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Human Resource Management and Technological Challenges

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Human Resource Management and Technological Challenges

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Preface

Human resource management (HRM) and technological challenges cover HRM and technology with special emphasis in what concerns the challenges and changes that new technologies have in human resources (HR) of modern organizations. It focus the challenges that HRM is facing in a new era, where organizations, integrating an environment characterized by high levels of competition, are suffering growing changes, namely in their technological dimension. Indeed, nowadays, and in order to obtain the necessary flexibility to respond to this competition, organizations are becoming more technologically sophisticated.

Drawing on the latest developments, ideas, research and best practice, this book intends to examine the technological implications of the last changes taking place and how they affect the management and motivation of HR belonging to these organizations. It looks for ways to understand and perceive how organizational HR, individually and as a team, conceptualize, invent, adapt, define, and use organizational technology, as well as how they are constrained by features of it.

Providing discussion and the exchange of information on principles, strategies, models, techniques, methodologies, and applications of HRM and technological challenges, this book aims to communicate the latest developments and thinking in what concerns the research activity relating to new information technology and HRM world-wide. It is designed to increase the knowledge and effectiveness of all those involved in HRM and technology whether in the profit or nonprofit sectors, or in the public or private sectors.

This book covers HRM and technological challenges in eight chapters. Chapter 1 discusses *Micro-Political Conflicts and Institutional Issues During e-HRM Implementation in MNCs: A Vendor's View*. Chapter 2 covers *Psychological Contracts in the Age of Social Networks*. Chapter 3 contains information on *HRM as Challenge for the Top Management of Technology Start-Ups*. Chapter 4 describes *People, Knowledge and Technology: Connecting the Dots from a Social Perspective*. Subsequently, Chap. 5 covers *Comparing HRM Practices for R&D in Business and University Centres*. Chapter 6 contains information on *Organisational Challenges of Human–Robot Interaction Systems in Industry: Human Resources Implications*. Chapter 7 describes *The Staffing Process in a High-Technology Environment*. Finally, in Chap. 8, *Human Resource Management and the Internet: Challenge and/or Threat to Workplace Productivity?* is presented.

Providing a channel of communication to disseminate the knowledge of HRM in a technological age between academics/researchers and managers, the present book can be used as a book for a final undergraduate management and engineering course or as a subject on HRM and technological challenges at the postgraduate level. It also can be used, as a useful reference, for academics, researchers, human resources managers, managers, engineers, and other professionals in related areas with HRM and technological challenges and changes. The interest of this book is evident for many institutes and universities throughout the world.

The Editors acknowledges their gratitude to Springer for this opportunity and for their professional support. Finally, we would like to thank to all chapter Authors for their interest and availability to work on this project.

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Contents

Chapter 1
Micro-Political Conflicts and Institutional Issues During e-HRM Implementation in MNCs: A Vendor's View

Jukka-Pekka Heikkilä, Chris Brewster and Jaakko Mattila

Abstract This chapter explores the implementation of electronic HRM systems (e-HRM) in multinational corporations (MNCs) from a vendor consultant's point of view. By presenting the issues surrounding implementation in MNCs and extending e-HRM definition to the MNC setting, this chapter combines the micro-political and institutional views and aims, firstly, to shed light on the micro-political issues and conflicts areas in e-HRM implementation and, secondly, to investigate how the institutional environment affects the e-HRM system implementation. The chapter contributes to our knowledge of e-HRM by exploring the previously largely unrecognized role of e-HRM vendor consultants and contributes to the theoretical discussion by extending and empirically testing a framework from the field of HRM to the field of e-HRM in MNCs.

1.1 Introduction

Multinational corporations (MNCs) seek to improve their management practices and processes with the use of information technology (IT), and they are investing in them ever more heavily [1]. The increasing use of technology is partly a result of HRM departments in MNCs facing more efficiency and cost-effectiveness

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pressures than ever before. In response to these pressures, the main motivation to implement large e-HRM systems is based on the concept of the "transformation of HRM," meaning that e-HRM will be a key part of improving efficiency, cutting costs, and ultimately facilitating a shift in the HRM role to a more strategic level [2]. In other words, e-HRM, in theory at least, enables the HRM departments of MNCs to analyze and store data to increase the flow of workforce information as well as enabling the devolution of many routine administrative and compliance functions traditionally performed by corporate HRM departments [1–3]. In this respect, e-HRM to some extent operates as an alternative to the outsourcing of transactional HRM tasks where IT has the potential to enhance the contribution that HRM makes to the company's strategic aims [4].

The e-HRM literature is still at an early stage compared to either the general information systems (IS), the technology, or the strategy literature [5]. This is especially apparent when discussing e-HRM in MNCs. Firstly, research has neglected important features of the MNC headquarters (HQ)–subsidiary relationship during e-HRM implementation. For instance, Sheu et al. [6] suggest that these relations are even stronger when enterprise resource planning (ERP) is implemented across multiple facilities with national differences. Multisite ERP implementation costs more and fails more often due in part to organizational and individual issues. The political aspect is apparent when the MNC HQ's drive for isomorphism is undermined by the ability of other actors to pursue divergent interests. According to Mense-Petermann [7] in such negotiations, the actors' advantage often derives from exploiting differences between the national business systems in which the MNC operates. While domestic applications have to deal with only one culture and nation, cross-border applications have to balance local issues against the requirements of international coordination. With this in mind, this chapter aims to answers the following questions from an e-HRM vendor consultant's point of view:

1. What are the micro-political issues and conflicts areas in e-HRM implementation?
2. How does the institutional environment affect e-HRM system implementation?

The next section focuses on defining e-HRM in the MNC setting and then discussing what the literature has to tell us about the role of actors, conflict areas and the resources used by those actors during implementation, and setting that in the context of institutional theories by combining the theoretical foundations of micro-political view and institutional theory. We then apply that analysis to a specific case and draw conclusions.

1.2 Defining e-HRM in the MNC Setting

In general, e-HRM has been defined as an enterprise-wide strategy that uses scalable, flexible, and integrated technology to link internal processes and knowledge workers directly to the business objectives of the organization [5].

There is no common agreement on terminology [8–10], but the following definition suggested by Bondarouk and Ruël [1] is the most exhaustive and broadest definitions in use at the time of this study and encourages more focused discussion of e-HRM. Bondarouk and Ruël [1] define e-HRM as an "umbrella term covering all possible integration mechanisms and contents between HRM and Information Technologies aiming at creating value within and across organizations for targeted employees and management" and suggest an integration of four aspects and recommendations for researchers:

- Content of e-HRM: It concerns any HRM practices that can be supported with IT, either administrative or transformational; it also concerns any type of IT that can offer support for HRM, either Internet, intranet, or complicated ERP systems. Research is needed to clarify the match between a type of IT and the type of HRM practices.
- Implementation of e-HRM: It involves the process of adoption and appropriation of e-HRM by organizational members. Research should explore judgments of the success of e-HRM implementation.
- Targeted employees and managers: HRIS was primarily directed toward the HRM department yet, by the turn of the century, line management and employees were actively involved in using e-HRM applications. Modern e-HRM broadens its target and goes beyond the organization's borders to address the needs of all stakeholders. Research should focus on specific stakeholder groups.
- Consequences of e-HRM: Alongside the discussion on value creation and value capture [11], Bondarouk and Ruël [1] stress a multilevel perspective which means that either an individual employee or an HRM professional, the whole HRM department, organization, or a net of several organizations is willing to exchange money for the value received from e-HRM. Lepak et al. [11] also note that the monetary amount exchanged must exceed the producer's costs (time, training, effort, money, meetings dedicated to e-HRM projects), and it is approximated as a delta between new value (like freedom from HRM administration or less paper work) and the users' alternative.

However, this definition does not include an international dimension and since this chapter focuses on international e-HRM, particularly the MNC context, we add a fifth, international aspect to this definition:

> The international aspect of e-HRM: When e-HRM acquires an international aspect, a broader perspective will be necessary to assess multiple, complex e-HRM activities. According to Dowling [12], the key variable that differentiates domestic and international HRM is the complexity of operating in different countries and employing and developing different nationalities as employees. For e-HRM, going international means paying attention to political, legal, cultural, linguistic, and economic forces that have implications for e-HRM practices across countries and also to international e-HRM implementation and use in MNCs.

1.3 e-HRM Implementation in MNCs

The complex international environment has its own implications for HRM systems' implementation in MNCs [13] where e-HRM systems force MNCs to think through the interconnectedness of their different functions in terms of information and processes [6]. Even though IS has the potential to push HRM into global integration and to support MNC's international strategy, MNCs are also forced to debate choices between central governance and local autonomy in HRM. Sheu et al. [6] note that larger firms prefer decentralized modes of corporate governance over their subsidiaries through enterprise-wide systems such as ERP, partly because there is a pressure to gain legitimacy in the environments of each of their subsidiaries [13]. This is a different approach to that of Tixier [14] and Ruël, Bondarouk & Looise [9] who presented evidence on MNCs use of e-HRM to standardize HRM policies and practices.

Research on e-HRM implementation in MNCs has identified a variety of barriers and challenges that affect the implementation process. For instance, Beamish et al [15] identify cultural resistance and individual end-user motivation as barriers and suggest that the other challenges are low level of awareness and lack of training, although Voermans & Van Veldhoven [16] found that the extent of knowledge of IT did not significantly influence attitudes toward e-HRM implementation. Tansley et al. [3] demonstrated that e-HRM had a limited impact when those involved in the implementation had a limited view of its potential. Other challenges included the "silo mentality" of the process owners, independent mapping of HRM processes between different business areas, and the lack of support available to the HRM team responsible for implementation.

In addition, Olivas-Lujan et al. [8] found that developing countries faced more challenges with e-HRM than companies operating in more developed countries. To support this, Rao [17] found that the challenges of e-recruitment in the emerging economies of India and Mexico were an undeveloped infrastructure and the impact of personal interactions in these collectivist cultures. By contrast, Olivas-Lujan et al. [8] argued that a global business environment creates an external pressure to improve HRM cost efficiency and that the strategic role "trumped cultural preferences for HR's activities".

IT process standardization in MNCs is generally perceived to be beneficial by the IT community as it minimizes the duplication of software development and increases the connectivity of systems and the ability to exchange data. In addition, it helps achieve economies of scale and reduces the support headcount [18]. Indeed, it seems the IS literature tends to consider the MNC as a homogeneous mass rather than a heterogeneous group of subsidiaries. According to Burbach & Royle [19], Heikkilä [20, 21] , studies of e-HRM in MNCs also often adopt this view [19].

Ruta's [22] case study describes the transnational challenges that arise when an MNC attempts to implement an HRM portal and illustrates the ways in which change management plans may need to be locally adapted to be effective in various subsidiaries. Local adaptation affects the use of HRM employee portals in

subsidiaries, even if there is a strongly aligned corporate culture. Ruta [22] acknowledge that implementing an HRM portal in an MNC is a complex process, requiring MNCs to manage both significant changes for the employees and technical challenges for the organization's project installation team. Although technical installation challenges can arise, it is the human challenges associated with change that make the difference during the implementation phase of e-HRM.

Indeed, another important area in implementation is the relational context, which concentrates on HQ managers' attitudes toward subsidiary staff and how dependent the subsidiary is on HQ resources [23]. In this context, subsidiary HR managers need to balance the possibly conflicting interests of HQ and the subsidiary [13]. This dynamic micro-political interaction works both ways so actors view things through their own unique set of perceptions.

Summarizing the research to date, we can suggest that e-HRM implementation is a multilevel phenomenon in MNCs, which requires constant analysis of the institutional and micro-political environment since organizations are socially embedded in their context. However, it seems that none of the e-HRM studies to date identified the actors in micro-politics or the conflict areas, including institutional pressures and how actors respond to them during the implementation process, from a vendor consultant's point of view, which is what we do next.

1.3.1 The Role of Consultants in e-HRM Implementation

Some work on e-HRM, by Heikkilä [21] and Smale and Heikkilä [24], investigated the subsidiary HRM point of view on implementation and found vendor consultants played a critical "dual role" which included presenting their own interests and the HQ interests against subsidiary HRM arguments during the conflicts on standardization.

We know very little about the role of e-HRM consultants even when there is evidence that they are numerous [25]. It is argued that use of consultants makes managers look more professional and knowledgeable [26] and assists in analysis of the business needs, recommending suitable software and managing the implementation [25]. Experienced senior consultants can use their expertise to forecast and prepare against possible challenges, although Kubr [25] notes that the final responsibility over the decisions should still be in the hands of the client. Conflicts arise when the client and the consultant have different opinions on what is required in the task [26]; however, consultants can help clients to network with the right key players for the project and help in planning the implementation [26].

This role between the client and the supplier has generated a new business model, where consultants are simultaneously serving the client *and* the supplier when recommending and selling possible technology solutions [25, 26]. Furthermore, Smale & Heikkilä [24] found that consultants in e-HRM implementation negotiations can be simultaneously serving HQ interests and their own agenda without the knowledge of local constraints. A lack of HRM knowledge gave

subsidiary HR managers power in system design negotiations. On the other hand, Rupidara and McGraw [13] argue that consulting firms are powerful influencing forces in institutionalism through providing services that utilize their standard, branded tools, and frameworks and sometimes use managers' lack of knowledge to sell currently hyped management tools [26]. The result is consultants pushing the same kind of solutions to each client, eroding the possibility of acquiring a competitive advantage through e-HRM [1], and promoting institutional isomorphism. Hence, Kubr [25] warns that in e-HRM projects organizations should prefer specialist HRM consultants over IT consultants, since the latter in many cases recommend software that is too sophisticated and expensive compared to the needs of the client.

1.4 Theoretical Approach

This section presents the theoretical assumptions adopted in this study. Firstly, we introduce the concept of micro-politics, then we examine institutional theory, and finally we combine these approaches.

1.4.1 Micro-Politics

According to Forsgren [27], MNCs are political systems where power games and political influence over decision making are useful in explaining the nature of internal processes. Compared to the dominant economic and deterministic approaches to studies of MNCs, this kind of sociopolitical dimension of managing MNCs has been largely neglected in the international business literature [28, 29] and especially in the e-HRM literature. Edwards et al. [30] criticize studies in the field of HRM in MNCs for not focusing clearly enough on how HRM practices become established in foreign subsidiaries and the roles played by the various actors in the integration process.

The micro-political approach focuses on "how actors seek to protect or advance their own interests, the resources they use, and the resolution of conflicts" [30]. Organizational micro-politics has been defined in general terms as "an attempt to exert a formative influence on social structures and human relations" [31], but is suggested more specifically to focus on "bringing back the actors and examining the conflicts that emerge when powerful actors with different goals, interests and identities interact with each other locally and across national and functional borders" [31].

The question of where decisions on organizational structure, production policies, and work organization are made is of primary importance to this perspective (e.g., [32]). MNC processes are no longer considered as homogeneous social systems or hierarchies, but are seen as "political arenas". The merit of this research stream is that it contributes to knowledge of internal MNC processes and their connection

with local strategies. Simple "convergence theses" are rejected [33] in the search for explanations of how and why organizational structures and the strategies of local subsidiaries diverge from the master plans of corporate HQ [7].

This chapter illustrates that an exploratory micro-political approach is appropriate in understanding e-HRM for the following reasons. First, we note that the e-HRM literature does not acknowledge how actors shape the reality of corporate mechanisms and does not define how the adoption of e-HRM practices proceeds throughout the MNC [29]. Second, e-HRM implementation in an MNC presents an opportunity to study what must be standardized versus what must be locally adapted and why. Finally, as e-HRM implementation in MNCs requires the parties involved to negotiate the system content and processes, which might encapsulate the full range of the MNC's HRM, this presents a unique opportunity to study and understand the actors and what conflicts arise during implementation and what resources are deployed during negotiations.

1.4.1.1 Actors

As suggested, the micro-political perspective is used to analyze interaction at the level of individuals, groups, or organizations. Political processes at these levels are not independent, but multilayered and interdependent [34]. HQ HRM specialists, subsidiary HRM specialists, and consultants all play a role [24]. And key subsidiary managers have a vital role in intra-firm competition as boundary spanners, they form coalitions with inside and outside stakeholders of the MNC to improve their opportunities and performance [34]. This duality of interest between HQ and subsidiary can be challenging for subsidiary managers since interests are sometimes conflicting. These actors are not just bound by the institutional and structural constraints of an organization, but are also considering their personal interests, like gaining power or enhancing career development, or are driven by personal identity construction or group dynamics [31]. Thus, members of organizations are simultaneously cooperators and rivals. From the actor's perspective, the crucial question is always what is at stake in a given power relation and what resources can be employed in the relationship. To analyze this, we use [34] interest conflicts and conflict responses propositions.

1.4.1.2 Interest Conflict of Actors

Bondarouk and Ruël [1] note that different users have divergent views on the usefulness of e-HRM and remind us that within the broad categories of managers, employees, and HRM professionals, there are subgroups with varying interests, which can result in conflicting interpretations. This realization of new information can, with the help of collaborative leadership, facilitate organizational change [35]. Power is socially dependent and power relationships exist only as long as actors

need each other for achieving their own interests [34]. Alternatively without a cooperative effort, politics can distort and restrict information flows.

Dörrenbächer and Becker-Ritterspach [34] argue that in situations where responsibilities are shifted from one subsidiary to another, for example, intense strategic interactions are triggered and conflicts escalate. Actors try to develop a shared understanding through assuming that various interests are served best by embracing conformity and obedience to authority, controlling conflict, and sometimes reducing or resolving it through collaboration in decision making [31]. Thus, Marler and Fisher [36] note that a conflict of interest between management and employees can alter the intended effect of IT implementation.

1.4.1.3 Resources Actors Use

From this point of view, micro-political conflicts and game playing focuses around the control of scarce resources such as for example money and capabilities (skills, knowledge, and processes) that certain people control [31]. For example, the consultants lack of HRM knowledge gave subsidiary HRM managers an edge in system design negotiations [24]. Individuals can work together to achieve their objectives. Behind these alliances of resources lies the combined self-interest of persons. In this context, the level of power one has is measured by the degree to which the individual is able to access, protect, and control scarce resources [31]. Dörrenbächer and Becker-Ritterspach [34] note that the existence of these resources has to be acknowledged by other parties before one can gain more power. A critique of the micro-political view, Mense-Petermann [7], suggests literature on "conflicts in MNCs may foster the impression that micro-political conflicts are conflicts between HQ and subsidiaries while inter-cultural conflicts are conflicts that occur in face-to-face situations between local employees and expatriates". As Mense-Petermann goes on to point out, actors, as well as their power resources, are socially constructed, so institutions play a crucial role in international e-HRM activities.

1.4.2 Institutional Theory

In the international HRM literature, a central "institutional issue" is the standardization/differentiation dilemma. MNCs want to standardize globally HRM processes they have had positive experience of [37]. They believe standardization offers economies of scale, increased coordination, or higher service quality [38], which are typical goals for e-HRM adoption. Parry et al. [39] suggest that there might be an ethical dimension to standardization with, for example, the establishment of systems to guarantee minimum labor rights or ban the use of child labor in all the national jurisdictions where the firm operates.

Institutional theory assumes that organizations are influenced by socially constructed beliefs, rules, and norms. According to DiMaggio & Powell [40], organizations are pressured by their institutional environment, which demands they seek legitimacy and recognition by adopting acceptable structures and practices. Scott [41] proposed three institutional pillars influencing organizational practices: the regulatory, the cognitive and the normative, and Kostova [42] found that these three will exert different effects in different countries. The regulatory dimension reflects the existing laws, regulations, and rules in a particular national environment that promote certain types of behavior and constrain others; the cognitive dimension (e.g., interpretations and frames of thought) constitutes the nature of reality and the frameworks establishing meaning; and the normative dimension (e.g., values and norms) focuses on the values and norms held by individuals in a given country. Cognitive and normative dimensions may be related to national culture. Cognitive and normative institutional processes unfolding in the local context may play important roles in explaining the patterns of HRM practices in different locations [43].

The institutional approach has been criticized by Ferner et al. [44] among others, who suggest that it mainly focuses on host-country factors and neglects the complex conditions affecting home- and host-country interactions. Nevertheless, institutional theory has been tested in a range of empirical studies on HRM in MNCs in a variety of geographic contexts including the USA, Europe, and China [45, 46] and can make a significant contribution to the debate on standardization versus localization in general.

In general terms, this discussion has suggested that institutional factors may compel a MNC to adapt its e-HRM practices locally; however, there seems to be no discussion on the standardization and local adaptation of e-HRM in subsidiaries of an MNC. It seems reasonable to assume that e-HRM practices in MNC subsidiaries are influenced by these institutional factors. However, such factors will likely include those that shape the social context for IT as well as HRM; therefore, the inclusion of a micro-political perspective in the institutional approach becomes relevant.

To date, the e-HRM literature has mostly assumed that unilaterally imposed e-HRM practices will be adopted by subsidiaries in the same manner in which they were intended by an MNC HQ, even though, as the above discussion illustrates, this is unlikely to be the case. This chapter pulls these approaches together and argues that we need to consider both institutional and micro-political issues linked to e-HRM implementation since organizations and individuals are both socially embedded.

1.4.3 Combining the Micro-Political and Institutional Approaches

Institutional theory lacks the ability to describe the complexity of social processes and the micro-forces affecting the adoption, where subsidiaries are sometimes able to resist HQ pressure [13]. However, the micro-political perspective is not enough

either since MNCs, subsidiaries, and human actors are integrated in their social environment and constrained to some degree by institutional forces. Actors thus are trying to build internal and external fit for the system under institutional pressures within dynamic environments [13].

e-HRM implementation needs to be approached in a unique manner and created in social process if it is to have influence in the creation of competitive advantage; this gives it path dependency and hence makes it very difficult to imitate [5, 13]. Since the e-HRM process is social and, as Kostova & Roth [47] argue, MNCs are themselves institutional environments, social actors within the MNC use their power and political skill to enforce institutional settings favoring themselves. HR managers are constantly involved in coping with and interpreting conflicting individual interests and institutional pressures during e-HRM implementation [13]. The process demands constant negotiations, compromises and restructuring to be successful. Hence, this study unifies these two perspectives together with the empirical setting which now follows.

1.5 Empirical Setting

The qualitative empirical evidence comes from a single case study in a Finnish e-HRM software solution and implementation consultancy provider.

1.5.1 Research Approach

As suggested, e-HRM is at an early stage of development as a discipline and there have been frequent calls for more qualitative and theory building research [10]. In general, case studies are the preferred method for this especially when how and why questions are being used; the investigators have little control over the events, and when the focus is on contemporary phenomenon in a real-life context [48]. Ferner et al. [44] argue that emphasis on processes favors an in-depth case study approach, especially when the aim is to investigate the dynamics of bargaining processes within MNC context.

1.5.2 Case Company Presentation: Sympa Ltd

Sympa Ltd (see Table 1.1) was established in 2005 and is a Finland-based e-HRM software and service provider. Currently, the company employs around 40 professionals and revenue growth in the past five years has been 617 %, with a position of a market leader in Finland among online-based e-HRM software solutions. Sympa operates a software-as-a-service model (SaaS), and according to

Table 1.1 Sympa Ltd

Sympa Ltd facts in brief
–e-HRM software and service provider
–Number 1 in SaaS—solutions
–Established in 2005:
–Sympa HRM (SaaS—model):
–Offers service for the whole HRM lifecycle
–Financial performance:
–617 % revenue growth in past five years
–Owned by operating management

company documents, the system is able to respond to the customer needs during whole HRM life cycle from recruitment to the ending of the employment relationship. Sympa Ltd provides services for around 200 companies and has more than 60,000 user profiles in its system. Operating management owns the company.

1.5.3 Research Process

The data were collected via face-to-face interviews with the consultants and managers in the case company facilities. Additional material was gathered from Sympa's Web site. Interviews were conducted with eight persons, including both system consultants and managers (see Table 1.2).

According to company documents, Sympa's e-HRM system is a solution where each HRM process forms its own independent partition/module. Each module can be taken into the system as a single entity or a part of a complete system based on customers' requirements. The marketing material presents that this system, with its pre-made applications and possibility for customization make the introduction of the software cost-efficient and flexible for the potential customer organization.

Table 1.2 List of interviewees

#	Interviewees	Role	Duration	Consultancy experience
1	Interviewee	HR system consultant	33 min 34 s	One year
2	Interviewee	HRM system consultant	19 min 57 s	One year
3	Interviewee	HRM system consultant	36 min 56 s	Six years
4	Interviewee	HRM system consultant	24 min 48 s	Seven years
5	Interviewee	Service manager integrations	18 min 31 s	Unknown
6	Interviewee	Sales manager	31 min 20 s	Less than one year
7	Interviewee	Account manager	48 min 16 s	Over a year
8	Interviewee	Service director	35 min 16 s	Three years

1.6 Results

1.6.1 Actors and Roles in the e-HRM Implementation Process

In general, the consultants' role was defined to be simultaneously the system expert and the supplier's project manager. Respondents suggested that in the early stages of implementation projects, it was critical to get the client to understand the importance of preparation in terms of HRM processes, procedures, and training personnel.

> We cannot go there and simple push a button to make the HRM system work for them. The project also requires work from their side (Service director).

Because the system is a tool for HRM specialists and line managers, it requires clients to adopt and implement new sets of HRM strategies. Consultants indicated that they have a "change agent" role, which included being able to analyze the gap between present and intended process states in order to offer "best practice" solutions, from the vendor's perspective. These best practice solutions tended to drive homogenization, this was evident especially if the client was lacking an expert who has past e-HRM implementation experience. Interviewees argued that the change agent role:

> is essential for the project. In my opinion even if there is a same customer and the implementation would be run by two consultants separately the system would look different since consultants can influence the final outcome a lot (HRM system consultant).

> Even though we have generic models where to start and best practices, the outcome depends on the personal preferences of the consultant, some prefer certain solutions over others and suggest them to customers more eagerly (HRM system consultant).

In addition, collaboration between the client's and vendor's technical staff was seen as critical as the system is not an off-the-shelf product; implementation involves a lot of consulting.

> The consultant is a vital piece of a puzzle in terms of knowing the system functionalities and its possibilities, but cannot do anything solely independently as it is ultimately teamwork (Account manager).

It was suggested that during the implementation, the consultant and the customer's project group constantly evaluate and improve the original implementation plan in workshops when the project progresses. The consultants' role was extended to be a communication manager, who is responsible for describing the different options with their upsides and downsides, thus recommending the best solutions:

> We participate in the conversation during workshops and offer best options from the system's perspective (HRM system consultant).

The responsibility to make the decisions was agreed to be in hands of the client; however, in many integration situations, the client did not have the required IT or HRM competence to define the system specification correctly, so the consultant's role was even more important: being an agent who has a deep understanding of the integration capabilities and technical possibilities:

> The consultant is the one who knows the system, its capabilities, and should be able to sense what the customer tries to get from the system. Then find out how their HRM process works currently and suggest the best approach in terms of their HRM process and the system functionalities (HRM system consultant).

> Consultants are foremost seen as supplier's project manager. Sometimes it is good to know when to agree with the customer and when to say that it is a good idea, but in this instance it does not work (Sales manager).

It was common to find that the client's project manager had an HRM background though IT managers were represented in the project team. The team usually included also HRM generalists, salary personnel and, in cases where salaries are outsourced, a third-party representative. However, only in a few cases, line managers were involved in the process. The consultants generally recommended keeping the project team size small since the decision making tends to be faster and there were fewer conflicts. These conflicts intensified when the aim was to spread standardized system solution to across all MNC units in different countries.

1.6.2 Causes of Conflicts

The most common cause of conflict between the vendor and client was misunderstandings regarding the system's possibilities. A root cause for these conflicts was seen to be limited time in the sales phase to demonstrate the system and its functionalities. Also, the cost of integration, especially if it required third-party participation, caused conflicts. Another reason was the lack of IT competence in the project team, causing frustration from the vendor's side, since clients' poor IT skills resulted into an inability to understand issues related to the implementation, such as how to define the system scope efficiently. Time availability also caused conflicts since many members of the client's project team carried out the project side by side with their daily work.

More precisely, the conflicting views about the HRM system features caused arguments between different personnel groups in the organization, where some were seen as more adaptive to change and some were a major obstacle to the implementation. Since the system transfers HRM work toward the line managers, this caused resistance among line management. This type of change-resistant attitude was even more common among the salary personnel, who were often seen as having a narrow perspective on processes and being the least flexible toward the change of processes. The dynamics of the project groups also created crises among the personnel who had purchased the system demanding change, while other

personnel in the implementation phase had a different view on the role of the HRM system. Typically, this was change favoring senior HR management conflicting against operating HRM personnel and salary personnel, who feared losing their jobs when some of their work is computerized.

Legacy systems, and previous or already established IT systems in the MNC, were an additional cause for conflict where e-HRM systems may not be top of the IT priority list. For example, one project team lead by an HR manager, the IT manager tried to "run over" the HR manager on almost all issues. In these situations, the MNC's IT department is usually very powerful and thus has a substantial influence on e-HRM processes and overall system implementation. However, under normal circumstances, the HR manager was given the authority to make the final call, and in most situations, the MNC's internal battles were described as being over before the implementation starts. According to a sales manager, the best-case scenario is when the HR manager is able to make decisions regarding adaptation of HRM processes to the HRM system's way of operating, "on the fly" without consulting others:

> HR management or whoever is responsible for the project, have the blessing of top management to adopt the HRM system and therefore have legitimacy to make certain decisions and in extreme cases have the power to exclude a troublesome entity out from the project team during the decision process (Service manager—Integrations).

There was strong evidence of power games in situation where HQ desires to control HRM information and push the system through to the MNCs country unit level. The level of conflict depended on how much influence HQ has over the country units or whether the country unit had a strong HRM representative, who tried to drive resistance toward change. Overall, it seemed that negotiations were at the same time restricted and shaped by their social and institutional environment, a topic to which we now turn.

1.6.2.1 Institutional Environment Conflicts

Respondents indicated that country-related regulations have a major influence on implementation, since clients desired to build the HRM system to match their requirements, for example, for collective labor agreements. For the system, this meant generating reports that were needed to fulfill the requirements of specific country legislation. It was commonly agreed by interviewees that legislation shapes the HRM system and its implementation and that the amount that regulation influenced the implementation depended on which HRM functions were being supported. For example, labor agreements commonly generated conflicts since these agreements vary between countries, resulting in payroll systems that differ between units. Since payroll systems are the most common system that was integrated with the vendor's system, these integrations had to be built to support the differences between countries. Another area for concern was the information security and privacy issues. The principle for the vendor was to handle these issues

through contracts guaranteeing that the personnel data in the system were stored in a highly secure manner and this was seen as a top priority. One of the consultants expressed the seriousness of this issue by saying that "we would not have any business if these matters would not be in order".

It was commonly suggested that usually HQ wants more control over its subsidiaries via the system. One motivation for introducing the system was to improve reporting and as a result to standardize e-HRM processes as much as possible, within the limits of local legislation. The personnel involved in international projects were seen as more professional than national teams. More precisely, the experience and competence from previous implementation projects were seen to result in fewer attempts for personal gains during the implementation.

Overall regulative institutional environment gave power for subsidiaries to resist the forthcoming change. Regarding customized software, one of the consultants argued that:

> usually it is one system for the whole MNC, but we also have cases where in each country there is a separate customization due to institutional differences (HRM system consultant).

The negative issue of this approach was that HQ was unable to produce unified reports from subsidiaries which diminished the system potential to enable more efficient communication among MNCs units.

In addition, working habits and perceptions about how daily work was done and has been done were so deeply infused that doing things in a new way became difficult in some instances. This was the case when the new system forces the company to do HRM in a certain specific way and, as a result, this created many challenges and much time-demanding discussion. Customs can also change the project scope since in many cases the original idea had been that alongside the HRM system implementation, HRM processes will be modernized; however, during the process, this turned out to be impossible since the customer decided they prefer the old habits. In these cases, the HRM system faced pressure to be aligned to support these old habits. For example, it was generally agreed that when doing business with "silo" MNCs, regardless of size, comments that "this is the way we have always done these things" were common. Customs caused conflicts in system access rights policies, since system users could not change their passwords by themselves; and in restricting data availability, for example by not allowing a new manager to access previous development discussion materials. A specific example of this was that HRM department personnel was allowed to see salaries, but not the salaries within their own team. Finally, language was mentioned as bringing additional challenges to companies in implementation projects since many of them still have problems in enforcing HQ' HRM policies in foreign subsidiaries and with respondents, suggesting that language difficulties were part of the cause similarly to Heikkilä & Smale [49].

1.6.3 Resources and Responses Used in Conflicts

Conflicts were most severe in situations where the project team included members who were emotionally attached to the old legacy system and desired to transfer its functionalities and logic to the new system. Most consultants believed that once this became reality, it was better to stop the process and try to give guidance for the decision making. Implementation time also caused conflicts, either because the other tasks of the client's HRM specialists slowed the process or because clients wanted the consultants to accelerate the process, and tried to use customer status to pressure consultants. This was dealt with by pointing out that additional consultant time came with additional costs. In some occasions, new members from outside the customer's project team were introduced as an expert in a certain process and this further caused confusion and conflicts as new members were seen to criticize previous decisions thus slowing the process.

As Marler and Fisher [36] suggested, conflicting interests between HR management and line management can have an effect on system implementation.

> in the worst cases HRM looks on things and says that our line managers are not going to go with this or are not willing to use the new process/system, which instantly reveals where the power is (Sales manager).

In the literature, alliances were suggested as a response for a conflict situation; however, the interviewees had not experienced any alliance building during implementation projects, perhaps due to the short nature of sales projects based on the SaaS technology.

> These projects are so short that no such thing can have enough time to form during these projects (Sales manager).

In situations where the consultants believed the client was not well prepared for the change in advance or the required HRM processes had not been thought through beforehand, the consultant invited system stakeholders to discuss the best solution in workshops. During workshops which attempted to solve conflicts, personal relationships within the project team could also cause delays. This became evident if the person responsible for HRM left the organization in the middle of the project. The consultants' views on taking part in these decisions were mixed:

> We prefer not to take any part in company's internal issues or to be present in these situations since it is a waste of our time (HRM system consultant).

Where another consultant said:

> In conflict situations I tend to be the negotiator from the system perspective and reassure each party on the benefits of certain approach and give confidence that the outcome will be functional and satisfying (HRM system consultant).

Finally, in some rare cases, conflicts lead to delay or even total cancellation of the project:

> Our client had understood our systems functionalities incorrectly and even though we tried to find an acceptable solution for the problem during the implementation phase, it was impossible and we ended the project, in cooperation (Service director).

1.7 Discussion

The focus of this chapter was in the institutional and micro-political perspectives on e-HRM implementation from the vendor consultant point of view. Hence, we have considered the e-HRM phenomenon in general, with the particular focus on the MNC context e-HRM implementation, the role of the e-HRM consultants and applied an institutional theory and micro-political view.

Even though the existing literature [13, 31, 34] indicates that micro-politics are continuously present in MNCs, this study's findings suggest that micro-politics do not appear to be evident to the e-HRM consultants. Therefore, the majority of micro-political conflicts must have been occurring before the actual e-HRM implementation project (at managerial level) or in between the workshops (among HRM and IT personnel) or after the implementation (among system end-users). Since the e-HRM consultants mostly dealt with the HRM specialists, their views are somewhat limited and they were not able to witness the full scale of resource exchange relationships indicated by Dörrenbächer and Geppert [31]. However, some micro-political conflicts emerged from the data. For example, *variations in perceptions*, especially between the sales and implementation phases, were suggested to cause most of the conflicts in projects. Within the MNCs, the power games were one-sided: HQ's desire for system standardization prevailed and only personally strong subsidiary managers were seen to be able to resist the forthcoming change [cf. 31, 34].

Issues regarding resource dependency [31, 34] such as the *lack of expertise in IT* among HRM professionals and *strong opinions* resulted in some conflicts; however, the IT skills of young professionals presented a chance to grasp a role with more power and influence than formally was allowed. In addition, actors solved the conflicts with different approaches either by giving authority to do a decision to a single actor, excluding rebellious elements from the decision-making process, negotiating acceptable solutions where alliances are tested, or finally relying on the consultants' expertise and experience. In this case, at least the consultants were unable to see alliance building within the limits of e-HRM projects. On the other hand, one group of employees (the salary personnel) seemed to be more active in conflicts than others. Since some of these employees managed to resist the intended change (supporting the view of Marler & Fisher [36]), it seems that organizational micro-political context is unique within organizations: power distribution is context specific. Hence, it can be argued that the level of conflicts in e-HRM projects depends on the power distribution within the

organization, particularly on the power of the project team and how these actors involved are able to take advantage of it.

The second issue for this chapter was to study how the *institutional environment affects e-HRM system implementation* [40, 47]. The case study suggests that MNCs are using standardization to push subsidiaries into homogenization, but also identifies institutional forces acting in the opposite direction. With this in mind, suppliers and customers must identify and comply with laws and customs in e-HRM projects and notify the implications that legacy systems and system integrations create. This is coercive isomorphism. Mimetic and normative isomorphism [40, 47] through selling "popular" solutions opens opportunities for e-HRM system suppliers to enhance their sales, but it is worth noticing that different consultants offered different solutions, thus pushing away from institutional isomorphism, in contrast to Bondarouk & Ruël [1] argument that e-HRM consultants usually offer identical solutions that erode the possibility of a competitive advantage through e-HRM.

When combining these elements, the institutional environment supported with the organizational micro-politics, this chapter suggests that both environments have an influence to the overall e-HRM implementation process and its outcomes. Although consultants actively participate in system negotiations, hence being the key actors in e-HRM system implementation processes, they still are participating in the process as third-party actors, with a limited view of the organizational realities that exist in the background.

1.7.1 Bringing e-HRM into the MNC Setting

This research was interested in the e-HRM phenomenon from the micro-political and institutional perspectives. e-HRM consultants were chosen as source of information to help us contribute to the theoretical discussion on these areas.

According to previous research and results of this study, institutional and organizational micro-politics are present in MNC's decision making even when, in some cases, these forces remain hidden. e-HRM implementation is no exception and with this in mind, this study presented and empirically tested a framework which combined elements from both institutional and micro-political views which was originally suggested by Heikkilä [21]. Based on the empirical results of this study, it can be argued that the institutional environment forms the boundaries and the micro-politics form the context for the e-HRM system implementation.

During implementation, the consultant's role included offering their expertise to identify issues regarding the stages of implementation and to pace the progress according to the MNC's capabilities to absorb the forthcoming HRM changes. In many cases, consultants seemed to affect the chosen e-HRM strategy by revealing the e-HRM possibilities to the client, who then makes a decision whether these possibilities fit with their desired overall HRM strategy. Furthermore, consultants seemed to influence the MNC's e-HRM architecture by recognizing relevant

customer needs, the present state of HRM processes and procedures and then reflecting these issues back to the client in terms of the system's flexibility and functionality. As a result, the consultants' role is arguably strong, as in many cases the organization's HRM specialists suffered from lack of understanding the e-HRM implications.

To conclude, the main critique in the field recently has been that studies in this field suffer from a lack of theorization and this is evident especially within the MNC context. With this in mind, this chapter contributes to the theoretical discussion by combining the micro-political and institutional approaches and tests this approach empirically. The results of this study emphasize a more intuitive perspective and focus on the role of key actors and use the institutional view where institutional pressures influence the e-HRM implementation. In line with Rupidara & McGraw [13] and Heikkilä [21], this chapter suggests using the experience of actors in an attempt to blend the micro-political perspective and the institutional perspective being particularly fruitful. Adopting only the micro-political view underestimates the effects of various institutional logics and mechanisms upon the actors where overemphasizing the deterministic influence of institutions discounts the actions of the actors. This chapter argues that by combining these theoretical approaches, we can more accurately represent the multiple and layered factors of influence which shape the reality. Such combination will advance theorization and researching of the outcomes of e-HRM implementation in MNCs.

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Chapter 2
Psychological Contracts in the Age of Social Networks

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Abstract Psychological contracts are unwritten agreements that mutually shape the employment relationship between the employer and the employee. This chapter presents a basic overview of the anticipations and beliefs of today's workforce in contemporary work settings. Since social relations have become a crucial part of the work life, the two main pillars of the social network theory—actors and interactions—are taken as the theoretical basis in explaining how individual employees interact and how such interactions may shape their beliefs and perceptions about their jobs.

2.1 The Age of Social Networks and Social Actors

We are living in the Information Age—and as suggested in the writings of John Archibald Wheeler, the renowned theoretical physicist, 'information is fundamental to the physics of the universe' (p. 302 in [1], see also [2]). Information exchange has always been essential for the survival of systems created by human beings. Countries, economies, institutions, governments and all other social systems need to find, collect, process and disseminate information in order to survive in their environments. Business organizations are no exception. Information on the needs and requirements is collected, strategies are developed and implemented, commercials are released, financial ratios are calculated, and these and many other processes are fulfilled by individuals employed in business organizations. Therefore, information has always been essential to an organization's survival.

However, the Information Age is highly characterized by the use of *real-time* data—data that are collected and used immediately after collection. Countless

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parameters constantly change and effect organizations. Thus, organizations do not need ordinary doers but individual *actors* who rapidly collect data and disseminate 'correct' (realistic) information, and the existence of strong and efficient *links* between these actors is vital. In contrary to the conformist, conventionalist and brick-in-the-wall type of doers of the traditional organizations, actors—as their name implies—are interpreters, messengers and advocates of constant change. For this reason, actors are and tend to remain *unique*, each with a variety of skills and experiences, which differentiate him or her from others. On this account, such concepts as *creativity*, *design* and *innovation* became even more familiar, thanks to recent studies in the field of management, and taking this new conception of the human being today, some authors prefer to call the Information Age by other names—the 'Digital Age' to impose the importance of the shift from mechanical and electronic technology to digital technology and such outcomes of this shift as virtual communication and collective intelligence (e.g. [3]), the 'New Media Age' to stress the ultimate impact of accessing necessary data and information anywhere and any time (e.g. [4]), or perhaps even more interestingly, the 'Conceptual Age' (as a successor of the Information Age) to praise right-brain thinkers who are highly skilled in creative thinking, design and empathy and to identify them as the new workforce needed in the new century [5].

Consistent with the circumstances of the Information Age, or whatever we call it, social networking Websites have also become extremely popular. In fact, the conception of *social networking* is not new, and it should not be confined to a framework of connections through Websites or a configuration of digital communication devices. As Roberts and Roach predicate, 'going to a social function such as a cocktail party, conference, or business luncheon' meant social networking in the past, and in our day, such Websites as Facebook, LinkedIn or Twitter serve as efficient platforms for people to meet friends, find new connections and make themselves known for new opportunities [6]. With the aim of building online communities where individuals can share activities, ideas, works and community news or news on particular topics of interests, these Websites nevertheless serve as platforms for individuals to enrich their social networks through abundant and compatible connections.

2.1.1 Social Networks: An Egocentric Approach

One of the basic notions that underlie the social network theory is that the interactions among individuals are crucial for their organizations. Primarily data and information as well as several other types of resources can easily be exchanged through informal networks. As Podolny and Baron suggest, informal networks may offer an excellent basis to exchange work-related resources like 'task advice' and 'strategic information' [7], and consequently, such resources are likely to have an impact on the job performance [8].

Actors and their relations in networks can be observed through the lens of *complex adaptive systems*. As stated by Holland, 'many difficult problems centre on complex adaptive systems' and 'complex adaptive systems are systems that have a large number of components, called agents, that interact, and adapt' [9].

This central definition emphasizes the agent role of components that make up the overall system, and agents in complex adaptive systems are akin to actors with their multiple roles in the social networks.

This chapter will primarily draw on employees as individuals who are interconnected within and across networks of organizations. Regarding the main idea behind our topic, we take an 'egocentric approach' [10] instead of analyzing factors related to the total network of an organization and its social structure. Therefore, we approach specifically to the *individual* employee in the context of a social actor, and we focus on how the individual's beliefs and expectations can shape in accordance with his or her interactions with others.

2.1.2 Social Actors… and Their Proactive Behaviours

In the past, as now, people were eager to develop and extend their social networks in order to fulfil their need for belongingness, accomplish their targets and exchange information. A regular individual had the intention to be part of sets of relationships (work, family, private club, hobby groups, etc.) which were usually wide apart from each other and could hardly intersect. Such an intention seemed natural. Even organizational practices, which promoted employee participation in decision-making, generally had the lack of understanding the payoff between work involvement and family involvement, where the latter could interfere with the former. A generally accepted concern about 'employee privacy' was dominant—discussing on an employee's personal life would mean the invasion of the employee's privacy (which is certainly unethical). However, although such issues as long work hours, geographical relocation, frequency of business travels, high job pressure and many others were explicitly challenging the private lives of employees, organizations usually abstained from explicit discussions on family issues [11].

Today, we witness the predominance of social networks everywhere. Work life and private life can easily merge, and specifically in business settings, the needs and characteristics of the individual have changed. Uncertainty and ambiguity are the new keywords, and flexibility in time and workplace are the new work-life standards. However, for a knowledge worker with the mind of a social actor, these circumstances are not threatening—instead, they promise hidden opportunities. Therefore, these individuals tend to have influence as well as to shape things in their work settings, and their satisfaction depends on organizational practices and

management systems which confirm that their efforts are valuable. Changing behaviours of employees compelled scholars and human resource practitioners to find and implement new tools and techniques, particularly in the field of 'job design'. In any case, the employment relationship must be seen as an exchange between the individual employed and the employer, which on the side of the former, perceptions and beliefs regarding the work is highly affected by social relationships.

Jobs—in the contemporary sense—seem to be embedded in social networks, and decisions related to work are affected by relationships among individuals [12]. Three reasons may be put forward as underlying factors to explain the impact of social networks on the work life of individuals:

1. Advancements in digital communication technologies and wide use of social media actualized efficient communication and rapid exchange of information.
2. Advancements in global logistics and transportation provided means for economic and rapid exchange of tangible resources and facilitated travelling.
3. Cultural and intellectual developments on a global scale gave rise to paradigm shifts in societies across the world.

In accordance with such developments, everybody holds the chance to establish and maintain an individualized social network. This 'age of social networks' portrays a complex set of relationships where contributions, expectations, rewards and obligations are discussed and set within the frame of multidimensional psychological contracts. While this equation is very complex, it also delivers significant signs regarding our understanding of today's employees—or simply, *individuals*. Individuals engage in proactive behaviours (e.g. job crafting and idiosyncratic deals); 'they engage in changing the task and relational boundaries of their work either cognitively or physically'—a process which is beyond the conventional job design efforts, whereas jobs are tailored by managers and assigned to employees [13, 14].

2.1.3 Individual as 'an Actor' of Production

Questioning, listening, learning, implementing and requestioning are the predominant behaviours of the new genre of workforce. Related to this point, almost a 100 years ago, Mary Parker Follett, the political writer who later reverted to a philosopher of management, said that the 'true man' was found solely through a group organization, whereas the group provided an environment for an individual to release his or her 'potentialities' (p. 6 in [15]). Her work on the 'interrelatedness' of individuals as well as systems actually presents us with various dimensions on understanding the whole systems for management. In maybe a

complaining manner, she made a point on writers and probably also on those who govern that they talked of the 'social mind' as if it were abstract and only the individual were concrete. However, in Follett's view, they are both real and inseparable, and as a social person needs other social people, she continued as follows:

> "… there is no way of separating individuals, they coalesce and coalesce, they are 'confluent'… Our nineteenth-century legal theory (individual rights, contract, 'a man can do what he likes with his own', etc.) was based on the conception of separate individual. We can have … no social or political progress until the fallacy of this idea is fully recognized. … Individuality and society are evolving together… the relation between the individual and the society is not merely made up of action and reaction, but of 'infinite reactions by which both individual and society are forever a-making…" (pp. 60–61 in [21]).

A couple of years later, she wrote another book, which investigated the complexity of the human nature and the system dynamics even deeper. She interrogated the central problem of social relations, whereas she claimed that *power* was the problem; it needed not to understand where power meant to be located in a system, but *how* it were to be developed (p. 12 in [16]). Follett also pointed out the appreciable facet of 'scientific management' (or, 'Taylorism' as some authors call) which transferred the authority to knowledge and tended to depersonalize the *order*—the problem of what had to be done was analysed, the problem was clearly understood and parties involved in bringing out solution to this problem were aware of the conditions of the situation; hence, both managers and the workers were under order and obey the *law of the situation* (p. 59 in [17]). Understanding the conception of 'power with' (i.e. the optimum use of power per se in a group environment in order to achieve 'the law of the situation', or in other words, 'the reality') is significant for a thorough evaluation of work dynamics. Today's individuals—in the sense of social actors—do not tend to fulfil orders without hesitation. Instead, they interrogate, criticize, evaluate and, above all, try their best to attribute meaning to the given tasks. As long as tasks reflect the real conditions of the things to be done, these individuals find space to use their creative skills and look for better ways to reach the target. On these grounds, the rise of a critical question is inevitable: Who are these actors?

An evaluation of an organization with a critical lens, whereas the priority is given to social relations, would *not* need the observation of individuals as 'isolated' actors—instead, their *positions* in the social network are crucial to understand, as relationships between individuals have great impact on how they perceive their jobs [12]. The isolated individual was the basic phenomenon of the Industrial Age. Frederick W. Taylor, founder of scientific management, and Henri Fayol, founder of the general management theory, were both engineers and rational thinkers. Taylor divided the work into simple tasks and assigned each task to the most possible appropriate individual—every single person in the workshop knew what to do, and the work in *total* was to be done efficiently. Fayol did the same for organizations; he divided it into several groups of activities (e.g. technical, commercial, accounting, etc.), formed departments and their subunits, defined the

process of management through sequential activities as forecasting, organizing, commanding, coordinating and controlling—every single person knew what to do, and the work—again in *total*—was to be done efficiently. However, either way, the task was repetitive, work was monotonous and employees were isolated [18].

Modern management theories which began to arise particularly after the World War II realized that not only human was a different factor but the system itself was also different. Gradually, the mechanistic perspective which assumed that managers hold the power in organizations and are responsible for the task as well as for motivating their employees shifted towards a dynamic paradigm. This paradigm shift, accompanied with the social, economic and cultural transformation, necessitated employees to be more proactive and open to experience in general. Consequent periods have evidenced the rise of organizations where learning and knowledge sharing were significant (e.g. [19]). Therefore, the successful performance of these companies was marked with the emergence of dynamic networks across business settings. This is basically where the discussions related on who an actor is begins. When a social network is taken as a complex adaptive system into consideration, the actors who are the nodes should be considered to have certain aspects.

2.1.4 Autonomy and Freedom to Collaborate

If autonomy marks the central characteristic of these individuals, then how can we define an *autonomous identity*? First of all, it should be noted that 'being autonomous' does not mean 'being irresponsible'. As Hackman and Oldham wrote in 1976, 'the job characteristic predicted to prompt employee feelings of personal responsibility for the work outcomes is autonomy'. Thus, a job with high autonomy implies that the job allows the individual a high degree of 'freedom, independence and discretion' in organizing the work and deciding on the procedures to follow; and in this case, the output of one's work highly depends on his or her own efforts and decisions—instructions from the boss or from a handbook of procedures will have less importance [20].

Agents in a complex system are autonomous—so are the social actors. Just as a complex system is not modelled as a globally integrated entity, a social network is not the outcome of the coordinated efforts of centralized authorities (which *may* only act as constraints) either, but it is the outcome of interactions among social actors who act as 'autonomous decision-makers'. Kauffman coined this phenomenon as *self-organization* [21, 22]. For these relations to sustain in the long run, individuals, as social actors, may feel the need for particular environmental constraints as *centralized authorities* and *institutions*—in our case 'business organizations'. In fact, the guidance of a few rules is usually beneficial. Individuals regard these rules in the form of procedures, ethical codes, social and cultural values, and contracts.

2.1.5 From Mechanistic Organizations to Social Networks

When autonomous decision-makers interact and collaborate on the solution of a certain problem, their interactions lead to the building of a network—this maybe seen as an illustration of a more realistic structure of organization, which depends on dynamic facts and actual relationships among the individuals. Organizations are created in order to collect such relationships under one roof—such initiatives actually have a good reason; decision-making is a process of communication and collaboration, and these require order. However, those who communicate and collaborate are human beings with their respective emotions, perceptions and social conditions. Hereby we arrive to a notion that underlies what we understand from social networks. This required order does not call for the implementation of a mechanism but a platform of relationships among individuals to facilitate communication and collaboration. As Herbert Simon once pointed out, once an organization is embodied in charts and manuals of job descriptions, it is rather acknowledged as 'a series of orderly cubicles following an abstract architectural logic' than 'a house inhabited by human beings'. To Simon, organizations are patterns of communications and relations among human beings, who are involved in processes for making and implementing decisions and, on this account, provided much of the information they need (pp. 18–19 in [23]).

Simon's perspective can be claimed to lay down the foundational thinking for contemporary organizations where individuals—as social actors—make decisions together, and for this reason, organizations cannot be illustrated as mechanistic structures. Years later, in 1961, the ground-breaking study of Burns and Stalker revealed that mechanistic and organic structures of organizations stand at two opposite ends, and from this lens, they informed us on the rise of networks in management studies. Some of the features of this contrast are summarized below (statements given as mechanistic structure *vs*. organic structure) [24]:

- Specialized differentiation versus contributive nature of special knowledge and experience.
- The abstract nature of each individual task versus the realistic nature of the individual task.
- The reconciliation of these distinct performances by the immediate superiors versus the adjustment and continual redefinition of individual tasks through interaction with others.
- The translation of rights and obligations and methods into the responsibilities of a functional position versus the spread of commitment to the concern beyond any technical definition.
- Structure based on hierarchic and contractual control versus network structure.

The authors also elucidated that in mechanistic organizations, knowledge of actualities was located at the top of hierarchy, communication was vertical between superior and subordinate, instructions and decisions were issued by superiors, and loyalty and obedience were expected from the employees, whereas

in organizations with organic structures, knowledge could be located anywhere in the network, communication was available between individuals of different hierarchical levels and functional units, information and advice were disseminated by superiors, and commitment to organizational tasks and progress were valued [24].

Unfolding such contrasts between classical and modern approaches to organizations revealed that organic organizational structures represent better and dynamic fits with environments.

2.1.6 Patterns of Relationships

Social network analysis focuses on the pattern of relationships among actors. However, as previously emphasized by some authors (e.g. [25, 26]), social network analysis encompasses the availability of resources as well as the exchange of these resources among these actors [25–28].

Yet, in today's stiff and innovation-driven work settings, having access to necessary resources is much more valuable than preserving the existing resources. Calling the present time as the *Age of Innovation*, Prahalad and Krishnan, in their book (2008), made a very good point on this that they drew their reader's attention to 'the centrality of the individual' and 'the access to resources instead of ownership of resources' (p. 11 in [29]). Their argument explicitly reflects an important detail underlying a pattern of relationships among actors—*value* and *experience*. Actors use their connections because they need resources; however, actors also have the intention to the best resource available to achieve the best outcomes. When two collaborating actors exchange a resource, the essential detail underlying this exchange is that the actor who initiated the interaction attributes value to what the other actor has. The applicant perceives what the recipient owns valuable. Once the interaction is complete, the applicant (and possibly the recipient too) acquires an experience, which takes the actor to a new state of being—the actor learns, blends the knowledge extracted out of the new experience with the already existing knowledge in mind and thus differentiates and takes one more step to being as unique as possible in the environment. Prahalad and Krishnan suggested that value was based on service, and an firm was actually selling a service rather than a product, which could be considered only an integral part of a service. For this reason, a firm was involved in a service relationship rather than a transactional relationship with a customer (p. 16 in [29])—whereas value and experience matter rather than a product. Collaboration and resource exchange patterns are not only realized among organizations. In fact, organizations are constituted by individuals, and in fact, individuals experience such resource exchange patterns. Individuals exchange tangible or intangible resources usually in the form of reciprocity [27]; nevertheless, reciprocity produces beliefs and perceptions on the value and experience obtained through such interactions.

2.1.7 Social Actors: A Brief Summary of Beliefs and Expectations

In order to frame our broad illustration of individuals at work regarding their beliefs and expectations *as social actors*, some key characteristics will manifest themselves as follows:

1. Individuals are intrinsically creative, and they have the intention to use their creative thinking skills and creative abilities.
2. For this reason, individuals need and tend to interact with other individuals (who are also social actors).
3. An individual can find these 'other' individuals anywhere—the workplace, other organizations (suppliers, customers or even competitors and non-governmental organizations), the market, unrelated industries, communities, social network Websites, networks of friends, etc.
4. Individuals are intrinsically autonomous—they communicate and act on the basis of self-determination, while they tend to follow basic and simple rules to facilitate their efforts and achieve their goals.
5. Individuals are autonomous but collaborative decision-makers—they are zealous to contribute their own knowledge and experience to the decision process, and they tend to collaborate with other individuals in order to construct a decision.
6. Individuals acknowledge their interactions with others as the preeminent source that (continually) define their tasks rather than instructions issued by superiors at higher levels of the hierarchy.
7. Individuals prioritize task contents and outcomes rather than procedures and other bureaucratic issues to accomplish the task.
8. Value is the key to the individual actions; therefore, primary concern of an individual is to access the best possible resource.
9. Interactions with other individuals—particularly coming from a variety of areas—are beneficial in a way to contribute to an individual's intellectual and professional skills, and in this way, individuals differentiate and preserve their unique identities in their work settings.

2.2 Psychological Contracts of Individuals as Social Actors

Psychological contract—in modern sense—can be defined as 'individual perceptions or beliefs of employees regarding terms and conditions of exchange agreements between themselves and their employing organizations' [30–32]. In this definition, the conception of *perceptions* seems to get emphasized as the fundamental basis for such contracts incorporating what the employee *as an individual* interprets the mutual obligations either explicitly or implicitly agreed upon at the

beginning of the employment relationship [33, 34]. Psychological contracts can be 'transactional' or 'relational' in nature—the former being tantamount to rather short-term agreement with specific terms and conditions, whereas the latter to long term with non-specified terms [34–38]. Rousseau has further developed a framework where she conceptualizes a hybrid type of contract, referred to as 'balanced' contracts, entailing high levels of both relational and transactional type characteristics, and a transitional type of contract entailing low levels of both (see p. 98 in [34] for further details). However, as can be observed in later studies, this conceptualization does not seem to be widely held (e.g. [39]), and even Rousseau herself does not make frequent use of the measure for transitional type, since she conceives of it as 'a temporary state' [40, 41].

Depending rather on short-term relations with the employer, transactional contracts have reasonably tangible and specified performance terms, a materialistic and economic focus, and limited involvement of both parties. Meanwhile, relational contracts represent long-term relationships with the employer, with intangible and non-specified performance terms, involving not only economic terms, but also broader terms that emphasize social aspects of the employment relationship, and that promote loyalty in exchange for security and growth opportunities [34]. In a similar vein, findings suggest that employees with relational contracts tend to identify with and internalize the organizational values more, while for those with transactional contracts, identity comes from their own skills and competencies, without any need for personal investment in or from the organization [36].

In their intriguing article which explicitly challenges the macro-orientation of the social contract theory (which, with authors' words, 'has endured for centuries'), Thompson and Hart argued that the individual level (or, nano-level as mentioned by the authors) of analysis would be more beneficial and—referring to individuals as *real actors*—aimed to illustrate how a psychological contract approach would yield practical insight [42]. In fact, studies concerning psychological contracts in the framework of the social network theory are very scarce. One particular study, conducted in a start-up research firm by three scholars including Rousseau, investigated the relationship between employees' social network positions and their psychological contract beliefs [43]. However, over the past few years, an increase in the number of studies on job design issues and proactive behaviour engagement in employment relationship associated directly or indirectly with the social network theory is observed (e.g. [12, 44–46]). As Kilduff and Brass inform us, 'there is a resurgence of interest in the social aspects of job design' [12], and at this point, it is crucial to understand the new workforce of the age in order to develop better tools and techniques to achieve more efficient and satisfying results in organizations and human resource management practices.

2.2.1 Freedom for Creativity

As a process of producing something novel and valuable, creativity has always been an attractive topic to study in the field of social sciences. Several researchers considered creativity at the individual level—how an individual might focus on a problem and use personal competencies in order to find out a way for solution. However, studies yield evidence that creativity is also an outcome of the work of a group of people [47, 48]. On one hand, psychology-oriented scholars bring forward the individual and some social factors regarding the relationship of this particular individual with others. For example Amabile, in 1983, focused on 'a set of necessary and sufficient components of creativity', whereas she constructed this framework by the 'domain-relevant skills, creativity-relevant skills and task motivation'; and such a framework reveals what social factors might contribute to the phases of the creativity process in addition to cognitive abilities and personality characteristics [49]. A couple of years later, Csikszentmihalyi gave attention to the outputs of individual actions in the context of the individual, the domain in terms of rules and practices, and the people who establish the structure of this domain [50, 51]. On the other hand, sociology-oriented scholars went on to focus on the impact of the environment on the creativity process [48].

A few years later, Amabile presented a three-component model of creativity as a process of bringing out ideas that are useful and actionable. She argued that thinking *imaginatively* and flexibly is one part of creativity along with two other components—expertise (technical, procedural and intellectual knowledge) and motivation (in the context of inner passion rather than such external rewards as money) [52]. At the heart of these components, greater attention is perhaps drawn to what the conception of *imagination* represents. Admittedly, 'ideas presented by the memory are much more lively and strong than those presented by imagination' as 'memory produces ideas in the same order as the original impressions were received', but 'imagination has liberty to transpose and change ideas' (p. 15 in [53]). In regard to this argument which explicitly distinguishes memory from imagination, we can now focus on another conception—*liberty*. In fact, liberty of actors is what underlies the social system, which tends to survive through dynamic interactions among its components. In other words, the social system will continue its presence as long as actors, who are part of it, are able to use their abilities to think 'the other way around' and allowed to ask challenging questions like 'What if?'.

Viktor Frankl, a psychiatrist and a Holocaust survivor, once stated that finding the *meaning of life* was the essential duty of an individual. One of the key avenues he suggested to those who investigated it was 'doing a deed or creating a work' (p. 141 in [54]). This little hint acquired through Frankl's sorrowful experience evidently explains that creativity is already a part of human nature and is related to the individual's motivation—the latter being not only a topic but also a field of exploration in the social sciences for many decades. Literature on motivation usually implies what managers and business owners can do in order to maintain the devotion of their employees, to secure their belongingness to the organization and

ultimately, to ensure their productive and beneficial behaviours. This is usually a reflection of a managerial perspective, which gives the priority of the interrogation and determination of motivating terms to the manager rather than the employee. Bernard and his colleagues suggest that 'a comprehensive theory of motivation should address not only mechanisms that motivate and activate goal-directed behaviour but also mechanisms that delay, alter, deactivate, and rechannel all manners of goal-directed behavior', and therefore, the authors rightly address the conception of *self-control*, which, with their words, 'may be effective in terms of resistance for immediate rewards in favour of longer term goals', and 'can intervene to channel motivated behaviours into prosocial behaviours' [55]. So, employee's self-control is inevitable in terms of the individual's continual tendency to control and regulate his or her emotions, desires and behaviours, which takes us to accept the fact that as social actors, employees tend to decide to remain in and to work for the benefits of the organization upon their perceptions on employment relationships and whether they perceive the liberty to use their imagination and to regulate their own social behaviours beside using their skills of expertise.

Creativity has usually been perceived as a challenging issue for managers. For organizations after all, creativity must be regarded as something more than a mere process of producing novel and valuable things. In fact, creative skills themselves are even more valuable than products. A creative mind knows *what* to produce for the firm, and knowing what to produce is a precise and clear state that serves as a basis for a transaction between the employee and the employer. Moreover—if allowed and well equipped—a creative mind will also consider further dimensions and will try to understand *how* to produce, *when* to produce, *for whom*, *where*, *with whom*, *how much* or *how many* to produce for the firm. Clarification of such issues has a strategic value, and it is crucial for the organization's long-term survival. Some beliefs and expectations of individuals can be listed as in the following:

- *Individuals want total freedom for observing facts*: In case that they realize a problem at work or an issue either directly or indirectly falls in their area of responsibility, they want to take action and interrogate the real facts of the situation.
- *Individuals want total freedom of speech*: Because they want to deal with real facts, they want to share their opinions freely with others in order to provide and supply necessary data and information.
- *Prerequisites must be fulfilled*: Easy and quick access to data and information inside and outside the organization must be provided. Only technically well-equipped and digitally literate individuals can efficiently use communication channels and collaborate with others.
- *Creative ideas must be confirmed beneficial and valuable*: Individuals spend efforts and time on dealing with problems, and in return, they want to ensure that their efforts are meaningful to the organization. This anticipation should not be restricted into a mere compensation based on higher salaries or rewards. Beyond a transactional relation, the individual wants to have the feeling of self-actualization rather than the feeling of belongingness.

2.2.2 Collaboration with 'Real' Actors

A realistic approach to problems facilitates the realistic definition of tasks to ensure effective task assignments to eligible individuals—and this is not a new phenomenon. In fact, the emergence of 'scientific management' in early 1900s took its root from the argument that any task could be redefined scientifically, required skills to accomplish the task could be identified and the 'right person' could be selected for the task; thus efficiency could be achieved in a rational manner [56]. It would be unwise to deny the fundamental role of this argument which obviously acts as the core idea of the general management theory. On the one hand—thanks to the advanced communication technologies and global transportation—searching, selecting and recruiting the right person for the rationally identified task has never been as easy as it is today. On the other hand, a wide range of practices—from job enlargement to teamworks—are being implemented for decades to overcome the demotivating nature of routine and simple tasks, and this leads to the question of how a realistic definition of tasks could be achieved in this contemporary context. Scientific management and other classical management theories assigned this responsibility to managers—scholars and practitioners avowed that the managers were the ones who could understand and solve the problems and employees were the ones to put the solution into action. Up to a certain point, such an approach may seem tolerable and reasonable, regarding the sociocultural and technological environment of the Industrial Age. However, problems in the contemporary context are quite complex and dynamic by nature—plenty of dimensions must be taken into account by several actors, while each dimension is also subject to change due to individual actions of these actors.

Teamwork culture was highly encouraged in the organizations particularly in the last 30 years of the past century. In this context, project teams were seen as a miracle where people from different departments could come together, discussed problems and shared ideas on a scope of different areas. Are intraorganizational teams effective enough to establish and exploit attentively developed strategies based on thoroughly examined facts? Is a cross-functional teamwork is solely an effective process to deliver products and services that fulfil the needs and requirements of the market? If we were back in the 1970s/1980s, where market competition was based on keeping know-how and information within the boundaries of the organization, 'yes' would probably be the answer to such questions. Nevertheless, how we interpret the competition or, more precisely, the rules of the game in the business environment seems to have changed over the past two decades.

In 1977, Hannan and Freeman published an article, which gives proof of their awareness of these two pillars. The authors laid particular stress on challenging issues related to how information was obtained by decision-makers in the organizations. This statement shows evidence: 'Much of what we know about the flow of information through organizational structures tells us that leaders do not obtain anything close to full information on activities within the organization and environmental contingencies facing the subunits' [57]. Hannan and Freeman's

approach was a pioneering example that represents the ecological model of competition—a response to the traditional model of competition based on linear relationships with principles and concepts borrowed from the classical Newtonian physics. According to the ecological model's point of view, business organizations operate in a complex environment, made up of other organizations either competitors or suppliers or customers. Organizations may be interpreted on the basis of the principles of living organisms, which are subject to the stages of the life cycle from birth to death and made up of lower-level organisms like subunits and individuals. However, organizations are entities which can decompose, whereas individuals can only move from one organization to another. This is actually where the notion related to exchange of information and connectedness on a global scale begins. If organizations tend to survive in the market, this depends on the effective interactions among its subunits and among its members. Yet, just as a living organism requires water and food from the environment, the organization will require information and resources as appropriate as possible—and which can already be possessed by anyone located anywhere—to continue its life in the environment. Individuals in the organization assume this duty; they look forward to ways of reaching, processing and using the information and resources in favour of their organization. Since these information and resources are owned by other individuals either inside or outside their organization, these individuals need to interact with others on exchange basis. Restricting such interactions, particularly between subunits or departments of the organization, apparently will cause a paradoxical situation.

One of the basic notions underlying the classical management paradigm is *cooperation*—which requires a group of individuals to carry out their respective tasks 'in accord with some larger plan', and as Smith puts it, these individuals need not 'to know what goes on in the other parts of the project', as long as they accomplish their part of the whole work. However, *collaboration* has the anticipation of the work of a single mind, whereas parts carried out by individuals are *integrated* (pp. 2–3 in [58]). Integration, in essence, requires a consciously realized mutual exchange among individual actors. Some implications on the individual beliefs and expectations in this sense may be listed as in the following:

- *Decision-making is a collective process*: Organizational problems are diverse, and even a simple problem is indeed a heterogeneous process of various activities carried out by different individuals (e.g. responding to customer complaints, developing a new product or even bookkeeping for a small shop for which the responsibility of one single accountant is assumed to be adequate). One single individual, in this case, cannot be assigned with the responsibility of making decisions.
- *Tasks are defined through interactions between individuals—not through instructions issued by authorities*: A realistic definition of an individual task can only be possible through interactions with other individuals, and redefinition of the task in line with changes becomes inevitable. In other words, instead of a solution process in a linear manner where problem analysis and task

assignments are fulfilled by decision-makers prior to the action stage, the possibility of the use of real-time information and skills of expertise transmutes this process into a dynamic platform, where interactions among individuals constantly redefine the problem and the solution in line with actual circumstances.

- *Integration of tasks is the key to working together*: Individuals collaborate. Every individual is specialized in a certain area and has the intention to contribute his or her knowledge and past experience to the collective work. Harmonized contribution is appreciated, and it is much more valuable than manifestation of personal contribution.
- *Individuals tend to exchange resources with real master*: The awareness of a problem requires the provision of the most accurate information and resources possible for an efficient solution. Therefore, individuals tend to use their social networks rather than remaining within the boundaries of their organizations.

2.2.3 Balancing Autonomy with Rules and Procedures

Empowerment theory has sufficiently been central to the field of management, especially in the 1990s. Scholars making research on empowerment frequently advocated its win–win advantage—improving organizational performance, which leads to improvements in the experience of work for the employees [59]. Far beyond being motivated due to what the organization offers, individuals as social actors are autonomous—sticking to their own rules and own ways of doing things while seizing opportunities to compromise with the system they are involved in.

Autonomy can be observed as the focus of many organizational practices and analysed by a great number of scholars throughout the history of management thought—the 'Junior Board' as part of McCormick's multiple management plan in 1930s, studies on 'employee participation' in the Harwood pyjama factory in 1940s, 'autonomous work group' practices in the Volvo car manufacturing plants at Uddevalla and Kalmar in Sweden in 1970s, and the Japanese 'quality circles' in 1980s are a few of many examples [60–63]. Nevertheless, in the context of employment relationship, autonomy is a two-dimensional phenomenon—a leadership issue taking trust and consensus among individuals into consideration and a job design issue reflecting the advent of new technologies that support better task accomplishments. The introduction of manufacturing technologies that replace the traditional assembly line and integrate work units after 1970s gave rise to better employee relationships (pp. 163–164 in [64]).

Autonomy is 'the degree to which employees experience freedom, independence and discretional decision-making in terms of scheduling their work, selecting the equipment they will use and deciding on procedures to follow' [65]. In other words, an individual's expression of 'high level of autonomy' indicates a belief in a sense that the individual can act independently and have control over his or her work [66]. However, on the side of the manager, giving autonomy may be perceived as a risk-taking action as the manager becomes dependent on the employee's skills and qualifications [20].

At this point, the individual is aware that some constraining rules and order might be necessary for his or her actions. Imagination is good, but for efficient and valuable outcomes, conceptualization—by means of certain limits and guiding rules—is necessary. Regarding the need for such a balance, the individual's beliefs and expectations may manifest themselves as in the following:

- *Rules and procedures are necessary, but they must derive from realistic issues*: Individuals tend to have freedom of thought and action. However, in order to shape their creative thoughts and transform them into concrete products, they need specifications determined through the analysis of the problem covered or situation handled. Imposed power or issued instructions from superiors are not welcome.
- *Rules and procedures must be simple, clear and intelligible*: Since individuals interact with each other, the efficiency of such interactions is based on the mutual satisfaction on the exchange process.
- *Individuals tend to arrange their own jobs*: Rules and procedures must be defined for guiding purposes. For example, standard working hours may be considered a mere formality, or dress codes may seem useless. Instead, the individual has the intention to arrange his or her own working hours and methods as the priority is given to the content and quality of the task rather than rules and procedures.

