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Abstract

The skills and abilities of a company's employees are a prerequisite for the enterprise to be innovative. In case the know-how needed to accomplish certain tasks is not available internally or cannot be developed within reasonable time, the company needs to address to the external labor market, e.g. by recruiting experts possessing the skill sets required. However, for rare candidate profiles there exists intense competition on the labor market. Thus, the ability to act within short periods of time when interacting with candidates becomes crucial. In the past, multiple elements of IS support provided many different benefits to improve the recruitment process. However, little research to date exists on what forms of IS support are adapted for what application scenarios within the recruitment arena. Therefore, this paper analyzes how the recruitment process can be optimized and what different levels of E-Recruitment adoption can be identified. We present results from quantitative and qualitative research showing that E-Recruitment functionality can be found in most companies nowadays ranging from isolated solutions for singular activities to integrated end-to-end solutions. Based on these findings we derive managerial guidelines for the management of projects in the E-Recruitment field.

Keywords: E-Recruitment, Human Resources Management, Change Management, Outsourcing.

1. Introduction

Driven by the increasing globalization of markets and, consequently, increasing competitor situation, the mutability and ability for innovation are considered by many researchers as essential for economic success (Cameron 1996; Geroski and Machin 1993; Griliches 1990). As one of the main prerequisites for innovation the knowledge of the employees together with the capacity to manage this knowledge and make it available throughout the company have been identified. Breese (2001) illustrates that "the productive assets of businesses are now composed less of buildings and machines and more of intellectual property rights and technical, commercial and organizational know-how" (p. 2). These 'intangible assets' play a major role in the competitiveness of organizations.

The process of knowledge creation and innovation starts with the identification of internal and external knowledge sources. If the organization's own employees cannot provide or develop the know-how, it must be purchased by e.g. recruiting experts or acquiring other companies that are supposed to possess the required knowledge (Albert 2004; Olfert 2003). This, however, requires the organization's ability to absorb information and know-how. Soo et al. (2002) showed that this ability leads to higher acquisition of know-how within the company which in turn increases the amount of innovation thus improving market and financial performance (see also Cameron 1996).

Due to the influence of information technology, more flexible organizational designs and more flexible ways of partnering among companies have evolved. Employees are more loosely affiliated with organizations (DiTomaso 2001) and work is conducted in a more project-based way (Beck 2002). As temporary networks of collaboration emerge (Malone and Laubacher 1998), the duration of employment relationships becomes shorter and people need to be matched to job offers more frequently, thus increasing the importance of effective and efficient recruitment processes. The companies cannot risk loosing qualified candidates due to bad organized workflows leading e.g. to late responses when interacting with applicants. But how can companies assure that they are able to attract large quantities of highly qualified candidates? What means of IS support do organizations implement in order to quickly identify and select the most qualified candidates from these masses of incoming applications? And can we identify best practices on how to subsequently introduce different means of IS support for the recruitment function?

This paper analyzes how IS supported recruitment processes – summarized under the term E-Recruitment – affect the HR function. Along with our continuous empirical research in this area we conducted several case studies with large and medium-sized enterprises in Germany to verify what kind of E-Recruitment functionality is used and what the effects of IS support on their recruitment activities are. The remainder of the paper is structured as follows. We start with an overview of the role of recruitment as a core function of Human Resource Management (HRM). Also, we present the actual state of IS support in this area. Building up on findings from change management literature as well as on results from an empirical study we identify different levels of E-Recruitment adoption. We continue with an illustration of our research approach to validate our findings before results from two case studies are discussed in detail. After an evaluation and comparison of the different approaches presented we conclude with managerial guidelines that support HR decision makers in conceiving and managing projects in the E-Recruitment field.

2. Different Forms of IS Support of the Recruitment Function

As we want to discuss the impact of IS support on recruitment processes we now first present the recruitment function and it position within the HR cycle. We continue with a discussion of different forms of IS support for the attraction and selection of applicants.

2.1. The Recruitment Function as part of HRM

The recruitment of employees is a core function of HRM directly following the personnel planning phase and meeting into the development and retention phase (Albert 2004; Olfert 2003). It can be decomposed into the attraction and selection of candidates as depicted in Figure 1. Within each of these two phases one can separate planning from execution activities (Färber et al. 2003). The planning activities define the overall strategy based on the personnel planning and define concrete measures for the subsequent execution activities. The execution activities comprise employer branding activities focused on establishing an attractive employer image in the mind set of potential candidates. Therefore it can be seen as an instrument to indirectly attract qualified applicants. Personnel attraction instead covers concrete actions for the direct attraction of candidates pushing them to apply for a specific open job position (Armstrong 1995; Beck 2002).
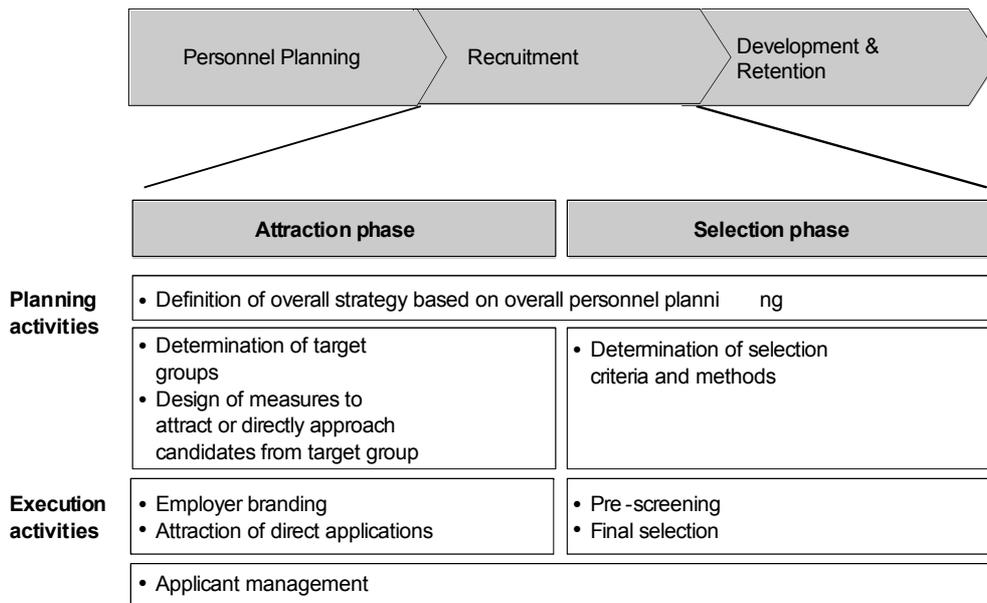
Figure 1. The Recruitment Function

Execution activities in the selection phase cover all measures and methods used to recruit candidates from internal or external sources. Typical recruitment instruments used in this context are job ads in print and online media, labor offices, personnel leasing, personnel consultants and others (Armstrong 1995; Beck 2002; Olfert 2003).

In the pre-screening activity, resumes and other submitted applicant documents are screened to evaluate the candidate's fit to the job profile. Based on the results of this screening it is decided whether or not a candidate enters the final evaluation stage where usually interviews, workshops or assessment centers are used to make a final decision regarding the employment of the candidate (Armstrong 1995; Kompa 1989).

Applicant management finally spans across all execution activities serving as support tasks for attraction and selection such as the communication with internal departments, the administration of applicant data or the response management (Albert 2004).

2.2. Current IS Support of Recruitment Processes

As part of our research we conducted empirical studies with the 1000 largest companies in Germany (based on their revenues) as well as with 1000 SME's to evaluate current e-recruitment practices. We conducted the questionnaire-based survey the third year in a row allowing for a longitudinal analysis (Färber et al. 2003; Keim et al. 2004; Keim et al. 2005). The survey contained questions regarding different E-Recruitment instruments and its effect on the organization and the HR processes. It was addressed directly to the recruitment department of the companies that we contacted personally beforehand. As a result of our survey three forms of IS support for recruitment processes were identified:

1. The career sections of corporate websites that serve as attraction channel and provide functionality to apply for open job positions online.
2. Intersectoral and industry-specific Internet job portals that are used to attract candidates especially increasing the range of possible applicants.
3. