Editorial: human issues in implementing information and communication technologies: perspectives from different countries

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Abstract: One of the most dramatic features of the last twenty years is the unprecedented scope and speed of technological innovations and breakthroughs with the increasing human and financial resources dedicated to technology. Amongst the above changes, information and communication technologies (ICTs) have pervaded most aspects of our life. Rapid advances in ICTs have induced a continuous increase in their use in organisations over the last two decades or so. The nature of the relationship between ICTs and human resources has become a significant area of research. It goes without saying that this is not an easy managerial challenge. Companies fail through under using technology, or through deriving inadequate benefits from it. This special issue of the *International Journal of Human Resources Development and Management* contains seven papers dealing with the human aspects of implementing ICTs. All of these were presented at the second international conference on 'Technology and Human Resources' that took place in May 2003 at CERAM Sophia Antipolis (France). In this introduction to the special issue, the study of the relationship between technology and human resources is positioned along two distinct dimensions: the dichotomy between technology conceptualised as an end vs. a tool, and the dichotomy between the determinist vs. voluntarist approaches to technology. This editorial suggests some illustrations of human issues in implementing ICTs and offers an overview of the papers.

Keywords: information systems deployment; intranet implementation; computer-based human resource management; telework; human-computer interface; human resource professionals; technology alignment.

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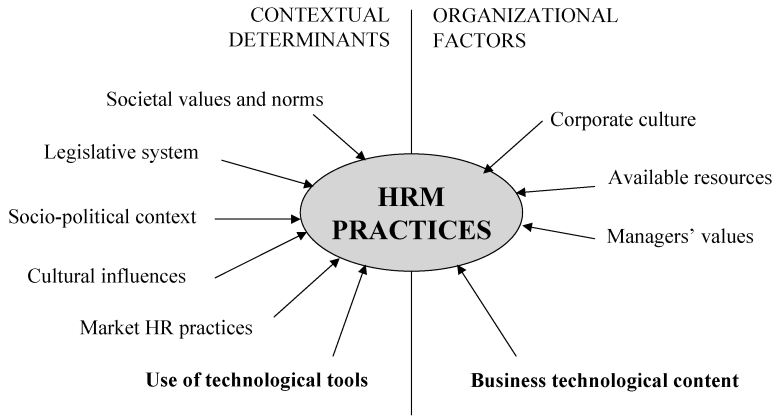
Biographical notes: Professor Dominique R. Jolly is a Faculty member of CERAM Sophia Antipolis (France). He teaches 'Strategic Management' and 'Technological Management' in undergraduate, postgraduate and post-experience programs. He has taught as Visiting Professor in several countries including: the UK, Switzerland, Denmark, China, Mexico, Indonesia, Turkey, Yugoslavia, Moldova and Senegal. He spent 1993–1994 as a Visiting Professor at the *École des H.É.C.* in Montréal (Québec). His research focuses on technological management. His papers were published in different academic journals: *The International Journal of Technology Management*, *Technovation*, *Innovation: Management, Policy & Practice*, *The European Management Journal*, *The Asia Pacific Business Review*, *Management Decision*,

The Harvard Deusto Business Review, and *European Business Forum*. He also acts as Reviewer for many of these journals. He is a member of the executive council of the International Association for the Management of Technology (Iamot).

1 The relationship between technology and human resources

There are many influences on human resource management (HRM) practice. Some are described in Figure 1. These influences can be split into two groups: contextual determinants and organisational factors. The company has very limited control on the first group because of its contextual nature; but factors arranged in the second group result mostly from the company's stream of decisions and history. The influence of technology appears in each group (at the bottom of the figure): this may result from the technological content of the business itself or from the use of technological tools. This distinction will be referred to later as technology as an end or as a tool (Chanaron and Jolly, 1999; Chanaron et al., 2002). This gives the first dichotomy examined in this section. A second question to be examined relates to whether a determinist or voluntarist approach should be adopted (Markus and Robey, 1988; Orlikowski, 1992).

Figure 1 Influential factors on HRM practices



1.1 Technology as an end or as a tool

A first dichotomy stems from two different perspectives. Technology can be conceptualised as an end when it is a core activity, i.e. when the company produces technology. On the other hand, technology can be conceptualised as a tool when it is deployed as a resource for improving a given business process by a technology user.

1.1.1 Technology conceptualised as an end: the producer's view

This situation is the one encountered by high-tech companies or more broadly technology-based organisations. They are well known for managing innovation, generating change, relying on knowledge workers, dealing with fast pace and uncertainty

and running flexible organisational structures. In these environments, competitors come under strong pressure: knowledge flows from one place to another, demands change quickly, and labour markets might be very tense (Shanklin and Ryans, 1987). These companies, by definition, spend a high proportion of their expenditures on Research and Development (R&D). A high-tech company is very frequently defined as a company dedicating more than 4% of its turn-over to R&D (Dankbaar, 1993). These companies usually belong to such business sectors as: pharmaceutical, bio-industries, electronics, semiconductor, computers, software, telecommunications equipment, nuclear industry, new materials, aeronautics, aerospace, etc. In these cases, technology is considered as an end because it is very frequently a source of competitive advantage; this is why such companies devote so much money to the creation and acquisition of technology.

The most common hypothesis regarding HRM in these companies is that it exhibits particular features. It is usually stated that HRM in high-tech firms is more internationally-based and more involved in human resources competency development; however, it is also recognised as less collective and unionist, and preferring to use process rather than results for evaluating human resources (Jolly and Roche, 2000). This is obviously due to the highly qualified and knowledgeable workforce that these companies employ (Mohrman and Von Glinow, 1990). Dealing with a large number of scientists, engineers and technicians calls for very specific HRM policies. Tremblay et al. (2002) show that engineers' career paths have specific determinants. Ramirez (2004) shows that recruitment, selection, training and compensation policies in high-tech companies are different from those implemented in low-tech companies; for example, recruitment tends to be on a much more global scale in high-tech companies.

1.1.2 Technology conceptualised as a tool: the user view

This second perspective is not confined to high-tech companies. Technology might be used as a tool whatever the technological intensity of the business – low, medium or high. Technology is considered as a tool when the objective is to improve the performance of a given business process thanks to investment in a given technology. Users of technology might be involved in very different business processes: procurement management, production management, assets management, marketing management, etc. Contrary to what was previously mentioned regarding the case of 'technology as an end', the type of technology I am now talking about is rarely developed inside the company. Most of the time, such technology is bought from an external supplier and implemented inside the purchasing company.

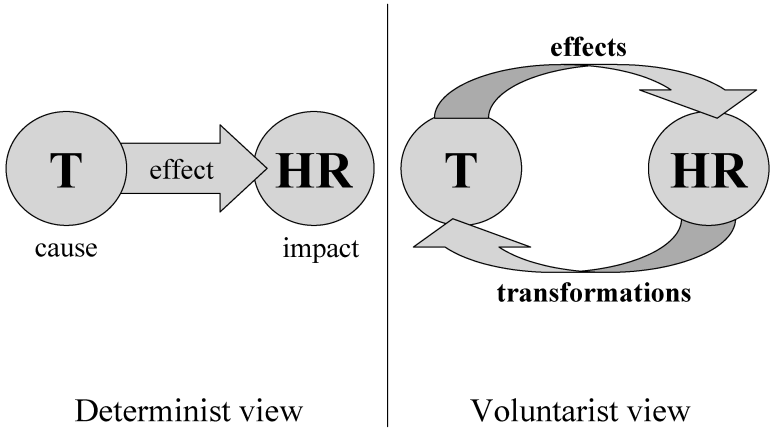
An example of this in the HRM function is the case of e-recruitment vs. the traditional recruitment and selection system; the use of the World Wide Web for recruiting new human resources online allows targeting on a larger geographical scale and reducing operating costs as well as delays (Bingham et al., 2002). The use of ICTs in HRM is precisely the topic covered by this special issue. ICTs will be considered as a tool for improving the performance of HRM processes: recruitment, interpersonal communication, coordination & control of individuals, knowledge sharing, compensation, etc. The *raison d'être* of such investments is to leverage the HRM function in the company. A variety of objectives will be taken into account and detailed later in this text. The introduction of ICTs raises very specific questions since most of the time, it means that users must adopt and deploy tools that were not designed by themselves but by people outside their own organisation – think about a given software,

for example (Haines and Petit, 1997). The software developers might be very far, or even unaware of the particularities of the organisations where their tools will be used. This is why some researchers may treat technology as a '*boîte noire*'. If tools are not well suited to organisation needs, they will be probably difficult to implement.

1.2 Determinist or voluntarist approaches to technology

The second question regarding the relationship between technology and human resources relates to the type of hypothesis made about the nature of the relationship between these two elements. Two approaches, described in Figure 2, will be briefly explained below. Simply stated, determinist approaches consider technology as an external force which affects people; consequently, these approaches focus on the impacts of technology on human resources. On the other hand, voluntarist approaches consider that attention should also be given to people's capacity to shape and redefine technologies. Let us see this in further detail.

Figure 2 Determinist vs. Voluntarist views of technology



1.2.1 Determinist approach

An underlying assumption of this approach is that science and technology dominate society. It is assumed that technology shapes operational procedures, methods, structures, etc. It is stated that the introduction of technology into a business process follows a development path and generates unidirectional impacts on the technical side as well as on the social side. Some of the consequences might be intended (e.g. enhancing information sharing), but others are not (e.g. increasing the digital divide between industrialised and underdeveloped countries). Some impacts might be positive; whereas others might be negative.

Human resources are one of the targets of technology impacts. The introduction of a new technology frequently affects the way work is performed: for example, the development of e-business has led sales people to act differently. New technologies might also have tremendous impacts on job qualifications and competencies when a technological breakthrough exhibits a high level of transilience – such as the one which traditional chemical-based camera manufacturers are facing with the advent of digital

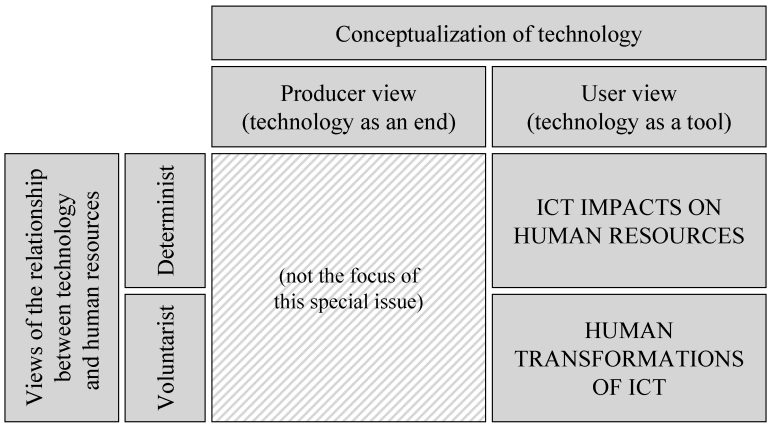
imaging. More specifically, ICTs have impacts on job design, recruitment and selection, performance appraisal, personal career development, etc. But, ICTs might have also some effects on the individual, such as, producing techno-ambiguity, creating techno-stress, generating de-skilling, etc.

1.2.2 Voluntarist approach

Technology is created by human action. This is quite obvious for companies producing technologies (the high-tech ones I talked about previously). But what is the situation of companies that are simply using technologies? Because they are historically and culturally grounded, organisations develop structures, conventions, habits, routines and practices that are more or less institutionalised. These organisational features exert strong influences on technology when it is implemented (Barley, 1986). This means that people, through their social actions, are at least moderating the impact of technology. To a larger extent, they might also be able to shape and adapt technologies: users can redesign technologies. Internal actors have the power to redefine their organisations and the tools they use (Crozier and Friedberg, 1977). They might also subvert technology and employ it for a different purpose than was originally intended.

In a nutshell, this approach suggests a coevolution of technology and human resources rather than considering technology as having simply a one way impact. As a wrap-up of this section, Figure 3 uses the two dimensions previously described to position the research area targeted by this special issue.

Figure 3 Issues targeted by this special issue



2 Some illustrations of human issues raised

There are numerous HRM challenges in implementing ICTs. But, the generic management challenge is to improve individual and collective (group and organisational) efficiency and effectiveness. This concerns for example:

- making administrative processes of human resources easier, faster and cheaper
- dealing with increasing task complexity and organisational changes
- reducing employee anxiety and resistance
- creating conditions for acceptance of technological change
- improving information transfers and enhancing effective communication between individuals
- inventing new modes of control and coordination between human resources in action
- designing new criteria for job evaluation.

There are different steps to be taken in the implementation process of ICTs. At each of these some tasks have to be accomplished and actions undertaken to support ICTs deployment. Before implementation, attention is focused on ICTs planning and work design needing revision. During deployment, tasks include such things as: selecting internal people for the new technology; hiring new competencies; definition of training programs for existing human resources; establishment of organisational support; defining new modes of control, etc. Finally, after deployment, it's essentially a question of control; three levels should be distinguished: individual and group effectiveness, job satisfaction, and increase in competitive advantage.

3 Overview of the papers of this special issue

An interesting feature of this special issue is that it bundles a series of research papers coming from a large number of countries: Australia, France, Italy, the Netherlands the United Kingdom, and the USA. All papers combine rigorous theoretical foundations and empirical data collection. Methodologies are very diverse, but consistent. Because the issues raised are still new areas for research, all these contributions rely on qualitative and ethnographic approaches: interviews of managers (un-structured and semi-structured); participant and non participant direct observation; content analysis (of documents emitted by the company, of e-mails, agenda, etc.). Studies were conducted in both private and public business sectors. Such a mixture of countries, methodologies and research designs offers rich and complementary perspectives on the issues raised.

Three main topics are more or less covered by all papers: human factors in implementing information systems; using ICTs tools designed by others; human-computer relationship. Renae A. Jones and Kerry A. Brown, Julie Tixier, and Teresa Waring give three examples of the implementation of computer based information systems; these systems are designed for dealing with human resources administrative processes such as compensation, competencies management or reporting. Giuseppina Pellegrino offers the example of the implementation of an intranet, i.e. the use of the internet for internal communication purposes within an organisation. Adriaanse et al. analyze other web devices for communication. Claire Dambrin examines the impact of teleworking equipment, i.e. the use of ICTs for remote working. And, Rosemarie Reynolds deals more broadly with computerised systems.

Arjen Adriaanse, Hans Voordijk and Geert Dewulf refer to the critical social theory of Habermas, which distinguishes four categories of social actions – teleological (e.g. strategic), normatively regulated, dramaturgical and communicative – for analysing

the use of ICTs in the construction industry. The research relies on former qualitative research into inter-organisational communication in construction projects. It shows that not only communicative action, but also normatively regulated action can be enhanced by present ICTs applications. The authors suggest that to enable effective and efficient communication between the different organisations participating in a given project, information and communication technologies need to be aligned with the pre-existing communication structure.

Claire Dambrin analyses how the implementation of telework impacts on the manager-employee relationship. Thanks to the internet boom, remote working has developed considerably since the late 90's. But, it raises issues regarding, for example, coordination and control. A qualitative case-study research design combining interviews, direct observation and content analysis (of e-mails and e-agendas) was applied to a population of sales people in a French subsidiary of an American company. Results are the following. Coordination between managers and teleworkers appeared to be more difficult because of less formal communication, possible bias in interpretation and difficulties in organising team work. On the other hand, telework forces teleworkers to develop responsibility, initiative and autonomy (in problem solving, for example). And when it comes to evaluation, telework puts the emphasis on results. Finally, these results claim a redefinition of the manager's role – control, for example, needs to be exercised differently.