2.3 Conclusion: Some Organizational and HR-Related Remarks

Studies on career planning in the turn of the century reflect the existence of a radical change, which has great impact on individual careers and human resource management practices [67–69]. Particularly, boundaryless careers—defined as 'a sequence of job opportunities that go beyond the boundaries of a single employment setting' (p. 116 in [70])—challenge traditional careers in certain ways. Traditional careers emphasise stability, hierarchy and clearly defined job positions. However, boundaryless careers encompass transferable skills instead of firm specific skills, individual's responsibility for career management instead of organisation's responsibility, on—the—job training instead of formal training programmes, learning—related career path instead of age—related career path, psychologically meaningful work rather than success based on pay, promotion and status [69]. In the past, managers were responsible in giving directions to careers. Following a long career path in their organizations, managers' experiences were essential. As pointed out by Dessler, particularly in today's environment, employees should not deliver this responsibility to others (p. 354 in [71]).

Sustainability of social networks depends on participation; and this participation is characterised by the freedom of self-–determination and collaboration of social network actors. Correspondingly, the classical maxim of management as

'getting things done through others' must be updated with the compendious message underlying the following statement of a manager in the Information Age: 'People need to be free to do what has to get done' (pp. 157–167 in [72]). Patronizing employees with promises of rewards will not work. However, organizations are expected to be platforms where a well-established web of channels facilitating communication with individuals inside and outside the organization is available, so organizational individuals can get connected freely with others and contribute to getting things done. Individual according to his or her intellectual, entrepreneurial and socioemotional traits use these channels and interact, and the sum of interactions shapes the behaviour of the organization observed in various forms of outcomes—e.g. market share, profit, the performance of a new product and innovative strategies. A managerial capability of seeing the future in its true colour and taking proactive measures to control the whole organization is factitious. No actor is capable of having the consciousness of the whole system, and in a dynamic sense, no actor can be kept informed of all information throughout the system—managers are no exception. Thus, a manager should take the responsibility of the dynamic flow of information exchange among individuals for valuable outcomes. In fact, the social capital theory reveals that supporting individuals by their connections to resources through their social networks and relations can provide additional resources to the organization (p. 20 in [73]). In return, individuals who are able to exploit the privileges of their networks and social relations—and thus can contribute more value to their organizations than their colleagues—believe that 'they are owed more' [43].

In conclusion, today's work settings are based increasingly on social relations—interactions between people contribute to the strategies, image and prejudice of the organizations. Individuals have beliefs and expectations in line with the features of the Information Age. Unfortunately, not all the work settings and circumstances respond to such anticipations. Organizational facilities and organizational culture together create a substantial infrastructure to meet the needs and requirements of the individual employees today.

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Chapter 3
HRM as Challenge for the Top Management of Technology Start-Ups

Irina Koprax, Eva-Maria Mayrhofer and Wolfgang H. Güttel

Abstract This chapter deals with the challenges that Top Managers of technology start-ups face in regard to human resource management. Technological innovation is seen as main driver of our economy. However, SMEs developing these high-tech products are widely neglected in the public discourse and in research. As human resource management in this setting is completely different to HRM carried out in HR departments of large firms, we raise awareness of HRM in technology start-ups, shed light on the characteristics of HRM in this context, present two case studies and identify their HRM practices, discuss strengths and weaknesses of identified practices, deal with the challenges for the Top Management regarding HRM in the growth process, and derive success factors for HRM in technology start-ups. In the end, we present the managerial and theoretical implications of our research.

3.1 Relevance of HRM in Technology Start-Ups

During the past decades, the organizational landscape dramatically changed. Firms are increasingly confronted with highly dynamic environments, high levels of competition, and rapidly changing technologies. New technologies such as the Internet revolutionized our way of living in the private and the business context.

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Whereas the focus of research and the public discourse is shifting toward multinational corporations, a certain type of firms delivering these strongly demanded high-tech products seem to be forgotten—SMEs. "What usually gets lost is that more than 99 % of all European businesses are, in fact, SMEs. They provide two out of three of the private sector jobs and contribute to more than half of the total value-added created by businesses in the EU. Moreover, SMEs are the true back-bone of the European economy, being primarily responsible for wealth and economic growth, next to their key role in innovation and R&D" [1]. Also by the US Academy of Engineering (1996), small- and medium-sized technology firms are seen as a unique source of diversity and flexibility and therefore significantly contribute to the long-term success of innovation systems. They take opportunities that stay unrecognized by larger firms and therefore play a decisive role in creating and developing new markets and build product diversity [2]. In particular, the technology start-ups we were looking at offer a high degree of innovativeness as the university background of founders and the funding by national research funds at an early stage of activities ensured the development of new technologies without or only limited constraints from market side.

As SMEs per se are underrepresented in research, also the role of HRM in SMEs is neglected. Literature on HRM primarily refers to HRM as a function pursued in HR departments of large firms [3, 4]. It widely neglects that this function does not exist in SMEs where the Top Management is strategically and operative responsible for HR agendas. OECD states that management capabilities are crucial to survival in early stages and human resource management gets increasingly important as the firm grows. Also, European Commission labels HRM as important issue for an SME's success, "SMEs regard four factors as constituting equally important barriers to innovation: problems in access to finance, scarcity of skilled labor, a lack of market demand and the high cost of human resources" [2]. According to Delaney [5], labor costs and finding skilled personnel are under the top 5 reasons that hamper growth.

Not surprisingly, entrepreneurs are deeply interested in new information about HRM issues [6] as they rarely have the financial resources to employ a HR specialist [7]. As SMEs are not a smaller version of their large competitors, it is crucial not to impose the same practices to them, but to investigate their characteristics [8]:

- HR is not the focal activity of the Top Management.
- Top Management lacks HRM knowledge.
- Top Management lacks managerial capabilities.
- Top Management lacks leadership skills.
- Knowledge workers as specific type of workforce have certain expectation to their work environment.
- Scarcity of resources impacts recruiting and retention.
- Growth processes pose various challenges to HRM.

Due to these specifics in comparison with larger firms, we apply a broader understanding of HRM following Boxall and Purcell [9] that "HRM refers to all of

those activities associated with the management of employment relationships in the firm" and do not only deal with the traditional HRM practices recruiting, induction, development, and compensation, but additionally think on their impact on motivation, ability, and opportunity, especially when it comes to job design. Also, Snell et al. [10] refer to a broader understanding of HRM as in knowledge-intensive firms and dynamic environments, shaping the values, attitudes, and commitment gets increasingly important. Strategic HRM provides firms with the internal capacity to adapt and adjust to their competitive environments by aligning HRM policies and practices [10].

Alignment of HRM policies and practices should gain center stage when start-ups grow in order to adjust to internal complexity. Churchill and Lewis [11] and Greiner [12, 13] emphasize the managerial challenges of growth (Fig. 3.1) and are thereby also touching the field of HRM. At the beginning, firms are characterized by technically and/or entrepreneurially oriented founders that work in close relation with their employees who are also completely dedicated to the product (development) and the firm. Communication is immediate and informal. The more successful the company is at that stage, the more likely growth becomes an issue. In particular, in fast growing firms, entrepreneurs are challenged by introducing formal processes and get burdened with managerial tasks. The success factors of

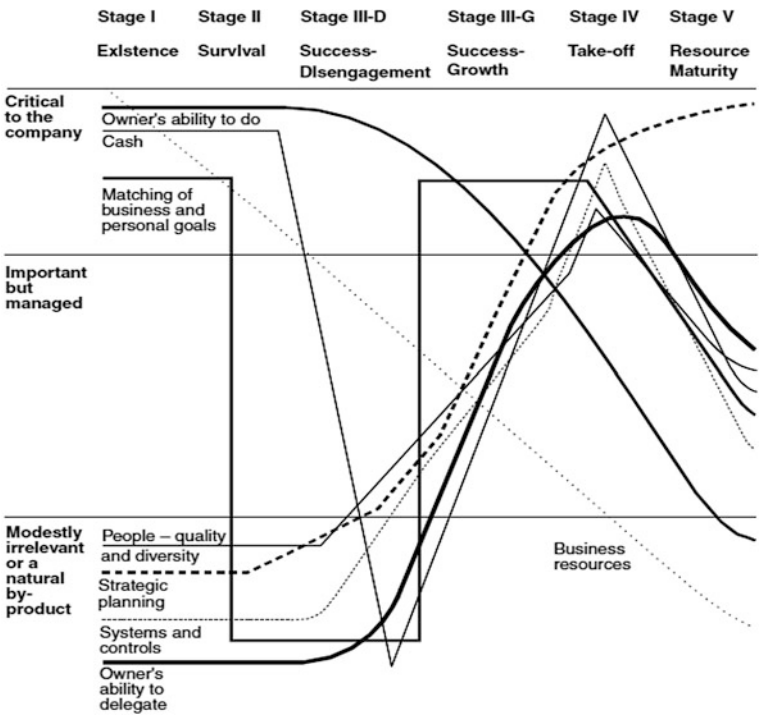

Fig. 3.1 Management factors and the stages of growth [11]

early stages become pitfalls in subsequent ones. Whereas a hardworking founder deeply involved in operative activities is important to survive the first years and bring his vision across, the ability of taking over a more managerial role or pass this responsibility on to somebody specialist in the field becomes essential. Greiner [13] calls it the "crisis in leadership," when founders become overloaded with managerial responsibility although they do not feel comfortable in this position. Therefore, founders tend to trivialize the problems and resist implementing more formal structures in the first place [14]. "Owner's ability to do" must be exchanged against "owner's ability to delegate," and "strategic planning and systems" get increasingly important. This also refers to HRM that is done on a case-by-case basis at the beginning but needs more strategic consideration when a firm grows.

Growth processes and adapting to them is at the moment the challenge for the two case firms we selected for presentation in the following section. By growth, we mean an increase in the number of employees [15] and the number of customers and increases in market share [16, 17].

3.2 Two Case Studies of Technology Start-Ups

As part of a larger research project on the influence of HRM practices on a firm's innovativeness, we picked out two start-ups engaged in the high-technology sector, which can be subsumed in the category of SME. The main factors determining an SME are (1) the number of employees and (2) either turnover or balance sheet total (see Table 3.1) [18].

We decided to follow a case study research design [19] as this design offers the chance to analyze complex social phenomena in depth and within the natural context. As we got rich data to analyze [19], the method facilitated a deeper understanding [20] of the Top Management's role in HRM. The data source consists of problem-orientated in-depth interviews at both firms. Each interview lasted between 1 and 2 h. We tape-recorded and transcribed them. Additionally, we collected data from other sources, e.g., annual reports, strategy documents, artifacts, and Web pages, in order to improve the understanding of interviews, the organization as a whole and its products. Multiple data sources enabled data triangulation and helped us to improve the validity of our findings [20]. Data analysis rooted in thematically coding the interviews [21].

Table 3.1 Definition of SME [2]

Company category	Employees	Turnover (m)	Or balance sheet total (m)
Medium-sized	<250	≤€ 50	≤€ 43
Small	<50	≤€ 10	≤€ 10
Micro	<10	≤€ 2	≤€ 2

Both SMEs are operating in a highly dynamic, knowledge- and research-intensive sector and are currently going through an intense growth process regarding the sales volume and the number of employees. Due to the rising number of products, customers, financial resources, and employees, the firms are ideal for showing how the Top Management is challenged by managing HR in the process of growth.

Both firms have their roots in university, where some students fascinated by a certain topic started working toward having their own business. Supported by incubators working in close cooperation with the university, the founders could concentrate on product development, while they received professional support on side of founding and leading a company. While there were only technicians in the founding team of Flyspy Ltd., a fictive name, Sports-Pro Ltd.'s founders were a mixed team of technicians and people with background in business administration (Table 3.2).

3.2.1 The Case of Flyspy Ltd.

Flyspy Ltd. was founded in 2005 and employs around 30 people. At the beginning, Flyspy Ltd. primarily focused on research projects, financed by the European Union, to ensure its survival. Research projects were necessary because, so far, Flyspy Ltd. had no product to sell, just some scientific results (knowledge) but a vision. After numerous small intermediate steps, Flyspy Ltd. translated its knowledge into marketable products (e.g., self-propelled lawn mower, automatic guided robots) and it started to accomplish customer orders, too. Flyspy Ltd.'s products are primarily sold in German-speaking countries, but it continuously enlarges its presence outside Europe. Fulfilling customer needs reduced its dependence on research funds and was helpful for building up a comprehensive client-base and partner-base. Flyspy Ltd.'s major customer groups are aviation and maritime organizations, government, and organizations that are in need of automatic guided vehicles. On the other hand, the organization spends plenty of time

Table 3.2 Firm profiles of Flyspy Ltd. and Sports-Pro Ltd.

	Flyspy Ltd.	Sports-Pro Ltd.
Foundation	2005	2009
Number of employees	About 30	About 70
Products	Technology suppliers in the field of navigation, motion tracking, and mobile robotics	Software development (apps) + sports equipment
Top Management	At the beginning CEO (= founder), later CEO + CTO + CFO, now CEO (= previous CFO)	Founding team (4 founders)

and money on R&D to develop a system that increases the value of the core product, but might also be sold as a component of objects produced by other firms. There was little competition; however, it was uncertain if or when the breakthrough could be achieved. The new technology required major investments, whereas the date of returns remained unclear.

Due to Flyspy Ltd.'s success, a strategic decision that successful start-ups are confronted with sooner or later arose—grow or stay small and serve a niche. These opposing directions were represented by the conflict within the Top Management at that time. The CEO preferred to grow, whereas the CTO considered staying small and operating in a niche. During that time, the flexibility and spontaneity that formerly brought the success resulted in confusion, insecurity, and inefficiency. In the end, the conflict was resolved by the CTO leaving Flyspy Ltd., but issues of structuring and organizing HR agendas still persist.

3.2.2 The Case of Sports-Pro Ltd.

Sports-Pro Ltd. was founded in 2009. The initial idea was born during a project at university for tracking sailboat races. As the target group was too small, the founders decided to focus on more popular sports, such as running, cycling, and walking, and developed an app that can track and analyze different kinds of sport activities. All relevant sports' data can be uploaded to a fitness portal and shared within the community. Subsequently, Sports-Pro Ltd. also launched hardware products in order to broaden its reach in the fitness industry. Additionally, Sports-Pro Ltd. develops apps for other companies. As living on the development of apps is difficult, all four founders completely reinvested the money into their firm, which is one characteristic that ties the Top Management of Sports-Pro Ltd. together and helps with rapid growth. Now, Sports-Pro Ltd. employs around 70 people with different national backgrounds. Sports-Pro Ltd. is not only operating in Europe, but also expanding to the United States by now. Sports-Pro Ltd.'s main competitors are firms in the United States, which is really tough as changing to another app is easy and free of charge for the end-customer. Therefore, close contact to end-customers and immediately reacting to their feedback is success-critical. This is done via a customer portal on the Internet. Due to direct communication and a flat hierarchy, responding to customer needs is comparably fast and easy and the main source of competitive advantage. Routines are only applied in quality checks and when it comes to answering customer queries. The Top Management persists since the foundation by clearly following their defined roles in sales, marketing, technological development, and internal agendas.

As SMEs and in particular technology start-ups are different to larger firms, we show their characteristics in the next section as they impact the alignment of HRM practices in the growth process.

3.3 Characteristics of Technology Start-Ups Impacting HRM

3.3.1 Top Management as HR Agents

Research on SMEs shows that their competitiveness is strongly related to the formal education and training of its Top Management, but the formal qualifications are in general inferior to those of the management in larger firms as founders rarely attend formal training [18].

In the case of Sports-Pro Ltd., the Top Management consists of persons having the technical understanding and also knowledge in business administration. Therefore, they strictly divide responsibilities and lay emphasis on product as well as organizational development. One founder is responsible for server infrastructure, one for mobile products, one for marketing and sales and representation activities, and one for gaining research funds and internal agendas. In contrast, Flyspy's founder has proficient technical background but lacks competence in business administration. Therefore, he stayed involved in operative product development tasks and neglects administrative, management, and leadership tasks. However, employees appreciate having a Top Management that knows that the process of developing new technologies takes time and includes making failures but complain about lacking communication structures and information management. Introducing an attendee recorder without prior communication at Flyspy Ltd. leads to extreme reactions of employees and serves as an example for the relevance of leadership and management skills. Instead of loosing the trust in the case of Flyspy Ltd., Sports-Pro Ltd. tracks working hours via its project management system to which employees are highly committed as they understand that tracking hours is crucial for planning and calculating projects for external customers. Learning leadership and management skills by doing bears the risk of loosing trust and credibility and in the end of loosing employees.

3.3.2 Knowledge Workers as Workforce

OECD's comparison on successful SMEs showed that hiring skilled employees and motivating them is crucial to success [2]. Employees are autonomously motivated and fascinated by new technologies. They are driven by the wish to constantly develop a certain technology further and by finding new technological solutions for given problems. They are therefore highly committed and appreciate an autonomous job design with the possibility to informally exchange ideas with their colleagues without any bureaucratic restrictions. Davenport [22] shaped the term "knowledge workers" as individuals with a high degree of expertise, education, or experience, and the primary purpose of their jobs involves the creation, distribution, or application of knowledge. North and Gueldenberg [23] showed that

these workers call for a completely different human resource management than people engaged in material work. Knowledge workers are high potentials possessing specific knowledge regarding the processes, products, or services of a firm. Therefore, changing and formalizing HRM processes needs to consider this specific workforce.

3.3.3 Scarcity of Resources

The build-up process of such job-specific knowledge takes time and is costly for the firm. Consequently, it gets more and more decisive to tie knowledge workers to the firm to reach ambitious business objectives and shape the firm's future. In particular, in periods of economic highs, small enterprises with limited resources have to find ways to retain their best employees. Also, the current shift in demographics and the consequent potential lack of workforce raise the challenge of how to recruit and retain good employees. Difficulty in recruiting qualified staff is a main barrier for SME's innovative capacity what makes it even more important to position oneself as attractive employer although compensation cannot be the motivator comparing to larger competitors [2].

3.3.4 Environmental Dynamism

Developing a new product that requires a new technology takes years, and the date of market entry is difficult to estimate. Therefore, forecasting what the market will look like when the product finally could be launched is hard, and planning the necessary HR resources and processes to serve the market is not easy. However, both start-ups have an advantage that literature also identified: "Not burdened by layers of bureaucracy or entrenched cultural barriers to functional area cooperation, these firms often outmaneuver their larger and older rivals by quickly responding to emerging markets" [24]:

- Working in open-space offices allows informal and direct communication and therefore fast information transfer.
- Flexible allocation of human resources to projects allows responding immediately to market demands.
- Autonomously motivated employees are willing to work longer hours on short notice in stressful times when demand is high.
- Employees fascinated by the product inform themselves outside the workplace about trends in the market.
- Developers' engagement in customer projects enhances their understanding of customer needs and the customers' understanding of technical limitations.
- University contact of founders ensures access to cutting-edge knowledge.

- Founders' engagement in industry networks shapes the future market situation also regarding legal regulations.

Due to the small firm size, technology start-ups often operate in niches, and therefore, competition is not that tough. Larger firms do not offer additional services such as integration and maintenance of their products in the case of Flyspy Ltd. or react to customer complaints that fast as in case of Sports-Pro Ltd. However, being informed about competitors and changes in the market is crucial as realizing the changes is a precondition to take the advantage of being able to flexibly react. This is especially important for Sports-Pro Ltd. as the demand for apps is constantly changing.

3.3.5 Growth Processes

As start-ups grow in terms of human resources and diversify in terms of products and financial resources, it gets increasingly complex to govern organizational processes. Top Management is broadly integrated into operative tasks, and management or leadership tasks are in the background. Due to rising complexity, the Top Management becomes overwhelmed, and therefore, rising complexity is often represented by problems and crisis [11] as managers of young growing firms have difficulties to understand the necessary changes [24]. In the case of Flyspy Ltd., product managers were installed to separate the core from the developing business. However, as the Top Management feared to lose power, their function was to give more information from the Top Management to the rest of employees than having concrete responsibilities to relieve the Top Management. Sports-Pro Ltd. laid more emphasis on the project structure and on clearly dividing responsibilities among Top Management members. As there are 4 founders, it is much easier for Sports-Pro to keep an eye on organizational development and leadership as this role is clearly assigned to one of them. Adaption of the organizational structure is especially critical for young firms as they are most susceptible to the adverse effects of an inappropriate organizational structure as their resource base is limited and their organizational slack resources are small [24]. Also, our case firms are permanently struggling to structuring and specializing and at the same time not loosing flexibility and motivation of employees. Lacking structures on the other hand leads to a loss of velocity, chaos, and uncertainty. Due to Flyspy Ltd.'s early success, the number of employees, products, markets, and financial resources increased over the years. Top Management focused on product development and forgot organizational development. Structures are basically the same as in the beginning. Employees call for more formal rules, tighter structures, and better top-down communication but are annoyed by losing autonomy and formal ways of control. As the Top Management invests little in leadership, role confusion, insecurity, and concerns on side of employees are the consequence. Basically, the culture of open informal communication enables a good climate of working together; however, difficulties in sharing information and knowledge [24] appear with growth.

Literature on HRM applies a static view on HR practices; however, in growing start-ups, HRM practices are evolving. Formal processes are mostly missing in early stages, and HR is more done on a day-to-day basis with lacking strategic focus. In particular, when it comes to job design structuring, efforts are often done with minimal thinking about the consequences for employees' motivation. Interestingly, firms producing high-tech products handle HR without technical support. Therefore, it is complicated to keep track of everything and administration becomes a burden.

3.4 HRM Practices in Technology Start-Ups

Although HR practices of SMEs and large organizations are more or less the same, in terms of how they are performed lays a huge difference. Therefore the practices of

- Recruiting
- Induction
- Compensation
- Development
- Job design

in the two case firms are described in this section (see Table 3.3).

Table 3.3 HRM practices at Flyspy Ltd. and Sports-Pro Ltd.

Recruiting	Recommendations, networks, internships (master thesis)
	High-performance values
	Fascination for product
	Fit with established team
Induction	1st day: Top Management tells about relevant firm data and processes, getting to know the team in an informal way
	Learning on the job, assignment of small projects, special attention of Top Management
Compensation	Based on qualification but low in comparison with larger competitors
Development	Learning on the job
	Internet platforms, blogs
	Trade fairs, conferences
	University cooperation
	Supervision of master thesis or doctoral thesis
Job design	Projects with different staffing;
	Time for own creative projects at Sports-Pro Ltd.
	Autonomy regarding working hours autonomy restraint by customer demands
	Close customer contact
	Performance judged by result at deadline
	Jourfixe for coordination at Flyspy Ltd.; not regularly held at Sports-Pro Ltd.

3.4.1 Recruiting

Recruiting in both firms lies in the Top Managements' hands. Thereby, Top Management team members rely on recommendations of their networks. They are in close contact with university institutes, where professors suggest talented people to them. Most employees are former undergraduate or doctoral students that were connected to Flyspy Ltd. or Sports-Pro Ltd. via their thesis before. That offers a good opportunity to get to know the person and about her/his work attitude. On the other hand, people can test whether the job fits their expectations or not. In particular, Sports-Pro Ltd. is recognized for a good working climate among programmers and gains new employees through word of mouth in the industry network. The CEO of Flyspy Ltd. additionally searches actively for qualified personnel in databases such as "Xing." Sports-Pro preselects its employees by first employing them on a service contract basis, which is also in favor for future employees as they are often university students when they first get in contact with Sports-Pro Ltd. and want to intensify their work load just after finishing their studies. As it is not that easy to find qualified personnel, both firms are looking for generalists or people experienced in the field even if they are trained in a different programming language. In order to ensure the qualification of employees, they rely on the recommendations of professors of educational institutions and universities. Sports-Pro Ltd. offers the perfect workplace for young people as working there provides a good opportunity to develop competences due to the autonomy given by the Top Management. The salary for people working there is not the main source of motivation, as it is very low in comparison to larger companies in the region. As autonomous motivation is very important for the Top Management of both firms, they are looking for people that are interested in and enthusiastic about the product and fit to the established team.

3.4.2 Induction

The new employee is shown the administrative processes, premises, and the products and soon works in smaller projects. Employees in their first weeks have enough time and do not feel any pressure. They are supported by the whole team, and also the Top Management takes a lot of time to answer their questions. At Flyspy Ltd., the new employee gets a firm presentation and scientific journals to read and can have a look into the manual of the product, but the main part is learning by doing and learning by explanations from colleagues. As it is often not possible to employ people that exactly meet the profile, they have to learn, for example, a different programming language in their induction phase. In order to show motivation, employees of Sports-Pro Ltd. at the very first stage learn the basics of the new language by themselves. Later on, they sit next to the most experienced person in this field, who acts as informal mentor even later on when the new employee pursues own projects. At the same time, they do not only

transfer the technical knowledge, but the new employee also learns about norms and values in the firm. As there is no formal induction process and written rules are missing, this form of individualized socialization is very important to ensure the internalization of processes, rules, and norms.

3.4.3 Compensation

Compensation at both firms is intransparent and depends on individual negotiation. As salary cannot be the prior factor of motivation due to resource constraints, Flyspy Ltd. builds on events to strengthen the group such as having dinner together or meets for sports activities outside the firm. Although start-ups are a very uncertain environment (high failure rate of start-ups), they are still demanded employers as they offer good working conditions and programmers know that they can easily get a job at an industrial group in case of failure.

3.4.4 Development

On the job, people develop competences by reading scientific journals or conducting the Internet, and rarely, they visit courses outside the firm. Development is closely related to solving day-to-day problems at work and not really future oriented. At Flyspy Ltd., the Top Management thinks that employees either possess creativity or not and does not think about any facilitation by workshops for example. A lot of potential stays unused as there are no efforts to think about human resource and knowledge management in a systematic way. Formal annual employee reviews are held to find out more about employees goals and interests. Development of employees, for example dissertations, is supported, but all kinds of development need to be initiated by the employee herself/himself. New knowledge is gained through supervising master thesis or following discussions on Internet blogs in the spare time. Moreover, discussions at trade fairs and scientific conferences offer room for exchange with others involved in the same industry sector to stay up to date.

3.4.5 Job Design

Both firms organize their work in projects with different staffing. Also during a project, employees can switch flexibly depending on the demand of human resources in other projects. Within the projects, decisions are made on individual basis, as Top Management is not interested in the process, but the result at the deadline. Also referring to working hours, employees decide on their own what

time they leave the office and are content with working longer hours in busy times in exchange to longer periods of compensatory time off. Autonomy rises with duration of firm membership.

The Top Management of Flyspy Ltd. wishes for independent employees that show initiative and believe in themselves and their ideas. They should be driven by the motivation to find out something new and should also take risks to achieve that. This attitude is expressed in team meetings where every argument counts no matter who brought it in. On the contrary, when looking at processed ideas, it can be seen that the CEO takes over a strong part and mostly pushes his ideas. He is the one responsible for ideas, and employees should bring them to life. Employees are often asked to participate in certain projects, but the initial idea always comes from the CEO. At Sports-Pro Ltd., on the contrary, employees get time to develop their own ideas and projects. Employees are motivated by the collaborative working environment and the involvement in different operations. Resource constraints become an advantage as work therefore is not that specialized and developers are also involved in testing which is especially in the case of Flyspy Ltd. a strong motivator as they have a physical product to test. Employees can clearly see how their work contributes to the whole and the company's success. They are also motivated because of only few formal controls. As research and development is a process that is never finished, employees need to be patient and forced by finding out something new. In particular, in the process of programming, employees of Sports-Pro Ltd. mentioned the importance of "flow," the psychological state where a person is fully focused on an activity. Being in such a state makes work going faster and therefore should not be interrupted. That is why they do not stick to working hours but to their psychological state. However, when the number of people in open-space offices increases, it becomes noisier and one gets interrupted more often. That is the reason why marketing and sales activities at Sports-Pro Ltd. are separated.

Formal meetings such as Jourfixe are planned but forgotten in the daily work of Sports-Pro Ltd., so communication suffers. Informal meetings during lunch break do insufficiently replace the formal ones. Flyspy Ltd. on the contrary uses Jourfixe for regularly informing each other about the projects.

3.5 Strengths and Weaknesses of HRM in Technology Start-Ups

Derived from the description above, it is possible to deduce strengths and weaknesses of HRM in technology start-ups (see Table 3.4). Having both in mind is in particular important when thinking about the structuring of HR activities in the growth process as the strengths should be maintained as long as possible.

Table 3.4 Strengths and weaknesses of HRM in technology start-ups

Strengths of HRM in technology start-ups	Weaknesses of HRM in technology start-ups
Flexibility	Chaos
Collaborative working environment	No formal control mechanisms
Innovative climate	No orientation through rules and structures
Informal communication	Lack of formal communication
Highly autonomously motivated employees	Top Management responsible for HR issues

3.5.1 Strengths

The strengths rely on a combination of the workforce and job design. Sustaining the job design characterized by flexibility, collaboration, innovation, and informal communication is central to attracting and maintaining the knowledge workers that are able to come up with innovative high-tech products.

- *Flexibility*: Based on a comparatively low degree of bureaucracy, HRM in technology start-ups is able to flexibly react to changing environments what is an enormous competitive advantage compared to larger organizations with a more inflexible HRM system. They are flexible due to people working on service contracts but also regarding their case-by-case decisions about training activities outside the firm. Moreover, allocating human resources internally between projects allows fast reactions.
- *Collaborative Working Environment*: Project-based working, as it is common in technology start-ups, fosters a collaborative working environment. As different competences are required for developing high-tech products, collaboration and cooperation are essential. This is enabled by a common vision based on the founder's principles.
- *Innovative climate*: Knowledge workers carry the dedication to find out something new. Combined with the vision of the founder that directs their search and the possibility to exchange ideas informally in- or outside the projects leads to an innovative climate. Moreover, a culture that sees failures as inherent in the innovation process facilitates new product development enormously.
- *Informal communication*: Based on a low degree of formal rules for communication, information can flow extremely fast in a very informal way. As technology start-ups are confronted with high environmental dynamics, this is one of the most important strengths.
- *Knowledge workers*: Such a job design fits well with the requirements of knowledge workers, and thus, they are highly autonomously motivated.

3.5.2 Weaknesses

The weaknesses are tightly coupled to the strengths and can be seen as the flip side of the coin.

- *Chaos*: Due to the flexibility of contracts, it is difficult to define the role of people working on service contracts. How much should they be integrated? Will they stay longer? Will they get a fix contract? Should collaboration with them be different from internal collaboration? Also, people switching internally between projects are problematic as it is then hard to keep everybody informed about activities in the project.
- *Control mechanisms*: Knowledge workers enjoy working autonomously, and performance is secured by clan control. However, as proper project documentation or tracking of working hours is missing, there is a certain insecurity on side of the Top Management, especially when the firm grows and keeping an overview over activities gets more difficult.
- *Structures and rules*: It is possible that the preferred autonomy and independence switch to a great burden for employees that later enter the firm as there are no rules and structures they can follow. The larger the firm gets, the more interpretations of how the daily processes should be pursued exist. This is reflected by different performance norms or understanding of communication and collaboration, which causes conflicts and insecurity.
- *Top Management as HR agent*: In technology start-ups, the Top Managers are usually not trained in HRM because they primarily enjoyed a technical education. As they focus on technology, they spend only little time and effort on HRM and on developing their skills in this field. Therefore, they often do not realize the importance of these issues and loose sight of necessary changes.

Most difficulties arise when the firm grows in employees, sales, products, or market segments, and thus, the requirements to the HRM system and the organization as a whole change. The previous strengths, which fostered organizational success and growth, can easily switch to weaknesses and endanger the survival of the firm.

3.6 Firm's Growth as Challenge for HRM

Small firms are characterized by a low level of complexity that roots in market proximity, few products, employees, rules, and formality. Challenges appear when the growth of small firms enhances complexity [24], and balancing different requirements becomes increasingly difficult. The firm is more and more confronted with various challenges [11, 25]. In the early stage, resources are moderate and thus easy to manage. Based on an increasing number of employees, products, and financial funds, allocating resources becomes more and more challenging. Therefore, more rules and processes for allocation are needed.

In the early phases, the individuals are in the foreground as they organize the main resources to survive as organization. During the growth process, the relation changes that means that individuals are more and more in the background and the organization with its structures, processes and rule becomes increasingly important.

In the following section, we deal with the challenges of growth and thereby identified necessary areas of change.

3.6.1 Processes and Rules

When the firm size is small, processes are quite easily manageable and primarily informal. As the number of products, sales, and markets increases, it becomes more difficult to manage all the processes within in the firm. Growing start-ups struggle with the rising complexity because they do not develop structures that help them to handle it. Adaption of the organizational structure is especially critical for young firms as they are most susceptible to the adverse effects of an inappropriate organizational structure as their resource base is limited and their organizational slack resources are small [24]. Technology start-ups primarily fail because of missing functional knowledge and because of not knowing how to handle internal processes. They have, for example, problems with processes such as consistent quotation processing, time recording, and paying earnings. For example, Flyspy Ltd. found itself in the situation that without major changes in the organization's structure, processes, and workplace, the higher number of employees could not be handled effectively. So, for example, handing in payslips in time becomes a challenge for the Top Management of firms that generate sophisticated technologies. Individual working hours lead to people constantly walking in and out the open-space office, which disturbs the working atmosphere.

3.6.2 Communication

A great advantage of small firms is that everybody knows about everything, as it is easy to communicate over the desks. Direct and immediate communication ensures that there are no redundancies and that time resources are well allocated. When the number of employees and projects increases, this informal way of passing on information becomes critical; it is quite challenging or even not possible that all employees get the information they need. At Flyspy Ltd., the Top Management believes that everybody should be informed about everything, but information needs to be requested. Information concerning products is given to each employee, but, for example, the entry of a new employee is not communicated at all. In both firms, there are hardly any e-mails about internal changes as written rules on communication are missing. Also, the chance to get information from informal communication decreased due to increased complexity. Project/product managers at Flyspy Ltd. should serve as information bridge between employees and the Top Management. Transfer among employees is retained by employees switching between projects. However, it takes time to get everybody at the same level of knowledge. Informal communication with the Top Management serves as a form of empowerment and is likely to reduce the motivation and commitment if it gets formalized and indirect. Moreover, it allows fast reaction, which is a major competitive advantage of small firms.

At the beginning, it is quite a lot of work to build up a fluent way of communication aside the project-based communication. However, for keeping employees motivated, a suitable and extensive communication system is very crucial.

3.6.3 Knowledge Management

Another critical aspect is documentation. At the beginning, every employee is responsible for a clearly defined field or process. Written documentation of projects is dependent on individual judgments of how much documentation is necessary. Thus, everybody documents her/his work in her/his own way. The Top Management of both firms tried to implement corporate wikis, but they are not that frequently used and updated. Although Flyspy Ltd. has suffered from the leaving of a key person at the very beginning, they were yet not able to raise awareness to use IT tools for knowledge storage. Employees share the opinion that knowledge becomes outdated very fast and that it takes too much time to keep up these systems. Therefore, it is extremely important to retain employees as long as there are no codification strategies in place. For reducing the dependence on individuals as they have enormous personalized knowledge storages, it is crucial to establish a knowledge management system that overstretches the whole organization. Limitations based on a personalized documentation system are no longer suitable for a growing organization.

Besides the formal ways of documentation, it is essential to create areas and structured ways of dividing and transferring knowledge. In small but growing firms, a possibility is to introduce Jourfixe and meetings or on a more informal way to meet for an after-work beer, reserve time for small talk, or regularly organized breakfasts at work. In growing firms, it becomes important that such activities are organized because it is quite difficult that the employees organize such project on their own.

3.6.4 Top Management

In technology start-ups, the Top Management is responsible for procuring the general requirements (e.g., acquiring the necessary resources [26]). Founders have a strong idea of what they wish to sell and roughly how to produce it. The main aim is to set up the initial goals [27] and to develop and realize a vision (e.g., [28]) through working hard instead of managing the organization or leading employees. As founders are mostly technicians without an economic education, the management tasks are mostly in the background: Their passion is the development of technical solutions and not organizational development and leadership. Employees are often asked to participate in bringing the ideas to life, but the initial stimulus

always comes from the Top Management. Hence, the firm becomes a reflection of the founders' behaviors. Based on the enormous discretion and the low level of bureaucracy [28], the Top Management leads the organization in a quite a loose, flexible, less rule- and formality-based way. In the first phase, it is even more important to bring the organization to life than to develop extensive strategic plans.

