensive use of HPWS reduce costs, improve plant performance and improve employee outcomes. Their multi-level research design included site visits, observational studies, and extensive interviews with managers, union representatives and staff, together with data in relation to plant performance and a survey of more than 4000 employees. The evidence showed that companies were more successful when managers shared knowledge and power with front-line workers and where workers assumed increased responsibility and autonomy.

Recent meta-analyses (e.g. Combs *et al*, 2006; Subramony, 2009) illustrate the voluminous body of research that has accumulated, much of which has focussed on examining the association between HRM practices and performance. Hoobler and Brown Johnson (2004) calculated that 20% of the 467 studies that they reviewed as a cross-section of HR publications during the period 1994 – 2001 were focused on the theme of strategic HRM and organisational or individual performance. Likewise, Boselie et al (2009) and Becker and Huselid (1998) confirm the vast interest in the issues. Taking a critical view of this body of literature, Fleetwood and Hesketh (2006) describe the literature as being 'awash' with studies of the association between HRM and performance.

Combs *et al* (2006) conclude from their analysis of 92 studies that report statistical findings that there is an overall effect by HRM on performance. Wall and Wood (2005) find that 19 of 25 studies they reviewed report some statistically positive relationship between HRM and performance measures, while six failed to find any such relationship. A minority of studies based on statistical analyses find no association or a negative association (Wood, 1999; Capelli and Neumark, 1999). Yet, despite the tendency of research to support the existence of an HRM – performance link, there is little agreement about the theoretical basis for these findings.

2.4 Key Debates in the literature

Becker and Huselid (2006) argue that, while HRM research can explain what HR practices and HPWS systems produce value, the underlying theory remains deficient as it has yet to articulate the mechanisms by which an organisation's human resources are a source of competitive advantage. They posit that the "black box" problem could be explained in terms of the role of HRM in implementing firm strategy, and that more attention should be paid to the "black box" between HR architecture and firm performance, and less emphasis on the "black box" within HR architecture.

There are many other perspectives on the variables that might unlock the "black box" (e.g. Coats, 2006, Jones *et al*, 2007; Wilkinson *et al*, 2004; Dundon and Gollan, 2007; Dundon *et al*, 2003; Flood *et al,* 2001; Rainbird *et al*, 2003) such as employee empowerment, employee voice, partnership climate and the role of

the psychological contract on discretionary and high-performance behaviour. Others still (e.g. Delaney and Godard, 2001; Godard, 2004; Liu *et al*, 2009; Datta *et al* 2005; Verma, 2005) explore the interaction between firm unionisation and HPWS.

Guthrie *et al* (2009), Wood and Wall (2007) and Boselie *et al* (2009) argue that the HRM-performance literature has tended to result in the marginalisation of certain research concerns about employee involvement as it impacts on firm performance. Wood and Wall (2007) decry the fact that, despite their centrality to concepts of high involvement and high commitment management, systems for employee involvement, work enrichment and voice have been de-emphasized or indeed ignored in much of the work. Adams et al (2006) observe that the innovation management research under-emphasises the issues of organisation and culture, although they point towards the better treatment of these topics in the organisational behaviour literature. Bessant (2005) highlights that a supporting organisational context is a critical part of innovation management. Such a context is important for the emergence and deployment of creative ideas, both for incremental or 'steady-state' innovation and discontinuous or radical innovation. Bessant includes organisational structures, work organization arrangements, training and development, reward and recognition systems, and communications arrangements as important inputs to organisational context, the primary purpose being to enable a learning organisation with shared problem identification and solving to operate.

Certainly, there is empirical evidence that organisational climate is an important consideration in the innovative or productive capacity of firms. Appelbaum *et al* (2000) found that companies were more successful when managers shared knowledge and power with front-line workers and where workers assumed increased responsibility and autonomy. Wilkinson et al (2004) describe an analysis of the perceived benefits of employee voice mechanisms in 18 firms located in the UK or Ireland that showed a widespread consensus that employee voice acted as the gateway to a more open and constructive organisational climate, which was seen as part of a broader HR strategy that cumulatively created the conditions for improved performance to materialise. Their case study analysis showed that people management systems and processes were improved consequent to the deepening of employee voice mechanisms, whereby the greater willingness of staff to challenge issues and decisions had an educative impact on management. Black and Lynch (2004) suggest that the marked improvements in productivity growth in the US economy from the latter half of the 1990s through to early 2003 can be partially explained by changes in workplace organisation including the increased adoption of technology and the increased adoption of participative work processes, whereby an increasing number of non-managerial workers are involved in problem-solving and innovation. They find that employee voice has a larger positive effect on productivity when it is done in the context of unionised establishments.

2.4.1 Contending Theoretical Perspectives on the HRM – performance link

Reviewing the state of the art arising from "fifteen years of intensive research", Boselie *et al* (2009) highlight some fundamental theoretical and cultural tensions that underlie the research literature regarding the HRM – performance link. They characterise these tensions in terms of a unitarist versus pluralist perspective on the role of employees in firm competitiveness. The unitarist approach considers competitiveness and high performance primarily from the perspective of employer and shareholder value, while the pluralist approach considers a broader stakeholder perspective that also includes employee value. Boselie *et al* suggest that the majority of HRM research is built on the unitarist perspective, but that a more balanced HRM approach takes into consideration both the economic and the human side of organizing.

Among proponents of the HRM – performance link, the main extant debate relates to whether the effect is universal across all circumstances, whether it is contingent on a small number of key variables, or whether it is such a dynamic and organic effect that therefore cannot be captured in any linear or multilinear account of the relationship.

Boxall and Purcell (2000) describe the basic struggle in the research and theoretical literature as being between two normative models of labour management – the 'best fit' school which argues that HR strategy will be most effective when integrated appropriately with its specific organisational and environmental context; and the 'universalistic' model which argues that a 'best

practice' approach exists – irrespective of the circumstances in which the firm operates – the adoption of which will invariably benefit firms. The 'best fit' model proposes a range of criteria which should inform the HR strategist's approach to HR systems design. The most common 'fit' criteria is firm strategy: whether firms are pursuing one of the three generic competitive strategies defined by Porter (1985) – cost-based, differentiation or focus.

Delery and Doty (1996) describe the debate on the link between HRM and performance in terms of a fundamental theoretical distinction between three strands of research. They describe the *universalistic*, *contingency* and *configurational* approaches as alternative bases for interpreting empirical data. More recently, Martin-Alcazar *et al* (2005) further developed this theoretical framework to incorporate the *contextual* approach, and propose an integrative framework that allows for the merits within all four approaches to be exploited in future research. The following sections explore these issues further, as they provide the basis for a number of the hypotheses examined in this study.

2.4.2 Universalistic approach

The universalistic approach to HRM, advanced by Pfeffer (1994), Huselid (1995) and others, is based on the proposition that there exists a generally positive relationship between HRM "best-practice" and firm performance, which is operationalised by high-performance work systems (HPWS) that are additive and enhance performance irrespective of context.

The universalistic approach starts from the premise that a linear relationship exists between variables that can be extended to the entire population (Delery and Doty. 1996). For example, Pfeffer (1994) proposes a list of 16 specific HR practices which he suggests will result in higher productivity and profit across all types of organisation. Other proponents of the universalistic approach propose variants of a list of "key practices" that are contained in a HPWS. Martin-Alcazar *et al* (2005) identify some of the key aspects of the universalistic approach to HRM as including practices that reinforce employees' abilities, such as variable compensation, certain recruitment and selection methods, comprehensive training, and performance appraisal, although they note a more recent inclusion of aspects of workforce commitment and participation, problem-solving, teamwork, etc.

Wall and Wood (2005) claim that, in practice, much empirical work adopts a universalistic approach. Martin-Alcazar *et al* (2005) describe how the application of a rigorous deductive logic in the universalistic approach leads researchers to a comparatively superior level of statistical significance, but a comparative weakness in its explanatory power (c.f. Fleetwood and Hesketh, 2008). In other words, those who are sceptical of the universalistic account of HRM observe a tendency in the universalistic research to rely on apparently sophisticated and somewhat inscrutable statistical analyses, while there is a concurrent weakness in the theoretical account of the potential role of crucial variables, constructs and relationships.

2.4.3 Contingency approach

Proponents of the contingency approach see the relationship between firms' HRM systems and performance as variable, depending on the effect of third variables, or contingency variables (Martin-Alcazar *et al*, 2005). Contingency variables, for example company size, company age, technology, degree of unionization, industrial sector, ownership (Paauwe, 2004) moderate the effect of the independent variable (HPWS or HRM bundles) on the dependent variable (firm performance). Put another way, the contingency approach allows for potentially complex interactions between variables, and allows researchers to explore the HRM – performance link with regard to the differing environments and contexts in which firms operate.

One contingency, or moderator, that has been examined extensively is firm strategy. Miles and Snow (1984) developed a typology of strategy (*Defenders*, *Prospectors*, *Analyzers*, and *Reactors*) that related particular HR sets to firms' product/market strategies. Similarly, Schuler and Jackson (1987) described the different HR strategies (innovation, quality improvement, and cost reduction) that they found in firms at different stages of the growth cycle (operating strategies of either 'dynamic growth', 'extract profit' or 'turnaround'). Datta *et al*. (2005) found, in addition to generally positive effects of HPWS practices on productivity, significant effects associated with industry characteristics on labour productivity.

Selvarajan *et al*. (2007) also adopt the contingency approach to describe how HR systems might be influenced by a firm's strategy, which in turn is dependent on environmental factors. They explore the proposition that firms operating in more uncertain operating environments, characterised by rapid changes in technology, products/services, or consumer needs, may need to empower their employees to a greater extent than firms operating in a stable environment do. Their analysis found support for the mediating roles of human capital philosophy and innovativeness in the relationships between firm strategy, industry environment and firm performance. This supports the proposition advanced by Guthrie *et al*. (2002) that firms competing based on unique or differentiated products or services may require a broader range of skills and higher commitment on the part its employees to achieve superior organisational performance. Their research found that use of high involvement work practices in a sample of firms in New Zealand was positively associated with performance in firms competing on the basis of differentiation but no relationship was found in firms pursuing a strategy of cost leadership.

Sung and Ashton (2005) found evidence of contingency effects on the adoption of HPWS bundles, whereby firms adopted different bundles of HPWS practices depending on the industry sector they were operating in. Flood et al (2005) and Gunnigle (2007) highlight the differences between MNCs and indigenous firms in Ireland in their adoption of strategic HRM/HPWS bundles, suggesting a potential contingency factor.

Martin-Alcazar *et al* describe the contingency approach as being more robust in terms of explanatory power, but its findings are not as strong in terms of statistical significance as those in the universalistic approach. Nevertheless, it persists with a deductive logic and the use of quantitative techniques.

2.4.4 Configurational and Contextual approaches

The configurational approach defines the HRM system as a multi-dimensional set of elements that can be combined in different ways to achieve an infinite number of possible configurations (Martin-Alcazar *et al*, 2005). Delery and Doty (1996) distinguish configurational approaches from universalistic and contingency approaches in that they are usually based on typologies of ideal types, are guided by the holistic principle of inquiry, and adopt the systems assumption of equifinality - meaning that the possibility exists of achieving the same end point using alternative configurations of HRM policies. It allows for the HRM system to be examined as an interactive, complex system, and utilises a broader range of statistical tools such as factor/cluster analysis.

The contextual approach provides researchers with the possibility of reconsidering the relationship between the HRM system and the environment (both internal and external to the firm) in which the HRM system is operating. It provides for a more socio-psychological understanding of the firm as an open system, or conglomerate of different actors, rather than the more functionalist systems perspective of the other approaches. Paauwe (2004) likens the emergence of the contextual approach to HRM to the paradigm shift that has

taken place in strategic management, where the 'outside-in' perspective of the 1980s has been added to by the 'inside-out' perspective of the firm, such as the 'dynamic capabilities' approach of Teece (1997). According to the contextual approach, context both conditions and is conditioned by the HRM system. In other words, the HRM – performance link is not a linear relationship that implies causality, but is an iterative, interdependent and organic relationship that is in a constant state of flux and development. This approach facilitates consideration of multiple stakeholders, and is much closer to having an industrial relations scope (Martin-Alcazar *et al*, 2005). The statistical techniques are typically less sophisticated than other approaches, but are used in a different way, to support theoretically-grounded arguments regarding the link between HRM and performance.

2.4.5 Towards an integrative approach

There is a growing sense that there is an unresolved deficit in terms of explaining the mechanisms by which HRM impacts on firm performance – Gerhart (2005) describes the problem as the "black box" phenomenon. As the research community, HRM practitioners and policy-makers seek a more sophisticated understanding of the relationship between HRM/HPWS and organisational performance, the research challenges become more significant. Martin-Alcazar *et al* (2005) describe the complexity of this field of research, and declare that, given that the human being is the central element of study, it requires multidisciplinary, multi-paradigmatic and multidimensional analytical frameworks. They propose a methodology for integrating the universalistic,

contingency, configurational and contextual approaches to HRM research, which recognises the strengths and limitations of each approach.

Yet, as the field of research currently stands, the significant volume of empirical studies tend to confirm the critique that research in this area pursues too narrow a line of enquiry, characterised by a very limited range of methodological and analytical approaches (e.g. Hoobler and Brown Johnson, 2004; Martin-Alcazar *et al*, 2005). Notwithstanding the apparent statistical power and growing volume of published evidence, the critique argues that the largely positivistic body of research remains unconvincing in its contribution to our theoretical insights into the role of HR practices in firm performance.

In seeking to explain the narrowness of research methods, Wall and Wood (2005) suggest that more extensive and collaborative research models are required to engage in the type of research that will provide the quality of empirical data that is required to resolve some of the core debates, and argue for a 'big science project' requiring extensive institutional collaboration between academics and practitioners. Wood and Wall (2007) suggest that refocusing research on examining diverse and potentially contending theoretical perspectives will enable researchers to become less dependent on a model that is based on links between performance and a 'generic and theoretically hybrid form of HRM'. Wall and Wood (2005) and Wood and Wall (2007) call for a series of improvements to the research, suggesting, *inter alia*, that future research

should develop more differentiated propositions and studies that are designed to test competing hypotheses of the HR – performance relationship.

2.5 Conclusion

The goal of this chapter was to introduce the key topics of concern for this study by reviewing the extant literature and identifying key issues of debate. The chapter presents a review of the literature on innovation and the role of human resource management (HRM) in the innovation capability of enterprises. The literature is replete with empirical studies of the associations between employee involvement and firm performance, including innovation performance. Much of the research is conducted from the perspective of measuring bundles of HR practices ("HPWS") and their impact on business outcomes. While there is a cohort of studies that fail to find a positive association, a number of meta-analyses confirm that the majority of the research does establish a positive association.

At the same time, the literature reveals a significant level of dispute, and indeed lack of clarity, about the *mechanisms* behind this association. There are a number of contending theoretical perspectives through which to interpret the associations. A useful distinction can be made between universalistic, contingent, configurational and contextual perspectives. There is a sense that the universalistic perspective is more widely espoused by HRM academics in the US, while contingency perspectives are adopted more widely by academics with

a European perspective. This may correspond with the greater heterogeneity of employment relations models found in Europe

The present study seeks to examine one of the key areas of contention, by investigating whether the evidence from Irish firms on the HRM – performance link is supportive of a universalistic or contingency perspective. From the contingency perspective, a number of key factors emerge in the literature as potentially capable of moderating the association between HPWS and innovation. These include organisational climate, R&D strategy, dynamic environment and country of ownership, and these factors provide the basis for hypotheses tested in this study.

The chosen methodology for this study, which is described in detail in Chapter 3, circumscribes the possibility of pursuing an integrative analysis of the issues – a research challenge which arguably warrants a major collaborative, multi-disciplinary study. Notwithstanding the limitations, it does follow the exhortations of Wood and Wall (2007) in seeking to examine the empirical evidence from a number of contending perspectives.

Chapter 3
Research Design and Methodology

3.1 Introduction

This chapter introduces the key research questions and hypotheses. It then describes the methodology of the survey[1], including the design, sampling and administration procedure, a description of the response rate, the profile of respondents, and a description of the key variables measured.

3.2 Key research questions and hypotheses

The literature review presented in Chapter 2 outlined a number of important theoretical considerations regarding the role of human capital in the competitive performance of firms. Specifically, the literature review explored the role of human capital in innovation, and the role played by a firm's human resource management system in attracting, retaining, motivating and developing its workforce to enhance innovation performance. However, the literature also reveals a growing sense of disquiet among the research community, which is increasingly concerned with the fact that, despite the enormous volume of research into the link between HPWS and firm performance, progress on understanding the so-called 'black box' of HRM is still far less than might be

[1] The survey was conducted in the course of a collaborative project involving a research team from University of Limerick and University of Kansas, and sponsored by the National Centre for Partnership and Performance and the Equality Authority.

desired. Arguably, the challenge of understanding what happens inside the HRM black box cannot be adequately addressed until some decisive advances are made in resolving the now persistent debates in the research literature.

This study provides an opportunity to examine empirical evidence about the impact of HPWS on the innovation performance of firms. The study is designed to explore a number of the ongoing debates about HPWS and innovation. I address the following issues: firstly, the debate about the additive value of bundles of HR practices; secondly, the debate about whether any observed impact of HPWS on firm performance (in this case, innovation performance) is universal or contingent; thirdly, whether, in addition to a firm's HRM practices and policies, the climate of the organisation – specifically, the level of trust in the organisation – has a bearing on innovation performance. Finally, I explore the policy-relevant question of whether there is evidence of significant differences between Irish firms and non-Irish firms in terms of their innovation performance, their adoption of HPWS, and their organisational culture.

3.2.1 Hypothesis regarding the Additive effect of bundles of HR practices (HPWS) on innovation performance

I firstly examine the proposition that the adoption of bundles of HRM practices, constituting a HPWS, has a greater impact on firm performance than the implementation of individual HRM practices in the firm.

Hypothesis 1: *The innovation performance of firms will be significantly impacted by HRM practices in the firm. The impact will be greater when practices are bundled together (HPWS).*

3.2.2 Hypotheses regarding Universalistic and Contingency Models of HPWS

Responding to exhortations to examine contending theoretical perspectives on the universality of the impact of HPWS on firm performance (e.g. Wood and Wall, 2007; Paauwe and Boselie, 2005), I examine the data for evidence that the impact of HPWS on innovation performance is moderated by relevant other variables, including:

- R&D Strategy. The finding by Guthrie et al (2002) that high involvement work practices in a sample of New Zealand firms were associated with performance in firms pursuing a differentiation strategy, but not in firms pursuing a cost-based strategy provides the rationale for examining R&D Strategy as a moderating variable.

- Operating Environment: The inclusion of operating environment as a moderating variable follows Selvarajan et al. (2007), who explore the proposition that firms operating in more uncertain operating environments, characterised by rapid changes in technology, products and services, or consumer needs may need to empower their employees to a greater extent than firms operating in a stable environment.

Hypothesis 2a *(The moderating impact of operating environment): The impact of HPWS on innovation performance will be significantly greater for firms operating in more dynamic and fast changing environments.*

Hypothesis 2b *(The moderating impact of R&D Strategy): The impact of HPWS on innovation performance will be significantly greater for firms that are pursuing a differentiation strategy rather than a cost-based strategy.*

3.2.3 Hypothesis regarding the impact of Organisational Climate on Innovation Performance

A critique that emerges in the literature is the tendency, particularly among proponents of a universalistic model of HRM, to downgrade or ignore issues regarding organisational climate, employee involvement, and employee voice (e.g. Wood and Wall, 2007; Coats, 2006; Haynes et al, 2005). This despite the fact that employee involvement has widely been held to be at the core of the relationship between management systems and firm performance for more than a quarter of a century (see, for example, Walton, 1985). Proponents of this critique argue for a renewed focus on the role of employee involvement and organisational climate in firm outcomes (e.g. Adams et al, 2006). In this narrative, a trust-based organisational climate is one that fosters high levels of creativity, innovation management and intellectual capital.

While HPWS measures typically capture elements of employee involvement, I examine the issue of organisational climate in more detail. Specifically, I examine the question of whether firms that have a high level of HPWS practices combined with a trust-based climate of employee involvement will have a better level of innovation performance than firms which do not have a strong trust-based climate.

Hypothesis 3*: (the moderating impact of organisational climate): The impact of HPWS on innovation performance will be moderated by organisational climate: the impact will be greater in firms that have an open, trust-based climate.*

3.2.4 Hypotheses regarding Country of Ownership Effects

Finally, I examine an issue that is of interest to HR theory, but is also a matter of concern for policy analysis, namely, whether there is evidence of systemic differences in the innovation performance of firms depending on their country of ownership. From a theoretical perspective, this touches on debates about a contingency perspective on HPWS, and the possibility of path-dependant and culturally-determined development of HR practices in firms (e.g. Bartlett and Ghoshal, 1989). From a policy perspective, this question touches on the frequently-posed assertion that management capabilities of Irish-owned firms are in important aspects weaker than the capabilities of foreign-owned firms (Geary and Roche, 2001; Forfás, 2009).

Hypothesis 4 (a)*: There will be a significant difference between the innovation performance of Irish-owned firms and other firms*

Hypothesis 4 (b)*: There will be a significant difference in the level of HPWS and organisational climate between Irish-owned firms and other firms.*

3.3 Research Design

This study was designed as an empirical, quantitative, multi-source research inquiry. The justification for adopting this research approach is that it allows for robust testing of two of the contending theoretical perspectives – the universalistic and contingency approaches, and enables an empirical examination of key issues for practitioners and policy makers.

With regard to the persuasive critique that the extant research on the impact of HPWS on firm performance is skewed by a predominance of positivist and universalistic approaches, the inherent limitation of this survey-based research approach is that it does not facilitate an examination of the contingency, contextual or integrative perspectives. Such research questions arguably require a far larger-scale, multi-disciplinary, multi-method research endeavour (Wood and Wall, 2007).

3.4 Data Sources

Three primary data sources were used in this research, including:

- A survey of HRM managers (the "HRM survey", Appendix B). This survey targeted the senior HR manager, and solicited information on the management policies and practices in the organisation. The HRM surveys elicited descriptions of discrete elements of High Performance Work Systems including management practices in the areas of communication and participation; training and development; staffing and recruitment;

performance management and remuneration; employee Involvement and Participation; and workplace partnership.

- A survey of General Managers (the "GM survey", Appendix C). This survey targeted the General Manager or CEO, and solicited measures of innovation strategy, business performance metrics including turnover and sales, estimates of innovation competitiveness, and company profile information (industry sector, workforce size, etc.).

- Additional performance and demographic data was sourced from a the *Irish Times Top 1000 Companies* database. This data was used primarily to facilitate reliability checking on the data obtained through the survey instruments.

3.5 Sampling

The survey population was large firms operating in Ireland. The sample was drawn from "The Irish Times Top 1000 Companies" database[2], which is a representative, multi-industry set of Irish-based operations. The sample included a range of industry sectors (Table 1) and both indigenous Irish companies and foreign-owned companies with operations in Ireland (Table 2).

[2] http://www.irishtimes.ie

Table 1 Profile of Sample x Industry Sector

Sector	% of sample
Other Manufacturing	24.24
Retail and Distribution	13.64
Banking, Financial Services	12.12
Building and Civil Engineering	7.58
Other Services	7.58
Transport and Communication	6.82
Metal Manufacturing	6.82
Chemical Products	6.82
Agriculture/Forestry/Fishing	4.55
Energy and Water	3.78
Health Services	3.03
Personal, Recreational Services	3.03

Table 2 Profile of Sample x Country of Ownership

Country of Ownership	Frequency	Percent
Ireland	67	50.8
USA	34	25.8
Asia	1	.8
Other European	30	22.7
Total	132	100.0

3.6 Research Procedure

The research procedure involved posting copies of the questionnaires to the HR managers and GM or CEO in the survey sample mailing list. The reason for seeking two respondents to the survey was to ensure a greater degree of reliability in the data. Key questions were repeated in both HR and GM questionnaires, allowing for tests of inter-rater reliability.

The recipients of the questionnaires were asked to complete the survey or forward it to any organisational member whom they thought was knowledgeable and was in a position to do so. A letter and an email or telephone call was sent as part of the 'follow-up' procedure after 30 days to companies that delayed in sending back the responses.

3.7 Response rate

In total, 241 companies responded either to the HR or GM questionnaires. From the 241 companies, 132 companies returned matched HR and GM questionnaires. Only matched pairs were included in the analysis, thus increasing the reliability of the data. This approach yielded an overall response rate of 13.2 per cent, which is within the range of response rates reviewed by Guthrie et al (2002) (ranging from 6 to 28 per cent) and favourable in the context of response rates described by Becker and Huselid (1998).

3.8 Profile of Respondents

For the HRM survey, 70% of respondents were from the HR function, 20% were other senior executives (e.g. Managing Director / CEO), and 10% were other executives (e.g. Financial Officer, Operating Officer).

For the GM survey, 70% of respondents were Senior Executives (e.g. Managing Director, CEO), while the remaining 30% were other Executives (e.g. HR Officer, Financial Officer, Operating Officer).

3.9 Measurement Variables

3.9.1 Introduction

This section introduces the key variables that were incorporated in the analysis, including the input variable (HPWS), control variables (unionisation, ownership, age and size of firm), moderator variables (organisational climate, R&D strategy and dynamic environment) and outcome variables (workforce innovation, innovation revenues and competitive innovation position).

3.9.2 Input Variable - HPWS

Following the work of Huselid (1995), Guthrie (2001) and Datta et al (2005), respondents were asked to indicate the prevalence of 18 HR practices in their firm, relating to recruitment, performance management and remuneration, training and development and communication and employee participation. The 18 HR practices are described in Table 3.

For each HR practice, scores could range, in theory, from 0 to 100%. Higher scores for a particular practice indicate more intensive use of that practice. Given that practices vary across employee groups, the questions relating to these HR practices were asked separately for two categories of employees: Group A consisted of production, maintenance, service and clerical employees; Group B consisted of executives, managers, supervisors and professional/technical employees. Using the number of full-time equivalent employees for each category of employee, a weighted average was calculated

for each practice. Two different approaches were then employed in analysing the impact of these 18 HR practices.

Firstly, an index score for HR practices (HR-18) was calculated as the mean of the aggregated weighted averages of these 18 items. The reliability coefficient for the 18 items, as measured by Cronbach's alpha, was 0.854. A high score on the overall index of HR practices indicates relatively intensive use of the 18-item bundle of practices, with a lower score indicating less extensive use of the bundle of practices. This index score was used in the analysis as the variable representing the adoption by the firm of a bundle of 'high-performance' HR practices.

Secondly, a factor analysis of the 18 items was conducted, using the principal components extraction method with varimax rotation. Table 3 displays the 6 main factors (communications, participation and teamwork, training and development, career progression, reward and remuneration, grievance practices) accounting for 66% of the variance, with the largest of these factors (communications) accounting for 5.45% of the variance.[3] Scores for these six factors were also available as discrete variables – allowing the option of deconstructing, or un-bundling of the set of HR practices for analysis purposes.

[3] Additional factor analyses of the same 18 HR items carried out on two typology-based sub-sets of the sample – companies following a predominantly low-cost or differentiation strategy - reveal changes in the factor loadings that suggest the 18-item HR bundle may not be as stable an entity when considered in the context of firm strategy.

Table 3 Principal Components Factor Analysis of HPWS

Item	Factor 1 Commun-ications	Factor 2 Participation and teamwork	Factor 3 Training and development	Factor 4 Career progression	Factor 5 Reward and remuneration	Factor 6 Grievance policy
Proportion of employees provided relevant financial performance information	.830					
Proportion of employees provided relevant strategic information (e.g., strategic mission, goals, tactics, competitor information, etc.)	.813					
Proportion of employees routinely administered attitude surveys to identify and correct employee morale problems	.718					
Proportion of employees provided relevant operating performance information (e.g., quality, productivity, etc.)	.557		.412			
Proportion of employees hired on the basis of intensive/extensive recruiting efforts resulting in many qualified applicants	.508		.387			
Proportion of employees organized in self-directed work teams in performing a major part of their work roles		.798				
Proportion of employees involved in programmes designed to elicit participation and employee input (e.g., quality circles, problem-solving or similar groups)	.380	.610	.308			
Proportion of employees which receive compensation partially contingent on group performance (e.g., profit-sharing, gainsharing, team-based)		.609	.308			
Proportion of employees which receive formal performance appraisals and feedback on a routine basis	.352	.547				
Proportion of employees which receive formal performance feedback from more than one source (i.e., feedback from several individuals such as supervisors, peers etc.)	.485	.500				

Table 3 (continued)

Item	Factor 1 Commun-ications	Factor 2 Participation and teamwork	Factor 3 Training and development	Factor 4 Career progression	Factor 5 Reward and remuneration	Factor 6 Grievance policy
Proportion of employees which have received intensive/extensive training in company-specific skills (e.g., task or firm-specific training)			.709			
Proportion of employees which have received intensive/extensive training in generic skills (e.g., problem-solving, communication skills, etc.			.634			
Proportion of employees which have been trained in a variety of jobs or skills (are "cross trained") and/or routinely perform more than one job (are "cross utilized)			.587			-.317
Proportion of employees administered one or more employment tests (e.g., skills tests, aptitude tests, mental/cognitive ability tests) prior to hiring			.538			
Proportion of employees holding non-entry level jobs as a result of internal promotions (as opposed to hired outside of the organisation				.878		
Proportion of employees holding non-entry level jobs due to promotions based upon merit or performance, as opposed to seniority				.844		
Proportion of employees which are paid primarily on the basis of a skill or knowledge-based pay system (versus a job-based system)? That is, pay is primarily determined by a person's skill or knowledge level as opposed to the particular job that they hold					.853	
Proportion of employees with access to a formal grievance/complaint resolution procedure						.895

3.9.3 Control Variables

A series of control variables were obtained from the survey. These included:

Firm Age: This was included as a control variable to cater for the possibility that there is a path-dependent characteristic to the design and implementation of a HPWS that is related in part to the length of time that a company has been established. Respondents to the General Manager's questionnaire were asked how long (in years) had the local organisation been in operation.

Firm Size: This was included as a control because of its propensity to be associated with HPWS. Larger firms will tend to have larger, better resourced HRM functions capable of supporting the implementation of a wider range of HRM practices. Firm size may also be associated with innovation activities. Respondents to the GM questionnaire and the HR questionnaire were each asked to quantify the total number of employees in the local organisation. The GM and HR estimates of number of employees correlated at $r = .92$ ($p < .001$) and the logarithm of the average of these two responses was used as the measure of firm size.

Unionisation: This was included to control for the possibility of different HRM regimes in non-union firms and unionised firms. The measure was taken from the question 'What proportion of your workforce is unionised?' A weighted average of responses for Group A and Group B employees was used to as the measure of unionisation.

Country of ownership: Based on prior research, there is prima facie evidence of differences between Irish firms and foreign-owned multi-national companies in

terms of their use of management practices (e.g. Forfás, 2009). Thus, country of ownership was used as a control variable. GM respondents were asked to specify the country in which their corporate headquarters is located, and responses were classified into three groups: Irish-owned, Other European, and US-owned.

3.9.4 Moderator Variables

Two moderator variables were obtained from the survey, including:

R&D Strategy. Following Guthrie et al (2002), who found that high involvement work practices were associated with performance in firms pursuing a differentiation strategy, but not in firms pursuing a cost-based strategy. Respondents to the GM questionnaire were asked to indicate the percentage of total annual sales/turnover spent on research & development (R&D) in their organisation. This measure of R&D expenditure level was used as a proxy indicator of innovation strategy: firms that invest more heavily in R&D are clearly pursing a strategy of differentiation, while firms that invest minimally in R&D are likely to be pursuing an alternative, cost-based strategy. Clearly, though, the measure is a limited indicator of strategy, and is biased towards product innovation where there is typically a stronger requirement for formal R&D investment, rather than other forms of innovation (see Section 2.2.1).

Operating Environment: Following Selvarajan et al. (2007), who examined whether firms operating in more uncertain operating environments, characterised by rapid changes in technology, products and services, or consumer needs may need to empower their employees to a greater extent than firms operating in a stable

environment. Respondents to the General Manager's questionnaire were asked to describe the industry and environment within which their firm functions (taking into consideration not only the economic, but the social, political and technological aspects of the environment). On a five-point Likert scale, respondents were asked to rate their level of agreement with a series of descriptors of the environment that their firm is operating in (following Selvarajan *et al*, 2007). A factor analysis using the principle components extraction method was conducted on the items, revealing a four-factor solution (Table 4): Competitiveness of the Environment, Pace of Change in the Environment, Predictability of Competitors and Consumers; and Rate of Market Growth. The aggregate score of the four factors was used as an *Index of Operating Environment Dynamism*.

Table 4 Rotated Component Matrix, Principal Components Factor Analysis of Operating Environment

	Factor			
	1	2	3	4
Item	Competitiveness of Environment	Pace of Change in Environment	Predictability of Environment (competitors, consumers)	Market Growth / Change / Innovation / Expansion
Very dynamic, fast-changing environment	.157	**.770**	-.001	.275
Very risky	**.826**	-.013	.081	.284
Rapidly expanding markets	-.075	.142	.027	**.896**
Stressful, exacting, hostile, challenging	**.792**	.037	.008	-.217
Actions of comeptitors easy to predict	-.007	-.043	**.871**	.131
Demand and consumer tastes easy to predict	.086	.239	**.819**	-.109
Very safe, little threat to company's survival	**.634**	.340	.006	-.398
Rate at which products and services are getting obselete is very slow	-.006	**.857**	.175	-.084

Organisational Climate: While HPWS measures typically capture elements of employee involvement, I examine the issue of organisational climate in more detail. Specifically, I examine the question of whether firms that have a high level of HPWS practices combined with a trust-based climate of employee involvement will have a better level of innovation performance than firms which do not have a strong trust-based climate. An Index of Organisational Climate was constructed to measure the extent to which a climate of trust and reciprocal information sharing exists in the organisation – in the opinion of the General Manager / CEO respondent. Data was

obtained from the GM survey, and included four items (Table 5), the transformed z-scores of which were aggregated to provide the index score. The resulting scale exhibited acceptable internal reliability (Cronbach's alpha = .728).

Table 5 Organisational Climate Items

Item	Definition
There is a high level of trust between management and employees	Strongly disagree=1; 2; 3; 4; Strongly agree=5.
Employees are well informed on the views and concerns of company management	Strongly disagree=1; 2; 3; 4; Strongly agree=5.
Company management are well informed on the views and concerns of employees	Strongly disagree=1; 2; 3; 4; Strongly agree=5.
Workplace partnership is…	0 (Non-existent); 1 (Largely confined to a few key individuals); 2 (Largely confined within formal partnership structures); 3 (Evident in at least certain parts); 4 (Evident across most of it); 5 (Now the norm for working).

3.9.5 Outcome (dependent) Variables

The survey data yielded three distinct measures of innovation performance. Two of these measures, *workforce innovation* and *innovation-related revenues*, were based on the firm's actual innovation performance during the preceding 12-month period, and were calculated using published data and the GM respondent's knowledge of firms' sales turnover derived from new products or services. The third measure, *Innovation Competitiveness*, was based on the GM respondent's rating of the firm's position relative to its competitors in terms of product or service innovation.

Workforce Innovation: Following Datta et al (2005), workforce innovation was calculated using data on total sales revenue; proportion of total sales (turnover)

from products or services introduced within the previous 12 months (using the log of the average of HR and GM responses), and number of employees. Workforce innovation was calculated as the proportion of the organization's total sales derived from products or services introduced within the previous 12 months, divided by number of employees. This provides a per capita measure of workforce innovation – or the efficiency of revenue generation through the introduction of new products and services. Workforce Innovation is expressed as follows:

$$W = \frac{\text{Sales x \% NPS revenue}}{\text{Total Employees}}$$

Innovation-related revenues: The second measure relating to innovation was a measure of how much revenue the firm had derived from innovation-related new products or services. GM respondents were asked to quantify, from a total of 100%, the proportion of their firm's revenues during the preceding 12 months that had been derived from a low cost strategy (competing on the basis of lower costs through economies of scale, experience, technology, etc), and the proportion that had been generated from the creation of products or services perceived industry-wide as unique. This latter proportion was treated as the measure (on a scale from 0 to 100) of innovation-related revenues in the firm.

Innovation Competitiveness: The third measure of innovation performance was a subjective measure based on the firm's reported competitive position relative to its direct competitors in terms of product or service quality and product or service features. The measures were derived from the GM respondent's rating of the firm's

position, using a 5-point Likert scale where 1 was “We are much lower than our direct competitors” and 5 was “We are much higher than our direct competitors”.

3.10 Conclusion

The main objective of this chapter was to set out the key research questions and hypotheses of the study, and to describe the research methodology including the survey design, sampling, and procedure. The chapter also described the response rate to the survey, and provided a breakdown of respondent companies by industry and country of ownership, showing that the sample was indeed a representative industry sample. The chapter also described in detail the key variables that were chosen, including the independent variable (HPWS), the control variables (age, size, industry, country of origin, level of unionisation) including a rationale for choosing these as control variables, the moderator variables (R&D strategy, dynamic operating environment and organisational climate), and the outcome (dependent) variables (workforce innovation, innovation revenue, and innovation competitiveness).

The next chapter presents the findings of the analyses conducted on these variables.

Chapter 4
Analysis

4.1 Introduction

This chapter presents an analysis of the survey findings. Section 4.2 presents the detailed results of the analysis, following a sequence corresponding to the hypotheses set out in Chapter 2. Conclusions are presented in Section 4.3.

4.2 Analysis

4.2.1 The impact of HRM practices on Innovation Performance, and the additive impact of bundles of practices (HPWS)

Hypothesis 1*: The innovation performance of firms will be significantly impacted by HRM practices in the firm. The impact will be greater when practices are bundled together (HPWS).*

To test this hypothesis, a series of multiple regression analyses were run to test the impact of HR practices, individually and additively as HPWS bundles, on two dependent variables: workforce innovation and innovation revenue performance. Each regression analysis utilised the *direct enter* method, and variables were entered in two blocks, relating to the control variables and the independent variable.

The first block included a series of control variables, including: the age of the company; company size (measured in no. of employees); the level of unionisation; country of ownership (grouped into three categories: Irish, Other European, and US

firms); and industry sector (categories included Agriculture, Forestry, Fisheries; Energy and Water; Chemicals and Pharmaceuticals; Metal Manufacturing; Other Manufacturing; Building and Civil Engineering; Retail and Distribution; Transport and Communications; Financial and Business Services; and Personal, Domestic and Recreational Services).

The second block added the HR practices to the regression analysis, either as individual practices (Models 2 and 6) or as HPWS bundles (Models 4 and 8), thus allowing a comparison between the impact of 18 individual practices, and the additive impact of the 18 practices 'bundled' into an HPWS index score.

Model 2 (Table 6) shows that the impact of individual HR practices on workforce innovation was not significant. In contrast, Model 4 (Table 7) indicates that the inclusion of HPWS as a bundle of HR practices explained 17% of the variance in workforce innovation ($p<.01$)

Model 6 (Table 8) indicates the impact of individual HR practices on innovation revenue performance. The impact is significant at the $p<.10$ level, which is a moderate impact, with only one HR practice having a significant impact (*Routine performance appraisals and feedback*, $p<.05$). Model 8 (Table 9) indicates that the inclusion of HPWS as a bundle of HR practices in the regression model accounted for an additional 3.1% of the variance in Innovation Revenues ($p<.01$).

In summary, a comparison between regression models 2 and 4 suggests that the impact of HR practices on workforce innovation is greater when they are included as a bundle of practices (HPWS) than when they are included as individual HR

practices. Similarly, a comparison of models 6 and 8 suggest that the impact of HR practices on firms' innovation revenues is greater when they are included as an HPWS bundle of practices than when they are considered as individual HR practices. Thus, the evidence is supportive of Hypothesis 1.

Table 6 Multiple Regression Models 1 & 2: Impact of HR practices on Workforce Innovation (Abbreviated version. See Appendix A: Table 1 for full detail)

	Model	1	2
		Standardized β Coefficients	
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership		
Step 2 Independent Variable	Employment tests		-0.359
	Competitive recruitment		-0.051
	Internal promotions		-1.282
	Merit-based promotions		0.870
	Cross-training, cross-deployment		0.907
	Company-specific training		0.805
	Generic training		0.849
	Routine performance appraisals and feedback		1.485
	Multi-source performance feedback		1.317
	Contingent Pay partly on group performance		0.237
	Skill-based pay		2.073*
	Participation programmes		-1.414
	Receive relevant operating performance information		-0.070
	Receive relevant financial performance information		1.209
	Receive relevant strategic information		-1.063
	Attitude surveys		0.391
	Access to formal grievance / dispute resolution		-1.109
	Self-directed work teams		0.249
Model Summary and change statistics	ΔR^2	.392	.445
	Model R^2	.392	.837
	Adjusted R^2	.088	.390
Analysis of Variance	Sum of Squares Regression	54.107	115.6
	Sum of Squares Residual	83.967	22.473
	Sum of Squares Total	138.074	138.074
	Model F	1.289	1.871
	Δ F	1.289	1.824
	Significance Δ F	.268	.145
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed			

Table 7 Multiple Regression Models 3 & 4: Impact of HPWS bundle on Workforce Innovation (Abbreviated version. See Appendix A: Table 2 for full detail)

		Model 3	4
		Standardized β Coefficients	
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership		
Step 2 Independent Variable	HPWS - 18-item index		.538**
Model Summary and change statistics	Δ R^2	0.392	0.17
	Model R^2	.392	0.562
	Adjusted R^2	.088	0.331
Analysis of Variance	Sum of Squares Regression	54.107	77.648
	Sum of Squares Residual	83.967	60.426
	Sum of Squares Total	138.074	138.074
	Model F	1.289	2.329*
	Δ F	1.289	11.298**
	Significance Δ F	.268	0.002
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed			

Table 8 Multiple Regression Models 5 & 6: Impact of HR Practices on Innovation Revenues (Abbreviated version. See Appendix A: Table 3 for full detail)

	Model	5	6
		Standardized β Coefficients	
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership		
Step 2 Independent Variable	Employment tests		0.099
	Competitive recruitment		-0.118
	Internal promotions		-0.156
	Merit-based promotions		0.113
	Cross-training, cross-deployment		-0.017
	Company-specific training		0.076
	Generic training		0.151
	Routine performance appraisals and feedback		0.404*
	Multi-source performance feedback		-0.111
	Contingent Pay partly on group performance		0.053
	Skill-based pay		-0.059
	Participation programmes		-0.041
	Receive relevant operating performance information		-0.098
	Receive relevant financial performance information		0.036
	Receive relevant strategic information		0.157
	Attitude surveys		0.288
	Access to formal grievance / dispute resolution		-0.145
	Self-directed work teams		-0.169
Model Summary and change statistics	Δ R^2	.389	.178
	Model R^2	.389	.567
	Adjusted R^2	.236	.227
Analysis of Variance	Sum of Squares Regression	26880.392	39222.57705
	Sum of Squares Residual	42275.766	29933.58084
	Sum of Squares Total	69156.158	69156.15789
	Model F	2.543**	1.668†
	Δ F	2.543	.962
	Significance Δ F	.005	.517
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed			

Table 9 Multiple Regression Models 7 & 8: Impact of HPWS bundle on Innovation Revenues (Abbreviated version. See Appendix A: Table 4 for full detail)

	Model	7	8
		Standardized β Coefficients	
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership		
Step 2 Independent Variable	HPWS - 18-item index		0.223†
Model Summary and change statistics	Δ R^2	.389	0.031†
	Model R^2	.389	0.420
	Adjusted R^2	.236	0.263
Analysis of Variance	Sum of Squares Regression	26880.392	29041.834
	Sum of Squares Residual	42275.767	40114.324
	Sum of Squares Total	69156.158	69156.158
	Model F	2.543**	2.67**
	Δ F	2.543	3.179
	Significance Δ F	.005	.080
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed			

4.2.2 Exploring Universalistic and Contingent models of the impact of HPWS on Innovation Performance

***Hypothesis 2**: The impact of HPWS on innovation performance will be moderated by factors including:*

a. operating environment: the impact of HPWS on innovation performance will be significantly greater for firms operating in more dynamic and fast changing environments

b. R&D Strategy: the impact of HPWS on innovation performance will be significantly greater for firms that are pursuing a differentiation strategy rather than a cost-based strategy

To investigate the impact of HPWS on innovation performance, and the effect of two variables – R&D strategy and dynamic environment - as potential moderators of HPWS, a series of multiple regression analyses was carried out. Each regression analysis utilised the *direct enter* method, and variables were entered in three

blocks, relating to the control variables, the independent variables and the hypothesised moderator variables.

The first block included a series of control variables, including: the age of the company; company size (measured in no. of employees); the level of unionisation; country of ownership (grouped into three categories: Irish, Other European, and US firms); and industry sector (categories included Agriculture, Forestry, Fisheries; Energy and Water; Chemicals and Pharmaceuticals; Metal Manufacturing; Other Manufacturing; Building and Civil Engineering; Retail and Distribution; Transport and Communications; Financial and Business Services; and Personal, Domestic and Recreational Services).

The second block added HPWS and the moderator variables (R&D strategy and dynamic environment, respectively) to the regression analysis. Finally, the third block added the co-efficient for the interaction between HPWS and the hypothesised moderator variables (HPWS x Dynamic Environment, or HPWS x R&D strategy, respectively).

Innovation performance was measured by three dependent variables: workforce innovation, innovation revenue performance, and innovation competitiveness.

4.2.3 Moderating Impact of Dynamic Environment

The first variable examined in respect of its moderating impact on HPWS was dynamic environment.

In respect of workforce innovation (Table 10), Model 9, which includes the control variables, accounts for 39.2 per cent of variance in workforce innovation. In Model 10, HPWS and Dynamic Environment are added as independent variables and explain an additional 17.2 per cent of variance in workforce innovation, where the impact of HPWS is significant (β=0.543, $p<.01$). Model 11 tests the moderating effect of dynamic environment on HPWS. The variance explained by this model increases by a minimal 1 per cent, and the interaction co-efficient (β = -0.042) is not significant. Thus, when controlling for a range of variables including size, age, country of ownership, level of unionisation and industry sector, HPWS has a significant impact on workforce innovation, and this impact is not moderated by the dynamic environment in which the firm operates.

In respect of innovation revenues (Table 11), Model 12 accounts for 39.3 per cent of variance in innovation revenues. In Model 13, HPWS and Dynamic Environment are added and explain an additional 4.2 per cent of variance, where the impact of neither variable is significant. Model 14 tests the moderating effect of dynamic environment on HPWS and the variance explained by this model increases by a minimal 1 per cent, with the interaction co-efficient (β = -0.147) not significant. In summary, when controlling for a range of variables including size, age, country of

ownership, level of unionisation and industry sector, HPWS does not have a significant impact on innovation revenues, and neither is there a moderating effect by the dynamic environment in which the firm operates.

In respect of firms' innovation competitiveness (Table 12), Model 18 accounts for 21.2 per cent of variance. In Model 19, HPWS and Dynamic Environment are added and explain an additional 3.8 per cent of variance, where neither variable is significant. Model 20 tests the moderating effect of dynamic environment on HPWS and the variance explained by this model increases by 11.5 per cent (β = 0.386, $p<.01$). This indicates that dynamic environment has a moderating effect on the impact of HPWS on firm's innovation competitiveness. Specifically, the impact of HPWS on firms' innovation competitiveness is greater for firms operating in a more dynamic environment – characterised by a riskier, faster-paced, less predictable and fast-growing environment.

Table 10 Regression Models 9, 10, 11: Impact of HPWS interaction with Dynamic Environment on Workforce Innovation
(Abbreviated version. See Appendix A: Table 5 for full detail)

	Model	9	10	11
		Standardized β Coefficients		
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership			
Step 2 Independent Variables	HPWS		0.543**	0.523*
	Dynamic Environment		-0.049	-0.061
Step 3 Interaction Effect	HPWS x Dynamic Environment			-0.042
Model Summary and change statistics	Δ R^2	0.392	0.172	0.001
	Model R^2	0.392	0.564	0.564
	Adjusted R^2	0.077	0.289	0.263
Analysis of Variance	Sum of Squares Regression	54.053	77.791	77.890
	Sum of Squares Residual	83.944	60.206	60.107
	Sum of Squares Total	137.997	137.997	137.997
	Model F	1.245	2.052*	1.872†
	Δ F	1.245*	5.323*	0.043
	Significance Δ F	0.297	0.011	0.837
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed Dependent Variable Workforce Innovation				

Table 11 Regression Models 12, 13, 14: Interaction of HPWS with Dynamic Environment on Innovation Revenues.
(Abbreviated version. See Appendix A: Table 6 for full detail)

	Model	12	13	14
		Standardized β Coefficients		
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership			
Step 2 Independent Variables	HPWS		0.212	0.153
	Dynamic Environment		0.115	0.107
Step 3 Interaction Effect	HPWS x Dynamic Environment			-0.147
Model Summary and change statistics	Δ R^2	0.393	0.042	0.015
	Model R^2	0.393	0.435	0.450
	Adjusted R^2	0.235	0.263	0.270
Analysis of Variance	Sum of Squares Regression	27137.01	30042.59	31091.38
	Sum of Squares Residual	41995.48	39089.90	38041.10
	Sum of Squares Total	69132.49	69132.49	69132.49
	Model F	2.499**	2.532**	2.497**
	Δ F	2.499	2.081	1.516
	Significance Δ F	0.007	0.005	0.005
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed Dependent Variable Innovation Revenue performance				

Table 12 Regression Models 15, 16, 17: Interaction of HPWS with Dynamic Environment on firms' innovation competitiveness
(Abbreviated version. See Appendix A: Table 7 for full detail)

		Model	15	16	17
			Standardized β Coefficients		
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership				
Step 2 Independent Variables	HPWS			-.206	-0.287*
	Dynamic Environment			.134	0.176
Step 3 Interaction Effect	HPWS x Dynamic Environment				0.386**
Model Summary and change statistics	Δ R^2		0.212	0.038	0.115
	Model R^2		0.212	0.250	0.365
	Adjusted R^2		-0.003	0.009	0.145
Analysis of Variance	Sum of Squares Regression		4.940	5.817	8.501
	Sum of Squares Residual		18.355	17.479	14.795
	Sum of Squares Total		23.296	23.296	23.296
	Model F		0.987	1.038	1.660†
	Δ F		0.987	1.329	9.433
	Significance Δ F		0.481	0.273	0.003

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed
Dependent Variable Innovation Competitiveness

4.2.4 Moderating Impact of R&D strategy

The second variable examined in respect of its moderating impact on HPWS was R&D strategy, based on the percentage of firms' total annual sales/turnover spent on research & development (R&D).

In respect of workforce innovation (Table 13), Model 18 accounts for 51.9 per cent of variance. In Model 19, HPWS and R&D strategy are added, and these explain an additional 9.2 per cent of variance in workforce innovation, but only HPWS is significant (standardised β=0.463, p<.10). Model 3 tests whether R&D strategy acts

as a moderator on HPWS, and the variance explained by this model increases by a mere 1 per cent (standardised β=0.163, not significant). Thus, when controlling for a range of variables including size, age, country of ownership, level of unionisation and industry sector, HPWS has a significant impact on workforce innovation, but this impact is not moderated by R&D strategy.

In respect of innovation performance as measured by Innovation Revenues (Table 14), Model 21 accounts for 41.1 per cent of variance. In Model 22, HPWS and R&D strategy are added, and these explain an additional 5 per cent of variance in innovation revenues, but only HPWS is significant (standardised β=0.292†, p<.10). Model 3 tests whether R&D strategy acts as a moderator on HPWS. This model does not explain any additional variance. Thus, when controlling for a range of variables including size, age, country of ownership, level of unionisation and industry sector, HPWS has a significant impact on innovation revenue, but this impact is not moderated by R&D strategy.

In respect of Innovation Competitiveness (Table 15), Model 24 accounts for 37.6 per cent of variance. In Model 22, HPWS and R&D strategy are added, and these explain an additional 5 per cent of variance in innovation revenues, but neither HPWS nor R&D strategy is significant in its own right. Model 3 tests whether R&D strategy acts as a moderator on HPWS, and the additional variance explained by this model is 5.6 per cent (F=1.758, p<.10), with HPWS becoming significant (standardised β=-.456, p<.05), and the interaction co-efficient also significant (standardised β=.398, p<.10). Thus, when controlling for a range of variables including size, age, country of ownership, level of unionisation and industry sector,

HPWS does not have a significant impact on Innovation Competitiveness, until the moderating impact of R&D strategy is introduced. This finding supports hypothesis 2(b), but the finding is only significant at p<.10.

Table 13 Regression Models 18, 19, 20: Impact of HPWS interaction with R&D strategy on Workforce Innovation
(Abbreviated version. See Appendix A: Table 8 for full detail)

	Model	18	19	20
		Standardized β Coefficients		
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership			
Step 2 Independent Variables	HPWS		.463†	.506†
	R&D strategy		-0.083	-0.032
Step 3 Interaction Effect	HPWS x R&D strategy			0.163
Model Summary and change statistics	Δ R^2	0.519	0.092	0.011
	Model R^2	0.519	0.611	0.621
	Adjusted R^2	0.114	0.199	0.172
Analysis of Variance	Sum of Squares Regression	29.863	35.148	35.754
	Sum of Squares Residual	27.681	22.396	21.790
	Sum of Squares Total	57.544	57.544	57.544
	Model F	1.281	1.482	1.382
	Δ F	1.281	2.006	0.445
	Significance Δ F	0.300	0.165	0.514
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed Dependent Variable Workforce Innovation				

Table 14 Regression Models 21, 22, 23: Impact of HPWS interaction with R&D strategy on Innovation Revenues
(Abbreviated version. See Appendix A: Table 9 for full detail)

	Model	21	22	23
		Standardized β Coefficients		
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership			
Step 2 Independent Variables	HPWS		.292†	0.287
	R&D strategy		0.079	0.083
Step 3 Interaction Effect	HPWS x R&D strategy			-0.016
Model Summary and change statistics	Δ R^2	0.411	0.050	0.000
	Model R^2	0.411	0.461	0.461
	Adjusted R^2	0.181	0.212	0.191
Analysis of Variance	Sum of Squares Regression	22961.354	25734.622	25744.328
	Sum of Squares Residual	32890.232	30116.964	30107.258
	Sum of Squares Total	55851.586	55851.586	55851.586
	Model F	1.789	1.851	1.710
	Δ F	1.789	1.796	0.012
	Significance Δ F	0.067	0.179	0.912
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed Dependent Variable Innovation Revenues				

Table 15 Regression Models 24, 25, 26: Impact of HPWS interaction with R&D strategy on Innovation Competitiveness
(Abbreviated version. See Appendix A: Table 10 for full detail)

	Model	24	25	26
		Standardized β Coefficients		
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership			
Step 2 Independent Variables	HPWS		-0.22	-.456*
	R&D strategy		0.26	0.212
Step 3 Interaction Effect	HPWS x R&D strategy			.398†
Model Summary and change statistics	Δ R^2	0.376	0.050	0.056
	Model R^2	0.376	0.426	0.481
	Adjusted R^2	0.120	0.146	0.207
Analysis of Variance	Sum of Squares Regression	6.95	7.86	8.89
	Sum of Squares Residual	11.53	10.62	9.59
	Sum of Squares Total	18.48	18.48	18.48
	Model F	1.47	1.523	1.76†
	Δ F	1.469	1.595	3.863
	Significance Δ F	0.162	0.217	0.057
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed Dependent Variable Innovation Competitiveness				

4.2.5 Impact of Organisational Climate on Innovation Performance

Hypothesis 3*: The impact of HPWS on innovation performance will be moderated by organisational climate; the impact will be greater in firms that have an open, trust-based climate.*

A series of multiple regression analyses was conducted to investigate the whether Organisational Climate moderates the impact of HPWS on innovation performance.

In respect of workforce innovation (Table 16), Model 27 accounts for 38.6 per cent of variance. In Model 28, HPWS and Organisational Climate are added, and these explain an additional 17.4 per cent of variance in workforce innovation, but only HPWS is significant (standardised β=2.919, $p<.05$). Model 3 tests whether organisational climate acts as a moderator on HPWS, but the model reveals no increase in explanatory power. Thus, when controlling for a range of variables including size, age, country of ownership, level of unionisation and industry sector, HPWS has a significant impact on workforce innovation, but this impact is not moderated by organisational climate.

In respect of innovation performance as measured by Innovation Revenues (Table 17), Model 30 accounts for 43.2 per cent of variance. In Model 31, HPWS and Organisational Climate are added, and these explain an additional 12 per cent of variance in innovation revenues, but only Organisational Climate is significant (standardised β=0.368, $p<.05$). Model 3 tests whether there is a moderating effect on HPWS, and the interaction between the two variables explains an additional 4 percent of variance with Organisational Climate only remaining significant, but the

interaction effect is not significant (standardised β=-0.073). Thus, when controlling for a range of variables including size, age, country of ownership, level of unionisation and industry sector, Organisational Climate has a significant impact on innovation revenue, but this impact is not moderated by HPWS.

These two findings are not supportive of the hypothesis that organisational climate will moderate the impact of HPWS. However, the findings are worthy of further consideration in future research, as it is clear that HPWS and organisational climate can each be significant factors in the innovation performance of firms.

Table 16 Regression Models 27, 28, 29: Impact of HPWS interaction with Organisational Climate on Workforce Innovation
(Abbreviated version. See Appendix A: Table 11 for full detail)

		Model		
		27	28	29
		Standardized β Coefficients		
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership			
Step 2 Independent Variables	HPWS		2.919**	2.866**
	Organisational Culture		0.007	0.044
Step 3 Interaction Effect	HPWS x Organisational Culture			0.095
Model Summary and change statistics	Δ R^2	0.386	0.174	0.000
	Model R^2	0.386	0.560	0.560
	Adjusted R^2	0.047	0.267	0.239
Analysis of Variance	Sum of Squares Regression	52.80	76.58	76.60
	Sum of Squares Residual	83.95	60.17	60.15
	Sum of Squares Total	136.75	136.75	136.75
	Model F	1.140	1.909†	1.743†
	Δ F	1.140	5.336	0.009
	Significance Δ F	0.368	0.011	0.925
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed Dependent Variable Workforce Innovation				

Table 17 Regression Models 30, 31, 32: Impact of HPWS interaction with Organisational Climate on Innovation Revenues
(Abbreviated version. See Appendix A: Table 12 for full detail)

		Model	30	31	32
			Standardized β Coefficients		
Step 1 Control Variables	Age, Size, Industry, Unionisation, Country of Ownership				
Step 2 Independent Variables	HPWS			0.255	0.279
	Organisational Culture			.368*	.364*
Step 3 Interaction Effect	HPWS x Organisational Culture				-0.073
Model Summary and change statistics	ΔR^2		0.432	0.120	0.004
	Model R^2		0.432	0.552	0.556
	Adjusted R^2		0.184	0.322	0.309
Analysis of Variance	Sum of Squares Regression		23775.78	30412.73	30608.14
	Sum of Squares Residual		31318.78	24681.83	24486.42
	Sum of Squares Total		55094.56	55094.56	55094.56
	Model F		1.742†	2.400**	2.250**
	Δ F		1.742	4.975	0.287
	Significance Δ F		0.076	0.012	0.595

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed
Dependent Variable Innovation Revenues

4.2.6 Analysis of Country of Ownership Effects on Innovation Performance

Hypothesis 4 (a)*: There is a significant difference between the innovation performance of Irish-owned firms and other firms*

Hypothesis 4 (b)*: There is a significant difference between the level of HPWS and organisational culture between Irish-owned firms and other firms*

To test these hypotheses, I conducted a series of one-way ANOVA tests to examine country-of-ownership differences in HR management systems (adoption of HPWS), organisational climate (existence of trust-based climate), and innovation performance (workforce innovation, innovation revenues and Innovation Competitiveness).

In respect of innovation-related revenue performance, a one-way ANOVA (Table 18) reveals a significant between-group difference ($p<.05$). Post-hoc tests (Appendix A: Table 13) reveal a significant mean difference ($p<.05$) between Irish-owned and US-owned firms. The mean level of innovation-related revenues in US firms was 16.94% higher than their Irish counterparts. Firms whose headquarters were in European countries other than Ireland were approximately mid-way between the Irish-owned and US-owned performance levels, but were not significantly different from either of these groups.

Table 18 Innovation Revenues x Country of Ownership ANOVA

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	6623.739	2	3311.870	3.513	.033
Within Groups	118771.486	126	942.631		
Total	125395.225	128			

*Proportion of organisation's total sales (turnover) achieved through competing on product / service differentiation

In respect of country of ownership as a factor in R&D strategy, a one-way ANOVA (Table 19) reveals significant between-group differences in the adoption of low-cost strategies ($p<.05$) and differentiation strategies ($p<.05$). Post-hoc tests using the Bonferroni method of comparison (Appendix A: Table 14) reveal that Irish firms are significantly different than US firms in their more extensive pursuit of low cost strategies ($p<.05$), while US firms are significantly higher than Irish firms in their pursuit of differentiation-based strategies ($p<.05$). Other European firms lie between these two groups, but are not significantly different from either US or Irish firms.

Table 19 R&D strategy x Country of Ownership ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Low Cost Strategy	Between Groups	7682.056	2	3841.028	4.021	.020
	Within Groups	121330.744	127	955.360		
	Total	129012.800	129			
Differentiation Strategy	Between Groups	6623.739	2	3311.870	3.513	.033
	Within Groups	118771.486	126	942.631		
	Total	125395.225	128			

In terms levels of investment in innovation, a one-way analysis of variance (Table 20) reveals a significant between-groups difference in investment levels in R&D ($p<.001$). Post-hoc analysis using the Bonferroni comparison method (Appendix A: Table 15) reveals a significant difference in terms of investment levels in R&D between US firms operating in Ireland and their Irish and other European counterparts ($p<.001$). There is no significant difference in R&D investment levels between Irish and other European firms operating here.

Table 20 R&D Investment Levels x Country of Ownership ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	526.097	2	263.048	16.805	.000
Within Groups	1706.215	109	15.653		
Total	2232.312	111			

In respect of HPWS, a one-way ANOVA (Table 21) reveals a significant between groups difference ($p<.001$) in firms' adoption of HPWS. Post-hoc tests (Appendix A: Table 16) using the Bonferroni comparison method reveal that Irish-owned firms

are significantly lower in their adoption of HPWS relative to both other European firms (p<.05) and US firms (p<.001). Other European firms were lower in their adoption of HPWS than US firms, but the significance of the difference was just outside the p<.05 level.

Table 21 HPWS x Country of Ownership ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8731.879	2	4365.940	14.545	.000
Within Groups	23113.666	77	300.177		
Total	31845.545	79			

To explore country of origin differences in the adoption of HPWS further, I conducted one-way ANOVA tests on the six factors revealed by principal components factor analysis of HPWS. The six factors are: Communications; Participation and Teamwork; Training and Development; Career Progression; Reward and Remuneration; Grievance Policy (see Table 3, Section 3.9.2 for factor loadings). ANOVA and post-hoc tests using the Bonferroni method confirm that the only two factors on which there are significant between group differences are Communications and Training and Development. In terms of communications practices, Irish firms score significantly lower than US firms (p<.001) and other European firms (p<.01). There is no significant difference between other European firms and US firms.

Thus, Irish-owned firms differ significantly from foreign multinationals (European and US-owned firms operating in Ireland) across a range of innovation measures, including investment in innovation, innovation-related revenue performance, and

R&D strategy. There are also significant differences between Irish-owned firms and foreign multinationals in terms of their adoption of HPWS – Irish firms being less likely to adopt HPWS than their European or US counterparts. These findings are supportive of hypotheses 4 and 5, and are suggestive of a contingency perspective on HPWS. From a policy perspective, the findings add further empirical evidence to a debate about the policy measures that are appropriate in the Irish context to support the emergence of a more innovative indigenous industry base.

4.3 Conclusions

This analysis has explored four distinct but related hypotheses regarding the impact of HPWS on innovation. Using a series of multiple regression analyses, and controlling for a number of variables including firm size, age of firm, level of unionisation and industry sector, it was possible to quantify the significant impact that HPWS has on innovation performance in firms. For two measures of innovation – workforce innovation and innovation revenues – the impact was not moderated by R&D strategy or by dynamic environment. For a third variable – Innovation Competitiveness – HPWS was moderated by R&D strategy and by dynamic environment. This provides some limited support for the contingency perspective on HPWS.

A further analysis explored whether a trust-based, open organisational climate has a moderating effect on HPWS. Again, there was no effect in respect of the HPWS impact on workforce innovation. However, organisational climate became the significant predictor variable for innovation revenues, and HPWS became non

significant. Thus, while not supporting a contingency perspective on HPWS, it does suggest that HPWS is not the exclusive predictor of innovation performance, and that organisational climate has a clear impact on this variable.

Finally, an analysis of the differences in innovation performance and HPWS based on country of ownership reveals a series of differences between Irish-owned firms and their European and US counterparts. This raises both theoretical and policy-related issues.

The next chapter will consider these issues more extensively.

Chapter 5
Discussion of Findings

5.1 Introduction

This chapter revisits the main findings arising from the analyses reported in Chapter 4 and considers the implications of these findings. Section 5.2 considers the extent to which the hypotheses in this study have been supported or otherwise. Section 5.3 considers the limitations of the study, and the chapter concludes with some consideration in Section 5.4 of directions for future research and policy development.

5.2 Interpreting the findings in relation to research hypotheses

There were three core hypotheses under examination in this study. First, I set out to test whether there is evidence of a synergistic effect when HRM practices are bundled together into an HPWS. Second, I tested the data to see whether it supported a "universalistic" or "contingency" perspective on HPWS, by exploring whether the HPWS – innovation performance link is in any way moderated by factors including the strategy being pursued by the firm, the environment in which the firm is operating, and the internal climate within the organisation. Finally, I tested the contention that Irish-owned firms have different approaches to innovation and to human resource management than foreign-owned firms operating in Ireland.

5.2.1 Hypothesis regarding HPWS 'bundles' of HRM practices

Hypothesis 1 related to the impact of HRM practices on Innovation Performance, and the additive impact of bundles of practices (HPWS). The proposition was that innovation performance of firms will be significantly impacted by HRM practices, but that the impact will be greater when practices are bundled together as an HPWS. A series of multiple regression analyses tested the impact of HR practices, individually and additively as HPWS bundles, on two dependent variables: workforce innovation and innovation revenue performance. Results confirmed that the impact of HR practices on innovation performance (as measured by workforce innovation and innovation revenues) is greater when HR practices are included as a bundle of practices (HPWS) rather than when they are included as individual HR practices, thus supporting Hypothesis 1. This finding is in line with the literature (e.g. Huselid, 1995; Milgrom and Roberts, 1995; Subramony, 2009) that there is an additive impact from the adoption of bundles of HR practices.

The main argument advanced in the literature to explain why HRM practices do appear to have a greater impact on firm performance when 'bundled' as HPWS is that the bundling of practices gives rise to synergistic effects (e.g. Milgrom and Roberts, 1995). Arguably, the use of synergistic effects as an explanatory concept might risk obfuscating the need for a credible theoretical and practical account of the mechanisms by which such synergistic values are realised. As such, the phenomenon of 'bundles of HRM practices' is important to observe, but does not adequately contribute to resolving the HRM 'black box' problem. Nor does it contribute robustly to a resolution of outstanding questions regarding the optimum

bundles of practices for firms. Thus, the debate about HPWS and 'bundles of HRM practices' is best considered in conjunction with debates such as that of universal versus contingency models of HPWS.

5.2.2 Hypotheses regarding Universalistic and Contingency models of HPWS

Hypotheses 2(a) and 2(b) related to the debate about whether the link between HPWS and firm performance is universalistic. The analysis explored the potential moderating impact of R&D Strategy and operating environment on the HPWS - Innovation Performance relationship. Specifically, the propositions examined were that the impact of HPWS on innovation performance will be significantly greater for firms operating in more dynamic and fast changing environments, and similarly, the impact of HPWS will be greater for firms that are pursuing a differentiation strategy rather than a cost-based strategy.

A series of multiple regression analyses examined these propositions using three distinct measures of innovation performance: workforce innovation, innovation revenue performance, and firms' Innovation Competitiveness.

There was no evidence of a moderating effect by either dynamic operating environment or R&D Strategy on HPWS for either workforce innovation or innovation revenues. In contrast, for the third innovation performance variable, which was the subjective estimate by GM respondents of their Innovation Competitiveness, there was a significant moderating effect on HPWS by both moderating variables – R&D Strategy and dynamic environment. What was particularly interesting was that HPWS did not appear to be a significant impact on

this variable until the interaction effects with R&D Strategy and dynamic environment were included in the models. The moderating effect of R&D Strategy on HPWS explained additional variance of 5.6 per cent ($F=1.758$, $p<.10$). The moderating effect of dynamic environment on HPWS was stronger, explaining additional variance of 11.5 per cent ($\beta = 0.386$, $p<.01$).

It is interesting that alternative measures of innovation performance yielded different results in respect of the tests for moderator effects. This suggests that, from a methodological point of view, researchers must remain wary of over-dependence on a narrow set of measures of performance with which to test their hypotheses. The paradoxical findings also remind us that more research is required before there is a clear conclusion to some of the most long-running debates about the HPWS – performance link.

5.2.3 Hypothesis regarding the moderating impact of organisational climate on the HPWS – performance link

Hypothesis 3 further explored the contingency perspective that the impact of HPWS on innovation is not impervious to circumstances within and without the firm. Following the literature on employee involvement and the role of a trust-based organisational climate in enabling high levels of innovation, a multivariate regression analysis was conducted to examine whether the impact of HPWS was greater in firms with an open, trust-based culture.

HPWS was found to be a significant predictor variable for workforce innovation, and organisational climate had no impact on this either as an independent variable or as a moderating variable. On the other hand, organisational climate was a strong

predictor variable for innovation revenue, while HPWS remained non significant in this model. Thus, while there is no evidence to support the hypothesis that a trust-based organisational climate will moderate the impact of HPWS, the data does reveal an interesting direct impact on innovation performance by organisational climate.

5.2.4 Country-of-ownership differences in HPWS and Innovation Performance

The final set of hypotheses, 4a and 4b, sought to examine the data from a perspective that combines a theoretical issue – whether innovation performance and adoption of HPWS can be related to the country of ownership of the firm – with a policy-related question, which relates to relative performance and practice differences between Irish-owned and foreign-owned firms.

A series of one-way ANOVA tests examined country-of-ownership differences in HR management systems (adoption of HPWS), organisational climate (existence of trust-based climate), and innovation performance (workforce innovation, innovation revenues and Innovation Competitiveness).

The results revealed that Irish-owned firms do differ significantly from foreign multinationals (European and US-owned firms operating in Ireland) across a range of innovation measures, including investment in innovation, innovation-related revenue performance, and innovation strategy. The results also revealed significant differences between Irish-owned firms and foreign multinationals in terms of their adoption of HPWS, with Irish firms being significantly less likely to adopt HPWS than their European or US counterparts. It seems noteworthy that there is a

consistent differential between indigenous, Irish-owned firms and foreign multi-nationals not only in their level of innovation performance, but also in the extent of HPWS. These findings are consistent with other research on human resource management practices and innovation performance in Ireland (e.g. Gunnigle et al, 2007), and are suggestive of the possibility of contingency effects in HPWS.

5.3 Limitations of the Study

This section considers the limitations of this study, with a view to appreciating the ways in which the study can point towards further research.

This was a multi-industry study. This was beneficial in providing a suitable sample for exploring issues such R&D Strategy and operating environment. On the other hand, there would be certain advantages to a study focussed on a single industry, which would potentially allow for a more homogenous sample from which to consider outcome measures such as innovation in products and services. Ideally, a single study with a sufficiently large sample size to allow for both a multi-industry analysis and a sub-sample of a single industry would allow for useful comparisons between the two approaches.

The study was cross-sectional, with all the inherent limitations associated with analysing 'snapshot' data. A longitudinal study would provide a far more effective means of analysing the influence of practices with regard for the time-lag effect that is inevitably involved in seeing an impact following the introduction of new HR practices. A longitudinal study would allow for analysis of trends over time while controlling for important variables such as investment in R&D, changing market

conditions, changing workforce size, and so on. Indeed, a longitudinal study conducted on a national basis would also facilitate potential quasi-experimental, or 'before and after' analysis of the impact of new HR practices. During the course of this study, firms were in the process of introducing new information and consultation arrangements in response to the enactment of the Employees (Provision of Information and Consultation) Act 2006. While it was beyond the scope of this study to examine the impact of this development, it is not inconceivable that a future national workplace survey carried out on a longitudinal basis would be capable of assessing such regulatory and legislative developments as they impact on the firm.

The study relied exclusively on management responses. While the use of two survey respondents and a matched pair approach to scoring was an important step in ensuring greater reliability, it is clearly the case that constructs such as organisational climate would be better measured by inclusion of data representing the views of employees as well as of management.

Finally, this study did not include any qualitative analysis. Ideally, in the context of an ongoing challenge to understand the 'black box' of HRM, the study would have benefited from a qualitative research component to complement the quantitative work.

5.4 Directions for Further Research and Policy Development

There is a growing critique of the quality of the research that is being drawn upon in the field of strategic HRM. From within the world of HRM academia, there have

been notable calls for a change of direction in the research agenda (Guest, 1997; Paauwe and Boselie, 2005; Becker and Huselid, 2006). For some, the concern lies in the apparent disconnection between research conducted by HRM academics and its application in the real world environment[4]. For others, the concerns lie more in the validity of the research itself.

Hoobler and Brown Johnson (2004) provide strong evidence that the body of research has a very limited adoption of methodological approaches, with the most frequently-employed methodology being empirical analysis of cross-sectional data from economy-wide or sector-specific research. Wall and Wood (2005) observe the tendency among researchers towards over-positive interpretation of results, where there is under-reporting of findings of no association, relative to positive findings of association which are reported even when the effect size is small and the level of statistical significance is moderate.

Wood and Wall (2007) argue that poorly articulated conceptual and theoretical issues, and poorly operationalised and confounded measures of these, have undermined the basis for much of the research examining the HRM–performance links. Hesketh and Fleetwood (2006) argue that poor meta-theoretical understanding has given rise to an ill-founded use of scientific methodologies to prove a point, almost regardless of the lack of theoretical explication. Fleetwood and Hesketh (2008) suggest that the under-theorized nature of the HRM field raises a fundamental problem for researchers, in that, irrespective of the volume of

[4] The AACSB International Taskforce Report on the Impact of Research (20??) highlights that this is a broader concern for Business School research generally

empirical evidence that accumulates, HRM will not be able to explain *why* the effects appear, until there is sufficient focus given to meta-theoretical issues.

The reasons posited for inadequacies in the research field persisting are interesting. Wall and Wood (2005) make the point that current funding mechanisms and models of collaboration among researchers are one of the reasons why much of the research has utilised less-than-ideal methodological approaches, and that a resolution of some of the core criticisms of the research will require greater levels of collaboration within the research community and between it and other stakeholders including governments and HRM practitioners. Questioning the practical utility of current research, Becker and Huselid (1998) suggest that both researchers and HR practitioners will benefit most from theoretical development that continues to broaden the focus of HRM research and the explanatory power of HRM theory.

There have been repeated critiques of the failure of the literature generally, and particularly the universalistic literature, to factor in broader sociological considerations that many authors feel have a fundamental impact on the explanation of why firms adopt particular bundles of HRM practices, and indeed on how these practices are related to performance.

Wood and Wall (2007) propose that different models of the HRM–performance relationship be tested to identify the relative weight, for example, of employee involvement versus skills and knowledge capabilities, and to explore the synergies between different factors. They suggest that refocusing future research on

examining diverse and potentially contending theoretical perspectives will enable researchers to become less dependent on a model that is based on links between performance and a 'generic and theoretically hybrid form of HRM'.

The limitations in the study highlighted in Section 5.3 provide some initial direction for future research. Broadly speaking, the opening up of the HRM 'black box' requires that future research continues to examine the HRM and HPWS proposition from multiple perspectives and using multiple lines of enquiry. As Wall and Wood (2005) note, research on the scale required to address the many limitations inherent in current research, including the present study, will demand resources of an order that is not available within current funding mechanisms. They argue for a 'big science project' that would require extensive institutional collaboration between academics and practitioners. I would concur with this proposal, and argue that it is only by adopting a more ambitious research agenda that the type of data that is required will become available.

5.5 Conclusion

This chapter has reviewed the findings emerging from this study, and has shown that a) there is evidence of a synergistic effect from bundling together HRM practices (HPWS); b) there is evidence of a moderating effect by variables including dynamic environment and R&D strategy on the HPWS – Innovation performance link, but only on one of the three measures of innovation performance; c) there is clear evidence of country of origin differences in HPWS adoption and in innovation strategy, with Irish-owned firms demonstrating lower levels of HPWS and a

tendency towards cost-based rather than innovation-based strategy, relative to other European and US-owned firms.

The chapter considered these findings in the context of limitations to the study, and considered some potential directions for future research.

Chapter 6
Conclusions

6.1 Introduction

This study has explored the evidence from a sample of Irish firms regarding the association between HPWS and innovation performance. The hypotheses in this study were designed to critically examine the universalistic proposition regarding HPWS. In the context of a relatively limited sample and a cross-sectional study, there was evidence that, on certain measures of innovation performance, that the impact of HPWS was moderated by dynamic environment, R&D Strategy and organisational climate. However, this effect was only apparent for the subjective measure of Innovation Competitiveness, and not for workforce innovation or innovation revenue performance. HPWS had a significant impact on innovation performance across all three measures.

The study illustrates both the potential and the limitations of this research approach. Clearly, there is no “silver bullet” when it comes to answering what are undoubtedly complex research questions about HRM and innovation. The methodological limitations of a study of this scale are evident, and mirror the limitations remarked on in critiques of the extant research literature. However, by showing that the moderation effect on the HPWS – innovation performance link will duly appear or disappear depending on which of three distinct measures of

innovation performance are used, the study reveals something about the complexity of the research challenge. It also reminds us of the need for caution when interpreting the positivistic findings that have dominated the research field for a decade or more.

The challenge of resolving long-running debates regarding the HPWS – performance link is an ongoing one. This research study, which provides some support for a contingency rather than universalistic perspective on the link, reinforces the proposition that more ambitious, multi-level, multi-method research projects will be required to move the debate on to where it needs to be focussed. Arguably, in the context of the real-world challenges facing firms in today's competitive globally economy, that focus needs to be on providing reliable and credible empirical evidence to support soundly-based theoretical perspectives on HRM that in turn inform HRM and general management practitioners within firms.

Useful suggestions have been put forward by eminent researchers in the field (e.g. Wood and Wall, 2007) regarding directions for future research that involve more ambitious collaboration on a national and international level between academics, practitioners and policy institutions. I echo these calls, and would suggest that strong potential exists in an Irish context to provide leadership on this ambitious agenda, in conjunction with international collaborators such as the EU Commission, EuroStat and the European Foundation.

This study also provides further evidence regarding a series of differences between Irish-owned firms and foreign-owned firms in relation to levels of investment in

innovation, innovation performance, and HPWS. From a theoretical perspective, this finding is suggestive of possible contingency effects. Perhaps more importantly, though, it is a strong reminder of the ongoing challenges for public policy in relation to enterprise development and the performance of indigenous industry in Ireland.

6.2 Potential implications for Public Policy

A key priority for public policy in Ireland is to stimulate greater levels of innovation-driven export growth in the economy. Significant focus is being placed on the ongoing innovation gap between multinational firms and Irish-owned SMEs. As the innovation agenda within the EU and domestically in Ireland continues to evolve, the range of policy instruments and funding supports that are targeted at SMEs continues to develop.

If, as this study suggests, there is a persistent and systemic difference between foreign-owned and Irish-owned firms in terms of the management style and organisational culture, then this must be viewed as a priority for public policy. Experience suggests that deficits in terms of management behaviour and skills are capable of being bridged with the right interventions. Management development, particularly around the hard and soft skills of innovation management, is an obvious area for public policy intervention. The potential of on-the-job training, mentoring and coaching for management in Irish-owned SMEs seems clear, particularly in the context where the necessary competencies exist elsewhere (in the multi-national firms). In light of the growing trend for multi-national

corporations to seek innovative ways of contributing to the challenges of industrial development in Ireland, the potential for skills transfer in areas such as innovation management seems an important consideration.

In view of the evidence of lower levels of HPWS practices among Irish-owned firms, it might be worth giving consideration to the potential of shared services or business process outsourcing for transactional elements of human resource management for SMEs. Likewise, it is worthwhile looking at the potential of industry-led organisations (including representative organisations such as IBEC, and skills providers such as Skillnets) to increase their level of support in relation to HRM for SMEs.

In terms of enterprise supports, it is worth exploring the potential of rejuvenating the supports available through Enterprise Ireland, in particular, for supporting management and leadership development. Public policy needs to continue experimenting with and evaluating specific supports for workplace innovation within SMEs, such as the Workplace Innovation Fund, and through mainstreaming the 'soft skills' of innovation management, communications and employee engagement through all of its funding programmes.

Public policy has a role in stimulating and mainstreaming innovative mechanisms for management – staff engagement, involving trade unions where appropriate. Ireland should examine the potential learning from successful policy initiatives in other EU member states, and should seek to maximise its benefits from EU-sponsored initiatives and supports for SMEs. Finally, Ireland should consider the

potential of public procurement as a vehicle for stimulating greater levels of innovation among SMEs.

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Appendix A

Full-version results tables for regression analysis and ANOVA.

Appendix A: Table 1
Multiple Regression Models 1 & 2: Impact of HR practices on Workforce Innovation

		Model	1	2
Step 1 Control Variables			Standardized β Coefficients	
Age of Company	Age of Company		.053	.489
Level of Unionisation	Level of Unionisation		.159	1.371
Size	No. of Employees		-.403*	-.598
Country of Ownership	Ireland			
	USA		.228	-.672
	Other European		-.143	-1.286
Industry	Agriculture, Forestry, Fisheries		-.114	.473
	Energy and Water		.124	1.583
	Chemicals and Pharmaceuticals		.031	1.906†
	Metal Manufacturing		.175	1.477
	Other Manufacturing		.109	1.521
	Building and Civil Eng.		.087	.679
	Retail and Distribution		.503†	2.387*
	Transport and Communications		-.039	.794
	Financial and Business Services		.199	1.668
	Personal, Domestic and Recreational Services		.164	.438

Appendix A: Table 1 (continued)

Step 2 Independent Variable	Employment tests		-0.359
	Competitive recruitment		-0.051
	Internal promotions		-1.282
	Merit-based promotions		0.870
	Cross-training, cross-deployment		0.907
	Company-specific training		0.805
	Generic training		0.849
	Routine performance appraisals and feedback		1.485
	Multi-source performance feedback		1.317
	Contingent Pay partly on group performance		0.237
	Skill-based pay		2.073*
	Participation programmes		-1.414
	Receive relevant operating performance information		-0.070
	Receive relevant financial performance information		1.209
	Receive relevant strategic information		-1.063
	Attitude surveys		0.391
	Access to formal grievance / dispute resolution		-1.109
	Self-directed work teams		0.249
Model Summary and change statistics	ΔR^2	.392	.445
	Model R^2	.392	.837
	Adjusted R^2	.088	.390
Analysis of Variance	Sum of Squares Regression	54.107	115.6
	Sum of Squares Residual	83.967	22.473
	Sum of Squares Total	138.074	138.074
	Model F	1.289	1.871
	Δ F	1.289	1.824
	Significance Δ F	.268	.145
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed			

Appendix A: Table 2
Multiple Regression Models 3 & 4: Impact of HPWS bundle on Workforce Innovation

		Model	3	4
Step 1 Control Variables			Standardized β Coefficients	
Age of Company	Age of Company		.053	-.035
Level of Unionisation	Level of Unionisation		.159	.334†
Size	No. of Employees		-.403*	-.374*
Country of Ownership	Ireland			
	USA		.228	-.130
	Other European		-.143	-.407*
Industry	Agriculture, Forestry, Fisheries		-.114	-.070
	Energy and Water		.124	.210
	Chemicals and Pharmaceuticals		.031	.119
	Metal Manufacturing		.175	.165
	Other Manufacturing		.109	.232
	Building and Civil Eng.		.087	.064
	Retail and Distribution		.503†	.553*
	Transport and Communications		-.039	-.046
	Financial and Business Services		.199	.147
	Personal, Domestic and Recreational Services		.164	.113
Step 2 Independent Variable	HPWS - 18-item index			.538**
Model Summary and change statistics	Δ R^2		0.392	0.17
	Model R^2		.392	0.562
	Adjusted R^2		.088	0.331
Analysis of Variance	Sum of Squares Regression		54.107	77.648
	Sum of Squares Residual		83.967	60.426
	Sum of Squares Total		138.074	138.074
	Model F		1.289	2.329*
	Δ F		1.289	11.298**
	Significance Δ F		.268	0.002

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed

Appendix A: Table 3
Multiple Regression Models 5 & 6: Impact of HR Practices on Innovation Revenues

		Model	5	6
			Standardized Coefficients	
Step 1 Control Variables			β	β
Age of Company	Age of Company		-.138	-.198
Level of Unionisation	Level of Unionisation		.210	.450*
Size	No. of Employees		.063	-.120
Country of Ownership	Ireland		.147	.439*
	USA		.215	.159
	Other European			
Industry	Agriculture, Forestry, Fisheries		0.091	0.048
	Energy and Water		-0.193	-0.261†
	Chemicals and Pharmaceuticals		0.259†	0.135
	Metal Manufacturing		-0.037	-0.132
	Other Manufacturing		-0.183	-0.246
	Building and Civil Eng.		-0.364**	-0.373†
	Retail and Distribution		0.053	0.022
	Transport and Communications		-0.212†	-0.301†
	Financial and Business Services		0.061	-0.101
	Personal, Domestic and Recreational Services		0.044	-0.001

Appendix A: Table 3 (continued)

Step 2 Independent Variable	Employment tests		0.099
	Competitive recruitment		-0.118
	Internal promotions		-0.156
	Merit-based promotions		0.113
	Cross-training, cross-deployment		-0.017
	Company-specific training		0.076
	Generic training		0.151
	Routine performance appraisals and feedback		0.404*
	Multi-source performance feedback		-0.111
	Contingent Pay partly on group performance		0.053
	Skill-based pay		-0.059
	Participation programmes		-0.041
	Receive relevant operating performance information		-0.098
	Receive relevant financial performance information		0.036
	Receive relevant strategic information		0.157
	Attitude surveys		0.288
	Access to formal grievance / dispute resolution		-0.145
	Self-directed work teams		-0.169
Model Summary and change statistics	ΔR^2	.389	.178
	Model R^2	.389	.567
	Adjusted R^2	.236	.227
Analysis of Variance	Sum of Squares Regression	26880.392	39222.57705
	Sum of Squares Residual	42275.766	29933.58084
	Sum of Squares Total	69156.158	69156.15789
	Model F	2.543**	1.668†
	Δ F	2.543	.962
	Significance Δ F	.005	.517
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed			

Appendix A: Table 4
Multiple Regression Models 7 & 8: Impact of HPWS bundle on Innovation Revenues

	Model	7	8
		Standardized Coefficients	
Step 1 Control Variables		β	β
Age of Company	Age of Company	-.138	
Level of Unionisation	Level of Unionisation	.210	.251†
Size	No. of Employees	.063	.024
Country of Ownership	Ireland	0.147	.223
	USA	0.215	.165
	Other European		
Industry	Agriculture, Forestry, Fisheries	0.091	0.086
	Energy and Water	-0.193	-0.206†
	Chemicals and Pharmaceuticals	0.259†	0.235†
	Metal Manufacturing	-0.037	-0.051
	Other Manufacturing	-0.183	-0.205
	Building and Civil Eng.	-0.364**	-0.387**
	Retail and Distribution	0.053	0.047
	Transport and Communications	-0.211	-0.247†
	Financial and Business Services	0.061	0.025
	Personal, Domestic and Recreational Services	0.044	0.020
Step 2 Independent Variable	HPWS - 18-item index		0.223†
Model Summary and change statistics	Δ R^2	.389	0.031†
	Model R^2	.389	0.420
	Adjusted R^2	.236	0.263
Analysis of Variance	Sum of Squares Regression	26880.39186	29041.834
	Sum of Squares Residual	42275.76604	40114.324
	Sum of Squares Total	69156.15789	69156.158
	Model F	2.543**	2.67**
	Δ F	2.543	3.179
	Significance Δ F	.005	.080

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed

Appendix A: Table 5
Regression Models 9, 10, 11: Impact of HPWS interaction with Dynamic Environment on Workforce Innovation

		Model		
		9	10	11
		Standardized Coefficients		
		β	β	B
Step 1 Control Variables				
Age of Company	Age of Company	0.054†	-0.033	-0.032
Level of Unionisation	Level of Unionisation	0.158*	0.328	0.325
Size	No. of Employees	-0.403*	-0.37*	-0.377*
Country of Ownership	USA	0.229	-0.138	-0.131
	Other European	-0.14	-0.395†	-0.376
Industry	Agriculture, Forestry, Fisheries	-0.115	-0.068	-0.074
	Energy and Water	0.124	0.207	0.203
	Chemicals and Pharmaceuticals	0.03	0.111	0.103
	Metal Manufacturing	0.175	0.167	0.166
	Other Manufacturing	0.103†	0.213	0.212
	Building and Civil Eng.	0.088	0.06†	0.044
	Retail and Distribution	0.503†	0.561*	0.559*
	Transport and Communications	-0.04	-0.054	-0.059
	Financial and Business Services	0.199	0.154	0.157
	Personal, Domestic and Recreational Services	0.165	0.107	0.107
Step 2 Independent Variables	HPWS		0.543**	0.523*
	Dynamic Environment		-0.049	-0.061
Step 3 Interaction Effect	HPWS x Dynamic Environment			-0.042
Model Summary and change statistics	Δ R^2	0.392	0.172	0.001
	Model R^2	0.392	0.564	0.564
	Adjusted R^2	0.077	0.289	0.263
Analysis of Variance	Sum of Squares Regression	54.053	77.791	77.890
	Sum of Squares Residual	83.944	60.206	60.107
	Sum of Squares Total	137.997	137.997	137.997
	Model F	1.245	2.052*	1.872†
	Δ F	1.245*	5.323*	0.043
	Significance Δ F	0.297	0.011	0.837

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed

Dependent Variable Workforce Innovation

Appendix A: Table 6
Regression Models 12, 13, 14: Interaction of HPWS with Dynamic Environment on Innovation Revenues

		Model 12	13	14
Step 1 Control Variables		Standardized β Coefficients		
Age of Company	Age of Company	-0.146	-0.144	-0.128
Level of Unionisation	Level of Unionisation	0.217	0.265†	0.26†
Size	No. of Employees	0.07	0.001	0.001
Country of Ownership	USA	0.144	0.227	0.183
	Other European	0.213	0.168	0.165
Industry	Agriculture, Forestry, Fisheries	0.09	0.075	0.066
	Energy and Water	-0.193	-0.192	-0.206
	Chemicals and Pharmaceuticals	0.257†	0.24†	0.231
	Metal Manufacturing	-0.039	-0.066	-0.065
	Other Manufacturing	-0.185	-0.194	-0.167
	Building and Civil Eng.	-0.364**	-0.378**	-0.413**
	Retail and Distribution	0.068	0.042	0.029
	Transport and Communications	-0.212†	-0.232†	-0.228†
	Financial and Business Services	0.062	0.016	0.023
	Personal, Domestic and Recreational Services	0.043	0.03	0.036
Step 2 Independent Variables	HPWS		0.212	0.153
	Dynamic Environment		0.115	0.107
Step 3 Interaction Effect	HPWS x Dynamic Environment			-0.147
Model Summary and change statistics	Δ R^2	0.393	0.042	0.015
	Model R^2	0.393	0.435	0.450
	Adjusted R^2	0.235	0.263	0.270
Analysis of Variance	Sum of Squares Regression	27137.006	30042.591	31091.383
	Sum of Squares Residual	41995.481	39089.895	38041.104
	Sum of Squares Total	69132.486	69132.486	69132.486
	Model F	2.499**	2.532**	2.497**
	Δ F	2.499	2.081	1.516
	Significance Δ F	0.007	0.005	0.005

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed
Dependent Variable Innovation Revenue performance

Appendix A: Table 7
Regression Models 15, 16, 17: Interaction of HPWS with Dynamic Environment on firms' innovation competitiveness

		Model		
		15	16	17
Step 1 Control Variables		Standardized β Coefficients		
Age of Company	Age of Company	0.117	.126	0.18
Level of Unionisation	Level of Unionisation	-.087	-.121	-0.112
Size	No. of Employees	.172	.178	0.164
Country of Ownership	Ireland	--	--	--
	USA	.080	.181	0.187
	Other European	.009	.058	-0.006
Industry	Agriculture, Forestry, Fisheries	.143	.137	0.187
	Energy and Water	-.220	-.188	-0.053
	Chemicals and Pharmaceuticals	-.145	-.114	0.022
	Metal Manufacturing	.041	.041	0.11
	Other Manufacturing	.140	.178	0.391†
	Building and Civil Eng.	-.014	.021	0.107
	Retail and Distribution	-.150	-.155	-0.051
	Transport and Communications	-.048	.000	0.094
	Financial and Business Services	-.051	-.036	0.042
	Personal, Domestic and Recreational Services	.017	.051	0.142
Step 2 Independent Variables	HPWS		-.206	-0.287*
	Dynamic Environment		.134	0.176
Step 3 Interaction Effect	HPWS x Dynamic Environment			0.386**
Model Summary and change statistics	Δ R^2	0.212	0.038	0.115
	Model R^2	0.212	0.250	0.365
	Adjusted R^2	-0.003	0.009	0.145
Analysis of Variance	Sum of Squares Regression	4.940	5.817	8.501
	Sum of Squares Residual	18.355	17.479	14.795
	Sum of Squares Total	23.296	23.296	23.296
	Model F	0.987	1.038	1.660†
	Δ F	0.987	1.329	9.433
	Significance Δ F	0.481	0.273	0.003

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed
Dependent Variable Innovation Competitiveness

Appendix A: Table 8
Regression Models 18, 19, 20: Impact of HPWS interaction with R&D Strategy on Workforce Innovation

		Model		
		18	19	20
Step 1 Control Variables		Standardized β Coefficients		
Age of Company	Age of Company	-0.356	-.387†	-.388†
Level of Unionisation	Level of Unionisation	-0.287	-0.213	-0.16
Size	No. of Employees	0.354	.423†	0.395
Country of Ownership	Ireland	-0.277	-0.164	-0.046
	USA	-0.381	-0.582	-0.528
	Other European	-0.551	-0.718	-0.628
Industry	Agriculture, Forestry, Fisheries	-0.248	-0.185	-0.164
	Energy and Water	-0.134	-0.06	-0.118
	Chemicals and Pharmaceuticals	0.069	0.137	0.141
	Metal Manufacturing	0.012	0.019	0.026
	Other Manufacturing	-0.011	0.075	0.021
	Building and Civil Eng.	-0.169	-0.159	-0.172
	Retail and Distribution	.500†	.492†	.500†
	Transport and Communications	-0.313	-.355†	-0.379
	Financial and Business Services	0.049	-0.076	-0.157
	Personal, Domestic and Recreational Services	0.048	-0.045	-0.058
Step 2 Independent Variables	HPWS		.463†	.506†
	R&D Strategy		-0.083	-0.032
Step 3 Interaction Effect	HPWS x R&D Strategy			0.163
Model Summary and change statistics	Δ R^2	0.519	0.092	0.011
	Model R^2	0.519	0.611	0.621
	Adjusted R^2	0.114	0.199	0.172
Analysis of Variance	Sum of Squares Regression	29.863	35.148	35.754
	Sum of Squares Residual	27.681	22.396	21.790
	Sum of Squares Total	57.544	57.544	57.544
	Model F	1.281	1.482	1.382
	Δ F	1.281	2.006	0.445
	Significance Δ F	0.300	0.165	0.514
Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed Dependent Variable Workforce Innovation				

Appendix A: Table 9
Regression Models 21, 22, 23: Impact of HPWS interaction with R&D Strategy on Innovation Revenues

		Model		
		21	22	23
Step 1 Control Variables		Standardized β Coefficients		
Age of Company	Age of Company	-0.052	-0.008	-0.008
Level of Unionisation	Level of Unionisation	-0.071	-0.156	-0.155
Size	No. of Employees	0.264	.336*	.339*
Country of Ownership	Ireland	-0.74	-0.721	-0.724
	USA	-0.558	-0.723	-0.72
	Other European	-0.792	-.892†	-.894†
Industry	Agriculture, Forestry, Fisheries	0.089	0.085	0.085
	Energy and Water	-.291*	-.294†	-.294†
	Chemicals and Pharmaceuticals	0.278	0.246	0.248
	Metal Manufacturing	-0.031	-0.077	-0.078
	Other Manufacturing	-0.135	-0.192	-0.189
	Building and Civil Eng.	-.333*	-.343*	-.342*
	Retail and Distribution	0.063	0.085	0.09
	Transport and Communications	-0.072	-0.101	-0.098
	Financial and Business Services	0.054	-0.002	-0.002
	Personal, Domestic and Recreational Services	0.048	0.034	0.034
Step 2 Independent Variables	HPWS		.292†	0.287
	R&D Strategy		0.079	0.083
Step 3 Interaction Effect	HPWS x R&D Strategy			-0.016
Model Summary and change statistics	Δ R^2	0.411	0.050	0.000
	Model R^2	0.411	0.461	0.461
	Adjusted R^2	0.181	0.212	0.191
Analysis of Variance	Sum of Squares Regression	22961.354	25734.622	25744.328
	Sum of Squares Residual	32890.232	30116.964	30107.258
	Sum of Squares Total	55851.586	55851.586	55851.586
	Model F	1.789	1.851	1.710
	Δ F	1.789	1.796	0.012
	Significance Δ F	0.067	0.179	0.912

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed
Dependent Variable Innovation Revenues

Appendix A: Table 10
Regression Models 24, 25, 26: Impact of HPWS interaction with R&D Strategy on Innovation Competitiveness

		Model		
		24	25	26
Step 1 Control Variables		Standardized β Coefficients		
Age of Company	Age of Company	.346*	.335*	.333*
Level of Unionisation	Level of Unionisation	-0.047	0.001	0.047
Size	No. of Employees	-0.11	-0.09	-0.224
Country of Ownership	Ireland	-0.209	-0.16	0.095
	USA	0.091	0.143	0.405
	Other European	-0.218	-0.087	0.232
Industry	Agriculture, Forestry, Fisheries	0.21	0.234	0.212
	Energy and Water	-0.178	-0.068	0.01
	Chemicals and Pharmaceuticals	-0.13	-0.119	-0.219
	Metal Manufacturing	0.087	0.11	0.15
	Other Manufacturing	0.257	0.329	.363†
	Building and Civil Eng.	0.097	0.149	0.248
	Retail and Distribution	-0.161	-0.082	-0.087
	Transport and Communications	0.132	0.16	0.193
	Financial and Business Services	-0.093	-0.005	-0.047
	Personal, Domestic and Recreational Services	0.114	0.192	0.171
Step 2 Independent Variables	HPWS		-0.22	-.456*
	R&D Strategy		0.26	0.212
Step 3 Interaction Effect	HPWS x R&D Strategy			.398†
Model Summary and change statistics	Δ R^2	0.376	0.050	0.056
	Model R^2	0.376	0.426	0.481
	Adjusted R^2	0.120	0.146	0.207
Analysis of Variance	Sum of Squares Regression	6.950	7.865	8.894
	Sum of Squares Residual	11.532	10.617	9.588
	Sum of Squares Total	18.482	18.482	18.482
	Model F	1.469	1.523	1.758†
	Δ F	1.469	1.595	3.863
	Significance Δ F	0.162	0.217	0.057

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed
Dependent Variable Innovation Competitiveness

Appendix A: Table 11
Regression Models 27, 28, 29: Impact of HPWS interaction with Organisational Climate on Workforce Innovation

		Model		
		27	28	29
		Standardized β Coefficients		
Step 1 Control Variables				
Age of Company	Age of Company	0.269	-0.191	-0.182
Level of Unionisation	Level of Unionisation	-2.250*	-2.392*	-2.255*
Size	No. of Employees	0.747	1.722†	1.615
Country of Ownership	Ireland	-0.546	-0.49	-0.449
	USA	0.01	-0.77	-0.742
	Other European	-0.785	-1.294	-1.215
Industry	Agriculture, Forestry, Fisheries	-0.681	-0.481	-0.462
	Energy and Water	0.665	1.218	1.196
	Chemicals and Pharmaceuticals	0.168	0.725	0.717
	Metal Manufacturing	0.862	0.909	0.882
	Other Manufacturing	0.369	0.88	0.854
	Building and Civil Eng.	0.401	0.322	0.306
	Retail and Distribution	1.859†	2.168*	2.130*
	Transport and Communications	-0.194	-0.267	-0.269
	Financial and Business Services	0.963	0.795	0.711
	Personal, Domestic and Recreational Services	0.969	0.743	0.733
Step 2 Independent Variables	HPWS		2.919**	2.866**
	Organisational Culture		0.007	0.044
Step 3 Interaction Effect	HPWS x Organisational Culture			0.095
Model Summary and change statistics	Δ R^2	0.386	0.174	0.000
	Model R^2	0.386	0.560	0.560
	Adjusted R^2	0.047	0.267	0.239
Analysis of Variance	Sum of Squares Regression	52.798	76.581	76.602
	Sum of Squares Residual	83.951	60.168	60.146
	Sum of Squares Total	136.749	136.749	136.749
	Model F	1.140	1.909†	1.743†
	Δ F	1.140	5.336	0.009
	Significance Δ F	0.368	0.011	0.925

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed
Dependent Variable Workforce Innovation

Appendix A: Table 12
Regression Models 30, 31, 32: Impact of HPWS interaction with Organisational Climate on Innovation Revenues

		Model		
		30	31	32
Step 1 Control Variables		Standardized β Coefficients		
Age of Company	Age of Company	-0.037	-0.003	-0.008
Level of Unionisation	Level of Unionisation	.311†	.313*	.312*
Size	No. of Employees	-0.082	-0.112	-0.112
R&D Strategy	R&D Strategy	0.16	0.005	-0.026
Country of Ownership	Ireland	-0.719	-0.646	-0.674
	USA	-0.607	-0.726	-0.732
	Other European	-0.773	-.776†	-.807†
Industry	Agriculture, Forestry, Fisheries	0.097	0.059	0.053
	Energy and Water	-0.239	-.453**	-.457**
	Chemicals and Pharmaceuticals	0.27	0.275	0.259
	Metal Manufacturing	-0.04	-0.019	-0.038
	Other Manufacturing	-0.121	-0.253	-0.253
	Building and Civil Eng.	-.313†	-.322*	-.328*
	Retail and Distribution	0.059	0.045	0.03
	Transport and Communications	-0.07	-0.074	-0.079
	Financial and Business Services	0.078	-0.055	-0.055
	Personal, Domestic and Recreational Services	0.084	0.048	0.035
Step 2 Independent Variables	HPWS		0.255	0.279
	Organisational Culture		.368*	.364*
Step 3 Interaction Effect	HPWS x Organisational Culture			-0.073
Model Summary and change statistics	Δ R^2	0.432	0.120	0.004
	Model R^2	0.432	0.552	0.556
	Adjusted R^2	0.184	0.322	0.309
Analysis of Variance	Sum of Squares Regression	23775.778	30412.729	30608.137
	Sum of Squares Residual	31318.783	24681.832	24486.424
	Sum of Squares Total	55094.561	55094.561	55094.561
	Model F	1.742†	2.400**	2.250**
	Δ F	1.742	4.975	0.287
	Significance Δ F	0.076	0.012	0.595

Notes: N=132; * p<0.05 ** p<0.01 *** p<0.001 † p>.10; all tests are one-tailed
Dependent Variable Innovation Revenues

Appendix A: Table 13
Innovation Revenues x Country of Ownership, Post-hoc tests

(I) Country Typology	(J) Country Typology	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Ireland	USA	-16.936*	6.481	.030	-32.66	-1.21
	Other European	-8.646	6.840	.626	-25.24	7.95
USA	Ireland	16.936*	6.481	.030	1.21	32.66
	Other European	8.290	7.761	.862	-10.54	27.12
Other European	Ireland	8.646	6.840	.626	-7.95	25.24
	USA	-8.290	7.761	.862	-27.12	10.54

* The mean difference is significant at the 0.05 level.