Renae A. Jones and Kerry A. Brown deal with the role that Human Resources professionals can play in information systems implementation. They plead for an active and supportive role rather than a reactive or passive approach, i.e. a 'fire-fighting' role. For human resources professionals, this means being involved right at the start: from the initial analysis through to the final implementation of the information systems. This also means sharing comparable boardroom status with disciplines such as finance or marketing. Their research analyzes how HRM professionals perceive the success implementation of information systems. This research was carried out in a large Australian state public sector agency that was implementing of an end-user information system. Interviews conducted with HRM professionals showed success to be indicated by: effective use of the system by users, user satisfaction, (perceived) positive impact on individual as well as on the organisation, fulfilment of change management objectives and enquiries received from users.

Giuseppina Pellegrino conducted an ethnographic case study on the uses of an intranet in an Italian company. This work combines participant observation along with semi and unstructured interviews as well as company documentation analysis. The author stresses that the implementation of an intranet does not necessarily improve internal communication processes and enhance knowledge sharing: this set of technologies might be an enabler as well as a constraint. A 'community of practices' approach was adopted. It suggests that the way people are used to communicating and sharing knowledge creates a repertoire of practices and routines that affect the interpretation of what an intranet is. This pleads for a constructivist and non-determinist analysis of technology; human resources, i.e. individual actors as well as workgroups, exert action on technology. Finally, four interpretations of intranet were inferred: a tool to affirm organisational identity; a way to experiment some technologies; a promotional tool; a way to share information.

Rosemarie Reynolds examines both the human-computer interface and the interface between computer technology and the human side of organisations. A review of trends on

human-computer interface research puts forward topics such as: input-output devices, intelligent agents, extended reality, nomadic computing, etc. Relying again on an extensive literature review, the author suggests that the nature of this interface impacts many areas of HRM. This includes: the way performance is appraised, the nature of careers, the methods of job analysis and design, the content of training, etc.

Julie Tixier studied the implementation of a human resources information system (HRIS) in a large French multinational company. The company was facing highly diversified human resources practices and organisations across its different subsidiaries. Its objective was to globally harmonise reporting practices and models of organisations (regarding recruitment, competencies and careers management, compensation and benefits management) through the entire group thanks to the implementation of an HRIS. The case study relies on participant observation carried out over a long period; it includes semi-structured interviews and company document analysis. Observation and analysis conducted by the author tend to question the support of human resources managers from subsidiaries and the ability and pertinence to align local human resources strategies with global ones. To reduce this lack of alignment, the author suggests a better examination of the countries existing structures and practices as preliminary step.

Teresa Waring conducted a case study through a research project in a United Kingdom hospital that was implementing an integrated payroll-personnel system. Research methodology was participative action research. This includes a large variety of methods including: diary analysis, document analysis, participant and non-participant observation, semi-structured interviews. The participatory approach enabled greater emancipation from restrictive ideologies or power relations and emphasised the validity of communication with stakeholders. The case analysis has highlighted: the highly stressful and intensely political climate that surrounded the proposed implementation; the system analyst's role in assisting stakeholders in dealing with social and political issues; the benefit of a three stage methodology (theory development on the social situation encountered, positioning of the actors, tactics and strategies choices) to implement the information system successfully.

4 Conclusion

Any deployment of a new ICT requires an understanding of the existing repertoires of practices, organisational rules, processes, habits and routines. This understanding provides for the necessary adaptations to be envisaged right from the design phase, thus the full benefit of the change may be reaped. On the contrary, not paying attention to the history and culture of the organisation will create a non-alignment that might seriously impede implementation.

The introduction of new ICT very frequently induces a redefinition of the manager's role as shown by the example of telework. There is a need for a dynamic, creative, and adaptive HRM approach: new forms of work organisation, new evaluations of performance, new forms of control, new indicators for success, etc. This also pleads for an early involvement of HR professionals. ICT implementation should not be solely affair of technologists.

I wish you 'happy reading' of this special issue.

Acknowledgments

I would like to thank the authors of this special issue of the IJHRDM for their significant academic contribution to the field of 'Human resources and ICT'. I would also like to use these lines as an opportunity to thank the members of the Scientific Committee (see list in appendix) for their valuable work done in selecting papers for the second edition of the international conference on 'Technology and Human Resources'.

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Appendix: Scientific committee of the second international conference on technology and human resources

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