However, rising complexity leads to more organizational and less operative working activities. Structures stay basically the same as in the beginning, but they are no longer suitable. However, in most cases, the Top Management is not clear about that and acts like in the beginning. The Top Management becomes overloaded, concerning operative, coordination, and management tasks. It is no longer able to handle the firm casually and does not fully understand the organization's processes anymore [29]. As dealing with rising complexity is a central function of the Top Management and pivotal for the success or failure of a firm, the Top Management needs to develop ways of handling. The members of the Top Management need to change their roles from the founders to the managers. That means that it becomes necessary to learn delegating duties and step aside from the operative business (see Fig. 3.2). Founders need to be aware of their strength and act accordingly. They should either invest in developing their skills in strategic management and HR, employ an HR specialist or seek help from consultants.

To ensure a better communication, Top Management can seek support from lower hierarchy levels [30]. In the case of Flyspy Ltd., product managers have been installed. However, in order to guarantee their performance, training in project management is required. So thinking about formal training for the Top Management as well as for other management levels is important in the growth process. Moreover, also the willingness of the Top Management to give responsibility to the lower hierarchy level must be given. This enables a division of work and responsibility between the Top Management and the Senior Management/ project leaders and protects the Top Management from work overload.

To sum up, the challenges root in underdeveloped processes, difficulties in sharing information and knowledge, inadequate (control) systems, and lack of transparency (see also [24]). Rising complexity calls for decisions in a very early stage in order to avoid or at least mitigate these challenges: The Top Management has to strategically decide whether to stay small and serve a niche or to foster the firm's growth. Fostering growth means introducing tighter structures and raising formality while reducing employees' autonomy. Functional experiences, the founder's personality and his influence on the firm and its employees [31, 32] as

Fig. 3.2 Role of owner in the growth process [11]. The *small circle* represents the owner. *Large circle* represents business

well as the Top Managements' past job-related experience [33] strongly influence this decision. If the Top Management decides to grow, it needs to ensure changes because otherwise it is no longer possible to handle the firm effectively.

Growing start-ups are confronted with a very special situation: They are no longer small enough to manage their duties informally, and they are not large enough to have such formalized ways like a global corporation. Growing start-ups take over an intermediate position.

It is critical to the success that they formalize their processes; otherwise, they are threatened to decline as the flexibility and spontaneity that formerly brought the success now resulted in confusion, insecurity, and inefficiency. However, it is crucial to the success to be aware of not losing the incentives that are important for knowledge workers—flexibility, spontaneity, autonomy, and a collaborative working environment. However, Bacon et al.'s [34] study of UK SMEs suggested an inverse U-shaped relationship between firms' HR formality and performance. According to Bacon et al. [34], the main challenge for SMEs is to introduce formal structures but at the same time protecting the informal culture as this is the source of competitive advantage. On the other hand, formality is necessary to unfold the potential of SMEs and enable their growth.

3.7 Successful HRM in Technology Start-Ups

Based on our findings, we derived some factors that we perceive as important for successful HRM in technology start-ups. By successful, we mean that practices contribute to high-performance work systems, which are characterized by giving employees the ability, the motivation, and the opportunity to perform well (Fig. 3.3).

3.7.1 Recruiting, Development and Induction Creating the Ability for High Performance

HRM practices that contribute to support the creation and maintenance of a corporate culture and a common frame of references are the recruiting based on the fascination for the product and the fit to the established team, the individualized induction, and the project-based job design. Thinking strategically about personnel development and training activities and introducing a transparent compensation system would be crucial as well, but was neglected by our case firms.

One of the most important factors is to recruit employees that fit the firm. A technology start-up primarily needs knowledge workers that enjoy working autonomously. They need to favor working proactively and self-dependent. They should show initiative and believe in themselves and their ideas. Another

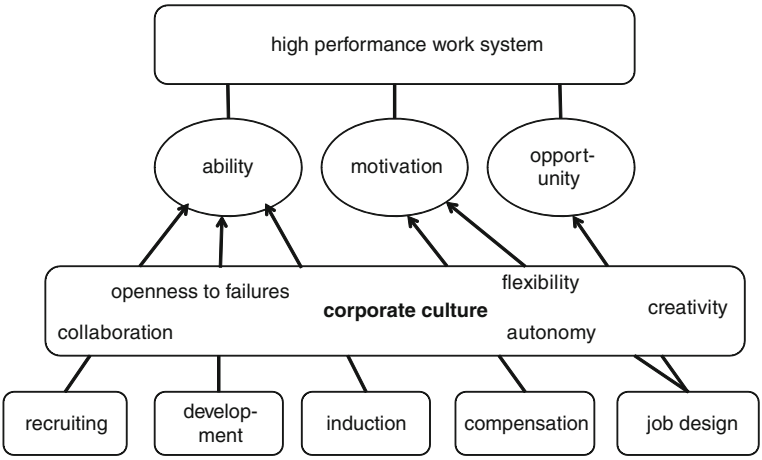

Fig. 3.3 HRM practices contributing to a high-performance work system

important aspect is being enthusiastic about the product as otherwise everybody would be working toward her/his own goal. If the employees are not enthusiastic, they will become tired in doing their work because working in technology start-ups could often be very exhausting, long-winded, and chaotic. Employees moreover need to be open for continuous development and change.

Factors that foster a successful HR system in small technology firms are as follows:

- Employees need to be
  - independent and autonomous
  - innovative and creative
  - proactive and self-dependent
  - enthusiastic about the product
  - highly committed to the firm
  - open for continuous development and change
- The Top Management needs to
  - be aware of the employees' needs
  - foster and support employees
  - provide a high level of trust to employees
  - be open for continuous development and change
- Corporate culture needs to support
  - collaboration
  - creativity
  - autonomy
  - failures
  - flexiblity

3.7.2 Job Design Providing Motivation and the Opportunity for High Performance

Employing independent, open-minded, and autonomous people requires a Top Management that provides enough autonomy to its employees. The Top Management's orientation should focus on the result, and how the employees achieve the result should be more or less in the background. The Top Management itself, however, is also strongly integrated into the operative tasks, and thus, it influences the product and organizational development through working together with the employees on current themes [30]. As knowledge is not bundled within the Top Management but employees possess specific expert knowledge that the Top Management does not necessarily need to have, focusing on fostering and supporting the employees and being aware of the their needs is an important task.

Working together in such a cooperative way without big hierarchical differences, formal rules, and strong control mechanism creates trust that employees would not abuse. At Flyspy Ltd., for example, this high level of trust becomes visible in open doors, delivering responsibility in important projects, free entry to every room, and the whole server on the PC. It is an immense challenge for Top Managements acting in that way because one sometimes might have the feeling of loosing control. However, from motivational aspects, this is very important.

For enabling to do a good job in technology start-ups, a corporate culture with shared values and norms that guide behaviors based on shared expectations [35, 36] is crucial. This culture should be characterized by trust, discipline, stretch, and support (see also [37]). Furthermore, such a corporate culture needs to assure a common frame of references that builds the framework for a common language and a high level of background knowledge (e.g., knowledge about challenges, the firm's goal, positioning of the firm) [38].

Technology start-ups need a corporate culture that supports a collaborative working environment, a creative climate, and working autonomy, which motivates the employees, especially knowledge workers. Furthermore, a positive attitude to failures is necessary because otherwise no innovative ideas can grow. Such a corporate culture supports knowledge exchange between employees and facilitates self-dependent working. Formal control and strict rules on the other side would hinder small technology firms in working successfully, as start-ups based on a commitment culture are less likely to fail than those pursuing an autocratic way [39].

3.8 Managerial Implications

As this book is aimed at practitioners and researchers, we tried to find a mix and serve both groups. Although the previous section contains many suggestions for practitioners, we wanted to summarize them additionally.

- The most important finding for technology start-ups is that it is essential to think strategically about HRM from the beginning. Introducing tighter structures and formal processes step by step is not that disruptive for employees than reacting when the firm is caught in chaos. Timing is a critical issue as too much formalization at an early stage is costly and slows down processes, and as a consequence, the firm looses its competitive advantage without profiting from specialization or economies of scale. Not only the timing but also the communication of change is crucial for employees, who are used to being engaged in decision-making. In particular, when it comes to introducing time-tracking systems, employees can easily feel a lack of trust that is why it is important to think about how to communicate such changes.
- Recruiting individuals that are highly autonomously motivated, fascinated by developing something new, dedicated to the firm and the product, and fit the team is a success factor of technology start-ups and can be easily achieved by relying on recommendations, pretesting through diploma thesis and service contracts, and having a good reputation as employer in the field. The challenge is to find employees flexible enough to perform current duties, manage multiple jobs, and take on different duties in the future as the firm grows [6]. A combination between fit to current culture and flexibility to adapt to a new one has to be considered in recruiting decisions [40].
- As good recruiting practices, we found that development and compensation do not get the attention they should. Although compensation is not the number one motivator as it is low, transparency gets an issue when the firm grows and employees are staying longer with the firm. In particular, as knowledge is stored in individuals' heads, thinking strategically about compensation to retain employees should be considered. Compensation should be seen from a total rewards' perspective, and considerations about learning opportunities should also be included in strategic planning.
- Another issue is development that should be thought about more strategically. Even if technical skills can be learned individually on the job, it is necessary to give employees that should support the Top Management in project management, HR agendas or organizational development the formal training they need to develop these skills.
- Management and leadership skills must be learned similar to technical ones. Therefore, it is crucial for the Top Management to develop these skills in trainings or give these responsibilities to a specialist. Launching a business requires different skills than managing and leading a business through changes in the growth process [41]; therefore, Top Management should admit that and seek support. Also, in that sense, network ties can help start-ups to exchange knowledge and experience about these issues.
- This is especially important as not only HR processes but also communication and cultural issues become more complex when the firm grows. However, being able to handle these internal complexities is essential to keeping up the innovative culture and being attractive to the workforce. Informality increases teamwork and relations between employees and therefore fosters motivation

[42]. Moreover, employees profit as they can negotiate work responsibilities and the form of supporting each other as well as enjoying flexible working hours [42].

To conclude HRM in a start-up means much more than being able to handle the typical HRM practices. It requires maintaining the culture, managing knowledge, and leading through change. It can therefore not be seen as only one of several responsibilities of the Top Management but must stay in the focus. However, "finding the right level of formality is both challenging and potentially beneficial" [8].

3.9 Theoretical Implications

Given the lack of literature on SMEs in general but in particular on the combination between HRM and SMEs [7], we contribute to raise awareness for this underinvestigated field. We show that HRM is not only a large firm phenomenon but crucial especially to growing start-ups. We thereby follow Heneman et al.'s [6] and Katz et al.'s [43] ideas to focus especially on growing SMEs.

Although HRM practices do not differ much from those of large firms, how they are practiced makes a big difference [34, 44, 45]. That is why we described how the traditional practices are carried out in our case firms and moreover directed attention to related fields such as knowledge management, communication, and change management as very important for HRM in SMEs.

But also regarding HRM practices in high-tech start-ups, we found differences to previous studies. For example, did Keating and Olivares [7] state the importance of in-house training, which we could not find in our case firms, where development was based on individually searching for solutions for day-to-day problems. Regarding communication, e-mails were found as being important for the daily business but not for passing on news about organizational issues from the Top Management to employees. Also, meetings bringing the whole firm together are not in the focus of the Top Management of our case firms in contrast to the findings in Irish high-tech start-ups [7]. Also, recruiting practices such as newspaper advertisements and employment agencies are not relevant in our case firms, but in line with Keating and Olivares [7] findings, referrals are very important.

Although there is research on HR practices in growing start-ups [46] or the importance of HRM in different stages of a firm's development [47] or HRM practices in growing SMEs (e.g., [48, 49]), these papers do not offer a wider understanding of HRM. Moreover, previous research in SMEs did not investigate the impact of HR practices on ability, motivation, and opportunity, which characterize high-performance work systems [50]. We fill this gap by showing how formalization can threaten motivation but how on the other hand lacking formalization can hamper opportunity. Ability is secured by recruiting and induction but later on left to the individual when it comes to further training. Therefore, the strategic component of human resource development is completely out of sight.

Even if literature states that there is no specialized function for HR in SMEs, it does not explicitly deal with the Top Managements as HR agent and the implications of that situation. Little [45] already discovered that HR practices are in nearly all cases handled by owners. However, the role of the Top Management and HRM practices of SMEs have so far been separated. We show the consequences of that by shedding light on the Top Management's lacking competences in (HR) management, and the fact that it is deeply engaged in operative activities and HR is out of the focus.

So far, the literature was dominated by dichotomies of commitment- versus control-based HR systems [50–52] and individualized versus institutionalized HR practices. Characteristics of each model can be easily found in the literature, but the way from one to the other or a mix is hardly ever mentioned. We fill this gap by showing how more control can be implemented and at the same time not loosing commitment and how institutionalized practices can complement individual practices.

The most prominent research in the field of HRM in high-tech start-ups is the one of Baron and Hannan [39] deriving 5 different HR blueprints of founders out of a sample of 200 start-ups in the Silicon Valley. They give a clear characterization of blueprints but also state that hybrid forms exist. As our case firms are hybrids between commitment and engineering blueprint, we contribute to the literature by further characterizing this hybrid type. Whereas selection in the commitment blueprint is based on cultural fit and clan control is predominant, in the engineering blueprint, selection is based on specific skills and the job is designed to offer challenging work to employees [39]. As the engineering blueprint in our case with only one founder is stronger, also the importance of HR is minor: "entrepreneurs in Engineering companies sometimes seemed to view the HR department as the people who buy the beer, chips, and dip for the Friday afternoon festivities" [39].

Moreover, we complement the literature on start-ups that is dominated by research from the United States by showing cases from the European context, where SMEs are an essential part of the economy.

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Chapter 4
People, Knowledge and Technology: Connecting the Dots from a Social Perspective

Raky Wane and Maria João Santos

Abstract This chapter analyses the contribution of human resource management (HRM) to building up and deepening organisational knowledge. If we perceive the management of knowledge as a collective phenomenon, based on persons, their qualities and interests, we need to question just how organisations may attract, develop, motivate and retain such members of staff. Throughout this chapter, we seek to respond to this question and demonstrate just how HRM may contribute to the effective management of knowledge. In parallel, we also aim to understand the way in which information and communication technologies may encourage and motivate such interactions between persons. To this end, we put forward a set of HRM practices susceptible to benefiting from the utilisation of technology in terms of encouraging both intra- and inter-organisational flows. The suggestions and examples presented provide important guidelines for the implementation of HRM practices structured around boosting the potential for knowledge management success.

4.1 Introduction

With the emergence of a knowledge-based economy, the management of intangible assets and, in particular, knowledge has taken on ever greater importance. Within this framework, the OECD [1] states that the creation, diffusion and application of knowledge are essential factors to organisations and countries seeking to innovate and survive in a highly competitive and globalised economy.

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There are various theoretical strands and authors establishing this relationship between knowledge management (KM) and value creation. The Knowledge-based view states that sharing and generating distinctive new knowledge is capable of driving improvements to the organisation's competitive positioning and performance [2–4]. According to authors such as Hislop [5], the implementation of KM reflects in the reduction in costs and productivity gains and, according to McAdam [6], fosters creativity and the empowerment of members of staff. Authors such as Nonaka [7] associate KM to organisational learning processes and the advancement of innovation and, in the field itself, these results reflect on organisational performances in terms of gains both in competitiveness and in economic–financial results [2, 8].

KM, according to Alavi and Leidner [9], involves a set of activities (or processes) consisting of the creation, storing and recovery, transfer and application of knowledge. However, effective KM policies, thus for value creation oriented KM, need to incorporate facilitating factors and, in this case, human resource management (HRM) represents an important factor enabling and driving KM.

Clearly, while there are also other antecedents, such as organisational culture, it remains no less true that the success of KM fundamentally depends on the way in which persons and their interactions are managed across both the intra- and inter-organisational facets and how these interrelate with the organisational tools and routines prevailing.

As persons learn, create and share knowledge in a collective fashion, through social interactions, HR management practices need to focus upon maximising flows of knowledge. Reflecting on the interconnectedness between HRM and KM, as well as the appropriateness of HR practices implemented within organisational contexts constitutes the core objective of this chapter.

Throughout this chapter, we maintain that leveraging flows of knowledge and ideas essentially depends on social and relational components. Hence, we begin by portraying the social dimension to KM. We then proceed to identify those HR practices within organisational contexts, putting forward a set of recommendations and suggestions while also illustrating specific company case studies. We close with a brief overview of information technologies—more specifically social platforms—capable of facilitating interactions between the various different parties to KM.

4.2 The Social Component to Knowledge Management

In the mid-1990s, interest in KM expanded throughout the academic, political, consultancy and business communities. While impossible to ascertain exactly the number of companies that have developed and implemented KM systems, studies undertaken by the consultancy firms KPMG and McKinsey suggest that a growing number of organisations have adopted and implemented structured KM systems [5].

However, all too commonly, the initial results returned by early KM initiatives do not meet the expectations stipulated. Authors such as Fahey and Prusak [10], when analysing the problems encountered, find that some of the mistakes made derive from organisational approaches to KM. The emphasis on the stock of knowledge to the detriment of driving flows of knowledge, alongside the replacement of human relations by technology, was among those factors identified as inhibiting the development of organisational knowledge.

Given this finding, various authors have backed the need to conceive of KM from a far broader perspective. To this end, Gupta and Govindarajan [11] highlight how effective KM involves establishing and fostering the creation of a "social ecology", i.e. a social ambience favourable to the sharing of knowledge between participants.

While there is no single and consensual definition of KM, the most recent proposals do also stress the social and relational aspects necessarily underlying KM. For example, Gao and colleagues [12] refer to how KM requires focusing upon managing the activities of knowledge workers with a particular focus on the facilitating mechanisms generating support, motivation, leadership and an ambience favourable to putting KM into practice.

This latter definition encloses a conception of knowledge significantly different to that which was first proposed within the scope of the early KM initiative in which knowledge was perceived as primarily information based. In this approach, knowledge may easily be separated out from its holders and stored in large repositories in order to facilitate their subsequent utilisation. In contrast, more recent conceptions consider knowledge to be inseparable from its holders and its development is a continuous process based on routines and the activities actually undertaken by persons (see Box 1). This shift in perspective clearly incurs implications for KM procedures. In this latter case, KM thus extends beyond the utilisation of existing knowledge to turn the focus on the creation of new knowledge as the key means of attaining higher levels of organisational performance.

Box 1: **12 Guiding Principles of KM**

1. **Knowledge is messy**. Because knowledge is connected to everything else, you can't isolate the knowledge aspect of anything neatly. In the knowledge universe, you can't pay attention to just one factor.
2. **Knowledge is self-organizing**. The self that knowledge organizes around is organisational or group identity and purpose.
3. **Knowledge seeks community**. Knowledge wants to happen, just as life wants to happen. Both want to happen as community. Nothing illustrates this principle more than the Internet.
4. **Knowledge travels via language**. Without a language to describe our experience, we cannot communicate what we know. Expanding organisational knowledge means that we must develop the languages we use to describe our work experience.

5. **The more you try to pin knowledge down, the more it slips away**. It's tempting to try to tie up knowledge as codified knowledge-documents, patents, libraries, databases, and so forth. But too much rigidity and formality regarding knowledge lead to the stultification of creativity.
6. **Looser is probably better**. Highly adaptable systems look sloppy. The survival rate of diverse, decentralized systems is higher. That means we can waste resources and energy trying to control knowledge too tightly.
7. **There is no one solution**. Knowledge is always changing. For the moment, the best approach to managing it is one that keeps things moving along while keeping options open.
8. **Knowledge does not grow forever**. Eventually, some knowledge is lost or dies, just as things in nature. Unlearning and letting go of old ways of thinking, even retiring whole blocks of knowledge, contribute to the vitality and evolution of knowledge.
9. **No one is in charge**. Knowledge is a social process. That means no one person can take responsibility for collective knowledge.
10. **You cannot impose rules and systems**. If knowledge is truly self-organizing, the most important way to advance it is to remove the barriers to self-organization. In a supportive environment, knowledge will take care of itself.
11. **There is no silver bullet**. There is no single leverage point or best practice to advance knowledge. It must be supported at multiple levels and in a variety of ways.
12. **How you define knowledge determines how you manage it**. The "knowledge question" can present itself many ways. For example, concern about the ownership of knowledge leads to acquiring codified knowledge that is protected by copyrights and patents.

by Verna Alllee
Source Magazine article from Training and Development, *Vol*. 51, *No*. 11, 2001

Within this current of thinking, the creation and sharing of knowledge are core facets to KM and inherently involve a large component of social interaction and face-to-face communication [5, 12]. This creation and sharing of knowledge essentially occurs through two different means. On the one hand, there is immersion in practice (learning by doing) and observation (see Box 2) and, furthermore, through social interaction, that is, through interactions that raise levels of confidence and favour the sharing of values or other tacit components [13].

Box 2: **Learning Through Communities of Practice**

Communities of practice (CoPs) are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.

Three characteristics are crucial:

The domain: *A community of practice is not merely a club of friends or a network of connections between people. It has an identity defined by a shared domain of interest. Membership therefore implies a commitment to the domain, and therefore a shared competence that distinguishes members from other people. (You could belong to the same network as someone and never know it.) The domain is not necessarily something recognized as "expertise" outside the community. A youth gang may have developed all sorts of ways of dealing with their domain: surviving on the street and maintaining some kind of identity they can live with. They value their collective competence and learn from each other, even though few people outside the group may value or even recognize their expertise.*

The community: *In pursuing their interest in their domain, members engage in joint activities and discussions, help each other, and share information. They build relationships that enable them to learn from each other. A website in itself is not a community of practice. Having the same job or the same title does not make for a community of practice unless members interact and learn together. The claims processors in a large insurance company or students in American high schools may have much in common, yet unless they interact and learn together, they do not form a community of practice. But members of a community of practice do not necessarily work together on a daily basis. The Impressionists, for instance, used to meet in cafes and studios to discuss the style of painting they were inventing together. These interactions were essential to making them a community of practice even though they often painted alone.*

The practice: *A community of practice is not merely a community of interest–people who like certain kinds of movies, for instance. Members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice. This takes time and sustained interaction. A good conversation with a stranger on an airplane may give you all sorts of interesting insights, but it does not in itself make for a community of practice. The development of a shared practice may be more or less self-conscious. The "windshield wipers" engineers at an auto manufacturer make a concerted effort to collect and document the tricks and lessons they have learned into a knowledge base. By contrast, nurses who meet regularly for lunch in a hospital cafeteria may not realize that their lunch discussions are one of their main sources of knowledge about how to care for patients. Still, in the course of all these conversations, they have developed a set of stories and cases that have become a shared repertoire for their practice.*

> *It is the combination of these three elements that constitutes a community of practice. And it is by developing these three elements in parallel that one cultivates such a community.*
>
> by Etienne Wenger
>
> *Source* http://www.ewenger.com/theory/

This perspective reinforces the idea that people are at the centre of KM processes. After all, individuals are ultimately responsible for transforming their individual knowledge, skills and competences into organisational knowledge, which in turn reflects in the respective organisation's results. However, this only happens whenever entities pre-establish an organisational context [14] favourable to the emergence of new ideas and the generation of new knowledge. This thereby highlights the importance of the respective culture [15] and an organisational strategy able to drive the continuous development of knowledge [6, 16]. Research results furthermore demonstrate the importance of other factors such as the existence of flexible organisational structures and with low levels of hierarchical division [17].

The workplace design is another aspect referred to the literature [18], with experimentation and proximity (for example open spaces) proving fundamental to transforming knowledge into new ideas and effective organisation. According to Nonaka [7], fostering a shared context in which all participants clearly understand the importance of knowledge processes plays a determinant role in the success of KM. Furthermore, the implementation of technological infrastructures facilitating communications between the various different members of staff and departments brings benefits when applied to the management of organisational knowledge (e.g. [9, 14, 19]).

However, the factors driving the potential of KM are not exhausted by these organisational components. Issues related to the knowledge flows generated by individual knowledge, skills and competences [19], leadership, setting up autonomous working teams, as well as the existence of mechanisms that motivate and provide due recognition to members of staff involved in these processes [6, 7, 10] collectively represent other aspects of relevance to the processes of identification, creation and sharing of knowledge.

4.3 Connecting People and Knowledge: Which Practices?

In order to deepen our analysis of HRM as a key antecedent to KM, understanding how human resource practices (HRP) contribute towards transforming individual knowledge into organisational knowledge flows proves fundamental.

Various authors defend the "the more, the better" approach, i.e. the greater the number of HRM practices implemented, the better the performance obtained.

However, this principle is not applicable when seeking to improve the knowledge flows between members of staff (see [20]). In effect, we need to define just which HRP are relevant to core KM processes (the identification, creation, sharing and utilisation of knowledge).

We should state that knowledge has always been an important factor to HRM. In truth, training and recruitment policies inherently reflect this concern. However, traditionally, HRP concentrate on job-related knowledge, hence, on that which an employee needs to perform their respective workplace role. To this end, knowledge is perceived as a personal characteristic with its development correspondingly also an individual level process. On the contrary, authors specialising in KM conceive knowledge from a broader reaching perspective. This extends beyond the knowledge relevant to the respective function, concentrating above all on market-relevant knowledge and thereby including knowledge on clients, competitors and knowledge of relevance to the design and production of new products [21].

Furthermore, knowledge is deemed a collective and organisational phenomenon. Thus, this requires accessing and sharing not only the knowledge residing in persons but also that contained within the scope of the respective relationships prevailing or institutionalised through the organisation's processes and routines [21].

According to the aforementioned theoretical assumptions, we proceeded to identify a set of HRP able to leverage the success of KM. In selecting HRP, we pay special attention to those practices bearing relational implications, such as mentoring or nurturing collaborative friendly working environments. We would also point out that KM ever more incorporates an inter-organisational component relationship with external actors. Finally, despite the studies subject to analysis concentrating their focus on HRP in terms of the sharing of knowledge, we deem analysing other processes associated with KM also of relevance. Hence, we identified the impacts of various HRP on the processes of identifying, creating, sharing and the application of knowledge.

Taking these criteria into consideration, we selected a set of HRP, grouped into four different dimensions: recruitment and selection; training and development; remuneration and working practices. Figure 4.1 systematises the effects of HRP on the application of knowledge. The right-hand side identifies the impacts of HRP on KM processes, while on the left-hand side, we list a set of HRP based upon our review of the literature. However, what facilitates these practices actually attaining their intended results is the fostering of a social ambience favourable to the development of the various different KM processes.

4.4 Recruitment and Selection

Advancing our understanding of selection and recruitment-based practices proves crucial for two different reasons. Firstly, recruitment enables organisations to provide an answer to the knowledge needs prevailing and, hence, recruitment—whether internal and/or external—is one key method deployed by companies to fill

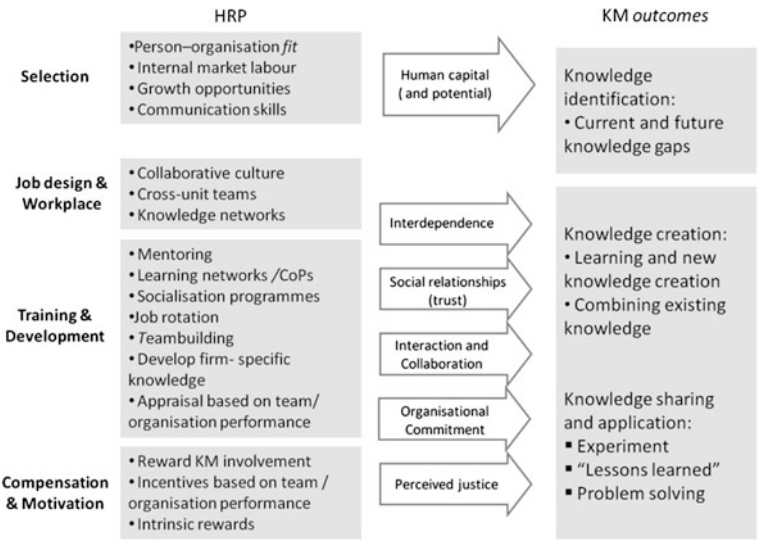


Fig. 4.1 HRP drivers of KM

their knowledge gaps and thus representing an opportunity to improve the internal stock of knowledge. Secondly, the selection and recruitment of new members with the appropriate skills and attitudes are essential to teams sharing and integrating knowledge derived from various different sources.

However, traditional recruitment and selection methods may actually contribute towards blocking the flows of knowledge between working teams [22]. This stems from HRM tending to primarily take into consideration the functional prerequisites of knowledge and therefore leading subsequently to recruitment criteria tailored to performing a particular function. From the outset, this positioning leads to a question. As working environments are undergoing constant change and becoming ever more complex and requiring different forms of expertises, it thereby becomes increasingly difficult to forecast and specify with any exactitude the actual knowledge requirements necessary to performing a particular function.

Furthermore, the overvaluing of technical or functional knowledge may contribute to establishing and maintaining organisational silos very much to the contrary of fostering intra- and inter-organisational cooperation. According to Sveiby and Simons [23], this "silo mentality" contributes to the reinforcing and deepening of organisational subcultures and represents a key hurdle to the sharing of knowledge between teams.

The limitations to the commonly implemented practices should lead organisations to question them and consider more dynamic methods tailored to developing the respective organisation's knowledge. Authors, including Scarbrough [24] for example, propose that focusing recruitment processes on factors more closely related to the interests and attitudes of candidates may represent the most appropriate

response to this challenge. The logic underlying this affirmation stems from how members of staff more committed to the organisation may reasonably be expected to become more active participants in its KM processes.

The adoption of high involvement HRP seeks to improve the level of commitment to the organisation through building up the relationship between personal and organisational interests within the objective of better attaining organisational goals. To this end, some authors refer to how recruitment and selection practices should be managed so as to identify those candidates holding the greatest probability of identifying not only with the organisational values and norms prevailing but also with the remaining members of staff. Recruitment based on person-to-organisation adjustment and "word-of-mouth" recruitment—according to recommendations made by current members of staff—are just some of the examples mentioned in the literature (e.g. [25]).

In effect, a growing number of organisations do evaluate cultural dimensions in the course of recruitment processes. The IKEA sustainability reports states the following:

> We always recruit based on our values to find engaged, diverse and straightforward people with a passion for home furnishings. Our co-workers come from all over the world but share the fundamental humanistic values that our culture is based on: togetherness, humbleness, simplicity, cost-consciousness and common sense (p. 68).[1]

Recruitment and selection processes may also constitute an opportunity to develop the employee–company relationship. For example, this would involve favouring internal candidates to the detriment of external applicants. The case of IKEA serves to demonstrate how companies do strive to build up long-term relations, emphasising the development of each respective employee (see Box 3).

Box 3: **IKEA**: **Employee-Company Relationship with a Long Term Focus**

We hire the right people. IKEA co-workers tend to be down-to-earth, hard workers with a genuine willingness to work together. While there are many reasons to join IKEA, if you ask co-workers why they stay, their number one response is "because of the people".

They're inspired! When a company has a vision and clear values you can believe in, it's not hard to get inspired. More than 90 % of IKEA co-workers know what we're here for. Almost 80 % feel inspired at work (and we're working on the other 20 %).

M**aking mistakes is okay—really**. There's a saying at IKEA companies that it's okay to make mistakes—everyone does it. In fact, we think it's a healthy way to learn and improve.

[1] IKEA website.

An up, down and sideways career. IKEA has more different types of jobs than any other company in the world. If co-workers get tired of what they're doing or just want to try something else, they can move to a new role within IKEA, not outside IKEA.
Sweden today, China tomorrow. Since IKEA has stores and offices in more than 44 countries, with the same values and business idea worldwide, moving from country to country is not uncommon. And if you do move, there's always another friendly IKEA person to help you adjust.
Egos parked at the door. We're not big on fancy titles, corner offices or private jets, and we ask co-workers to leave their egos at the door. Why? Because it means you get to work as a team member, have fun and get on with the job.
The rewards of a never-ending job. People like working for a company they can be proud of. So far IKEA Social Initiative has benefited 100 million children in need. And we are working on the never-ending job of being kinder to the environment.
Learning by the seat of your pants. What other company trusts you with a $30 million budget? At the age of 22? If you are the right person for the job, learning with support and coaching is a way of life at IKEA.
A parent-friendly environment. IKEA is a business, without a doubt, but it is our policy to put people first. And people have lives outside work that include families. That means we believe in a parent-friendly environment.
The original social network. The people you work with are also your friends. You know there's someone to turn to in every major city around the world. And you instantly have something to talk about with 127,000 people a lot like yourself. That's a big social network.

Source IKEA website

Furthermore, taking into account how the leveraging of knowledge depends to a large extent on the people and their respective relations, incorporating this principle into processes of recruitment and selection proves relevant. According to Youndt and Snell [26], in order to develop team working and cooperation capacities, companies should begin by reorienting their selection criteria to include interpersonal relational skills. Such skills necessarily extend to oral and written skills, active listening, team working, founding and maintaining relationships, self-learning and problem resolution [19, 27].

Based upon the aforementioned contents, we formulated the following set of suggestions that may serve as a guide to HR managers in implementing recruitment and selection procedures able to develop and advance knowledge:

- *Prioritising internal recruitment*. Representing an opportunity for personal development and strengthening internal expertise. This equally constitutes an opportunity to deepen the relationship between the employee and the company

from a long-term perspective and represents a critical factor in fostering the creation and sharing of knowledge.

- *Selecting based upon the fit between the person and the organisation*. Guaranteeing the alignment between the respective competences and skills of the candidate and the needs for organisational knowledge holds due importance. However, of equal relevance is a strong correspondence between the individual's and the organisation's goals that, from the outset, facilitates a more active and participative attitude in the development of knowledge.
- *Evaluating the potential for candidate growth and development*. Analysing the potential for candidate evolution as regards the respective willingness to learn or react to the unforeseen (that implies change and adaptation) are critical factors to KM.
- *Evaluating the relational competences*. The capacities to create and maintain personal relationships, both relational and informational are equally critical criteria to take into consideration, in particular, in processes leading to the co-creation of knowledge that involves a range of different expertises and multiple actors (co-workers, partners, clients).
- *Prioritising soft skills*. KM is a dynamic process and contains a strong collective component. Soft skills, such as handling interrelational dynamics, adaptability, communication and active listening, should all also be subjected to evaluation.

4.5 Training and Development

While recruiting employees with the appropriate profile represents a crucial step, this does not in itself prove sufficient to guaranteeing KM success. Once contracted, adopting and developing the policies and practices able to maximise flows of knowledge between organisational members proves of equal importance.

From our perspective, KM-focused training and development practices should above all bring about social interaction and interdependence between the organisational members. Through such training and development practices, organisations are able to improve facets such as learning and the capacity to absorb information, creativity, the relations between external actors and, furthermore, the organisational routines necessary to KM. For example, selecting training programs structured around the joint resolution of problems facilitates experimentation and the emergence of new ideas that may result in new knowledge (see Box 4).

Recently, Simonin and Özsomer [28] proposed that a learning based orientation, alongside the existence of HRP striving to develop knowledge, improve an organisation's capacity to absorb new knowledge. In turn, the acquisition and dissemination of relevant market knowledge leads to positive results both in terms of the internal sharing of knowledge and as regards the organisational performance (growth of sales and market share). To a large extent, the authors associate HRP to

learning, thus considering the existence of internal mechanisms facilitating the creation and sharing of knowledge both within and between organisational units, as well as the existence of incentives for learning.

Box 4: **Learning and Development at Samsung Electronics**

Samsung Electronics has established a Creative Development Research Institute System to provide employees with opportunities to pursue creative new ideas that take full advantage of their talents and professional passions in a way that encourages taking risks.

This new initiative encourages employees to be more entrepreneurial in developing creative ideas that can become new businesses. Once an employee's plan is accepted, they may concentrate on the project as a member of a task force for up to one year. During this period, they will be free from their usual responsibilities and may receive a dedicated work space, development expenses and necessary equipment as appropriate. Successful outcomes are encouraged through an incentive program, however they are not subject to penalty if they don't achieve their goals.

The first outcome of the Creative Development Institute, "eyeCan", was launched in February 2012. The eyeCan is a special mouse for the disabled, which allows its user to use a computer using eye movement. Unlike existing eye mouse products, which cost more than KRW 10 million, the eyeCan mouse can be manufactured for less than KRW 50,000. The software and manufacturing technique for this product that assists the disabled has also been made available for non-commercial use. Samsung Electronics will continue to support similar technology projects that our talented workforce introduces to assist those in need.

Source Samsung Electronics Website

In addition to learning-related issues, HRP focused on KM need to take other factors into account. Learning—and self-learning—certainly represents a crucial facet to the development of human capital in organisations. Joint (or collective) learning is

still more relevant should we consider that the most valuable knowledge derives from the interactions between different persons and organisations. However, in the majority of cases, knowledge does not flow in any natural or spontaneous sense and thus the need to create close relationships between different persons and institutions.

Given this scenario, we need to grasp just how HRP may be deployed to develop human capital as well as the social and relational components associated with KM.

In the Youndt and Snell [26] study, different HR configurations were proposed with the authors verifying how "HR acquisition" and "developmental HR" both contribute towards the development of human capital. The former stems fundamentally from recruitment and selection practices with an emphasis on the aggressive mechanisms of attractions—e.g. selective recruitment, above averages wages and conditions—designed to contract the best candidates. The latter, in contrast, seeks to improve the pool of human capital through training and education. This framework includes comprehensive training practices, internal promotions or performance evaluations with a focus on the development of employees.

On the other hand, the "collaborative HR" configuration is associated with the development of social capital. Collaborative practices, by eliminating horizontal and functional barriers, enable the creation of working structures that allow for close and proximate relations, the development of teams and the attribution of group incentives. These two configurations "developmental HR" and "collaborative HR" represent valuable avenues of exploration for the implementation of HRP focused on maximising flows of knowledge.

Another study [29] analysed the effects of knowledge-based HRM practices and demonstrated that the implementation of collaborative practices contributes positively towards organisations developing a unique foundation of knowledge that distinguishes them from their competitors (for example, fostering the existence of competences that enable the development of new products or services).

In summary, the combination of different HRP designed for the development of the organisation's human and social capital, and incorporating the aforementioned organisational values, may bring countless benefits in terms of KM.

In terms of generating knowledge, this highlights learning through training programs that develop employee expertise and soft skills. However, developing the capacity of absorbing knowledge through programs also enables access to knowledge already existing whether internal to the company or in the wider marketplace based upon which new knowledge gets established.

As regards the sharing and application of knowledge, training and development practices may foster the joint resolution of problems, interaction between employees from different departments or in terms of levels of support and mutual cooperation between members of the organisation. We present below a set of suggestions and recommendations for training and development practices susceptible to developing the knowledge base in effect:

- *Holding events fostering socialisation*. Producing and sharing new knowledge requires strong social interaction. Periodically staging social events in order to facilitate the cross-fertilisation of knowledge, establishing informal relationships

and the exchange of individual knowledge, based on trust, now represents a strategic requirement.

- *Promoting integration programs*. The welcoming of new members helps in bringing about their immersion in the organisational culture and advancing networks of knowledge critical to the organisation.
- *Developing team building initiatives*. Designing initiatives to facilitate the flows of knowledge, minimising the functional silos or hierarchical barriers, nurturing shared languages between the different backgrounds and responsibilities and thereby enabling the development of knowledge.
- *Incorporating job rotation as a means of development*. The rotation of functions may expand competences, skills and expertise and spreading knowledge more widely among the organisation.
- *Implementing mentoring and/or coaching programs*. Rethinking traditional training programs in order to boost cross-learning, the joint resolution of problems and collaborative working. Fostering learning contexts focused upon the relationships and face-to-face interactions and channelling interactions towards working contexts and flows of knowledge.
- *Focusing performance evaluation on employee development*. Incorporating into the evaluation process performance items that value and judge the contribution made to the creation, sharing and utilisation of knowledge represents a strategy of significant relevance to KM. This enables the identification of knowledge gaps and directs members of staff towards actions able to minimise these gaps.
- *Accepting non-repeated errors*. Tolerating errors and learning from them through the lessons resulting and how the knowledge acquired may be deployed for other purposes, facilitates experimentation and the application of knowledge in the working context.
- *Encouraging team working and interpersonal relations*. Implementing forms of organising team working, co-creation and cooperation drawing on a diverse range of partners represent very important dimensions to KM. HRM may build on these potentials both through designing specific working practices and through nurturing specific skill sets (e.g. cooperation, team working).

4.6 Compensation and Motivation

The literature contains a wide ranging debate on the benefits of each compensation typography—both intrinsic and extrinsic rewards—and their effects in terms of motivation and results. This extends to systems designed to provide incentives aimed at maximising the flows of knowledge. Despite the broad consensus as regards the need to reward the sharing or utilisation of knowledge, the same does not hold in relation to either the type of rewards that should be made or just what should be remunerated—whether the effort or the result. Scarbrough [24], for example, drew attention to the dangers of compensations that overvalue knowledge sharing behaviours to the detriment of rewarding their effectiveness.

In the majority of cases, the scientific analytical results and the empirical evidence would seem to advocate incentives based on organisational or group performance.

According to Cabrera and Cabrera [27], the attribution of financial incentives may be interpreted as a means of direct control and, thus, in some cases, restricts creativity. These authors maintain that intrinsic rewards, such as recognition, may prove the most effective means of fostering involvement in knowledge sharing processes. In addition to the importance of perceived justice, they also conclude that such incentives should be based on organisational and group results.

In turn, Collins and Smith [30] demonstrated that the awarding of rewards based upon organisational or team results boosts the levels of confidence, communication and interaction ongoing between members of staff. Simultaneously, this proves an efficient means of encouraging an alignment between individual actions and organisational targets.

More recently, Edvardsson [22] referred to the need for mixed reward systems in order to motivate knowledge workers. These included equitable salary structures, profit sharing, diverse social benefits, timetable flexibility and free time to invest in their own personal development (see Box 5).

Box 5: **Rewarding and Recognizing**

To instill intrinsic motivation, several innovative organisations have encouraged:

- peer recognition,
- formal events ("Bringing people together") and,
- work structures conducive to cultivating relevant innovations.

When an organisation establishes extrinsic rewards to encourage innovation and flows of knowledge and ideas should be careful:

- not to attribute greater importance to money than it really deserves,
- not to confuse compensation with rewards,
- individual recognition may inhibit team working,
- not to ignore issues underlying behaviours and
- the effectiveness of rewards tends to diminish over the long term.

Source American Productivity and Quality Center (APQC) Website

We incorporate a range of different academic positions into the following practical suggestions that in our perspective serve to facilitate KM processes:

- *Attributing incentives based on the organisational performance and/or the team results*. Setting out collective performance objectives to encourage cooperation and not internal competition.

- *Adopting equitable compensation policies*. The compensation system needs to be fair and equitable. When such is perceived as unfair, people tend to block or direct their behaviours only towards maximising their personal rewards.
- *Rewarding employees for their involvement in KM*. Employees need to clearly understand that their contributions to knowledge processes are valued and appreciated. This recognition may imply greater flexibility and development (promotions, training, participation in innovative projects, etc.) and lead to personal advancement.
- *Utilising internal promotions as a reward mechanism*. The evaluation and recognition of involvement and participation within KM systems when combined with other criteria may serve to guarantee the alignment between the individual contribution and the organisational targets.

4.7 Workplace and Job Design

The development of knowledge depends to a large extent on the interactions established between persons. The organisational structures, the working processes and practices, as well as the technologies in effect all represent crucial facets whether to leveraging the potential or to inhibiting these interactions. Among these factors, working processes and practices should come in for particular attention from HR managers.

The search for new solutions for existing problems, new approaches and ways of working as well as learning based upon existing knowledge (e.g. [7, 18, 31]) stimulate both the appearance of new ideas and the creation of new knowledge. Within this framework, we may assert that the development of knowledge and creativity are intimately bound up with each other.

Creativity consists of the production of new and useful ideas in any domain of human activity [32]. Nijstad and Stroebe [33] define the idea generation process as the repeated search for ideas in the associative memory and inherently incorporating two different phases (the activation of knowledge and the production of ideas) and controlled by negative feedbacks and cognitive failures (efforts that fail to produce any ideas). Therefore, the generation of ideas requires specific knowledge (expertise), autonomy and flexibility that enables, among other factors, experimentation.

The generation of ideas may stem from individual or group processes. Nevertheless, there are authors that defend how some groups turn in better performances in various types of creative processes such as problem resolution, creative thinking and decision making (e.g. [34]). Taking a similar line, Burt [35] referred to how individuals engaged in social relations with different groups attain a greater probability of expressing good ideas. Perry-Smith [36] also verified how relations between actors with different academic backgrounds prove beneficial to creativity.

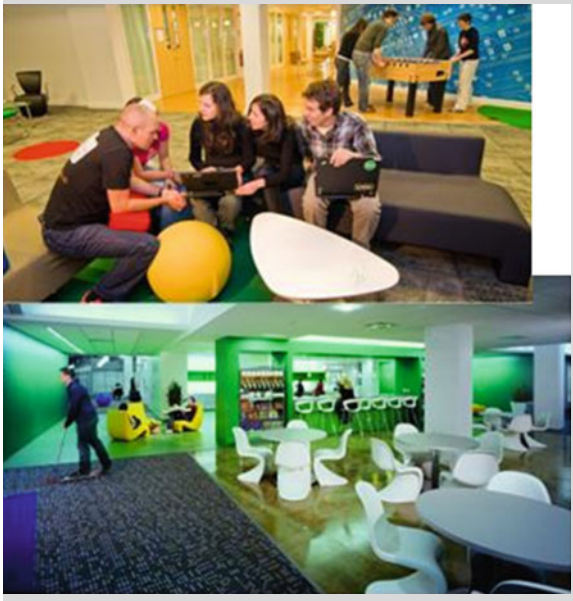
The research undertaken by these authors collectively backs the idea that the establishment of social network strengthens and deepens the flows of ideas. Social

networks are built up out of a set of actors bound together by a set of relations. The actors may be persons, teams, organisations, etc. [37].

In effect, knowledge networks, have gained a far higher profile in recent years. This KM process spans across a range of initiatives and practices that seek to improve flows of knowledge between intra- and inter-organisational actors. Hence, cooperation between diverse actors does prove susceptible to fostering the creation of new knowledge, joint learning and the development of new ideas based on the various different contributions and inputs. This fundamentally involves focusing on the efficient usage and application of knowledge. Typically, in the case of inter-organisational networks, there are no monetary transactions driving the exchange of knowledge and furthermore encouraging the cooperation between entities.

However, what implications do knowledge networks, the generation of ideas and autonomy hold for the design of workplace environments and job content? To a greater or lesser extent, the response is simple and involves facilitating these different aspects. Hence, companies such as Google strive to "maintain an open culture (…) in which everybody participates actively and feels comfortable in sharing ideas and opinions"[2] and to remove those physical barriers that hinder interactions (see Box 6).

Box 6: Collaborative Culture and Work Places at Google



When you want people to think creatively and push the boundaries of what's possible, their workspace shouldn't be a drab maze of beige cubicles. Our offices have become well known for their innovative, fun and—some might say wacky—design. Like most of our decisions, data shows that these spaces have a positive impact on productivity, collaboration and inspiration.

Source Google Website

[2] Google website http://www.google.com/about/jobs/lifeatgoogle/creating-an-office-for-work-and-play.html.

> Google's success depends on innovation and collaboration. Everything we did was geared toward making it easy to talk. Being on one floor here removed psychological barriers to interacting, and we've tried to preserve that.
>
> by Mr. Nevill-Manning, Google
>
> *Source Magazine article from NYTimes, March* 15, 2023

Thus, HRM takes on responsibility for job design and encouraging practices that strengthen and enhance practices susceptible to reinforcing an organisational culture of openness, fostering collaboration and innovation. The design of workplace processes directly conditions the level of interdependence, the frequency of interactions as well as the flows of information and knowledge between people. For example, contrary to designing static and individualised workplace functions, activities may be designed in a sequential fashion and requiring close cooperation with different actors [27].

A recent study carried out by Kaše, Paauwe and Zupan [38] reported that the design of work may improve interpersonal relations that, in turn, boost the level of intra-organisational knowledge sharing. According to their results, some traditionally neglected working practices—such as designing interactive working practices, the existence of free time, team working between units or more functional layouts—prove extremely relevant to KM. Below, we set out some of these practices in greater details:

- *Involving employees in decision-making processes*. Involving employees in decisions, beyond enabling empowerment, also allows for greater interaction between the creation of knowledge and its utilisation within the working context. Fostering autonomy and self-responsibility ensures that the teams themselves take on the role of owners of KM processes.
- *Deploying multifunctional teams*. Multifunctional teams are particularly effective in the diagnosis and resolution of complex problems. This may necessarily involve the setting up of matrix or project structures incorporating different units and members of staff with distinct backgrounds and expertise.
- *Participating in partnership networks*. Given that knowledge is unable to flow spontaneously, designing networked working practices reaching out to different actors helps in facilitating flows and the cross-fertilisation of knowledge.
- *Decreasing direct forms of control*. Turning to alternative forms of control, based on autonomy, self-responsibility and regular supervision may prove more effective in enabling flows of knowledge.

4.8 Technology: The Incentive to Interaction

The core principle underlying the application of information technologies to HRP focused upon KM consists in accelerating the rate of flow of knowledge and ideas. The existence of knowledge per se does little or nothing to ensure the competitiveness of companies. What does matter is the circulation of that knowledge through persons, networks and communities. The technological infrastructures should be of sufficient capacity to enable such interactions to take place.

Quite clearly, technology in isolation cannot make people share knowledge nor even make the member of staff sit down in front of the computer with the objective of researching and never mind transforming the company into a knowledge creating company [16]. However, the implementation of tools that facilitate collaborative work and communication as well as researching and accessing knowledge boosts the flow of information and enables the review and monitoring of knowledge [9, 39]. Thus, it is within this perspective that this chapter takes into account the role of technology and with a special focus on social media technologies.

In the early initiatives within the KM framework, companies implemented electronic management tools for documents management, groupware, workflows and knowledge charts, among others [40]. These involved the deployment of technologically sophisticated tools and with relatively high costs. However, whether due to questions of complexity or due to employee resistance, various companies saw their expectations as regards the effectiveness of these tools entirely let down.

The evolution of KM and the primacy of the people-centric perspective subsequently reflected in a change in the type of technological tools applied in support of knowledge-based activities. In effect, this drove a trend towards organisations opting for more flexible tools focused on interactions and with some incurring only low levels of cost.

In recent years, with the advance of Web 2.0 and its associated concepts—such as Company 2.0 or Management 2.0—the attention of firms has returned to another type of technological tools. The term Web 2.0 was first introduced by O'Reilly and MediaLive International in 2004. In the following year, O'Reilly himself affirmed that "there still exists an enormous disagreement over the significance of Web 2.0" [41].

This new generation of the Internet—a means inherently characterised by user participation, its openness and the effects of networking—takes as its motto the development of applications to capitalise on the opportunities posed by networks, which become better the more people there are using them [42].

Setting aside conceptual divergences, we shall focus on specific tools—social media—capable of facilitating the implementation of HRP and processes focused on KM. According to Kietzmann and colleagues [43], "social media employ mobile and web-based technologies to create highly interactive platforms via which individuals and communities share, co-create, discuss, and modify user-generated

content (p. 241)". Blogs, wikis and social network are some of the examples now available to HRM professionals. In turn, Ana Neves advances that "there are some activities that may benefit greatly from the adoption of Web 2.0 tools".[3] Highlights among such activities include recruitment and selection, leadership, horizontal communication and as well as learning and development (including CoPs).

The 2011 annual report from the Boston Consulting Group (BCG) similarly states "companies that don't master online social media technologies soon will struggle to keep pace in the talent race" [44, p. 10]. However, perhaps surprisingly, in 2012, the relevance of Web 2.0 and social media-related facets slid in importance. One of the justifications put forward by BCG stems from the low perceived effectiveness of such tools by companies. Indeed, only 19 % of companies considered social platforms to be effective and efficient [45].

Social tools may, however, serve to share information and maintain relations between employees, ex-employees as well as with external partners. Another equally important aspect concerning KM-oriented HRP derives from the possibility that these tools provide for environments favourable for informal discussion within the scope of which new ideas and knowledge may emerge. Josh Bersin, founder and principal of Bersin by Deloitte, stated that "there are dozens of mission-critical applications for social tools within HR and talent management: experts can share content and expertise; managers can find internal candidates for new positions; teams can share and collaborate with each other; performance feedback and recognition can be shared; executives can broadcast information and monitor their teams; recognition can be shared and captured; on boarding and talent mobility can be dramatically improved; and you can 'find' people in the company easily".[4]

Some social tools are free access and therefore clearly within the reach of the majority of companies, if not every company. For example, wikis are a social tool in which co-authors collectively construct websites featuring both text and visuals. GoogleDocs (www.docs.google.com) enables the management of documents, spreadsheets and other files via cloud computing within the framework of which users may access, share and carry out alterations to documents. Video and photograph sharing websites such as YouTube (www.youtube.com) and Flickr (www.flickr.com) incorporate videos and images (respectively) to foster social interaction. Social network websites such as Facebook (www.facebook.com) and LinkedIn (www.linkedin.com) provide for online connections and networking groups and including conversation topics, interest groups and events, among other

[3] http://kmol.online.pt/

[4] http://www.bersin.com/blog/post/2012/07/Social-Tools-Collide-with-Talent-Management-Software.aspx

Fig. 4.2 Online social networks: opportunities and risks [44]

facets. In addition, all these tools may be accessed and used "at any time and in any place" and, appropriately channelled, serve to boost KM in organisations.

However, the aforementioned list of tools is in no way exhaustive of the tools available for deployment by organisations. Ana Neves pointed out how it is "possible to encounter low cost tools/social platforms for organisations and including: free tools or 'freemium' (free up to a certain level of consumption), cloud based tools and services ('Software as a Service' [SaaS]) and 'open source' tools".[5] Some of the suggestions referred to within this scope are as follows: XWiki; Sosius and Yammer. XWiki (www.xwiki.org) is a wiki with organisational purposes in which it is possible to manage accesses and permissions, listing FAQs or the publication of blogs. Sosius (sosius.com) is a cooperative platform that provides for the sharing of information online through posts, discussion groups and /or chat groups. In turn, Yammer (www.yammer.com) is a company social network while also extendable to external partners. Individuals may set up special interest groups, receive messages, feeds, exchange ideas via chat groups, manage documents, etc.

While such social tools certainly do open up a range of potential avenues for communication with the most varied actors, it is no less true there are some associated risks. The benefits and risks associated with social platforms are presented in Fig. 4.2.

In principle, this type of tool enables content to be edited and shared by any authorised user. This facet raises a series of questions for reflection. Just what types of content should be shared? Should uploaded information always be validated? If yes, just who should undertake this validation process: experts, employee groups, the public relations department, etc?

[5] http://kmol.online.pt/blog/2012/05/21/ferramentas-sociais-baixo-custo

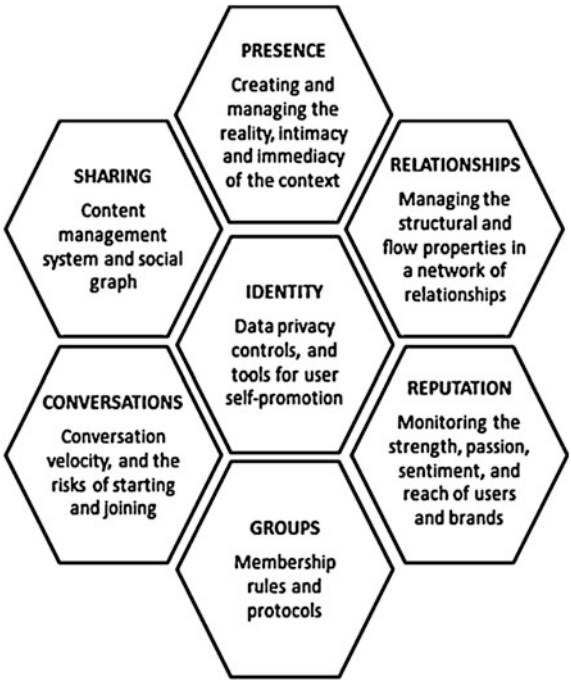


Fig. 4.3 Social media honeycomb [43]

In a recent study by Kietzmann and colleagues [43], through "The honeycomb of social media" framework they set out the implications of social media tools for organisations across seven different levels (see Fig. 4.3). Based on this framework, the authors put forward some guidelines to assist companies in understanding, monitoring and responding to the different activities taking place across such social platforms. Below, we present the 4Cs to the strategy suggested:

- *Cognize*: understand whether (and on what platforms) there are conversations and comments ongoing about the company. The company may also compare its portrayal and profile with competitors and seek to understand their approach to social tools.
- *Congruity*: develop strategies—e.g. policies, rules, guidelines—coherent to the seven honeycomb blocks as well as with the organisational objectives.
- *Curate*: the company should be the guardian of the interactions and contents ongoing on its social platforms. For example, pre-defining the frequency with which the company places content online or its official online representative.

- *Chase*: accompanying all of the information that is placed online—e.g. comments, complaints, questions. Automatic warnings very much exist in order to ensure this process becomes feasible even though this remains an extremely time-consuming activity. Furthermore, even while it may seem late or after the event, it is always preferable to respond rather than ignore the subject (and especially whenever dealing with a question or a complaint).

Some organisations have engaged in significant efforts to minimise the risks associated with such channels, especially through setting user rules that restrict the online behaviours. For example, the Roche guidelines state that the company "recognizes the ubiquity and benefits of social media and welcomes its use—however, we also acknowledge that certain risks are associated with these new channels. We have therefore developed this guideline to help you use these new platforms in a responsible way" (see Box 7). Within a similar framework, Dell also developed a social media policy (see Box 8).

Box 7: **Roche Social Media Principles in Short**

7 Rules for PERSONAL online activities Speaking "about" *Roche*:

- Be conscious about mixing your personal and business lives.
- You are responsible for your actions.
- Follow the Roche Group Code of Conduct.
- Mind the global audience.
- Be careful if talking about Roche. Only share publicly available information.
- Be transparent about your affiliation with Roche and that opinions raised are your own.
- Be a "scout" for sentiment and critical issues.

7 Rules for PROFESSIONAL online activities Speaking "on behalf of" *Roche*:

- Follow the Roche Group Code of Conduct.
- Follow approval processes for publications and communication.
- Mind Copyrights and give credit to the owners.
- Use special care if talking about Roche products or financial data.
- Identify yourself as a representative of Roche.
- Monitor your relevant social media channels.
- Know and follow our Record Management Practices.

Source Roche Website

Box 8: **Dell Social Media Policy**

There's a lot of talk about Social Media these days both at Dell and around the world. Dell encourages all employees to use Social Media the right way and this policy should help you on that path. This policy is the first step, not the last; so if you're interested in Social Media, whether personally or professionally, you should look into our Social Media and Communities University (SMaC-U) classes.

(…) Even though this policy is written so it's easy to understand and conversational in tone, it's an actual policy. If you don't follow the principles laid out below when engaging in Social Media you could face serious consequences up to termination in accordance with the laws of the country where you are employed. Nobody wants that to happen though, so read over this policy and make sure you understand it.

Dell has five Social Media principles that you should know before engaging in any type of online conversation that might impact Dell. You'll know these principles if you've already taken the Social Media Principles course from SMaC U.

Source Dell Website

Thus far, we have detailed some specific tools and identified the associated potential risks and opportunities and presented examples of how companies may seek to minimise these risks. We bring this theme to a close by presenting some of the challenges and the critical factors to success in utilising social platforms (see Table 4.1).

Table 4.1 Social platforms: challenges and critical success factors

Challenges	Critical factors to success
Maintenance of content and timely responses	Active involvement of participants
Management of knowledge flows in accordance with the diversity of the actors involved	Definition and communication of the strategy and principles behind online social platform interaction
Identification of valuable knowledge and ideas "in among the large quantities of information"	Development of collaborative organisational cultures
	Prior definition of objectives

4.9 Conclusion

In the current socio-economic context, the importance of intangible assets has become unquestionable. Therefore, given this scenario, the core objective of this chapter was to demonstrate the means by which HRM may contribute to the effective management of knowledge through purpose designed means and their associated dynamics. Furthermore, we also sought to grasp how technology may harness thee dynamics.

In conjunction with those authors defending the "the more, the better" principle does not reflect in effective KM, we identified a set of practices that from our perspective reach beyond those practices traditionally implemented under the auspices of HRM. Taking into consideration the preconditions necessary to implementing KM, we set out the HRP that foster: (a) the social relations and trust between members of staff; (b) interaction and collaboration; (c) commitment and alignment with organisational objectives; (d) interdependence; (e) equity; and (f) the development of human capital by organisations. Table 4.2 summarises the proposed practices.

However, we do fully recognise that this does not amount to some magic formula able to somehow guarantee the maximisation of knowledge flows. Clearly, flows of knowledge depend upon a multiplicity of factors and not all are subject to consideration within this scope. Nevertheless, we do maintain that the implementation of these practices boosts the probability of enhancing such flows.

In terms of the proposed practices, we are able to reach some general conclusions. Firstly, the notion of knowledge implicit to the HRP suggested conciliates the knowledge relevant to the performance of the respective function and the understanding relevant to the market. Rather than valuing individual knowledge or expertise, what matters is understanding the way in which the knowledge available internally and externally may be transformed into organisational knowledge with the potential to add value. Within this framework, HRP should bring about interaction between internal and external actors with the objective of exchanging information, ideas and knowledge.

Secondly, building up flows of knowledge is neither something static nor immediate. On the contrary, underlying these flows are a series of interdependent processes and that require a certain degree of continuity over the course of time.

Table 4.2 HRP focused on developing knowledge

Recruitment and selection	Training and development
Prioritising internal recruitment	Staging events encouraging socialisation
Selection based on the fit between the person and the organisation	Prioritising integration programs
Evaluating potential candidate growth and development	Developing team building actions and initiatives
Evaluating relational competences	Applying job rotation as a means of development
Favouring soft skills	Implementing mentoring and/or coaching programs
	Focusing performance evaluation on employee development
	Accepting non-repeated errors
	Encouraging team work and the interpersonal relations
Workplace and job design	**Compensation and motivation**
Involving employees in decision-making processes	Attributing incentives based on performance and/or team results
Running multifunctional teams	Adopting equitable compensation strategies
Participating in partnership networks	Rewarding employees for their participation in KM
Reducing direct forms of control	Utilising internal promotions as a reward mechanism

Not by chance, HRM is very much confronted by the challenge of reconciling "value and values" [46]. More than some business partner focused on the short term, HRM (or HR managers) should be expected to seek to create and deliver value from a long-term perspective. Thus, associating HRM with effective KM (that results in innovation or other gains in competitiveness) may be a means of demonstrating the tangible impact of HR actions.

This leads onto a third aspect. There are strong reasons pointing to how traditional HRP (e.g. tightly binding descriptions of job functions, penalisation of errors, setting short term objectives) are in fact barriers to the flow of knowledge and ideas. Hence, from our perspective, some HRP need rethinking and the overemphasis on functional knowledge should be abandoned. For example, instead of stressing individual results, which may put a block on collaboration, evaluations and rewards, the organisational or group results should be valued. Another example is the utilisation of multifunctional teams able to raise the level of interdependence between persons and cut back on the existence of organisational silos. Channelling HRM towards the social and relational aspects associated with intra- and inter-organisational KM, fostering company social capital and the creation of value through knowledge-based assets may all prove possible responses to meeting the challenge of managing "value and values".

Our fourth and final conclusion relates to the scope of HRP focused upon the application of knowledge. Beyond recruitment, selection, development and compensation, HRM should strive to ensure the creation of social contexts favourable to

the sharing of ideas and knowledge. This may imply the management of processes of organisational change, strengthening the organisation's culture and values, the design of physical working spaces, etc.

Furthermore, we consider it of equal relevance to understanding the way in which HRM interacts with other antecedents and the synergies between these potential drivers and the processes specific to KM. Hence, we defend how social platforms may be deployed as added value capable of fostering the flows of knowledge and ideas between peoples. Within this framework, HR managers need to take an active role in the selection of social tools and in defining the strategies that guide the behaviours of employees when engaging with such forums. Above all, this means that the relationships between people interacting on social platforms are aligned with the HRP under implementation. For example, where the organisation provides incentives to diversity in face-to-face interactions, through contact between persons with distinct backgrounds, this may be an aspect to take into consideration when determining the management of social platform access and user guidelines.

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Chapter 5
Comparing HRM Practices for R&D in Business and University Centres

Nola Hewitt-Dundas

Abstract Governments are now very aware of the importance of technological development for business and economic growth, and this has led to efforts to stimulate investment by organisations in research and development (R&D). There are two main policy approaches for achieving this: (1) direct procurement and/or provision in public facilities and (2) incentives for private investment such as tax incentives or R&D subsidies. In this chapter, the focus is on the second of these approaches, incentives for R&D, and specifically examining these investments through the lens of human resource management (HRM) practices. A focus on HRM is warranted, given that R&D investment is dominated by capital equipment and knowledge workers with longer-term organisational benefits most commonly achieved through R&D employees as behaviours acquired through the publicly supported R&D are sustained in the post-funding period. However, this raises important issues where government investment is in private sector organisations such as businesses or public sector organisations such as universities. To what extent are there similarities and differences in the profile of R&D employees and HRM practices of business and university R&D centres? What are the implications of this for government efforts to stimulate R&D investment through subsidies?

5.1 Public Sector Investment in R&D

In recent years, innovation policy has recognised that the capability of a nation to generate advanced technology, information and ultimately knowledge is the 'single most important force driving the secular process of economic growth' (p. 1 in [1]). In the UK and the USA, public sector innovation budgets have been

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balanced between fiscal incentives for innovation, subsidy measures and 'integrated packages of support [2], while in other countries, e.g. Finland, direct support measures (subsidies and loans) have dominated, while in others, e.g. France, more emphasis has been placed on direct credit and loan support.

Public sector support for research and development (R&D) activity has traditionally been explained in terms of 'market failure' arguments whereby organisations—private or public—unable to capture all of the benefits of their R&D investments tend to under-invest in R&D relative to the social optimum level [3–5]. Alternatively, the rationale for public support of R&D may be based on an evolutionary view of economics and in particular the innovation process. Here, R&D support is justified in terms of developing the portfolio of export products, contributing to cluster development or enhancing the competitiveness of local supply chains. In each case, however, investment in R&D or technological capability is perceived as being strongly associated with productivity and economic growth [6–8].

This positive relationship between R&D investment and productivity growth is evident at the macro-economic level [9], as well as regional levels [10]. Further, sectoral studies have also emphasised the positive relationship between R&D intensity and innovation outputs across a range of high-tech [11] and low-tech sectors [12]. In addition, at the firm or business unit level, evidence of the positive innovation effect of firms' internal knowledge investments is also widespread. Artz et al. [13], for example explore the relationship between R&D investment and patenting and R&D investment and product announcements by large North American firms finding a positive relationship in each case.

The extent to which public sector financial support for R&D investments results in private performance gains as well as wider social benefit depends on a number of factors [14]. Perhaps one of the most important is human resource management (HRM) practices. Systematic research has demonstrated the relationship between HRM and organisational performance [15–17], highlighting that an organisation's human capital represents its collective capacity to extract optimal solutions from the knowledge of its employees. Investments in employees' skills and knowledge therefore will strongly influence the private returns to R&D activity in terms of the organisation's competitive position and performance [18–20].

Beyond the organisational context, publicly funded R&D may play a vital role in the attraction and development of a region's human capital. For example, local organisations will benefit from the 'common pool' of skilled human capital which will gather around such centres (p. 319 in [21]). Labour market spillovers may emerge from these R&D centres and include the following: the availability of new or improved research skills developed through training; the provision of trained research staff as localised carriers of knowledge and the spillover of knowledge in the form of spin-outs or corporate entrepreneurship.

The implication of this is that the success with which private and social benefits are derived from publicly funded R&D centres of excellence depends on the way in which human resources are organised and managed to maximise their performance. In this context, the management and organisational structure of publicly funded R&D centres becomes as important as the political and economic infrastructure

which has enabled them [22]. In other words, public support for R&D centres may be directed towards R&D activity in the private sector, or in the public—university—sector.

Indeed, in recent years, the potential role of universities in contributing to economic growth has attracted increased attention [23]. This has coincided with changes in how universities perceive their contribution to economic development. Traditionally, investment in university research has occurred based on the expectation of a strong pubic good element, as it spills over to the private sector where it is exploited through innovation. In more recent years, however, universities have moved towards a model of 'Academic Capitalism' [24] characterised less by an open science approach to the dissemination of research and more by a growing emphasis on the protection of intellectual property through patenting, licensing and applied research [25].

Given the important impact of HRM on the private and social benefits arising from R&D activity in these centres, this warrants an examination of HRM practices in these two organisational contexts.

5.2 R&D in Private and Public Organisations

Distinctions between policy and practices in public and private sector organisations have been a central aspect of debates in public sector management [26], political science [27–29] and HRM [30–32]. A key objective has been to identify practices which, if transferred successfully to the other context, will lead to enhanced organisational performance. Perhaps the most notable example of attempts to identify and adopt the practices of the private sector in a public sector context is that of Managerialism and New Public Management (NPM).[1] Since the 1980s, the management theory of NPM has been the basis of attempts to modernise the public sector with key proposition of NPM being that greater orientation by the public sector towards the market will result in cost-efficiency for governments [34, 35].[2]

An important attempt to synthesise the literature on the distinctive characteristics of public and private sector organisations was undertaken by Boyne [37]. Drawing on a meta-analysis of 34 empirical studies published between 1960 and 1999, he identifies four areas of difference between private and public sector organisations: organisational environment, goals, structures and values.

Associated with these four key differences, he proposes that HRM policies and practices is one area where 'the consequences of publicness', as identified by Boyne [37], may have a significant impact. For example, in terms of the HR

[1] For an overview of managerialism, new public management and more recently the term 'leaderism' see O'Reilly and Reed [33].

[2] More recently the underlying principles of NPM have been challenged with some [p. 467 in 36] suggesting that 'this wave (of NPM) has now largely stalled or been reversed in some key 'leading-edge' countries'.

practices of recruitment, compensation, training and development and employee relations, Budhwar [38] and Budhwar and Boyne [39] argue that significant differences exist between public and private sector organisations. At the same time, and perhaps related to the emphasis on New Public Management from the 1980s onwards, Boyne et al. [31] suggest that the gap between public and private sector practices is narrowing. Harel and Tzafrir [40], despite identifying differences in recruitment practices and performance-related pay between private and public sector organisations, also suggest that there is a general movement towards 'high-performance work practices' in public sector organisations. Farnham and Horton [41], Lupton and Shaw [42] and O'Reilly and Reed [33] also point to a growing convergence between the management practices of large multi-divisional firms and public sector organisations. Doubts about the real extent of such convergence are emphasised by Duncan (p. 32 in [43]), however, suggesting that public sector convergence to private sector norms has been 'more apparent than real'.

One context in which such public–private contrasts in HR policies and practices are evident is that of publicly funded R&D centres. Such centres exist in both the private and public sectors and are generally focused on 'leading edge, industrially exploitable and commercially focused research' with the aim of generating private benefits for the R&D performing organisation as well as wider social benefits, arising from 'spillovers' and (positive) externalities.[3] In this chapter, we are interested in how differences between the organisational contexts of publicly funded R&D centres based in the public and private sectors are reflected in their HR practices and any implications this may have for private and social outcomes.

Our opportunity to compare HR practices in private and public R&D centres arises from a policy experiment conducted in the UK region of Northern Ireland. In 2002, eighteen R&D Centres of Excellence (eight university-based centres and ten company-based centres) were established within a common public support framework with the objective of contributing to regional competitiveness.[4] Managed by Invest Northern Ireland—the regional development agency for Northern Ireland—the centres received total public funding of £34.7 m matched by investment by the host organisations of £79.7 m over three years.[5]

[3] Private benefits accruing to the R&D Centre of Excellence from public sector support may include reducing the cost of building up knowledge stocks, enhancing business performance [44] and the ability of organisations to conduct future research projects [e.g. 45, 46]. Public support for R&D may also contribute to developments in human resources and innovation activity [e.g. 47] and improve firms' ability to absorb R&D results or knowledge from elsewhere [48, 49]. In addition, reputational or 'halo' effects may also stem from receipt of public R&D support and create the potential for R&D cost savings through collaborative R&D and the sharing of research results.

[4] Specifically: 'The RTD Centres of Excellence programme supports the establishment of R&D centres to stimulate leading edge, industrially exploitable and commercially focused research which will demonstrably improve the competitiveness of Northern Ireland industry' [50].

[5] In fact, funding came from the European Union Programme for Peace and Reconciliation in Northern Ireland and the Border Region of Ireland (PEACE II) managed by the Special EU Programmes Body in partnership with the Northern Ireland Department of Employment and Learning.

The aim in this chapter is to contribute to our knowledge of differences in HR practices in different types of private and public sector technology-intensive environments. The context for this study allows us to overcome some of the limitations of previous research in this area by controlling not only for ownership between the private and public sector R&D centres but also the nature of the public funding the centres received, its duration, the region in which the centres were located and their common organisational focus, i.e. as R&D centres. The remainder of this chapter is structured as follows. In the next section, we consider the differences between private and public sector organisations and the potential consequences for HRM practices. Following that, we outline the background to the Centres of Excellence programme in Northern Ireland, the characteristics of the R&D centres supported and the data collection methods employed in our study. The main empirical findings of the research are outlined, and the final sections of the chapter then consider the key issues and potential implications arising from the research.

5.3 Organisational Context and HRM Practices

In this section, the differences between R&D centres in private (business) and public sector (university) organisations are considered, and a series of propositions for HRM policies and practices are developed. The conceptual underpinning to the research reported in this chapter is derived from Boyne [37] who identifies public–private contrasts along four dimensions: organisational environment, goals, structures and values. He argues that public sector organisations often have a greater diversity of stakeholders than those in the private sector, potentially generating goal ambiguity [51]. Second, reflecting the varied interests of stakeholders, public sector organisations may need to be more open and responsive to a range of stakeholder needs, perhaps contributing to greater instability. Finally, Boyne [37] argues that the environment of public sector organisations may be characterised by less competitive pressure than that facing private sector organisations. Each of these four dimensions is considered separately in terms of how they might influence private and public R&D centres and the HRM implications of each.

5.3.1 Organisational Environment and HRM Practices

Looking first at the organisational environment in private and public R&D centres, it could be anticipated that university-based R&D centres would face greater conflicting expectations of their cultural, social and economic contribution.

In contrast, for private sector R&D centres, shareholders represent the primary interest group with the more focussed goal of sustained competitiveness.[6]

In an R&D centre, the role of external connections and competitive pressure are particularly relevant. This reflects the changing environment for R&D and innovation, which is characterised by the complexity of scientific and technological development, uncertainty surrounding R&D, high costs of R&D projects and shortened innovation cycles [52]. This environmental context has led organisations to develop global strategies emphasising strategic alliances. According to Rothwell (p. 22 in [53]), innovation now involves 'horizontal linkages such as collaborative pre-competitive research, joint R&D ventures and R&D-based strategic alliances, i.e. innovation is becoming more of a networking process'. Rothwell refers to this model of innovation as 'systems integration and networking', while Chesbrough [54] terms it 'open innovation', with external knowledge seen as important in reducing development time and reducing the risk and cost of development.[7]

From an HR perspective, collaborating with partners outside the organisation not only benefits the organisation in terms of reducing the cost and risk of R&D and increasing the speed of technology development, but also benefits the individuals involved. For example, Katz and Martin [52] found that high levels of collaboration had a positive influence on publication rates. Opportunities to engage in external collaborative arrangements may therefore act as a valuable learning experience in broadening employees' knowledge and resulting in career development.

In a university environment, a more open culture should make it easier for R&D centres to engage in an 'open innovation' model. At the same time, it is possible that lower competitive pressures in public sector organisations, as highlighted by Boyne [37], may reduce the probability of engaging in inter-organisational collaboration. Where R&D is more applied, generic and further removed from exploitation in the market, as is the case with most university-based R&D, the shortening of product life cycles and subsequently pressure on speed of development will be less important in driving external collaboration. Again this is likely to reduce the potential for such centres to form external collaborative links. Given these conflicting positions, it is difficult to predict a priori the likelihood of university R&D centres engaging in external collaborative arrangements as compared to company R&D centres. This suggests two possible propositions:

Proposition 1a *University R&D Centres will engage in inter-organisational innovation to a greater extent than private R&D Centres.*

Proposition 1b *University R&D Centres will engage in inter-organisational innovation to a lesser extent than private R&D Centres.*

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[6] O'Reilly and Reed [33] suggest that the more recent emphasis on leadership associated with transformational and system-wide change in the public sector has overcome the inherent tensions of diverse stakeholders, bringing them together in a unified discourse.

[7] This approach stands in stark contrast to the 'closed innovation' model whereby organisations depend solely on in-house R&D with very limited inter-organisational knowledge sharing.

5.3.2 Organisational Goals and HRM Practices

Differences in the goals of public and private sector R&D centres are also likely to reflect the variety of stakeholder profiles. Greater diversity of stakeholders in public R&D centres may, for example place greater emphasis on equity and accountability [35, 55], while Boyne [37] suggests that the search for such collective goals may result in multiple, and often vague, goals. In contrast, in private sector R&D centres, the narrower range of stakeholders might result in greater clarity of purpose with clearly articulated targets linked to the firm's business objectives.

In R&D centres, the main activity is knowledge generation in terms of basic, applied or experimental research. As recognised by Pavitt (p. 13 in [56]), however, 'the outputs of basic research rarely possess intrinsic economic value. Instead, they are critically important inputs to other investment processes that yield further research findings, and sometimes yield innovations'. Reflecting this, policy initiatives in the UK have increasingly emphasised the role of universities in both generating knowledge and facilitating the exploitation of this, largely through closer industry links [57].

In terms of the differences in the organisational goals of public and private R&D centres, this suggests that for private R&D centres, their stakeholders' focus on profit and sustained competitiveness is likely to emphasise the exploitation of knowledge as one of the main outputs of R&D activity. In contrast, for university-based R&D centres, the diversity of stakeholders is likely to suggest more diffuse outputs encompassing both knowledge generation and knowledge exploitation. One implication is that these differences in organisational goals between public and private sector R&D centres mean that employees in university-based R&D centres would engage in a broader range of knowledge generation and exploitation activities than their counterparts in company-based centres. This suggests:

Proposition 2 *Employees in University-based R&D centres will engage in a broader range of dissemination and commercialisation activities than those in company R&D centres.*

Dietz and Bozeman [58] suggest that the output from R&D centres, in terms of publications and patents, is positively influenced by the career diversity of staff (i.e. inter-sectoral changes throughout their career). Similarly, Zucker et al. [59] in their research on 'star scientists' found that academics with industrial links had higher patent rates and the organisation had a greater number of products both in terms of those in development and those launched in the market. Therefore, the expectation would be that the greater diversity of stakeholders in university R&D centres means that researchers are required to undertake a wider range of activities, i.e. the writing of academic publications and dissemination of these findings as well as activities associated with the commercialisation of research. Furthermore, this requirement will lead to the recruitment of staff with a more diverse career background than for researchers in company-based R&D centres. This suggests:

Proposition 3 *University-based R&D employees will display a more diverse career background that researchers in company-based R&D centres.*

5.3.3 Organisational Structures and HRM Practices

In addition to organisations' environment and goals, Boyne [37] summarises three ways in which the internal structures of public and private sector organisations can vary with public sector organisations having greater bureaucracy, facing more 'red tape' and having lower managerial autonomy. Ultimately, as with the goals of the organisation, these internal characteristics are shaped by the diversity of demands from different stakeholders and the need for public sector accountability. This can create rigidity within public sector organisations and a tendency to be risk-averse. The 2003 Lambert Review in the UK highlighted these characteristics in universities, identifying the prevalence of a risk-averse, bureaucratic mentality in universities, with mangers 'prone to take decisions to committees in order to cover their backs,' (p. 98 in [57]). In terms of HR practices, uncertainty regarding the sustainability of funding, lower managerial autonomy and risk aversion may result in a tendency for R&D employment contracts to be on a fixed-term basis. This leads us to the proposition:

Proposition 4 *University-based R&D centres are more likely to employ researchers on fixed term contracts whereas company-based R&D centres will tend to use permanent contracts.*

Research on the implications of employee contracts on organisational performance suggests that despite benefits to the organisation from employing staff on fixed-term contracts, i.e. a reduction in fixed employee pay and benefit costs, negative externalities may arise through a reduction in motivation and loyalty, therefore constraining innovation and creativity within the firm [60].

A further way in which organisational structures may influence HR practices is in terms of the use of teamwork and in particular, cross-functional activities. For cross-functional activities to occur, a fluid organisational structure is required with the ability to transfer resources and knowledge across organisational areas. Where teamwork is implemented successfully, research suggests that this positively contributes to employee commitment and motivation [61], innovative performance [22], scientific output [62], new product development [63] and general R&D effectiveness [64]. Kochanski et al. [65] develop this point by stating that not only does working in cross-functional teams improve performance, but also it increases an organisation's ability to attract and retain skilled R&D human capital because R&D workers enjoy engaging creatively in cross-functional teams.

In university R&D centres, rigidities generated by greater bureaucracy, red tape and lower managerial autonomy may constrain cross-functional team working. In contrast, private sector organisations tend to have a more organic structure, with lower demarcation between functional areas. Therefore, it is possible to propose that:

Proposition 5 *Cross-functional working and teamwork will be less common in university R&D centres.*

5.3.4 Organisational Values and HRM Practices

The final distinction identified by Boyne [37] between public and private sector organisations relates to managerial values. Boyne [37] characterises managers in the public sector as being less materialistic and driven by financial rewards than those in the private sector but as having a lower level of organisational commitment. Pratchett and Wingfield [66] describe a similar view suggesting that managers in the public sector display a 'public service ethos'. Financial rewards may be assessed in two ways: first, standard and predetermined remuneration levels and second incentive schemes or performance-related pay. In general, incentive schemes are believed to be positively related to employee motivation and subsequently organisational performance and to be more common in the private sector [39, 40]. Indeed in the UK, while 44 % of UK private sector organisations use some form of performance-related pay, only 19 % of public sector organisations made performance-related pay arrangements [67].

Based on this result, it would be natural to assume that R&D employees in private R&D centres would be more likely to be rewarded with performance-related pay than their public sector counterparts. However, performance-related pay may be less significant as a motivator among R&D employees than among other groups. Jordan [68], for example found that US R&D workers seek employment in organisations with a clear research vision and that focus on future competencies and capabilities. Most of all, on top of competitive salaries, R&D workers are motivated by non-monetary incentives, 'particularly recognition of the value of their work' (p. 23 in [68]). Non-monetary rewards may come in the form of stimulating career opportunities, rewards for creative thinking and team-based work all of which will positively contribute to an organisation's performance in R&D [65]. Therefore, while differences in managerial values between private and public sector R&D centres might suggest that financial incentives would be more common in the private sector, this may be less evident for R&D workers. Hence, it is possible to suggest that:

Proposition 6 *R&D workers in private and university centres will not receive performance related pay.*

5.4 R&D Centres of Excellence Programme

The research which forms the basis for analysis in this chapter was undertaken in a UK region, Northern Ireland. In early 2000s, there were longstanding concerns about low levels of R&D and innovation in the region [69, 70]. One assessment at the time concluded that Northern Ireland's regional innovation system was

'dominated by relatively few large firms, with predominantly national and global rather than local and regional linkages, and supported by relatively low levels of regional private and public R&D'. The result was that 'business innovation [was] too low in Northern Ireland and the linkages in the innovation system [were] inadequately developed. Both the level of innovation (capabilities) and of interaction in the innovation process (networks) need to be increased' (p. 74 in [71]).

With the regional Northern Ireland government aware of the evidence that increasing R&D and innovation can have positive effects on firm-level and economy-wide growth and productivity, the rationale and context for public intervention in the level of R&D investment was set. In 2002, the Centres of Excellence R&D programme was launched to 'support the establishment of R&D centres to 'stimulate leading edge, industrially exploitable and commercially focused research which will demonstrably improve the competitiveness of Northern Ireland industry' [50]. In other words, the programme of R&D support was established with the explicit objective of contributing to regional competitiveness.

The programme was launched with two open and competitive calls for proposals. From 28 applications for funding, direct financial support was offered to eighteen R&D centres (eight university-based centres and ten company-based centres). Public sector investment in these 18 centres amounted to £34.0 m (30.0 % of total costs) with this matched by an additional £79.4 m from the centre's host organisations over three years. The ten company-based R&D centres accounted for 40.3 % of total programme investment and were awarded 31.5 % of public funding. As a result, the eight university R&D centres accounted for the remaining 59.7 % of the total R&D investment and received 68.5 % of public funding. This difference in funding between the university and company centres reflects the fact that on average, the university centres were larger and public support was proportionately greater. One consequence of this open call for applications was that the sectoral composition of the centres was quite diverse with a focus on engineering and life science applications (Table 5.1).

Through a longitudinal monitoring approach, data were collected for all 18 centres over the 3 years period when they were receiving financial support (2003–2006). A mixed methods approach was adopted including periodic written reports and interviews with each of the centres focusing on a range of issues including HRM practices. The data therefore comprise three main elements. First, each of the R&D centres was asked to complete a detailed written questionnaire every four months between February 2004 and September 2006. This provided regular quantitative data on the level and type of R&D activity being conducted in each R&D centre, employment profile, employee characteristics, staff moves, etc. with an average response rate of 75 % throughout the period.

Second, more in-depth face-to-face interviews were conducted with each R&D centre on an ongoing basis to validate data obtained through the written returns and follow-up issues of particular interest. Third, in November 2005, a series of focussed semi-structured interviews were carried out with each of the centres relating specifically to their HRM policies and practices. At the time of these

Table 5.1 Profile of R&D centres

PRC No.	Budget £m	Subject focus	Host organisation	Types of R&D		
				● Major focus		○ Minor focus
				Basic R&D	Applied R&D	Experimental development
1	1.52	Software process improvement	University		●	●
2	0.95	Technology start-up and incubation	University		○	●
3	37.76	Electronic communication technologies	University	●	●	○
4	4.20	Medical polymers	University	○	●	○
5	3.95	Environmental monitoring technologies	University		●	●
6	4.00	Functional genomics	University		●	
7	3.65	Aeronautical technologies	University	○	●	○
8	11.65	Nanotechnology	University	○	●	○
9	2.71	Automotive engineering	Locally owned SME			●
10	4.71	Food research and development	Locally-owned firm			●
11	3.68	Electric power engineering	MNE operation		○	●
12	7.97	Recording media substrate	MNE operation		●	
13	4.99	Mobile software systems	MNE operation			●
14	4.50	Electrical engineering test centre	MNE operation		○	●
15	2.89	Scientific cameras	Locally-owned SME		○	●
16	3.14	Controlled drug delivery	MNE operation		○	●
17	7.03	Proteomics	Locally-owned firm		○	●
18	4.15	Speciality pharmaceuticals	Locally-owned SME			●

interviews, 416 people were employed by the centres [380 on a full-time equivalent basis (FTE)].[8] Therefore, the Centres of Excellence programme accounted for 8.7 % of R&D employment in Northern Ireland in 2005, in terms of FTEs [72]. Three hundred and nineteen of these posts were 'new' jobs created through the programme, of which researchers comprised 66.6 %, technical support were 26.9 % and other staff 6.5 %.

[8] Of these 416 employees, 343 were employed on a full-time basis, with 73 staff dividing their time between centre activities and other responsibilities in the wider organisation.

5.5 Empirical Results

The first proposition (1a, 1b) relates to the way in which inter-organisational innovation links might be shaped by the organisational environment within which R&D centres are operating. In general terms, however, little evidence was found of the anticipated differences in the extent of inter-organisational collaboration between public and private R&D centres. There is however more variation in the nature of these collaborative relationships. For example, where company-based R&D centres collaborated with external organisations, these tended to be locally based, industrial partners. For one of the ICT R&D centres, for example relationships with other software companies were important in managing fluctuations in the demand through contract labour:

> We don't collaborate as such, but we do use both [company A] and [company B] as the source of contract labour. So one of the ways of managing our peaks in demands and the desire sometimes to have engineers on board which we could let go at short notice.

Other collaborative relationships were based on complementary technologies as a means of achieving product and service innovation:

> We are to some extent collaborating with [company A], [company B] and [Company C] at the moment. … our technology is non competing and so we are willing to collaborate in terms of trying to close a deal with a customer. [Company B] is trying to get us to sign an agreement to distribute or resell their technology, which we might do.

In other situations, collaborative relationships were formed as a means of identifying and implementing best practice:

> One of the projects that we did was the [product], a brand new vehicle and there was a whole host of new partners involved in that project…We did a partnership agreement with [company A] and selected them as a benchmarking partner for the development of our new vehicles. A lot of the people involved in that project went to Coventry and looked at how they did the styling of the new vehicle; how they did the detail design of the new vehicle; how they did the prototyping; and their design processes. During the project they came to us at various strategic points along the project and helped us with the design process and the timing plans.

Employees in the university-based R&D centres were much less likely to engage in collaboration with local industrial partners. Interestingly, however, efforts were being made by a majority of university-based centres to ensure that local industry had an 'input' into the research process. For example, in some of the centres, an advisory committee had been formed with industrial representation from both local and international industry partners. What was found however was that university R&D centres' innovation links tended to be globally oriented, with the benefits from these links emphasised in terms of dissemination of research activity and findings, access to technology and intellectual expertise, as well as a role in setting industry standards. This is reflected in the following quotes from University centres:

> Our collaborations have been more with English universities and American and Indian and hopefully very shortly Japanese universities, more than local universities. That has been part of the whole outreach agenda.

> We operate at an international level. I [the director of the Centre] am one of the members of an international research consortium… developing a research roadmap which will influence the strategy for all research Centres… The consortium has about thirty members. It is a mixture of academics and industry representatives. There are seven large corporations funding this consortium… What these organisations get out of it is an insight into what is emerging in terms of research in software process. This is promoting the Centre, the university and Northern Ireland in a good light because it is in an international forum. That is one area of the research where there has been an impact. We wouldn't otherwise have been involved in this. We wouldn't even have been invited to be involved in this if we hadn't had the Centre and been engaged in the type of activities that we are doing.

Collaboration between university-based R&D centres and local industrial partners was less common with one of the company-based centres commenting that:

> So far we have failed to find any way to engage with R&D within [NI Universities]. They seem to have as much money as they can spend to do the things that interest them. My attempts to suggest projects that we might in someway support have had literally no interest.

In summary, there is little clear support for either Proposition 1a or 1b, but instead differences are observed in the nature of the external linkages of public and private R&D centres. In general, company R&D centres tended to collaborate locally with other private sector companies. For the university R&D centres, inter-organisational relationships tended instead to be international and people-driven. Links between the university R&D centres and local industry were limited and where these were found they tended to be in an advisory capacity as opposed to engaging in collaborative R&D.

The second proposition suggested that employees in university-based R&D centres would engage in a broader range of knowledge generation and exploitation activities than employees in company-based centres. Overall strong support is found for this proposition in terms of the number of technical presentations, research papers, patent applications, patents granted and the number of licenses that staff in the university-based and company-based R&D centres developed during the study period.

Controlling for the total number of employees and researchers in the R&D centres, each researcher in the company R&D centres undertook an average of 0.5 presentations and wrote 0.03 research papers during the study period compared to 2.5 presentations per university R&D researcher and 9.1 research papers (Table 5.2). This reflects the greater emphasis on knowledge sharing in the universities and the much lower propensity for companies to share information. As one company centre remarked:

> The nature of our business is that we would typically patent or publish something that cannot be reverse engineered, externally. Hence what we would do is provide a patent

Table 5.2 Dissemination, protection and commercialisation of research by R&D centre employees

R&D centre type	Technical presentations per employee	Research papers (submitted or published) per employee	Patent applications per employee	Patents granted per employee	Number of licenses per employee
Private—					
Per employee	0.32	0.02	0.07	0.00	0.01
Per researcher	0.51	0.03	0.11	0.00	0.01
University—					
Per employee	1.95	7.25	0.13	0.02	0.02
Per researcher	2.45	9.10	0.16	0.02	0.02

Source Monitoring returns and RTD centres of excellence programme

> protection or if we felt it was technically of benefit to the wider industry we would sometimes go along to a conference. However, everything within this Centre can be reverse engineered. Hence publishing or communicating externally creates a disadvantage to us as an operations facility so we keep it quiet. So our people are one of our best kept secrets.

The contrast between the company and university R&D centres is less stark in terms of their activities to protect intellectual property. University R&D employees were slightly more likely to make patent applications (0.16 compared to 1.11 per employee in company R&D centres), and while the data suggest that university researchers were also more successful with these applications within the study period, it is likely that insufficient time had elapsed to fully determine the conversion of patent applications into awards. In general, researchers in both university and company R&D centres were engaged in a similar number of license agreements (Table 5.2).

Overall, support is found for the second proposition that university R&D employees engage in a wider range of dissemination activities than employees in company R&D centres: employees in company R&D centres focus on knowledge protection and commercialisation activities, and those in university R&D centres devote considerable effort to dissemination but also seek to protect and commercialise their research.

Proposition 3 asserted that R&D staff in university R&D centres were likely to have more diverse career histories than those in company centres. To investigate this, information was collected on the career history of all new employees in the R&D centres (Table 5.3). Of the 319 new employees, 6.3 % were graduates who came straight from university with no previous employment, with this percentage being similar for both company- and university-based centres.[9] Of the other 210 new staff employed by the company-based R&D centres, no employees had come directly from academic positions but all had instead previously been employed in

[9] The employment history of 17.7 % was unknown. It should also be noted that only the most recent employment prior to working in the Centre of Excellence was considered.

Table 5.3 Previous employment of new employees in university- and company-based R&D centres

Centre type	New staff (n)	Previous employment (% of employees)					
		In host organisation	NI private sector	NI public sector	Outside NI	No previous employment	Unknown
Private	209.6	46.3	17.7	0.5	4.8	5.7	25.1
University	109.75	43.5	20.0	3.6	21.9	7.3	3.6
Total	319.35	45.3	18.5	1.6	10.6	6.3	17.7

Source Monitoring returns and RTD centres of excellence programme

industry. This was noted by a number of companies as adding significantly in terms of skills:

> We have a lot of ex-[multinational 1] staff in fact if you look around you will probably find fifty to sixty per cent of people here are ex-[multinational 1]. Virtually all of the management team, myself included, spent many years in [multinational 1]. Then there is some [Multinational 2] in the mix now, a little bit of [multinational 3]. These are all people with comes, data protocol, networking service management backgrounds.

By contrast, around 20 % of new recruits to the university-based centres had previously been employed in the private sector. As two of the university centres commented:

> Most of them [new recruits] have had some history of industry employment in their careers, but are now academics. I would view that as a net strength because people getting out there and working in industry for a while and then coming back gives a breadth of experience to academia. We have got a balanced suite of skills and experience.

> One thing that is maybe a little bit unique about [R&D Centre] is the engineers. There are engineers, senior engineers and principal engineers… They have industrial experience, so they are a key part of what we are trying to do here…Of the engineers seventy-five per cent [fifteen engineers] would be from industry.

Another aspect of individuals' career histories which was markedly different between the company and university R&D centres was the proportion of new staff that were recruited locally or internationally (Table 5.3). Less than 5 % of employees in the company R&D centres were recruited from outside the region compared to over a quarter of new employees in the university centres. The company-based centres perceived recruitment of employees from outside the region as a problem stating that 'it is pretty tough to bring people in from far away'. In contrast, industrial engineers recruited to the university-based centres tended not to be local and were typically mobile highly skilled workers:

> The last five or so [engineers] to have been recruited have all been Chinese. That is where we are finding a lot of very skilled, capable and knowledgeable people. Typically they won't have come directly from China they have come from GB, maybe working in universities there and have come over from GB to here.

These findings therefore support our third proposition that employees in university R&D centres will have more diverse career backgrounds than researchers in company R&D centres. Furthermore, the findings support that of Dietz and Bozeman [58] that greater career diversity will be reflected in a broader spectrum of research-related activities by employees.

The fourth proposition related to contrasts between employment contracts in the company and university R&D centres. Drawing on Boyne's [37] synthesis of the literature, it could be expected that greater rigidity and risk aversion in public sector organisations would mean that fixed-term employee contracts would be more common than in company R&D centres. In fact, approximately three-quarters (76.3 %) of all staff in the R&D centres were employed on permanent contracts; however, this was concentrated among the company centres—97.9 %—compared to 42.9 % in the university centres. University centres highlighted that they were reluctant to employ new staff on a permanent contract when ongoing funding was not guaranteed. As one centre manager commented:

> At the moment it [the contract term] is for the funding period on account that the university is strangely unwilling to take me at my word when I assure them that we will be coming into maturity in year four.

As centres approached the end of their public funding period, the university centres were also conscious of the imminent need to downsize the scale of their activities. Of full-time equivalent jobs in the centres over the 3 years funding period, approximately 57.8 % of these were being sustained in the post-funding era (Table 5.4). Continuity of employment was however much more likely in the company centres (77 % of employees) than the university centres (23 %), therefore emphasising that the type of contracts issued to employees directly reflected the likelihood of continuation (or termination) of employment in the post-funding period.

These results provide strong support for the fourth proposition that university centres would tend to be more risk-averse and that this would be reflected in the nature of employment contracts. If staff were employed on a project-specific initiative with a dedicated funding stream, universities were most likely to recruit in line with the period of funding. By contrast, company centres tended to recruit staff on permanent contracts.

The fifth proposition relates to the greater likelihood that company centres are engaging in team working. In fact, the vast majority of centres (75.0 %) operate

Table 5.4 Composition of jobs sustained beyond public sector funding period in the R&D centres

Centre type	Jobs sustained	Research	Technical	Admin	Other staff
Private	175 (77 %)	78.3	17.1	4.0	0.6
University	53 (23 %)	67.9	15.1	17.0	0.0
Total	228 (57.8 %)	75.9	16.7	7.0	0.4

Source Monitoring returns and RTD centres of excellence programme

cross-functional teams, with this only slightly more common in the company centres (77.8 %) than in the university centres (71.4 %). This suggests little support for the fifth proposition that the rigidities associated with increased bureaucracy and red tape in public sector organisations were constraining cross-functional working and teamwork. Instead, both university and company R&D centres identified individual and collective benefits from team working, for example:

> The way we are structured we actually have seven people who are common throughout all of the projects. So what we have is a core of seven people and they are involved in all of the projects. Then each of the projects has its own project team as well. By keeping the central core each project is aware of what is going on in every other project.

The final proposition related to the impact of organisational values on HR practices particularly in terms of their impact on performance-related pay. In terms of average salaries, little difference is found between the company (£26,700) and university centres (£25,720). However, three-quarters (77.7 %) of company centres operated additional financial incentive schemes compared to none of the university centres. In all of the company R&D centres where financial incentives were used, these applied across the organisation and were not confined to R&D employees. Similar organisation-wide rules also applied in the universities, suggesting that such rules seem to be more important in setting remuneration profiles in the R&D centres than the specific nature of individuals' occupation. According to Adams' equity theory [73, 74] R&D staff will perceive an inequity if other staff receive performance pay and they do not (and vice versa). This perceived unfairness will lead to a readjustment of their efforts to a level which they feel is justified by the differential rewards. Therefore, if an organisation is using performance pay as an incentive for non-R&D employees, it needs to be an organisation-wide policy, which explains why the organisational context rather than individual occupation is a key determinant of remuneration schemes.

5.6 Conclusions

Based on this comparison of the HR practices of a group of closely related university and company R&D centres, relatively strong support is found for each of the dimensions of public–private contrast identified by Boyne [37]. In particular, the contrasting organisational environments of the university and company centres, marked by very different profiles and aspirations of stakeholder groups, lead to very different patterns of external connectivity and patterns of engagement by centre staff in external knowledge-sharing activities.

Reflecting the aspirations of their more diverse stakeholder groups, university R&D centres are more engaged with international partners than with local industrial partners, and their staff are significantly more strongly engaged in knowledge-sharing activities than those in the private sector centres. Conversely, driven largely by the issues of confidentiality and concern over knowledge leakage, staff in

company-based R&D centres were only minimally engaged in external knowledge sharing but had developed some local linkages with supply chain partners. The wider range of knowledge-sharing activities in the university centres was also facilitated by the more diverse prior career histories of staff newly recruited to the centres.

Organisational structures—hierarchy, regulation and a lack of managerial autonomy—also prove important in shaping employees' contractual position in the R&D centres. Greater risk aversion in the university centres led to more use of fixed-term employment contracts and less ability to sustain research activity beyond the end of the public funding period. No difference was evident, however, in the flexibility of working practices within the university- and company-based centres with, for example both equally likely to be working in cross-functional teams. Finally, Boyne [37] argues that organisational values may be important in shaping differences in remuneration structures between public and private sector organisations. Here, while little difference is found between the salaries of university and company R&D centre employees, there was evidence that performance-related pay was used significantly more by the company centres (see also [67]).

The results suggests that at least in the context of R&D centres, significant differences still exist between the HRM practices of public and private sector organisations, even where these are located in the same region, face similar economic and social conditions, and are being funded through the same public funding programme. In conceptual terms, this casts some doubt on the 'convergence' hypothesis between public sector and private sector HRM practices. Instead, this study finds each type of organisation maintaining its distinctive HRM approach as a consequence of, and influence on, its organisational role and performance. For example, the greater risk aversion of the university centres is reflected in the greater use of fixed-term employment contacts for research staff, something almost unheard of in the private sector R&D centres. This has implications for whether research activity is sustained beyond the end of the public funding period. Conversely, the more 'open' attitude to knowledge sharing by the university centres—facilitated by employees' more diverse career histories—generates more external contacts although these tend to be extra-regional rather than local.

The distinctiveness of the HRM approaches of university and company R&D centres which are observed—reflecting more fundamental differences in their organisational structures goals and values—impacts significantly on their patterns of external connectivity and their potential contribution to regional economic development. From a policy standpoint, this raises interesting questions about the relative benefits of providing public support to university and company R&D centres, a dilemma considered in the next section.

5.7 Implications

In this chapter, drawing on the framework for public–private contrasts developed by Boyne [37], the research reported here has emphasised the continued differences between HR practices in the public and private sectors. The organising framework developed by Boyne [37], with its focus on organisational environment, goals, structures and values, proved useful here to capture the effects of the diversity of R&D centres' stakeholders and their organisational context on HR practices. Even among the R&D centres considered here, with their very similar social and economic positioning and funding source, significant differences in HR practices were evident in terms of each aspect highlighted by Boyne [37]. Notably, however, the study focused on a group of relatively new public and private sector organisations, albeit ones that had grown relatively rapidly as a result of public sector funding. As such, it might be anticipated that these R&D centres would start up with legacy values, structures, etc. derived from their host organisations, before developing more individual organisational cultures. This development process might either reinforce existing cultural norms etc. or reflect the process of convergence identified by Farnham and Horton [41] and Lupton and Shaw [42], etc.

Analysing this developmental process, which may reflect both secular trends towards public–private sector convergence as well as increasing organisational maturity, is likely to require some development of the essentially static Boyne [37] framework to integrate processes of organisational learning. This is likely to involve notions of absorptive capacity [e.g. 75], as the R&D centre seeks to identify and implement leading practice from elsewhere, as well as the balance between external and internal pressures or resistance to change. In empirical terms, analysing this process of development and maturity will require a more long-term longitudinal approach covering more than the three years of the current study.

The study also suggests a number of implications for public policy and investment priorities reflecting the continuing differences in HR practices between the university and company centres. First, while it is clear that public support for R&D centres, both public and private, can contribute to a strengthening of regional R&D, the regional benefits which derive from each centre do differ with implications for investment priorities. Company R&D centres, for example, are more likely to form local supply chain research linkages with other firms, but engage in little other knowledge-sharing activity. University R&D centres, on the other hand, tend to have stronger international linkages and weaker local networks but do tend to be more actively engaged in knowledge sharing and dissemination. From a policy standpoint, this suggests a range of options and priorities with different potential benefits. If the policy priority is strengthening local supply chains, then supporting company R&D centres may be most appropriate. If, on the other hand, the aim is to develop a region's external connectivity and knowledge gathering capability, then supporting university centres may be more relevant.

Other factors may also be relevant here, however, such as the sustainability of R&D activity following any period of public funding. In our study, at least, the

university centres, in particular, were making much greater use of fixed-term contracts and seemed less able to sustain R&D activity after a period of public funding than the company R&D centres. On the negative side, this is likely to limit the long-term impact of public investments in university R&D centres. The limited life of such centres may, however, have other spin-off benefits if, for example, staff attracted initially by the centre join other organisations in the region. In the centres considered here, for example, around three-quarters of leavers remained within Northern Ireland over the monitoring period.

Finally, given the emphasis in Boyne [37] on the impact of the diversity of stakeholder goals on public organisations in particular, it is worth considering the potential distortionary effects of public R&D funding. For example, the need to address local economic agendas may distort existing research agendas by contributing to the diversity of stakeholders within each R&D centre. Alternatively, the need to satisfy the criteria for public funding may be distorting the operating policies and practices of both the university and company centres. The research findings suggest a reassuring picture here, however. While there is some evidence that public support for the university R&D centres is broadening the scope of these centres, prompting HR practices such as IP protection and commercialisation, we see little evidence of any other changes in organisational priorities as a result of the Centres of Excellence programme funding. In part, this may reflect the 'light touch' design of the programme itself, however, which operated by asking potential centres to compete for funding in an open competition with relatively few required performance criteria. This allowed centres to develop their own agendas and ways of working with relatively few administrative restrictions.

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Chapter 6
Organisational Challenges of Human–Robot Interaction Systems in Industry: Human Resources Implications

António B. Moniz

Abstract In this paper, the social aspects related to new concepts on the complex work environments (CWE) will be analysed, especially those that configure the design of work organisation systems with automated equipment. In such environments, the work with autonomous systems (AS) represents specific options in the design of workplaces. This means that human resources management (HRM) is becoming more decisive for a successful design of a complex and automated system. Traditionally, it was thought that automation would replace operational work and the importance of the dimension of human resource would become less decisive for management option. Most recent studies are demonstrating total different conclusions. We intend to present here some of those results. Another topic covered by this article is the relation of humans with computers in their working environment. That means the role of agents in the human–computer interaction (HCI) (robots, human operators, other automated machinery, sensors) and the implications in the management of human resources. The technology development represents also a challenge for managerial options.

6.1 Introduction

In an interesting article published in 1996, Masakasu Ejiri approached the future development of robotics. And already there he verified that "many robotics researchers believe that autonomous robots will play an important role in our future society" (p. 3 [1]). This researcher from Hitachi Lab understood that most problems could be more visible on the possibilities for mobility and motion

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control, or on energy and battery developments. But a lack of research was done on "machine reliability". He concluded on the state of the art of that time that "we should direct efforts towards providing assistance to human drivers" [1]. He foresees the development of robotics into this direction when he provides the example of medical field applications: "we have to note that the final goal should not be an automatic surgery machine, but a machine with the capability to help a surgeon as a skilled assistant" (p. 4 [1]). This is one of the main discussions in this paper about what would mean the role of agents in the human–computer interaction (HCI) (robots, human operators, other automated machinery, sensors) and the implications in the management of human resources.

6.2 Organisational Challenges

The role of the different agents in the interaction between humans and information technologies also means the discussion about the technological developments in each of the elements that participate in the working environment. Means also their implications in the way humans work and use such agents or elements of their work environment. This includes the definition of decision process in complex working systems (CWS). That contributes to consider what an autonomous system in the production sphere is, and what the end-user is with capacity of decision responsibility that can affect safety and quality of work [2]. The answers to that can clarify the role of human work in the increasingly automated spaces.

Social aspects related to new concepts on the complex work environments (CWE) will be analysed, especially those that configure the design of work organisation systems with automated equipment. The concept of autonomous systems (AS) is one of that group. In work environments with high levels of automation, the work with AS (autonomous robots, auto-guided vehicles or AGV, integrated manufacturing systems, work companions) represents specific options in the design of workplaces. In the epistemological tradition of "social construction of technology" [3, 4], technology can be defined not as a product (or an equipment) designed and marketed, but as a social relation that integrates the equipment and working tools, the operators and the material to be transformed.

From these social relations, the concepts of "agents", "co-working" or "human-centred technical systems" reveal new dimensions related to HCI. This means that the design of human-centred technical systems is dependent on specific social relations and is not a mere technical issue. Those technical systems (robots, NC machine tools, AGV) are not designed with more sophisticated developments of increased communication systems (machine–machine communications, but also machine–human communication), but those developments have an intention. Why such systems are designed in that way? Are there alternatives? Why they are not implemented? The answer to these questions rely on social principles, on defined strategies for organisational development and even the human resources management (HRM) options obey to such rationale.

The HCI concept should not be only defined on the base of configurations of technical systems, but more in terms of organisational configurations, because this concept of organisational configurations under CWE leads to new pattern of human–machine interfaces. Why? Because the design of work organisation implies the definition of tasks to be accomplished by humans with major or less autonomy, using tools and intelligent equipments. That is why HCI should be connected with approaches on organisation theories in industrial work systems.

Some authors (as Dhondt et al. [5], based on the model of Karasek and Theorell [6]) use the following distinction in a study for the European Foundation on work organisation and technology:

- Active work organisation, where the workers experience higher levels of demands but at the same time enjoy enough opportunities to control these demands.
- Passive work organisation, where workers experience no job demands and have no control of possibly changing features of the work situation.
- High-strain work organisation, where the workers experience high demands but have no way of controlling what happens. They have to passively adapt to ever-changing and possibly conflicting demands.
- Low-strain work organisation, where workers experience low demands and have enough control to deal with problems.

In the European Foundation survey (p. 23, [5]), it was verified that 22 % of answers were related to an "active work organisation" in Europe. More than the half of the respondents mentioned the identification of their jobs as "low-strain work organisation" (25.6 %) and a "passive work organisation" (26.6 %). This means that (at least in Europe) most workers are in simple and passive work organisation systems. But a large number of them experience higher levels of job demands and can control them. This would be applied to workplaces with higher-level technicity. The examples of industrial automation and operation of robots are usually in this framework.

In this sense, our hypothesis is that robotics is in a development process that has important implications on the human interaction possibilities: the information becomes more formalised and the process can be standardised. That can have obvious implications in the way human resources would be managed. The risk for a less reflexive work organisation model is high when the standardisation process is fostered by the technical features [4, 7]. However, is acknowledgeable two major alternatives. In some (few) cases, it is possible that the high qualified human interaction can intervene in the production process and control it from a higher level. In other cases, low-skilled operation only is able to monitor the process with less interaction, and the human workplaces can become irrelevant. These different results depend on the chosen organisational model.

6.3 Robotics and Job Design

Hereby, we will use the case of robotics to exemplify the issues related to the use of automation in working environments and the emergence of new HCI approaches that would include social implications. Some of the most critical approaches on the development of robotics lay on the question if their use may lead to labour displacement or substitution. Would job profiles improve as robots take over dangerous, dull and dirty jobs, as promises for the adoption of these technical changes?

Following this direction, it would be necessary to know if it can lead to an extension of the digital divide. Or does the introduction of robotics create new forms of work organisation? Or is it done for repetitive tasks? And who is the "end-user" of robotics? The operator or the programmer? Actually, the answer of these questions marks a debate field of social sciences for several decades [8, 9]. The trends show that the "classical" questions about the social impacts still remain important. But the most recent developments on robotics demonstrate the need to revisit those debated concepts and to increase the collaboration with social scientists among the engineering and computer scientist research teams.

A survey for the European Foundation for Improvement of Working and Living Conditions mentioned that the use of machine technology shows a high correlation with short and long repetitive, monotonous work. Machine technology seems to be a requirement for such repetitive work (p. 18, [5]). In fact, the authors underline that there is a weak correlation between use of machine technology and high-strain working situations ($r = 0.17$). Also, a small correlation exists between active work situations and use of computers. This means that the way in which work is organised in organisations does not coincide with the use of technology (p. 22, [5]).

However, are we talking about a new empirical field? There are several empirical studies on HCI applied to robotics, or on CWS, or even on human interaction with AS. But studies on technology assessment of industrial robotics and AS on manufacturing environment are not so frequent, and they should also focus on the human involvement strategies in organisations. Such empirical field would need as well evidences from the human resource management sciences. And again, few research is being done in this knowledge field.

To add more gaps into this topic, a needed participatory strategy implies a new approach to workplaces design. The involvement of human agents in the decision process needs an *ex ante* definition of features and principles for a work place design. Such design (with involvement of robot operator in the decision process) implies more interaction with robots, different competences and responsibilities. The research on software development to integrate knowledge based systems into automated and programmable machinery is also an empirical field where the space of tacit knowledge can raise new problems for the formalised knowledge. Several sociological studies were aiming those topics, but almost no research was done in the framework of complex manufacturing systems environments [7, 10, 11].

In this way, we can conclude that the knowledge about the organisational challenges outcomes under the framework of technological developments found important gaps about the manufacturing industry sector experiences, especially when those developments are related to robotics. One can use research findings from management sciences, industrial sociology, social psychology, but there are few empirical studies on that. Eventually, technology assessment exercises can produce more scientific material on the social and organisational implications of the development of human and robot interactions [2].

6.4 Some Final Remarks

The study of the dissemination of robots in production activities leads us to understand possible implications to the labour market. In fact, the volume of introduction of new robots in manufacturing industry is much higher than with service robotics, or even with professional service robots [12, 13]. However, expectations point out to a clear increase in this market. Automotive industry sector is the one where most IR are introduced, and the one with highest density. Thus, the type of AS used with interaction with humans can indicate what are the social needs associated to the design of technology. For that reason, studies on technology assessment of robotics and AS on manufacturing environment should also focus on the human involvement strategies in organisations [2].

A needed participatory strategy implies a new approach to workplaces design, as above was already mentioned. But was must also be said, is that it also implies the definition of principles to regulate the means of involvement of humans in the control of those equipments as system agents. With an increase in the number and complexity of those interfaces, the capacities of human intervention can become limited, originating further problems [14].

Some new research questions can be presented as about new concepts dealing with the relation of automated systems and job design. At a first overview, it would seem that is still the same type of issues that are been revisited in the last years [15, 16]. But is not yet clear which concepts have been accepted and which not. The discussions reveal that further empirical approaches are still needed in this field. Hereby, the guiding hypotheses agree with the conviction that working with autonomous agents is increasing the safety problems and imply a shift in the framework of the relation of humans with their work environments [17, 18]. New questions must be developed to understand newly emerging problems of allocating, monitoring and diagnosing responsibilities in such systems [19, 20].

On the one hand, the technology design does not have specific consideration for organisational and social dimensions. The major IR manufacturers do not consider those dimensions. This can lead to further problems on systems implementations in CWE. The workplace design under such environments implies more interaction with robots, different competences and responsibilities [2, 20]. As said before, the non-determinist interaction is a human feature. And the complexity is too great to

develop those features on machines. Thus, the risk of trying it can be not worth, and it can bring additional safety problems that are not yet controlled. It is, however, interesting to develop and apply to some AS those features in given sectors as mining, medical, planetary, rescue or inspection applications [21, 22].

On the other hand, is not clear which kind of discussion framework is the social science dealing with under this relationship. The concept of "new working environments" gave considerable attention to the challenges of the increased competencies of people working together with automated technologies. But in the last years social sciences did not produce further knowledge on such issues. Nevertheless, non-technological dimension (sociological, psychological, cultural and ethical) of technology design should be recognised and taken into consideration [23, 24].

In such conditions, it can be questionable how far is possible to implement real interactive procedures. The same would be applied to the use of HRI integrating organisational dimensions. One cannot really speak about "common aims" in co-working environments integrating humans and AS [11, 15, 18, 25]. When one takes workgroup strategies the concept of "common aim" must be taken. Thus, how could it be possible to design co-working environments without workgroup strategies? We must conclude that would not be rationally possible.

Today, one can understand that is possible and necessary the wider use of the anthropocentrism concept applied to the production architectures, although intrinsic difficulties can be evident. These difficulties rely either on the side of organisational design (that include co-working features) or on the side of technical development. This means that industrial companies (automotive, electronics, metal engineering) and service organisations (health, logistics) are still framed under organisational models that constrain the possibility to redistribute the decision process to lower hierarchical levels, as for robot operators [26–28].

It is emerging, however, a new indication of the value of intuitive capacities and human knowledge in the optimisation and flexibilisation of the manufacturing processes. These dimensions were not usually considered [29, 30]. But when there are new risk situations that occur with the use of AS (especially IR and SR), those can be elements to consider in the design process [5, 25, 31]. It is becoming evident that is necessary to take into consideration qualitative variables in the definition and design of robotic (IR/SR) systems, jobs and production systems [8, 32, 33].

It is already possible to implement knowledge sharing at the workplace. But that is not always recognised when applied to IR in manufacturing environments [34–36]. An improved "intelligent" workplace should mean not only an increased capacity of the manufacturing system (that would include robotics, numerical control machine tools, logistics and complex work flows) in terms of programming, system control or environment data processing. It should also mean the involvement of operators that intervene in the different manufacturing phases. They should become more "system operators" and less "machine operators". The issue of responsibility in the decision process is still not clear: in increased self-controlled system who takes responsibility for unexpected events? Are AS

co-workers of organisational managers? Will it be possible for autonomous agents to achieve tacit knowledge? The answer to such questions need further research evidences [37, 38].

To summarise we can say that the status of the scientific research on these issues is no longer focused on the human aspects of the manufacturing automation concepts. The focus has been taken on the human–machine interfaces and on the self-governance of AS. In other words, the focus is on the relation between technology and social dimensions not as separate entities, but integrated in the design of an interaction system. That means the knowledge and communication structures are elements of the organisational technology system [9, 39]. Thus, competence requirements and skill need for the workplaces interacting (or co-working) with AS are as important as the product manufacturing system design or the integration process that provides further production flexibilities [8, 33]. Those perspectives should be analysed critically on future research on AS and on HRM applied to technological developments at the workplace.

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Chapter 7
The Staffing Process in a High-Technology Environment

Jordi Olivella Nadal and Gema Calleja Sanz

Abstract Technology has been increasingly important for any kind of companies and has a strong influence on the activity they develop. High-technology companies are based on the knowledge and development of edge technologies. By its hand, staffing is the process of acquiring, deploying, and retaining a company workforce. Staffing includes (but is not limited to) recruiting, hiring, transfers, promotions, redeployment, layoffs, retirements, terminations, and retention. Staffing process in high-technology is addressed.

7.1 Introduction

Technology has been increasingly important for any kind of companies and has a strong influence on the activity they develop. High-technology companies are based on the knowledge and development of edge technologies. By its hand, staffing is the process of acquiring, deploying, and retaining a company workforce. Staffing includes (but is not limited to) recruiting, hiring, transfers, promotions, redeployment, layoffs, retirements, terminations, and retention. Some organizations also include the development that supports planned staff movement as part of their staffing plan ([1], p. 11).

Staffing of high-technology companies has particular characteristics and requirements. Technology and staffing have a two-sided relationship: while staffing uses technology intensively, the technological character of the work to be done influences this staffing process.

The management of knowledge work is not based only on jobs, as traditional work management is. Traditionally, the job has been the fundamental unit of analysis. The main emphasis in the management of knowledge work is on

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leveraging the knowledge base of employees rather than making their job performance more efficient. This approach coexists with this job structure, which implies certain types of knowledge. In knowledge-based competition, traditional approaches to managing human capital are extended to focus on contributions to core competencies as stated by Lepak and Snell [2].

As reported by Bo and Xiaohui [3], knowledge staff in high-technology companies has the following characteristics:

- High qualification, as high-technology companies focus on the research and exploration of some technology in a specific area and, in consequence, need edge knowledge of this area.
- Strong motivation, as knowledge staff has clear objectives and they expect to exert their specialties and wisdom to gain achievements in work, not only to fulfill a stable objective.
- Sense of independence, derived from having a high qualification in a specific area.
- Creative spirit, as it is necessary for this work.
- Communication and participation skills, as knowledge staff intend to be open-minded to others' opinions and they prefer to communicating and participating more than others.
- Frequent job flowage, as they are more tied to their profession than to their company.
- Difficulty in evaluation, as work is often collective and, in consequence, it is not easy to assess the individual contribution.

The staffing of this kind of employees needs the use of appropriate procedures and tools. In a high-technology environment, the critical resource to determine capacity tends to be the availability of employees with the appropriate competences. The staffing process is strongly affected by the demanding nature of the work developed when high technology is involved.

Due to the changing nature of the technological work, the competencies related to learning, adaptability, and teamwork are highly valuated. Personal motivation and an appropriate career path become critical. By its hand, learning and learning planning goes beyond the usual training and learning by doing. Due to complexity and changing nature of technological work, the learning process is a combination of acquisition of abilities, professional growing, and support to creativity. The measure of performance has to take into account all these factors.

In Sect. 7.2, the particular characteristics of staffing in a high-technology environment are presented. In particular, Sect. 7.2.1 deals about the hiring, deploying, and retaining the necessary workforce; Sect. 7.2.2 is devoted to the management of the learning processes—referred, in this case, to the technological learning; and in Sect. 7.2.3, the adequate performance measure to support the process is treated. These activities are strongly affected by the fact that the work is dominated by technology.

Section 7.3 is devoted to the treatment of information. In this specific environment, appropriate management tools to support the staffing function have to be used. Conceptual analysis has been presented in the literature. Decision systems have also been described. In addition, information systems to support staffing and assignment that take into account the characteristics of technological work have been recounted. Conclusions, finally, are exposed in Sect. 7.4.

7.2 Particularities of the Staffing Function in a Technological Environment

7.2.1 Hiring, Deploying, and Retaining the Necessary Workforce

Technology workers give great importance to aspects different from salary or hierarchical position. In this field, the interest of the projects to be developed is of great importance, for example. The culture of the company, that is to say, how the business is conducted, problems are approached, and employees are treated, is the most frequently cited reason for joining and staying with a company. According to Brantley and Coleman [4], "Techies are learning engines. They want to be challenged on a daily basis. Once the job ceases to provide opportunities for growth, you stand to lose them." The biggest reason why these people want to be part of a company is the opportunity for personal growth.

Then, the motivation for knowledge workers is in general different from the motivation of the employees of other types of industries. According to Pulakos et al. [5], "Organizations engaged in knowledge-based competition may thus achieve great benefits by advertising and capitalizing on such factors when they develop materials and communications to recruit knowledge workers."

In any case, the conventional factors leading to retention and commitment cannot be dismissed. By analyzing high-technology employees behavior, Dockel et al. [6] found that the most relevant factors were compensation, job characteristics, supervisor support, and work/life policies, which appeared to have a significant influence on commitment. In their study, it was also found that training, development, and career opportunities play an important role on the development of organizational commitment among employees.

The competence to hire and retain the best knowledge workers is increasingly hard. According to Erickson et al. [7], "To try to attract the necessary talent from the market or competitors, technology companies have begun to increase starting salaries, benefits and stock options. (…) Because of this high demand for talent, voluntary turnover and job switching are common in technology companies."

Special attention has to be given to so-called superstars [4]. Superstars are people with unique skills and whose contribution to the organization goals is very high. The value they provide to the company is clearly higher than the compensation they

receive. This kind of personnel can exist in technological companies. They are tied to the technological development, the product development, the sales, or some of these three areas. The effort to retain these people is individual and specific.

Hiring has to be planned appropriately. Hiring decision comes from the need to increase the available capacity. In such a situation, three different decisions can be adopted: contract, hire, and train. Contracting external work capacity is usually a fast way to obtain flexible capacity. In spite of this, it may lead to the consequences that follow [8]: (1) new boundaries that need to be managed and require changes in organizational design; (2) strategic implications, regarding the development of the core activities; and (3) reduction in the firm's ability to control and perform the involved activities.

The criterion to define whether train, recruit, or contract is used to cope with new needs is an important policy decision. Alternative policies can be considered—see Fig. 7.1. Jae et al. [9] analyzed the case of IT projects. They concluded that cases involving limited resources and lower problem urgency favor the use of training as a means of closing the gap in staffing needs. It is deduced that: (1) As the urgency to close the gaps increases, training ceases to be the preferred option; (2) for situations involving greater time pressures from incipient projects, recruitment and contracting become preferred options; (3) if a firm has adopted a short-term staffing strategy, it will tend to favor contracting; and (4) firms adopting a long-term strategy will tend to favor recruitment.

Globalization also plays its role. High-technology activities are increasingly being outsourced by the companies and becoming global. The international

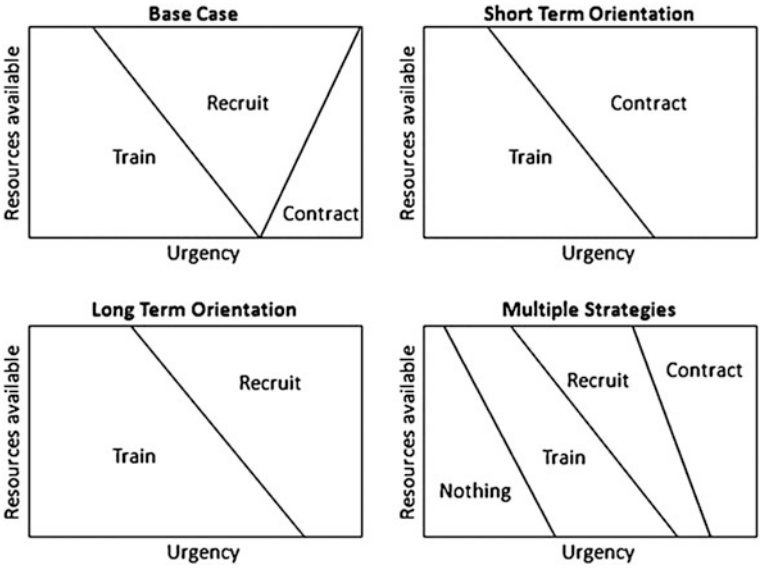

Fig. 7.1 Alternative skill sourcing strategies. *Source* Jae et al. [9]

character of these activities strongly affects the human resources policy adopted. As stated by Huang et al. [10], assignment goals involves increasingly the coordination of different systems while facilitating local flexibility and adaptation to the local level. A cross-cultural management team needs to be developed to effectively manage. Managers have to exchange information between subsidiary locations and the parent organization in a highly effective and actionable manner.

On the other side, nowadays, the capacity of high-technology employees to connect with markets is also taken into account. It has been stated that, in order to bridge the gap between the business decision makers and the researchers in charge of creating new knowledge, innovation process should be supported by a new professional who has a broader scope both for technologies and for markets [11].

Flexibility has also proven to be an important factor of team performance. According to McComb et al. [12], "Managers need to heed the staffing process to ensure that high quality, professional team members who can work together flexibly are assigned to projects." The need of an extreme flexibility can be negative for performance. If the projects are too diverse, the team flexibility can affect team performance.

Individual flexibility is also a factor that, being positive up to a certain level, has not to be overvalued. Hoyt and Matuszek [13] found that the assertion saying that the availability of multi-skilled employees leads to greater financial performance is no well-founded. A sample of companies from three high-technology industries is studied and the conclusion obtained is that the costs associated with achieving a high level of responsiveness must also be recognized. The results of the study suggest that the availability of employees with a diverse set of skills obtained either through training or hiring appear to have little or no relationship to the financial performance of the company.

To hire and retain the necessary technological employees, a staffing plan has to be developed ([4], p. 88). It includes the steps that follow:

1. Understand the goals of your corporate strategy.
2. Describe your workgroup's goals and the structure you will need to achieve them.
3. Evaluate your current talent.
4. Plan for succession.
5. Anticipate attrition.
6. Define hiring specifications.
7. Develop sourcing strategy.

In addition, policies regarding retention have to be developed. Given the strategic importance of such employees, the success of these plans and policies can determine the success of the company. Tools helping to take the best solutions are discussed in Sect. 7.3.

7.2.2 Technological Learning

Individual learning is necessary but insufficient to produce organizational learning. Staffing is important for the organizational learning as it provides relational competences and technological competences that allow the process of organizational learning exist. At the same time, organizational learning is necessary for individual learning. An environment that eases the generation and transmission of knowledge has to be created.

Technological learning is a critical process for technology-driven companies. To focus on competencies, rather than on products, has proved to be a winner option in dynamic environments. According to Fowler, King et al. [14], dynamic environments require firms to focus their strategies on the technological, market-driven, and integration competencies that underlie product development, not the products themselves. In this context, the strategic and organizational aspects of the learning process become of central importance.

Technological learning has ben defined as "the process by which a technology-driven firm creates, renews, and upgrades its latent and enacted capabilities based on its stock of explicit and tacit resources" [15]. Different levels of technological learning have been defined. The fact that the focus is on strategic, tactical or operational concern implies that priority is given to robustness, variety, and redundancy, respectively—see Fig. 7.2. In this approach, the organizational implications of learning are remarked. The process of learning technology has been completed when the organization, the team, or the individual involved is able to effectively apply it.

A basic characteristic of the technological learning is that it relays on previous and difficult to possess knowledge. It is not a training activity that training experts

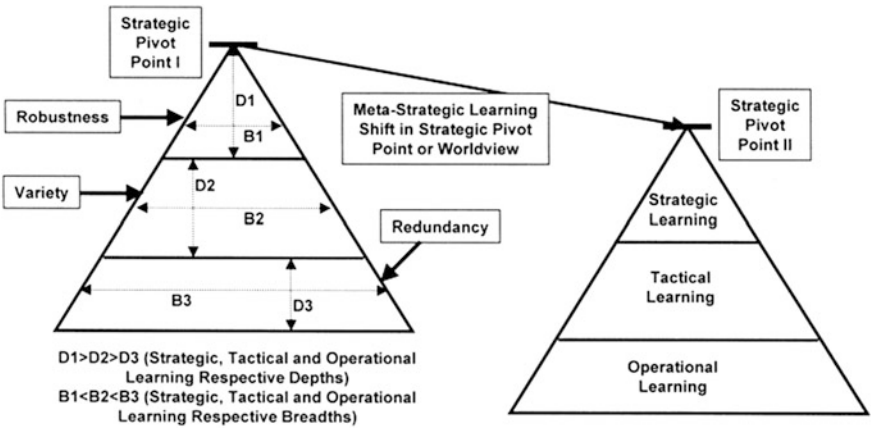

Fig. 7.2 Strategic pivot points represent the current prevalent business/technological worldview. *Source* Carayannis [15]

can control. It is an individual and at the same time collective process controlled in a good extend by the learners themselves.

How the work is structured and organized influences the performance and the organizational and individual learning. The more the work is shared between the members of the group, the more intense the process of learning is. In an analysis of product development teams, Chen [16] concludes that the project design can influence the type of knowledge exchange and learning within this kind of teams. Choosing an inappropriate design can result in an undesired learning outcome. Meyers [17], by his side, remarks the importance of the informal networks in learning transfer. Network roles are critical both in generating new learning and attaining cooperative implementation of complex learning within organizations. In consequences, the staffing function depends indirectly on the organization decisions affecting the learning process and has to take it into account.

7.2.3 Performance Measurement

The staffing function would not be complete without an effective control of the performance of the performed work. The complexity of the tasks developed by the knowledge employee makes it necessary to distinguish between the different aspects of their contribution to the organization. The measure and the assessment of the developed job will be established according to each individual profile.

Lepak and Snell [2] propose a distinction between different profiles of knowledge workers. They offer examples of personal profiles taking into account four dimensions: general knowledge, occupational knowledge, industrial knowledge, and firm-specific knowledge. A recent college graduate, for example, might contribute to a firm based on a high amount of general knowledge and a modest amount of occupational knowledge but rely very little on industrial and firm-specific knowledge—see Fig. 7.3.

The measures adopted to control the contribution of the employees to the company have to be based in the strategic aims of the organization. In the case of high-technology activities, knowledge is by definition a unique and distinctive asset. The process of generation and accumulation of knowledge is critical. Knowledge measures can be a basis on which to build the measures to be used. Boudreau [18] presents a list of knowledge measures, organized according to the role of any factor in the knowledge generation and maintaining process—see Table 7.1. The stocks are factors identifying the accumulation of knowledge, the flows are activities leading to knowledge creation and dissemination in the company, and the enablers are factors that ease the action of the other elements.

Fowler et al. [14] propose a list of measures at company level for the different types of competencies, in order to help to define meaningful measures for each case. Individual competences, and in consequence individual measures, have to be defined to serve the competences at collective or company level. From their point of view, competences have to be distinguished according to their orientation to

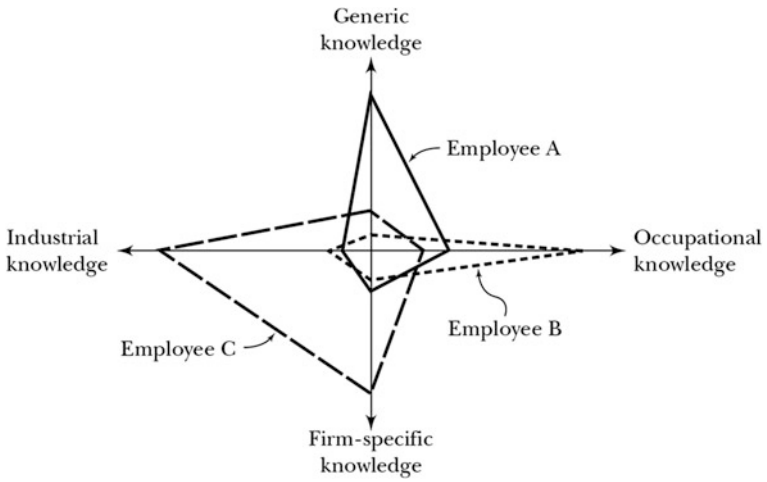

Fig. 7.3 The knowledge profile of human capital. *Source* Lepak and Snell [2]

market, technology, or the integration of both—that is to say, oriented to products. The schema emphasizes a double focus on technology and market, a central point in the innovation strategy (Table 7.2).

The different approaches mentioned in this subsection have in common the aim to reflect the complexity of knowledge work and the plurality of objectives, a central concept in defining the appropriate performance measure. The measures to be applied have to be adapted to every situation to measure appropriately the performed work and the knowledge that has been generated.

7.3 Information Treatment and Decisions

For organizations in which technological work plays a critical role, appropriately managing the needed and the available skills is indispensable. The objectives to be coped with in the staffing process are [19]:

- To minimize idle resources.
- To increase revenue from new project opportunities.
- To improve the quality of practitioners assigned to each project.

A trade-off between these objectives has to be addressed. To do so, the process of assigning practitioners to projects is critical. The projects to witch an employee is assigned determines both the development of the projects and the employee career. The employee learning process, motivation, and expectancies are clearly influenced by the project assignments.

Table 7.1 Knowledge measures. *Source* Boudreau [18]

Stocks	Flows	Enablers
Accounting	Changes in performance between units or firms	Geographic and political proximity
Augmenting financial statements	Type of alliance reorganization	International and domestic organizational and alliance design
Patents or publications and their citation patterns	Perceived knowledge flows between units and alliance partners	R&D expenditures
Organization experience and competitive rivalry	Movement of routines, tools, and ideas, including patents	Absorptive capacity
Learning curves	Perceived information exchanged or awareness of knowledge available in other units	Network attributes (strength, intensity, structure, communication, individual movement)
Unit-level competencies, education, experience, and job requirements	Collaboration and information sharing between colleagues	Tacitness
"High-performance" work systems	Analysis of work products for sources of ideas and information	

Table 7.2 Measures of market-driven, technological, and integration competencies. *Source* Fowler et al. [14]

Measures of market-driven competencies	Measures of technological competencies	Measures of integration competencies
Spending per customer	Cycle time	Product profitability
Number and percent repeat customers	Unit cost	Percent of sales from new products
Referral customers	Yield	Variety of products
Customer complaints	Setup time	Warranty costs
Response to customer requests	Common parts/common technologies	Cost of quality as percent of sales
On-time delivery	Number of competitors able to produce this technology	Actual introduction schedule versus plan
Number of competitors serving this customer	Profile of competitors technological competencies	Number of competitors delivering similar products
Profile of competitors market competencies		Profile of competitors integration competencies

An appropriate management of present and futures assignments requires an information system designed to serve the mentioned objectives. Regarding the information to be managed, it has to be taken into account that persons have skills but also do have groups of people or organizations. We can take from the data model literature the concept of party.

The so-called party comprises any person or organization that deals with the company [20]. The involved organizations can be legal or informal, external or internal—as teams or departments. Often, a person is able to work in a project only if he or she works in common with other people. Skills can be possessed collectively. It will be necessary to know the available skills of the parties devoted to work for the company projects, as employees, groups of employees, and suppliers.

Again using the nomenclature of data model, customer requirements give place to internal work requirements. To cope with these internal work requirements, certain work efforts have to be fulfilled. Work effort party assignment consists in assigning the tasks to be done to the parties. To do it, information about parties' skills is necessary. Each party may have one or more party qualifications or party skills. It is proposed that the information includes for each skill the years of experience and the level possessed, which will be assessed by using a certain rating method ([20], pp. 203–206). This schema is showed in Fig. 7.4.

In addition, employees' training and qualifications are also registered. This information is part of the human resources information. Skills, training, and qualifications are used both for work assignment and for the other functions of human resources management.

The process of assigning projects consists in deciding which employees will be assigned to each project, the period, or periods of the assignment and the part of their work time that the employee will devote to each project, when diverse projects are simultaneously assigned. A tool to manage the projects assignment, developed by IBM, is described by Dixit et al. [19] and Chenthamarakshan [21]. The schema is proposed for an IT service provider; even the explained concepts are common to any other activity based on projects. The tool described consists on

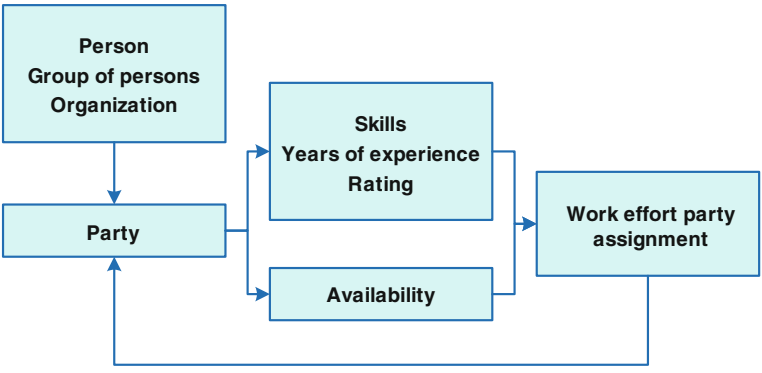

Fig. 7.4 Parties and work effort party assignment. *Source* Own elaboration

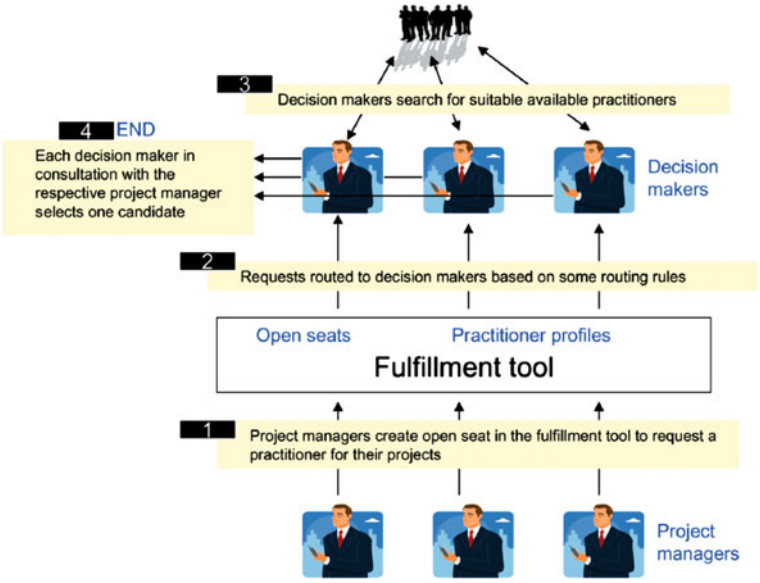

Fig. 7.5 Assignment of employees to open seats. *Source* Dixit [19]

a service system for workforce deployment with distributed decision making. The tool comprises the following:

- Matching module that matches practitioners to project openings.
- Optimization module that produces globally optimal recommendations.
- A user interface for displaying the recommendations.

The schema "promotes a common shared perspective among decision makers enabling multiple decision makers to independently arrive at near-optimal decisions using the tool recommendations" [19]. A schema of the tool is showed in Fig. 7.5.

An essential element of this kind of analysis consists in establishing and assessing the compatibility between employees and the roles on projects to be assigned. To do it, the information taken into account consists in:

- Forecasted functions of the position or job, qualifications, accreditations, or other conditions that make possible the assignment.
- Structured information about skills. A stock of available skills categorizes the different abilities that the employees can eventually possess, including both technological and managerial capacities. Information about the level of the acquired ability or the expected performance in developing a specific ability can be included.
- Information in free text. As it is not possible to categorize in detail all the aspects of the work to be done and of the employees' trajectory and personal traits, free text is included both in the project role description and in the employees' resumes.

The treatment of free-text information can be automatized. In the tool mentioned above, Chenthamarakshan [21] explains that "The text-matching component performs free-text matching between the free-text fields of each open seat and the free-text fields of each of the practitioners and generates a text compatibility score for that pair."

Information about roles to be assumed in a concrete project has to clearly differentiate from the position or job that every employee occupies. Jobs description is mostly a planning tool but is used in all other human resources functions. According to Bechet ([22], p. 18), information about positions has to have the following characteristics:

- A small number of really important capabilities are used to identify each job category, rather than trying to define all the capabilities. The most critical ones are identified, ideally less than ten.
- Identify in specific terms the capabilities that differentiate one job category from another.
- The capabilities are defined in terms of behaviors that can be observed.

Jobs, categories, or positions are defined in any organization, at least in any organization of a certain size. Priority given to positions or competences when planning and scheduling is a strategic decision with important consequences. Gutjahr [23] explains that "Institutions relying on the competencies of their employees therefore are not first and foremost concerned with the money to be distributed among a set of (R&D) project opportunities, but rather with the allocation of human capital."

It seems recommendable to adapt the planning horizon to the strategy of the company and, more concretely, to the information of the demand. In high-technology work, long term is often not possible, due to the fast changes in technology and in market. A long-term planning can give a false sense of security that does not correspond with the reality. Adaptation to the circumstances is necessary. Bechet ([22], p. 53) advises that "If you are looking at jobs in which requirements and technology change quickly, you might use a 1-year time frame, creating plans for each of the four quarters in that year. If you are analyzing management depth, you might need to use a 3–5-year planning horizon."

The optimization of the assignment to projects in a high-technology environment has been addressed by the literature. Filhol et al. [24] propose a mathematical programming model supported by multi-criteria to assist the information technology organization during the staff scheduling activity. The model application allows optimizing the distribution of professionals, minimizing the time of idleness and maximizing the attendance of a set of objectives and restrictions proposed.

Not all instances can be solved optimally by using optimization techniques. In order to overcome this drawback, the use of constraint satisfaction has been proposed. Richter [25] describes the solution adopted in Optimatch, a software solution used by IBM. It is explained that "We deal with very large pools of both positions and employees, where optimal decisions should be made rapidly in a

dynamic environment. Since traditional operations research (OR) methods fail to answer this problem, we employ constraint programming (CP), a subfield of Artificial Intelligence with strong algorithmic foundations."

7.4 Conclusions

The different particular aspects of the staffing of high-technology workers have been presented. To manage this kind of employees, it has to be taken into account that their skills and knowledge are the main elements to consider. In addition, their specific interests and motivations cannot be left apart. For them, the company culture, the possibilities of professional grown, and the attractiveness of the work to be done are of crucial interest. As there is an increasing fight to hire and retain high-technology employees, knowing their interests and motivations is also increasingly important for human resource managers.

As it has been explained, the lack of available competences gives place to contract, recruit, and train, according to the circumstances and the company's policy. The capacities to cope with globalization, connect with markets, and be flexible are of great importance when managing high-technology workers nowadays.

As skills and knowledge are critical, learning also is. The relevant technological learning implies the capacity to apply it. In the high-technology field, knowledge and learning are, in a good extend, collective. For this reason, the performance measure is particularly demanding. Measures of performance of high-technology work are mostly related to the process of generating, disseminate and maintain knowledge. Naturally, the applying of the knowledge to the marked is also a critical point.

An appropriated Information System is necessary to develop the staffing function and address the multiple objectives involved. The availability of skills and knowledge has to be as much as possible under control. The skills and the knowledge have to be considered both at individual and at group level. This information is used to assign the projects to the employees. Information about qualifications and categorized skills that each employee possesses is used. Free-text explanations about the work to be done and about each employee characteristics are used to complete the necessary information. Software solution exists supporting the several decisions that staffing implies. Optimization techniques and constraint satisfaction have been used to obtain appropriate solutions to the raised problems.