Appendix A: Table 14
R&D Strategy x Country of Ownership: Post-hoc tests

Dependent Variable	(I) Country Typology	(J) Country Typology	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Low Cost Strategy	Ireland	USA	18.112*	6.525	.019	2.28	33.94
		Other European	9.885	6.806	.447	-6.63	26.40
	USA	Ireland	-18.112*	6.525	.019	-33.94	-2.28
		Other European	-8.227	7.742	.870	-27.01	10.56
	Other European	Ireland	-9.885	6.806	.447	-26.40	6.63
		USA	8.227	7.742	.870	-10.56	27.01
Differentiation Strategy	Ireland	USA	-16.936*	6.481	.030	-32.66	-1.21
		Other European	-8.646	6.840	.626	-25.24	7.95
	USA	Ireland	16.936*	6.481	.030	1.21	32.66
		Other European	8.290	7.761	.862	-10.54	27.12
	Other European	Ireland	8.646	6.840	.626	-7.95	25.24
		USA	-8.290	7.761	.862	-27.12	10.54

* The mean difference is significant at the 0.05 level.

Appendix A: Table 15
R&D Investment Levels by Country of Ownership: Post-hoc Between-Group Comparisons

(I) Country Typology	(J) Country Typology	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Ireland	USA	-5.18512*	.90550	.000	-7.3868	-2.9834
	Other European	-.82500	.95557	1.000	-3.1485	1.4985
USA	Ireland	5.18512*	.90550	.000	2.9834	7.3868
	Other European	4.36012*	1.10058	.000	1.6841	7.0362
Other European	Ireland	.82500	.95557	1.000	-1.4985	3.1485
	USA	-4.36012*	1.10058	.000	-7.0362	-1.6841

* The mean difference is significant at the 0.05 level.

Appendix A: Table 16
HPWS x Country of Ownership Post-hoc Tests

(I) Country Typology	(J) Country Typology	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Ireland	USA	-25.49576*	4.78626	.000	-37.2097	-13.7818
	Other European	-12.45624*	4.64153	.027	-23.8160	-1.0965
USA	Ireland	25.49576*	4.78626	.000	13.7818	37.2097
	Other European	13.03951	5.35288	.051	-.0612	26.1402
Other European	Ireland	12.45624*	4.64153	.027	1.0965	23.8160
	USA	-13.03951	5.35288	.051	-26.1402	.0612

* The mean difference is significant at the 0.05 level.

Appendix B

HR Questionnaire

HR MANAGER QUESTIONNAIRE

UNIVERSITY *of* LIMERICK
OLLSCOIL LUIMNIGH

University of Kansas
School of Business

UL - KU 2006 SURVEY OF HUMAN RESOURCE PRACTICES AND WORKPLACE INNOVATION

A research study sponsored by

National Centre for Partnership Performance

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PROJECT DIRECTORS

Patrick Flood, Ph.D., received his doctorate from the London School of Economics. He is currently Research Professor in the Kemmy Business School at the University of Limerick where he also directs the strategic leadership research programme. Previous appointments include EU Postdoctoral fellow at London Business School, Fulbright scholar at the R.H. Smith School of Business, University of Maryland at College Park, Academic Visitor and British Council scholar at the London School of Economics.

James P. Guthrie, Ph.D., is Professor of Business and Charles W. Oswald Faculty Fellow with the School of Business at the University of Kansas. He received his B.A. and M.B.A. from the State University of New York at Buffalo and his PhD from the University of Maryland. He is currently Visiting Professor with the Kemmy Business School, University of Limerick. He has previously held visiting faculty appointments with the University of Waikato in New Zealand and with the Consortium of Universities for International Business Studies in Italy.

Wenchuan Liu, Ph.D., is Postdoctoral Fellow at the University of Limerick. He previously worked as an Assistant Professor at North-eastern University, China. He gained his PhD from the Kemmy Business School, University of Limerick for a study of the economic impact of high performance work systems in Irish industry.

Sarah MacCurtain, Ph.D., is a Lecturer with the Kemmy Business School, University of Limerick. She received her PhD from Aston University. She is co-author of Effective Top Teams (2001, Blackhall) and Managing Knowledge Based Organisations (2002, Blackhall).

Claire Murphy, Ph.D., is a Research Scholar at the Kemmy Business School, University of Limerick. She received her PhD from the University of Limerick in 2004. She has conducted research on organizational justice, the psychological contract, absenteeism, continuing professional education, and health services management.

Thadeus Mkamwa, is a registered doctoral student at the Kemmy Business School, University of Limerick. His research topic is on HPWS and diversity management in Irish workplaces. He received his STB from Pontifical University Urbaniana at St.Paul's, Tanzania. He also graduated with BA and MS from Elmira College, New York. He has also lectured on Development Studies at St. Augustine University of Tanzania.

Cathal O'Regan, is currently a National Coordinator at the National Centre for Partnership and Performance of Ireland. He is a registered doctoral student at the University of Limerick.

If you have questions about any aspect of this study, please contact one of the project directors. Contact information is provided on the front page of the questionnaire.

Would you like a summary report of the findings of the study? Yes____ No____

If 'yes', please provide name and address or attach a business card:

Name: _____

Address: _____

_____

_____

Email:_____

Please provide responses that best describe HR practices in your operations in Ireland during 2005-06.

I. HUMAN RESOURCE PRACTICES

Please answer the following questions ***with respect to two broad groups of employees during 2005-06:***

Group A = Production, maintenance, service and clerical employees.
Group B = Executives, managers, supervisors and professional/technical employees.

	Group A	***Group B***
Staffing: What proportion of your employees		
Are interviewed during the hiring process using structured, standardized interviews (e.g., behavioural or situational interviews), as opposed to unstructured interviews	_____%	_____%
Are administered one or more employment tests (e.g., skills tests, aptitude tests, mental/cognitive ability tests) prior to hiring?	_____%	_____%
Are hired for entry level jobs based on employment test(s) which have been analysed in terms of the test's ability to predict job success (i.e., the tests have been validated)	_____%	_____%
Are hired on the basis of intensive/extensive recruiting efforts resulting in many qualified applicants	_____%	_____%
Hold jobs which have been subjected to a formal job analysis to identify position requirements (such as required knowledge, skills or abilities)?	_____%	_____ %
Hold non-entry level jobs as a result of internal promotions (as opposed to hired from outside of the organisation)?	_____%	_____ %
Hold non-entry level jobs due to promotions based upon merit or performance, as opposed to seniority?	_____%	_____ %
Have job security: Employment with the firm is almost guaranteed.....	_____%	_____ %

Please provide responses that **best describe HR practices** in your operations in Ireland during **2005-06.**

Group A = Production, maintenance, service, clerical employees.
Group B = Executives, managers, supervisors, professional/technical employees.

	Group A	***Group B***
Performance Management & Remuneration: What proportion of your employees		
Receive formal performance appraisals and feedback on a routine basis? …….....	_____%	_____ %
Receive formal performance feedback from more than one source (i.e., feedback from several individuals such as supervisors, peers etc.)?.....	_____%	_____ %
Receive compensation partially contingent on *individual* merit or performance?.....	_____%	_____ %
Receive compensation partially contingent on *group* performance (e.g., profit-sharing, gainsharing, team-based)?……..……	_____%	_____ %
Own shares of your organisation's stock (e.g., an employee stock ownership plan)?	_____%	_____ %
Are paid primarily on the basis of a skill or knowledge-based pay system (versus a job-based system)? That is, pay is primarily determined by a person's skill or knowledge level as opposed to the particular job that they hold	_____%	_____ %
In terms of total remuneration (pay and benefits), what is your organisation's position relative to the market? Assume the market is at the 50th percentile and indicate your position relative to this. For example, a response of "40" indicates that you are at the 40th percentile -- 10% below the market.	_____%	_____ %
What proportion of the average employee's total annual remuneration is contingent on performance? …….....	_____%	_____ %
Training & Development: What proportion of your employees		
Have been trained in a variety of jobs or skills (are "cross trained") and/or routinely perform more than one job (are "cross utilized")?	_____%	_____ %
Have received intensive/extensive training in company-specific skills (e.g., task or firm-specific training)……..……	_____%	_____ %
Have received intensive/extensive training in generic skills (e.g., problem-solving, communication skills, etc.)……..……	_____%	_____ %
What is the *average number of hours of training* received by a typical employee *per year*?	_____#	_____ #

Please provide responses that best describe HR practices in your operations in Ireland during 2005-06.

Group A = Production, maintenance, service, clerical employees.
Group B = Executives, managers, supervisors, professional/technical employees.

	Group A	***Group B***
Communication & Participation: What proportion of your employees		
Are involved in programmes designed to elicit participation and employee input (e.g., quality circles, problem-solving or similar groups)? …….....	_____%	_____ %
Are provided relevant operating performance information (e.g., quality, productivity, etc.) …….....	_____%	_____ %
Are provided relevant financial performance information …….....	_____%	_____ %
Are provided relevant strategic information (e.g., strategic mission, goals, tactics, competitor information, etc.) …….....	_____%	_____ %
Are routinely administered attitude surveys to identify and correct employee morale problems?.....	_____%	_____ %
Have access to a formal grievance/complaint resolution procedure…….....	_____%	_____ %
Are organized in self-directed work teams in performing a major part of their work roles?	_____%	_____ %
Other HR Issues:		
What proportion of your workforce is unionized?	_____%	_____ %
Please estimate your annual **voluntary** employee turnover rate (percent who voluntarily departed your organisation).....	_____%	_____ %
Please estimate your annual **involuntary** employee turnover rate (percent who involuntarily departed your organisation – i.e., were discharged).....	_____%	_____ %
Please estimate the average number of days per year employees were absent.....	_____#	_____ #
Please estimate the approximate number of full time equivalent (FTE) employees in your organisation …….....	_____#	_____ #

Please provide responses that best describe HR practices in your operations in Ireland during 2005-06.

Group A = Production, maintenance, service, clerical employees.
Group B = Executives, managers, supervisors, professional/technical employees.

	Group A	***Group B***
Diversity / Work-life balance / Equality of Opportunity: What proportion of your employees		
Receive equality/diversity training	_____%	_____%
Would receive their normal, full rate of pay going on maternity leave from this workplace? (Calculate on the basis of **female employees** only)	_____%	_____%
Are afforded any of the following working time arrangements?		
Working at or from home in normal working hours……	_____%	_____%
Ability to reduce working hours (e.g. switching from full-time to part-time employment)……..	_____%	_____%
Ability to increase working hours (e.g. switching from part-time to full-time employment)…….	_____%	_____%
Job sharing schemes (sharing a full-time job with another employee)……	_____%	_____%
Flexi-time (where an employee has no set start or finish time but an agreement to work a set number of hours per week or per month)……..	_____%	_____%
Ability to change shift patterns……..	_____%	_____%
Working compressed hours (e.g. a 9 day fortnight / 4½ day ……	_____%	_____%
Night working…….	_____%	_____%
Are entitled to any of the following?		
Working only during school term-time……..	_____%	_____%
Workplace nursery or nursery linked with workplace……	_____%	_____%
Financial help with child-care (e.g. loans, repayable contributions to fees for childcare outside of the workplace, subsidised places not located at the establishment)……	_____%	_____%
A specific period of leave for carers of older adults (in addition to time off for emergencies)…….	_____%	_____%
Belong to the following categories		
Female ……	_____%	_____%
Aged ……..	_____%	_____%
50+		
White • Irish……	_____%	_____%
• Western European (excl. Irish)……..	_____%	_____%

- Eastern European…… _____% _____%
- Other white background…… _____% _____%

Black …….. _____% _____%

Asian …….. _____% _____%

Has a long-term disability that affects the amount or type of work they can do……. _____% _____%

Please use the scale below to indicate your level of agreement or disagreement with each of the following statements. Write a scale number in the space provided beside each statement.

Strongly *Disagree* 1 2 3 4 5 Strongly *Agree*

Our employees can expect to stay with the organization as long as they wish……. _____

Our company is committed to a goal of long-term employment security……..…. _____

If this organization were facing economic problems, employee downsizing would be the last option used ……..._____

During the last two years, has your firm engaged in employee downsizing (redundancies)? Yes ____ No ____

If yes, what percentage of your workforce was made redundant during this time? _____%

Please provide responses that best describe HR practices in your operations in Ireland during 2005-06.

Diversity / Work-life balance / Equality of Opportunity

Does this workplace have a formal written policy on equal opportunities or managing diversity? Yes____ No___

Has a senior manager been designated to champion equality and diversity in your organization?Yes___ No___

To what extent is it integrated into overall corporate strategy? (Please circle as appropriate)

Not at all 1 2 3 4 5 To a very great extent

If yes, on which of the following grounds does the policy explicitly mention equality of treatment or discrimination? (Please circle all that are appropriate)

Sex/Gender	Race/Ethnicity	Religion or belief	Membership of the travelling community	Sexual orientation
Disability	Age	Marital status	Family status	Nationality

Other (please specify

How is the policy made known to employees? (Please circle all that are appropriate)

Part of induction programme	In contract of employment	In staff handbook	Other way (please specify)
Told by supervisor/line-manager/foreman	In letter of appointment	Notice-board	

Have you tried to measure the effects of your equal opportunities policies on the workplace or on the employees at this establishment? Yes_____ No_____

Do you monitor recruitment and selection by any of the following characteristics? If yes, which ones? (Please circle all that are appropriate)

Gender Ethnic background Disability Age Other, please specify_____

Do you monitor promotions by any of these characteristics? If yes, which ones? (Please circle all that are appropriate)

Gender Ethnic background Disability Age Other, please specify_____

Do you monitor relative pay rates by any of these characteristics? If yes, which ones? (Please circle all that are appropriate)

Gender Ethnic background Disability Age Other, please specify_____

Have you made a formal assessment of the extent to which this workplace is accessible to employees or job applicants with disabilities? Yes_____ No_____

Have you made any adjustments at this workplace to accommodate disabled employees?
Yes_____ No_____

If an employee needed to take time off at short notice to deal with an emergency involving a child or family member, how would they usually take this time off? (Please circle as appropriate)

Take time off but make it up later	As leave without pay	As sick leave	Other (please specify)
As annual leave	As special paid leave	Is not allowed	Has never been requested

Partnership: To what extent do you agree with the following statements?

Strongly disagree 1 2 3 4 5 Strongly agree

There is a high level of trust between management and employees _____

Employees are well informed on the views and concerns of company management _____

Company management are well informed on the views and concerns of employees _____

Partnership: In this organisation…

Workplace partnership is… (Please circle appropriate number)

1	**2**	**3**	**4**	**5**	**6**
Non-existent	Largely confined to a few key individuals	Largely confined within formal partnership structures	Evident in at least certain parts	Evident across most of it	Now the norm for working

Partnership: Are there formal arrangements in place for…

Workplace partnership? (Please tick one)

❒No

❒No, but under active consideration

❒Yes How many years has this arrangement been in place? _____

Informing and consulting employees? (Please tick one)

❒No

❒No, but under active consideration

❒Yes, but may require adjustment to comply with forthcoming legislation

❒Yes, and already largely compliant with requirements of forthcoming legislation

Partnership: To what extent are each of the following issues the subject of discussion between management and employees (and/or their representatives)?

(Please insert appropriate number in space provided)

No discussion 1 2 3 4 5 Very substantial discussion

Production issues (e.g. level of production or sales, quality of product or service) _____

Employment issues (e.g. avoiding redundancies, reducing labour turnover) _____

Financial issues (e. g. financial performance, budgets or budgetary cuts) _____

Future plans (e.g. changes in goods produced or services offered, company expansion or contraction) _____

Pay issues (e.g. wage or salary reviews, bonuses, regarding, job evaluation) _____

Leave and flexible working arrangements, including working time _____

Welfare services and facilities (e.g. child care, rest rooms, car parking, canteens, recreation) _____

Government regulations (e.g. EU Directives, Local Authority regulations) _____

Work organisation (e.g. changes to working methods, allocation of work between employees, multi-skilling) _____

Health and safety _____

Equal opportunities _____

Training _____
Product innovations _____
Service innovations _____
Technical innovations _____
Other (please specify) _____ _____

II. ORGANISATIONAL CHARACTERISTICS

What proportion of your organisation's total sales (turnover) comes from products or services introduced within the previous 12 months? …… _____%

How long has your local organisation been in operation? …….. _____ years.

In what country is your corporate headquarter located? _____

Which of the following categories best describes your **primary** industry sector? (Please tick one)

___ Agriculture/forestry/fishing
___ Energy & Water
___ Chemical Products
___ Metal Mfg. (mechanical, electrical & instrument engineering; data processing machinery)
___ Other Mfg (e.g., food, drink, tobacco; textiles, clothing; paper, publishing; rubber, plastics)
____ Building & civil engineering
____ Retail & distribution; hotels
____ Transport & Communication (e.g., rail, postal, telecoms)
____ Banking; finance, insurance; business services (e.g., consultancies, PR, legal, etc.)
____ Personal, domestic, recreational services
____ Health services
____ Other services (e.g, R&D, television, radio, etc.)
____ Other: _____

Approximately what proportion of your total sales (turnover) is from the above industry? _____ %

Which category best approximates the **percentage of total annual sales/turnover** spent on research & development (R&D) in your organisation? (Please **circle one** category).

(a) < 1% (d) 3% (g) 6% (j) 9% (m) 12% (p) 15%
(b) 1% (e) 4% (h) 7% (k) 10% (n) 13% (q) 16%
(c) 2% (f) 5% (i) 8% (l) 11% (o) 14% (r) > 16%

Which category best approximates the **percentage of your total annual operating expenses** accounted for by labour costs in your organisation? (Please **circle one** category).

(a) < 5% (d) 15% (g) 30% (j) 45% (m) 60% (p) 75%

(b) 5%	(e) 20%	(h) 35%	(k) 50%	(n) 65%	(q) 80%
(c) 10%	(f) 25%	(i) 40%	(l) 55%	(o) 70%	(r) > 80%

How do your labour costs compare with your direct competitors?

Our costs are ***much lower***	**1**	**2**	**3**	**4**	**5**	Our costs are ***much higher***

As measures of size:

a. Please estimate the total number of employees in your local organisation:
   Three years ago .... _______
   Today .... _______

b. Please estimate your local organisation's annual sales revenue (turnover):
   Three years ago .... _________________million Euro
   Today .... _________________million Euro

III. RESPONDENT BACKGROUND

Please indicate the number of years of work experience you have in each of the following areas:

Sales ………………….. _____ yrs	Information Systems……………._____ yrs
Marketing……………… _____ yrs	Human Resources……………… _____ yrs
R & D………………..… _____ yrs	Engineering………………………_____ yrs
Operations/Production..._____ yrs	Law……………………………….._____ yrs
Accounting…………….. _____ yrs	General Management………….. _____ yrs
Finance………………… _____ yrs	Other (specify) ____________..._____ yrs

What is your organisational position or title? .... ___________________________________
How many years have you been in the above position? ………… ______ years

How many years have you been with this organisation? ……… ______ years

How many total years of post secondary/high school education have you attained if any? …. _____ years

Have you earned a post secondary/high school degree? …Yes _____. No _____.

If yes, what is the highest degree you have obtained (e.g., associates, BA, MS, etc)? ________

Academic area of highest degree (e.g., business, engineering, liberal arts, etc.)? _______________

THANK YOU FOR YOUR HELP!
When completed, **please return in the envelope provided** or send to:

PROFESSOR PATRICK FLOOD, KEMMY BUSINESS SCHOOL

Appendix C

GM Questionnaire

GENERAL MANAGER QUESTIONNAIRE

UNIVERSITY *of* LIMERICK
OLLSCOIL LUIMNIGH

University of Kansas
School of Business

UL - KU 2006 SURVEY OF GENERAL MANAGEMENT PRACTICES IN IRELAND

A research study sponsored by

National Centre for Partnership Performance

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PROJECT DIRECTORS

Patrick Flood, Ph.D., received his doctorate from the London School of Economics. He is currently Research Professor in the Kemmy Business School at the University of Limerick where he also directs the strategic leadership research programme. Previous appointments include EU Postdoctoral fellow at London Business School, Fulbright scholar at the R.H. Smith School of Business, University of Maryland at College Park, Academic Visitor and British Council scholar at the London School of Economics.

James P. Guthrie, Ph.D., is Professor of Business and Charles W. Oswald Faculty Fellow with the School of Business at the University of Kansas. He received his B.A. and M.B.A. from the State University of New York at Buffalo and his PhD from the University of Maryland. He is currently Visiting Professor with the Kemmy Business School, University of Limerick. He has previously held visiting faculty appointments with the University of Waikato in New Zealand and with the Consortium of Universities for International Business Studies in Italy.

Wenchuan Liu, Ph.D., is Postdoctoral Fellow at the University of Limerick. He previously worked as an Assistant Professor at North-eastern University, China. He gained his PhD from the Kemmy Business School, University of Limerick for a study of the economic impact of high performance work systems in Irish industry.

Sarah MacCurtain, Ph.D., is a Lecturer with the Kemmy Business School, University of Limerick. She received her PhD from Aston University. She is co-author of Effective Top Teams (2001, Blackhall) and Managing Knowledge Based Organisations (2002, Blackhall).

Claire Murphy, Ph.D., is a Research Scholar at the Kemmy Business School, University of Limerick. She received her PhD from the University of Limerick in 2004. She has conducted research on organizational justice, the psychological contract, absenteeism, continuing professional education, and health services management.

Thadeus Mkamwa, is a registered doctoral student at the Kemmy Business School, University of Limerick. His research topic is on HPWS and diversity management in Irish workplaces. He received his STB from Pontifical University Urbaniana at St.Paul's, Tanzania. He also graduated with BA and MS from Elmira College, New York. He has also lectured on Development Studies at St. Augustine University of Tanzania.

Cathal O'Regan, is currently a National Coordinator at the National Centre for Partnership and Performance of Ireland. He is a registered doctoral student at the University of Limerick.

If you have questions about any aspect of this study, please contact one of the project directors. Contact information is provided on the front page of the questionnaire.

Would you like a summary report of the findings of the study? Yes____ No____

If 'yes', please provide name and address or attach a business card:

Name: _____

Address: _____

_____

_____

Email:_____

I. ORGANISATIONAL CHARACTERISTICS

During 2005-06, what proportion of your organisation's total sales (turnover) was achieved through each of these two strategic approaches? Your answers should total 100%.

- **LOW COST:** Compete on the basis of lower costs (through economies of scale, experience, technology, etc), resulting in lower prices to consumers ..... _____%

- **DIFFERENTIATION:** Create products or services perceived industry-wide as unique _____%

Total: 100%

Please allocate 100 points across the following factors reflecting how your firm's top managers would view each factor's relative importance in achieving competitive success:

Products or services ……..…..... _____
Advertising/marketing ……..…. _____
Employees/workforce ……..…. _____
Technology ……..…….. _____
Total: 100 Points

How would you **describe the industry and environment** within which your organisation functions? Where relevant please consider not only the economic, but also the social, political, and technological aspects of the environment. Write a scale number in the space provided beside each statement.

Strongly *Disagree* 1 2 3 4 5 Strongly *Agree*

Very dynamic, changing rapidly in technical, economic and cultural dimensions……..… _____
Very risky, one false step can mean the firm's undoing ……..……. _____
Very rapidly expanding through expansion of old markets and emergence of new ones… _____
Very stressful, exacting, hostile; hard to keep afloat ……..…. _____
Actions of competitors are quite easy to predict ……..……. _____
Demand and consumer tastes are fairly easy to forecast……..…… _____
Very safe, little threat to the survival of my company ……..……. _____
The rate at which products or services are getting obsolete in the industry is very slow… _____

The relative importance of different functional activities (e.g., manufacturing, marketing) varies across organisations. Please indicate how your firm's top managers would rate the relative importance of each functional activity in achieving competitive success. Write a scale number in the space beside each function to indicate its relative importance.

Of little importance 1 2 3 4 5 Extremely important

R & D ..... _____
Manufacturing ..... _____
Marketing/Sales ..... _____
Human Resource Management …..... _____
Finance/Budgeting …..... _____
Information Systems ..... _____

Please circle a response on each scale to answer the following questions:

In general, the top managers of my firm favor ……

A strong emphasis on the marketing of tried and true products or services	1	2	3	4	5	6	7	A strong emphasis on R&D, technological leadership and innovations

How many new lines of products or services has your firm marketed in the last few years?

No new lines of products or services	1	2	3	4	5	6	7	Very many new lines of products or services

In the last few years in my firm …..

Changes in product or service lines have been mostly minor in nature	1	2	3	4	5	6	7	Changes in product or service lines have usually been quite dramatic

In dealing with competitors, my firm ……

Typically responds to actions that competitors initiate	1	2	3	4	5	6	7	Typically initiates actions that competitors respond to
Typically seeks to avoid competitive clashes, preferring a 'live-and-let-live' posture	1	2	3	4	5	6	7	Typically adopts a very competitive, 'undo-the-competitors' posture
Is very aggressive and intensely competitive	1	2	3	4	5	6	7	Makes no special effort to take business from competitors

In general, the top managers of my firm have ……

A strong preference for low-risk projects (with normal and certain rates of return)	1	2	3	4	5	6	7	A strong preference for high-risk projects (with chances of very high returns)
A strong tendency to 'follow-the-leader' in introducing new products/services, technology or management ideas	1	2	3	4	5	6	7	A strong tendency to be ahead of competitors in introducing new products/services, technology or management ideas

In general, the top managers of my firm believe that ……

Owing to the nature of the environment, it is best to explore it gradually via timid, incremental behavior	1	2	3	4	5	6	7	Owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives

When confronted with decision-making situations involving uncertainty, my firm ……

Typically adopts a cautious 'wait-and-see' posture in order to minimize the probability of making costly decisions	1	2	3	4	5	6	7	Typically adopts a bold, aggressive posture in order to maximize the probability of exploiting potential opportunities

Please indicate the current position of your organisation <u>relative to your direct competitors</u>:

	We are much lower		**Same**		**We are much higher**
Product or service cost ……	1	2	3	4	5
Product or service selling price ……	1	2	3	4	5
Per cent of sales (turnover) spent on R & D ……	1	2	3	4	5
Per cent of sales (turnover) spent on marketing ….....	1	2	3	4	5
Product or service quality ……	1	2	3	4	5
Brand image ……..	1	2	3	4	5
Product or service features ……	1	2	3	4	5
After sales service ……..	1	2	3	4	5
Sales growth ……..	1	2	3	4	5
Return-on-Sales ……	1	2	3	4	5
Profitability ……..	1	2	3	4	5

What proportion of your organisation's total sales (turnover) comes from products or services introduced within the previous 12 months? …… _____%

How long has your local organisation been in operation? …….. _____ years.

In what country is your corporate headquarter located?_____

Which of the following categories best describes your **primary** industry sector? (Please tick **one**)

___ Agriculture/forestry/fishing
___ Energy & Water
___ Chemical Products
___ Metal Mfg. (mechanical, electrical & instrument engineering; data processing machinery)
___ Other Mfg (e.g., food, drink, tobacco; textiles, clothing; paper, publishing; rubber, plastics)
____ Building & civil engineering
____ Retail & distribution; hotels
____ Transport & Communication (e.g., rail, postal, telecoms)
____ Banking; finance, insurance; business services (e.g., consultancies, PR, legal, etc.)
____ Personal, domestic, recreational services
____ Health services
____ Other services (e.g, R&D, television, radio, etc.)
____ Other: _____

Approximately what proportion of your total sales (turnover) is from the above industry? _____ %

Which category best approximates the **percentage of total annual sales/turnover** spent on research & development (R&D) in your organisation? (Please **circle one** category).

(a) < 1%	(d) 3%	(g) 6%	(j) 9%	(m) 12%	(p) 15%
(b) 1%	(e) 4%	(h) 7%	(k) 10%	(n) 13%	(q) 16%
(c) 2%	(f) 5%	(i) 8%	(l) 11%	(o) 14%	(r) > 16%

Which category best approximates the **percentage of your total annual operating expenses** accounted for by labour costs in your organisation? (Please **circle one** category).

(a) < 5%	(d) 15%	(g) 30%	(j) 45%	(m) 60%	(p) 75%
(b) 5%	(e) 20%	(h) 35%	(k) 50%	(n) 65%	(q) 80%
(c) 10%	(f) 25%	(i) 40%	(l) 55%	(o) 70%	(r) > 80%

How do your labour costs compare with your direct competitors?

Our costs are ***much lower*** **1** **2** **3** **4** **5** Our costs are ***much higher***

As measures of size:

a. Please estimate the total number of employees in your local organisation:
   Three years ago ..... _____
   Today ..... _____

b. Please estimate your local organisation's annual sales revenue (turnover):

Three years ago ..... _____ million Euro

Today ..... _____ million Euro

Please use the scale below to indicate your level of agreement or disagreement with each of the following statements. Write a scale number in the space provided beside each statement.

Strongly *Disagree* 1 2 3 4 5 Strongly *Agree*

Our employees can expect to stay with the organization as long as they wish……. _____

Our company is committed to a goal of long-term employment security……..…_____

If this organization were facing economic problems, employee downsizing would be the last option used ……..._____

During the last two years, has your firm engaged in employee downsizing (redundancies)? Yes ____ No ____

If yes, what percentage of your workforce was made redundant during this time? _____%

Partnership: To what extent do you agree with the following statements?

Strongly disagree 1 2 3 4 5 Strongly agree

There is a high level of trust between management and employees _____

Employees are well informed on the views and concerns of company management _____

Company management are well informed on the views and concerns of employees _____

Partnership: In this organisation…

Workplace partnership is… (Please circle appropriate number)

1	**2**	**3**	**4**	**5**	**6**
Non-existent	Largely confined to a few key individuals	Largely confined within formal partnership structures	Evident in at least certain parts	Evident across most of it	Now the norm for working

Partnership: Are there formal arrangements in place for…

Workplace partnership? (Please tick one)

❒No

❒No, but under active consideration

❒Yes How many years has this arrangement been in place? _____

Informing and consulting employees? (Please tick one)

❒No

❒No, but under active consideration

❒Yes, but may require adjustment to comply with forthcoming legislation

❒Yes, and already largely compliant with requirements of forthcoming legislation

Partnership: To what extent are each of the following issues the subject of discussion between management and employees (and/or their representatives)?

(Please insert appropriate number in space provided)

No discussion 1 2 3 4 5 Very substantial discussion

Production issues (e.g. level of production or sales, quality of product or service) _____

Employment issues (e.g. avoiding redundancies, reducing labour turnover) _____

Financial issues (e. g. financial performance, budgets or budgetary cuts) _____

Future plans (e.g. changes in goods produced or services offered, company expansion or contraction) _____

Pay issues (e.g. wage or salary reviews, bonuses, regarding, job evaluation) _____

Leave and flexible working arrangements, including working time _____

Welfare services and facilities (e.g. child care, rest rooms, car parking, canteens, recreation) _____

Government regulations (e.g. EU Directives, Local Authority regulations) _____

Work organisation (e.g. changes to working methods, allocation of work between employees, multi-skilling) _____

Health and safety _____

Equal opportunities _____

Training _____

Product innovations _____

Service innovations _____

Technical innovations _____

Other (please specify) _____ _____

Please use the scale below to indicate your level of agreement or disagreement with each of the following statements. Write a scale number in the space provided beside each statement.

Strongly *Disagree* 1 2 3 4 5 Strongly *Agree*

Our employees are highly skilled ….....____

Our employees are widely considered the best in our industry. ….... .....____

Our employees are creative and bright….....____

Our employees are experts in their particular jobs and functions ……____

Our employees develop new ideas and knowledge ……____

Our employees are skilled at collaborating with each other to diagnose and solve problems…...____

Our employees share information and learn from one another ……____

Our employees interact and exchange ideas with people from different areas of the company…____

Our employees partner with customers, suppliers, alliance partners, etc., to develop solutions ..____.

Our employees apply knowledge from one area of the company to problems

and opportunities that arise in another. ……____

Please use the scale below to indicate your level of agreement or disagreement with each of the following statements. Write a scale number in the space provided beside each statement.

Strongly *Disagree* 1 2 3 4 5 Strongly *Agree*

The HR department or function has helped to enhance the firm's competitive position ..... ____

The HR department or function provides value-added contributions to the firm's bottom line .....____

The HR department or function contributes to building or maintaining the firm's core competence...____

The HR department or function contributes to building the firm's human capital

(employees, managers) as a source of competitive advantage ……____

II. RESPONDENT BACKGROUND

Please indicate the number of years of work experience you have in each of the following areas:

Sales …….. _____ yrs	Information Systems……..._____ yrs
Marketing……. _____ yrs	Human Resources……. _____ yrs
R & D…… _____ yrs	Engineering……_____ yrs
Operations/Production..._____ yrs	Law……..._____ yrs
Accounting…….. _____ yrs	General Management…….. _____ yrs
Finance…… _____ yrs	Other (specify) _____...._____ yrs

What is your organisational position or title? ..... _____

How many years have you been in the above position? ……. _____ years

How many years have you been with this organisation? ……. _____ years

How many total years of post secondary/high school education have you attained if any? …. _____ years

Have you earned a post secondary/high school degree? …Yes _____. No _____.

If yes, what is the highest degree you have obtained (e.g., associates, BA, MS, etc)? _____

Academic area of above degree (e.g., business, engineering, liberal arts, etc.)? _____

THANK YOU FOR YOUR HELP!
When completed, **please return in the envelope provided** or send to:

PROFESSOR PATRICK FLOOD, KEMMY BUSINESS SCHOOL