Staffing of high-technology workers is an increasingly relevant topic, due to the social and economic importance of high-technology and the critical influence in these activities of staff characteristics and performing. The authors believe that this is an activity that deserves more attention in the future, both by analyzing the phenomenon itself and developing management and decision support tools.

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Chapter 8
Human Resource Management and the Internet: Challenge and/or Threat to Workplace Productivity?

Carolina Feliciana Machado, José Cunha Machado and Maria Clara Sousa

Abstract Throughout the last few years, the Internet has become a common tool at the workplace. Companies, from different activity sectors, were quick to embrace the opportunities and potential given by the Internet and put them to good use to achieve their goals. However, despite having contributed to the efficiency of employees, by allowing them to have immediate access to information on a variety of topics and facilitating communication all over the world, it also contributed to never before encountered concerns to employers. Initial research into the use of the Internet for personal reasons during working hours stated that such use had a negative impact on productivity. The reasoning for such was that employees would be wasting time which could be used to further their work, thus possibly making them unproductive. On the other hand, recent research has shown the Internet to be quite valuable to productivity. Studies have shown that not only is the Internet a priceless tool which aids workers to accomplish their designated tasks, but also when used reasonably, allows those who are working to have moments of relaxation. This contributes to improvements in concentration and ultimately in productivity. Due to this ambiguity and the absence of works on this theme in Portugal, a decision was made to base this study on the impact of the Internet usage on productivity.

8.1 Introduction

Today, we live in a technological world. Everywhere we see the use of new technologies and information technologies (IT). The Internet, a useful tool that allows us to reduce time and space among each other, exists in almost all family

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houses. Workplace is not an exception. Indeed, many are the authors who, during the last decades, have been studied the impact of the use of the Internet in the workplace [1–15]. The interest in this subject, namely in what concerns IT impact in productivity, date from the 1980s when Robert Solow, Economy Nobel in 1987, introduced the productivity paradox with the sentence "you can see the computer age everywhere but in the productivity statistics" ([16] p. 36). Although important, what Solow tried to say was that it was not possible to affirm, in a convincing way, that technological investments result in organizations productivity improvement. Deriving from this paradox, and in order to obtain a deeper analysis and an explanation of it, some authors such as Brynjolfsson [17], Brynjolfsson and Yang [18], and Triplett [19] have implemented new research.

In what concerns the Internet, the study of its impact in productivity has followed a similar course of that of IT. Seen as an access to the biggest world playground [5], we can found here different points of view about its relevance and impact in work development. Indeed, while some defend that, the simple act of sending an email to a friend, watch YouTube videos or use Facebook to participate in social networks [13, 20, 21] can lead to a decrease in their productivity, as they are spending a useful time to their effective work; others [22, 23] consider that the use of the Internet in the workplace can help to increase productivity once it makes available different resources highly useful to workers in their daily work. More recently, however, Coker [14, 15] has been contributing to this discussion, showing that, when used in a moderate way, the use of the Internet by workers in their workplace can make them more productive that those who do not.

Although important, studies about the Internet impact, and more specific, focusing productivity impact, are scarce, if not, almost inexistent, in Portugal, reason why it seems relevant to try to discover what it is happening about this matter in Portuguese organizations. More specifically, we will look to assess the use and reasons of the Internet use in the workplace; to assess the impact of the Internet use in workers' productivity; and to assess the existence of a relation between the Internet use and the existence of control politics in its use and its implications in productivity.

8.2 Productivity: The Concept

In a market characterized by high levels of competitiveness, productivity must be seen as a way to survive and be competitive. Indeed, in a country like Portugal, whose productivity level is one of the smaller from the European Union, although be identified as one of the countries with a higher mean week working hours schedule, just behind the United Kingdom and Greece, productivity is seen as a challenge to Portuguese society [24].

Many are the researchers who, during the last decades, are trying to define productivity [25–28]. Usually confused with individual performance, output, and production capacity, Pritchard [29] considers that productivity can be perceived as a results measure related to objectives (effectiveness) or from results related to inputs (efficiency). The author defends that productivity is related with these two measures, efficiency (seen as the ratio between outputs over inputs) and effectiveness (concerning the relation between outputs and some standard or expectation), independently of the perspective from which we can define productivity. Indeed, while the economists consider that productivity is related with the change of inputs into outputs; for industrial engineers, productivity is seen as the useful labor ratio (output) divided by the energy used to produce this labor (input); while managers, present a more extensive concept, where productivity is seen as any measure that contributes to the efficiency and effectiveness growth, such as the cross-selling raise, the consumer satisfaction improvement or the absenteeism reduction. About productivity measures, Cunha et al. [24] present some indicators such as profits, clients satisfaction, market share, non-defective products, investment return, employee output, real versus planned output, labor cost by unit produced, among others. For the present study, one of the main relevant measures is the employee output, in other words, the product originated by his work.

About employees, we can say that in the present days, they are considered one, if not, the most critical success factor of an organization. They are the only organizational resource that can make the difference, as they are not imitable. Their know-how, their knowledge, is unique, reason why the best and more successful organizations are those who really invest in their human resources. However, manage people in an organization is not easy. On the contrary, manage human resources is seen as one of the most complex functions with which organizations need to deal. This is because organizations want not only efficient collaborators, that make the right things, but also effective, which means they need to do the right things in the right way. Only by this process is possible to obtain a better collaborators performance, compatible with a productivity improvement.

At this point it is important to say that independently of these concerns, it is difficult to obtain a regular good performance. Some factors such as low knowledge, absence of motivation, physical and intellectual limitations, personal and familiar problems, weak leadership, weak levels of organizational communication, bad working environment, among others, contribute, frequently, to the low levels of organizational productivity, requiring a more effective intervention from management in order to obtain the intended productivity levels. Conscious of this reality and based in Armstrong and Baron (2005) research, Goodhew et al. [30] present some overcome measures of this problem of bad performance, namely first of all, it is necessary to identify, agree, and understand the reason of the low-performance existence; identify and decide about the way how to overcome this situation, such as implement training programs conducting to a better performance, and control this performance giving the necessary feedback. Based on these steps,

and according its own objectives and internal organization, organizations have a good support to overcome the bad performance levels of their collaborators. Looking to human resource management politics and practices, we can point here that, in parallel with training programs, having an effective management in what concerns recruitment and selection, performance appraisal and feedback, flexible work schedules, effective compensations, management by objectives, work reorganization, among others, are good intervention programs looking a better individual performance ([24] based on Guzzo et al. 1985). The introduction of new technologies, well combined with the human component in a context of participative organizational changes, is also an interesting intervention program considered by these authors. Without the existence of a unique "receipt," it is necessary that each organization takes into account its own characteristics and main aims, and never forget that in these processes, the participation and collaboration of organizational collaborators is crucial to the success of these programs.

Overcoming this individual (micro) perspective and looking now to the organizational (macro) perspective, Cunha et al. [24] consider that the organization performance can be established through the realization of its objectives (rational approach), the resource acquisition (systems/resources approach), the human resources management (internal processes approach), the stakeholders interests (stakeholders approach), as well as the creation of a consistent and articulated management model (contrasting values approach).

Between these two perspectives (micro and macro), we can find the productivity paradox (first generated by Robert Solow, in 1987, as focused earlier). The introduction of new technologies, namely communication and IT, is a reality that had introduced several changes in almost everybody's way of life. Considering is massive existence, we could expect that the growing organizational automation will conduct to a work productivity increase. However, this is not a linear conclusion. Indeed, and taking into account that the relation between the existence of new technologies and productivity does not mean an increase in this last one, the productivity paradox begins having power, originating the development of multiples researches. Subjacent to this paradox, Brynjolfsson and Yang [18] established to central questions: (1) Why organizations invest highly in IT without the correspondent productivity increase; and (2) If IT contribute to productivity, why is so difficult to measure this contribution? Taking in mind this paradox, and in order to better understand the relation between these two factors, Rei [31] implemented an analysis in which is possible to see a synthesis of some of the studies showing the relation between IT and productivity (Table 8.1).

Looking to this table, we can see that productivity paradox starts to be put in question. Indeed, since 1991, many are the studies that contribute to show that investments in IT contribute, in some way, to increase productivity. At the same time, IT introduction in organizations also helps to obtain more organizational flexibility, increasing the work resources efficiency. Besides, through the development of Internet transactions, such as business to business transactions, organizational efficiency could also increase through network externalities.

Table 8.1 Some results about IT—productivity research

Research	Sample	Results
Loveman 1988	60 business units	IT investments did not increase output
Strassman 1990	*Computerworld* inquiry to 38 companies	None correlation between IT and profits or productivity
Harris and Katz 1991	Insurance industry	Weak positive relation between IT expense ratios and diverse performance ratios
Dewan and Kraemer 1994	12 Asia–Pacific countries, 1984–1990	IT investments positively correlated with PIB and productivity increase
Greenan and Mairesse 1996		There are a positive relation between company organization and the percentage of workers that use computer in the work
Dewan and Kraemer 1998, 2000	36 countries	IT capital positively correlated with work productivity in developed countries, but without significance in countries in development
Melville 2001	31 industries in the USA, 1965–1991	IT return is positive to the USA as an all. Benefits from IT increase with time
Gilchrist et al. 2001	Fortune panel of 1,000 companies in the USA, 1987–1993	Productivity is higher in production companies than in user companies
Bresnahan et al. 2002	Data panel of 331 companies in the USA	IT hardware capital has a meaningful positive impact in productivity
Zwick 2003	9,000–14,000 German branches, 1997–2000	IT investments increase substantially the German branch medium productivity

Adapted from Rei [31], pp. 131–132

8.3 Internet and Productivity

8.3.1 The Internet Use During Work Hours

During the last years, many are the changes that our society is facing, deeply influenced by technological development, which contributes not only to a more efficient tasks development, but also to an instantaneous information change, all over the world.

Computers, and more exactly the Internet, are good examples of this technological development, as they allow people approach, which ones can establish faster and efficient contacts with any world region. The way people work, nowadays, is deeply influenced by computers; however, and according to Mastrangelo et al. [11], computers also lead people to avoid and sabotage the work. These authors refer, in their research, that according to a study implemented by FBI and the Computers Insurance Institute, 91 % of the participants identified an abuse in the privilege of access to the Internet in the work place, including a not suitable use of the email and pornography download. Indeed, the not suitable use of the Internet during the work hours is problematic as it can lead to some productivity

losses. Time that workers spend seeing pornography, speaking with friends and family, play games, buy things by the Internet, among others, can lead to a lost and not productive time [32]. Lim [20] argues that reporting in media corroborates the concerning and expensive tendency of the Internet bad use by workers in the workplace, showing that a study developed by SurfWatch concluded that when workers use the Internet in work hours, it may occur one billion dollars costs.

These results show that although all company benefits given by Internet, these companies also need to lead with its challenges, namely in what concerns the abuse in its use by workers, reason why it is important to understand what we mean by "workplace abuse in the Internet use." Young [33] spoke in the "Internet vice," while Davis [34] used the expression "problematic use of the Internet." These different definitions lead researchers to study the behaviors of diverse individual psychological approaches less expected in the present work environment [35]. For instance, Mahatanankoon [36] considers that one person can use the Internet excessively in order to escape to psychological and emotional problems.

In what concerns the "Internet vice," Brenner (1997 cited by Mahatanankoon [36]) considers that an Internet addicted shows a bigger tolerance to the Internet use, withdrawal difficulties, and an Internet desire when compared with the normal Internet users. Griffiths [37], on the other hand, considers that even if Internet can be a vice, as it make up for other problems in the person life, this vice symptom only occur in a small number of people. Stanton [38] highlights that workers profile that use Internet frequently is not the same to the Internet addicted, as they could be happier and more productive. Definitions as cyberloafing [21] or personal use of the Web [39] give a better idea of the not productive standards that occur in the workplace due to the Internet [36]. Cyberloafing exists when a worker, in a volunteer way, uses his organization Internet access during work hours for personal reasons, including receive and send emails not related with the job [21]. About the personnel use of the Web, it is also the worker volunteer use of the organization Web, during work hours, in order to "surf" in Web sites not related with the work by reasons not related with the work too [39]. Mahatanankoon [36], however, has the opinion that there are some activities not related with the work that are not characterized as cyberloafing or personnel use of the Web, but only, as not productive, illegal, or highly devious.

In what concerns devious behaviors, Mastrangelo et al. [11] consider that when workers are paid in order to be productive, but they are not having a productive behavior, they digress from the work rules. These rules can also be violated when workers, without authorization, use the employer resources, materials, or installations, for reasons not related with the job, finishing in an organizational inefficiency. For these authors, although the existence of workers devious behaviors models, they do not consider the unique aspects of computers bad use, because with personnel computers, workers can have these behaviors directly from their desk, being unnoticed by friends near them. In order to create specific hypothesis to the organizational digress through work computers, Mastrangelo et al. [11] create the ABCD model, which analyzes the **A**ccess to computers/Internet, the **B**reaks from work, the organizational **C**limate, and individual **D**ifferences.

8.3.2 The Internet Use During Work Hours: The Positive Side

Although the Internet excessively use can lead to a productivity decrease, if limited, it can improve the worker capabilities to do his job [14, 15, 22, 23, 40].

To Litan and Rivlin [22], Internet has the potential to increase productivity in different, but with mutually reinforcement, ways, namely (1) decreasing, in a significant dimension, the cost of different transactions needed to produce and distribute goods and services; (2) increasing management efficiency, as it allows a more effective resource management as well as an easier communication within the organization and with clients and partners; (3) increasing competition, making prices more transparent and increasing markets to buyers and sellers, leading to a costs reduction.

Anandarajan et al. [40] refer that Internet allows the workers and organizations to have more flexibility, as work is not tie to time, place, and information availability limitations. Team members do not need to be all together in the same place; apprenticeship can occur in organization; and Internet can be a phone list, a consultation book, a register book, and an encyclopedia.

Cox [23] considers that Internet offers a lot of resources that can help workers to carry out their job responsibilities, including research functions, local networks, and other tools. Many organizations have adopted social networks, encouraging, actively, their workers to use Internet in such matters related with their work, namely marketing, recruitment, communication with clients and information share between workers and industry contacts.

More recently, Coker [14, 15] concludes that workers who use Internet, as leisure, in the work place, in the maximum of 20 % of the time they spend in the organization, are 9 % more productive when compared to those that do not use it. Based on Zijlstra, Roe, Leonora and Kredite (1999), Coker ([15], p. 114) considers that "Having a break during work hours enables office workers to restore attentional resources." By this reason, he introduced the new concept of WILB when he says ([15], p. 114) that "In recent times, the Internet has made possible an additional type of break for office workers, Workplace Internet Leisure Browsing (WILB)," which he define as "the act of using the company Internet for personal reasons during work hours, which might include watching YouTube movies, engaging in social media sites such as Facebook, or doing any other activity that might be construed as personal Internet use outside of organizationally set tasks." We have here the idea that the existence of short breaks during the workday will have a positive impact on the worker productivity, much better than less and longer breaks. It lead us to consider that a "Moderate amount of WILB may be construed as an enjoyable volitional activity, much like visiting a café for a coffee with friends after work or talking a walk, although less effortful, requiring just a few clicks of the mouse" ([14], p. 241). Introducing a more participative and

autonomous work environment contributes to conclude "that freedom to surf at work fosters a sense of autonomy, which research suggest may have a positive effect on workplace loyalty and willingness to perform" ([14], p. 241).

8.3.3 Reasons to the Internet Personal Use in Workplace

The Internet use in the workplace is not limited to professional role. Garrett and Danziger [13] refer that many researchers see the Internet personal use in workplace as a worker expression of unhappiness. To the authors, this unhappiness can be effective in explaining more disapproval ways of computer abuse, such as data destruction or peer worker harassment, but put in question its power in explaining the Internet not productive use, like sending personal emails during the work hours. They also add that research about the motivation to the Internet personal use in workplace usually deals with this activity as a devious behavior used in order to reduce the negative affect related to the work. Cyberloafing (defined above and also known as cyberslacking) [20], the organization data robbery or destruction, and the colleagues harassment by email [13, 36], are possible answers to these negative affect.

Research focuses its attention in the Internet use as an abuse in the work place [5, 21, 32]. However, Garrett and Danziger [13], although agree that the more extreme way of a devious computers use identified in the literature could be an aggressive answer to work provocations, put in question that this could be the main motivation to the greatest personal use of the Internet during the work hours. On contrary, they suggest that many people, who use the Internet to personnel reasons, are not take revenge to their employers, not even damage, intentionally, their organization. Instead of this, they suggest that many workers are answering to the capabilities offered by technology potential.

As the Internet use became a routine task in the everyday life, it could exists the tendency to its use whenever individuals think that it is useful whether in their work development or to matters not related with the job, during work hours [35].

Commitment with the organization is another factor that can have a relevant impact in the Internet personal use in the workplace [13]. To an individual, with a high level of commitment, tasks not related with the job reduce productivity, are incompatible with auto-image and can prejudice the workplace status. In other words, it will be less probable that more job-committed workers use the Internet for personal reasons.

In sum, looking to the factors that can lead to the Internet personal use in the workplace, we conclude that the unhappiness with the work, the stress, and the perceived work injustice [13], the expected Internet work usefulness [13, 41], and the computers routine use [13, 35, 41, 42] are positively correlated with the Internet personnel use; while commitment with the organization and the organization restrictions in computers use are negatively correlated [13]. In what

concerns this last item, the authors defend that restrictions established by employers, about the Internet use during work hours, promote the worker self-regulation, leading to an Internet use reduction.

8.3.4 The Internet Personal Use Control in the Workplace

In the present days, where the Internet use by organizations and its domain by workers are an added value, to know-how to use it without abuse appears as a delicate task. "Research suggests that blocking or controlling Internet access in the workplace is viewed by many employees as a restraint impinging on their sense of control. Specifically, several studies have reported that although participants were aware that WILBing was wrong, they did not agree that it was devious behavior" ([14], p. 239). Following with this author point of view, we can reinforce that ([14], p. 239)

> The incongruence between employers' and employees' views on the acceptance of WILB creates a conflict of interest in the workplace. While workers believe they should be allowed to WILB, management believes they should not be allowed. Efforts by employers to control employees' misuse of the Internet in these conditions result in resentment and feelings of being over-controlled.

Taking into account these different perspectives, the organizations reaction to the personnel computers use is not the same to all of them. Indeed, changing from organization to organization, while some recognize and tolerate this use, others, fearing the impact that it could have in workers' productivity [1], have been developing computers use policies with different restriction degrees [11]. Organizations have been looking to reduce the Internet abuse occurrence developing some policies, since Internet use policies to controlling and filter tools as preventive policies [36]. Instead of forbidden the Internet use, many organizations established that the more efficient strategy consists in finding a way of how to control and regulate the online activities developed by workers [23].

According to Young and Case [8], considering that the Internet use abuse has been identified as a deep problem, possible to seriously affect the organizations productivity, organizations have developed some strategies in order to face this problem. First of all, employers begin using policies about the Internet use which give some directives about the conduct that is, or not, allowed in what concerns the Internet. Besides giving some directions about the right behavior, these policies also describe how to deal with rape. Secondly, organizations have been using electronic control software in order to dissuade potential abuses and guarantee the existent policies. Finally, it is important to promote the management development as well as training programs able to train supervisors in what concerns the workers Internet abuse helping the earlier prevention and detection.

The performance control allows managers to continuously and directly follow their workers tasks, which can have a significant impact in productivity [43].

However, the control of the Internet use can put important queries in what concerns the workers privacy [1]. In Young [44] view, managers ought to establish how to effectively control the workers Internet use, maintaining their productivity and moral. According to Wen and Lin [1], to exist a correct Internet use, organizations more than restrict to the Internet control and blockage need to establish policies to the Internet use as well as directives to a successful Internet access.

Kimberly Young [45] presents an Internet management model where the **policies of the Internet use** appear as the main item that managers need to take into account, followed by **training** saw as the way of how to communicate these policies to the workers, specially the last which arrive the organization. Once the policies are effectively communicated, employers ought to control the workers Internet use, in order to **apply** the policies of the Internet use. Finally, instead of dismiss, organizations can opt for the workers **rehabilitation**. In sum, to Young [45], the development of Internet use policies, workers training, the Internet use control, and to rehabilitate abuse incidents are the ways that organizations have in order to protect from problems introduced by the abuse in the Internet use.

8.3.5 Internet and the Workplace Changes

The use of the Internet has changed the way how we live and work. It has changed the work content and context, at the same time that the frontier between personal and professional life get nearer.

Individuals and organizations were deeply influenced by the highly use of the Internet. From the individual side, the ability to be continuously "on" tends to join personnel with professional life. To balance work and private life becomes complicated as work seems never has an end [40]. In what concerns organizations, they need to face some challenges, namely related with productivity decline, virus spread, and security [2].

The Internet introduction in the workplace has changed deeply the way how people work. Once upon a time, workers realized their job and left the hanging work on the secretary, beginning with their personal life. Nowadays, it does not exist a clear barrier between these two realities, as workers transport their work to home at the same time they transport personal matters to their job. Rewards are many, namely flexibility at work, autonomy, higher work ability, ability to work in a global environment, as well as access to great information amount. However, the challenges placed by the superimposition of personal and professional lives are also very numerous, by example, stress, work excess, organizational loss of control, and information and noise proliferation [40]. According to these authors, Internet has, also, changed work environment, business environment, and competing environment in a cycle of interdependent relations. The Internet became a catalyst to new business models, strategies, and organizational structures. It has introduced new factors that have affected the competitive scenario, new rivalries, new competitors, and new types of pressure [9].

Business changes, cause by the Internet use, demand changes in the psychological contract [40]. In the psychological contract established in the pre-Internet period, the employer was the person who take care and the supplier. The worker carried out his job, previously defined, being rewarded by his performance. It exists a job security and certainty. Psychological contract had a transactional component focused, mainly, in tangible rewards; and a relational component involving socioemotional elements, such as trust, equity, and commitment [40]. However, due to the observed changes, where the Internet use is a relevant item to take into account, it has been developed a new psychological contract, based in short-term jobs, worker responsibility in his career development, commitment in the job instead of the employer, and the hierarchy importance reduction [40]. Finally, and according to these authors, changes observed in the workplace can be divided into types: worrying and promising. Looking to the first one, it is related with the devious use or the addicted behavior in what concerns the Internet use. The promising changes are related with the knowledge management, apprenticeship, virtual teams, and career support.

8.4 Methodological Questions

8.4.1 Data Collection and Sample

Facing a quantitative study, our data were obtained through the inquiry by questionnaire. This inquiry by questionnaire resulted from the literature review and the Endicott Work Productivity Scale (kindly available by Jean Endicott, who gave permission to use it). The questionnaire was divided into four sections: in the first one, personal information, such as age, gender, schooling level, activity sector, and some job characteristics, are presented; the second section looks to measure workers' productivity; the third section is focused in the Internet use by workers; and finally, in fourth section, questions look to identify the existence of some type of control in the use of the Internet in the workplace.

The inquiry by questionnaire focused the Portuguese active population. Within this, and using a convenient sample, we have obtained a sample of 158 valid questionnaires.

8.4.2 Personal Information

The sample is formed, basically, by women (59.5 %) and by young people with age under 35 years old (65.9 %), with, at least, the frequency of a university course (62.6 %), working in companies and institutions from public sector (75.3 %). In its great majority, they work with other people (94.3 %), on account of someone else (88.6 %) and has a chief or a hierarchical superior. It is also

important to say that 69.6 % has supervision functions and 42.4 % contact with clients or sellers. Only 11.4 % are workers on one's own account.

In the sample, we only register gender differences in what concerns the schooling level, where are registered a superior number of women with schooling at the university degree level (50.0 %) and a lower number with basic-level schooling (15.6 %), as well as in others supervision in the workplace, where women make the difference in this job characteristic (79.8 % against 54.7 % of men) (Table 8.2).

Table 8.2 Personal information by gender (%)

Personal information	Female ($n = 94$)	Male ($n = 64$)	Total ($n = 158$)
Gender	59.5	40.5	
Age			
18–25	14.9	14.1	14.6
26–35	55.3	45.3	51.3
36–45	19.1	20.3	19.6
46–55	9.6	12.5	10.8
56 and more	1.1	7.8	3.8
Schooling			
9° or less	4.3	15.6	8.9
10°–12°	29.8	26.6	28.5
Frequence of a university course	10.6	18.8	13.9
University degree	50.0	28.1	41.1
Master/PhD	5.3	10.9	7.6
Activity sector			
Public	27.7	20.3	24.7
Private	72.3	79.7	75.3
Job characteristics			
I have colleagues with who I need to work	93.6	95.3	94.3
I work on account of someone else	91.5	84.4	88.6
I have a chief/supervisor	89.4	85.9	88.0
I supervise other colleagues	79.8	54.7	69.6
I contact with clients/sellers	46.8	35.9	42.4
I work on one's own account	8.5	15.6	11.4

8.5 Some Results

8.5.1 The Internet Use in the Workplace

The Internet use in the workplace is, in its large majority, daily (87.3 %), although 56.3 % accept to access it many times during the day. However, there are only 7 % those that do not use the Internet in the labor environment, while 5.7 % use it with less frequency (weekly or monthly).

Table 8.3 The use of the Internet in the workplace by frequency (%)

The use of the Internet in the workplace	Many times during the day ($n = 89$)	Daily ($n = 49$)	Less than once in the day ($n = 9$)	Total ($n = 147$)
How frequent do you use the Internet?				
(Never: $n = 11$; 7.0 %)	56.3	31.0	5.7	
What is the duration, in average, of each session?				
Until 1 h	68.5	71.4	100.0	71.4
Between 1 and 3 h	15.7	14.3	–	14.3
More than 3 h	15.7	14.3	–	14.3
What is the percentage for leisure?				
Until 5 %	58.4	69.4	77.8	63.3
Between 5 and 20 %	28.1	16.3	–	22.4
More than 20 %	13.5	14.3	22.2	14.3

In average, the duration of each daily session does not surpass 1 h (71.4 %), being the time spending online, in its majority, to activities related with the developed work. Distinguishing the time spend online between work and leisure, we can observe that 63.3 % do not use more than 5 % of the time to leisure, while only 14.3 % declare more than 20 % of the time to leisure (Table 8.3).

In order to assess about the applications which are used more frequently in the Internet and the main reasons to use them, we asked, in our inquiry that among a group of seven applications and twelve reasons workers identify, in each case, and by order of importance, the five more used.

Once analyzed the results, we verify that the most used applications in the workplace are, basically, and considering only the two most used applications, the e-mail access (93.9 %) and browsers use (88.5 %), although e-mail access is the main used application for 75 % of the cases. In a second level, also appear as applications used in the workplace social networks (48.0 %), chats (41.2 %), forums and blogs (both with 40.5 %), although chosen mainly in third, fourth, and fifth place. After e-mail and browsers, appear in third place the chats, although in the set of these three positions social networks are more mentioned. Finally, the use of games is residual as it is pointed out, at the best of possibilities, in the fifth position only by 5.4 % of the cases (Fig. 8.1).

Of course the two applications most used in the workplace—e-mails and browsers—are directly associated with the two main reasons to the Internet use—change e-mails and make search. Looking again, and only, to the two main reasons, change e-mails and make search are pointed out by 81.1 and 78.4 %, respectively, although with a light superiority to the e-mails change as the first option (45.3 % against 38.5 %). In a second level, gain a distinction as reasons to the Internet use to read newspapers online (59.5 %), contact with friends (46.6 %), and to pay personal bills (41.9 %), although selected mainly in third, fourth, and fifth place. To see social Web sites of friends and shopping take up sixth and

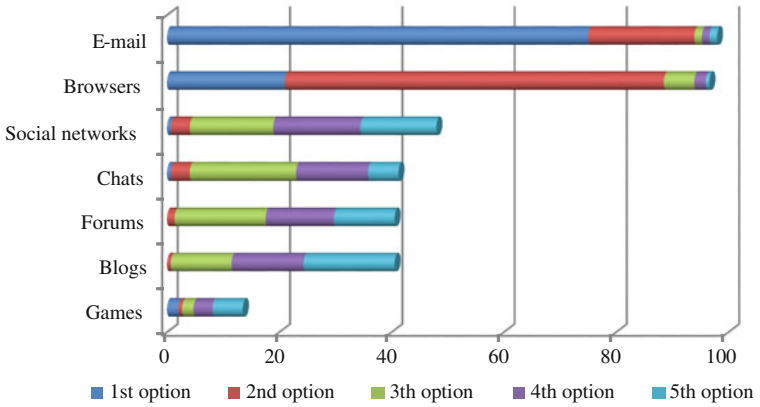

Fig. 8.1 Applications more used in the Internet (%)

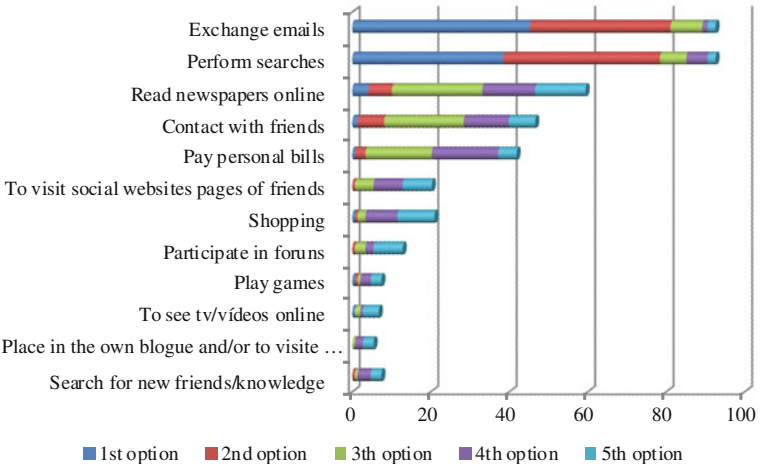

Fig. 8.2 Main reasons to the Internet use (%)

seventh place with around 20 % of the answers pointed out these reasons. Finally, appear the remaining reasons with percentages quite residual and referred, mainly, as fifth option (Fig. 8.2).

8.5.2 Monitorization of the Internet Use

Controlling the Internet use in workplace is a practice in 64.3 % of the companies. Although companies use in majority specific software to control (62.1 %), even so we can see 32.6 % of the companies where control depends on the definition of internal policies (Table 8.4).

Table 8.4 Monitorization of Internet by frequency (%)

Internet use in workplace	Many times during the day	Daily	Less than once in the day	Total
Your company controls the Internet use?	($n = 89$)	($n = 49$)	($n = 9$)	($n = 147$)
Yes	65.2	65.3	55.6	64.6
No	34.8	34.7	44.4	35.4
In what way?	($n = 58$)	($n = 32$)	($n = 5$)	($n = 95$)
Specific software	65.5	56.3	60.0	62.1
Internal policies	31.0	34.4	40.0	32.6
Another	3.4	9.4	–	3.4

8.5.3 Productivity Assessment

Work productivity was measured on the Endicott Work Productivity Scale (EWPS), a 25-item scale which was designed to assess attitudes and behaviors that affect work performance and efficiency. Each item was rated on a 5-point scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = almost always). The instrument evaluates worker performance in attendance, work quality, performance capacity, and social/mental, physical, and emotional personal factors. Summed scores range between 25 (best possible score; high work productivity) to 125 (worst possible score; low work productivity).

Among the inquiries productivity scores change between a minimum of 25 (best possible score; high work productivity) and a maximum of 94, registering a mean value of 44.1 (standard deviation = 11.2) and significant degree of skewness and kurtosis, due to the existence of three outliers. Eliminated these outliers, productivity scores change between a minimum of 25 and a maximum of 68, with a mean value of 43.3 (standard deviation = 9.6) and without skewness neither kurtosis (Table 8.5).

Table 8.5 Measures of work productivity

Measures	Statistic ($n = 158$)	Statistic[a] ($n = 155$)
Mean	44.1	43.3
Standard deviation	11.2	9.6
Minimum	25.0	25.0
Maximum	94.0	68.0
Percentile 25	36.0	36.0
Percentile 75	50.0	50.0
Skewness (statistic/std. error)	6.1	1.5
Kurtosis (statistic/std. error)	8.4	−1.2

[a] without outliers

8.5.4 Assess the Existence of Differences Between Personal Characteristics and Productivity

Table 8.6 shows the results obtained from the comparison of the productivity levels as a result of gender, age, qualifications, and the activity sector. Mean comparison test (Student's t test) proves that neither of the differences are significant (Sig. > 0.05).

Table 8.6 Independent samples *t* test between productivity and personal information

Statistics of productivity	*N*	Mean	Standard deviation	*T* test	
				t	Sig.
Gender					
Female	91	43.4	9.9	0.132	0.895
Male	64	43.2	9.1		
Age					
Until 35 years	104	43.2	9.5	−0.058	0.954
More than 35 years	51	43.3	9.8		
Qualifications					
Until 12° years	58	42.5	9.6	−0.803	0.423
More than 12° Years	97	43.8	9.5		
Activity sector					
Public	38	42.9	10.2	−0.302	0.763
Private	117	43.4	9.4		

8.5.5 Assess the Existence of a Relation Between the Internet Use and the Existence of Controlling Policies

Table 8.7 shows the results from the analysis of the association among the frequency of use, the mean duration of each session and the percentage of time used to leisure and the use of control in the Internet use by companies. The independence test of chi square proves that only in what concerns the mean duration of each session the test result is significant (Sig. $= 0.005$). In companies where Internet control exists, we find a superior percentage of mean uses inferior to one hour (76.8 % against 61.5 % when it does not exist control). On the other hand, when it does not exist control, we find a high percentage of cases where the mean duration is between 1 and 3 h (26.8 % against 7.4 % when control exists).

Table 8.7 Association test between control and the Internet use

Your company controls the Internet use?	Yes ($n = 95$)	No ($n = 52$)	Chi square Test	
			Value	Sig.
How frequent do you use the Internet?				
Many times during the day	61.1	59.6	0.35	0.841
Daily	33.7	32.7		
Less than once in the day	5.3	7.7		
What is the duration (mean) of each session?				
Until 1 h	76.8	61.5	10.5	0.005
Between 1 and 3 h	7.4	26.9		
More than 3 h	15.8	11.5		
What is the percentage to leisure?				
Until 5 %	67.4	55.8	2.32	0.313
Between 5 and 20 %	21.1	25.0		
More than 20 %	11.6	19.2		

8.6 Assess the Existence of Differences Between the Internet Use and Productivity

Table 8.8 shows the results obtained from the comparison of the productivity levels as a result of the frequency of use, the mean duration of each session and the percentage of time used to leisure. Mean comparison test one-way ANOVA proves that only in what concerns the percentage of time used to leisure, the result of the test is significant (Sig. = 0.005). Workers whose time spend in the Internet is due to work activities, in other words, whose percentage of time used to leisure does not surpass 5 %, are those with lower scores corresponding to higher productivity levels.

Table 8.8 One-way ANOVA between productivity and the Internet use

Statistics of productivity	*N*	Mean	Standard deviation	One-way ANOVA	
				F	Sig.
How many times do you use the Internet?					
Many times during the day	89	44.1	9.8	0.523	0.667
Daily	46	42.0	10.0		
Less than once a day	9	43.2	7.2		
Never	11	42.2	7.3		
What is the duration (mean) of each session?					
Until 1 h	105	43.2	9.8	0.117	0.890
Between 1 and 3 h	20	43.5	9.0		
More than 3 h	19	43.4	9.7		
What is the percentage to leisure?					
Until 5 %	91	41.4	9.1	5.40	0.005
Between 5 and 20 %	33	47.2	10.4		
More than 20 %	20	45.9	9.4		

8.7 Some Final Remarks

Data analysis allows us to conclude that the use of the Internet, for personal reasons, during work hours, does not have a direct impact in workers' productivity. Indeed, there are workers who have never used the Internet and are less productive than others who use it in a considerable percentage of their working time. The justification that seems to be more consistent is that we believe that workers only use the Internet by leisure when they really can do this, as they know these actions are not going to interfere in their work performance. When they have finished their work and/or the work is in well progress, they use the different applications that Internet make available to their personal interests.

Nowadays, in the present work market, it does not exist clear borders between personal and professional field. So, in the same way that it is very frequent to finish some work tasks at home, workers also begin to deal with some personal matters, through the Internet, when they are in their workplace, without presenting a reduction in their productivity levels.

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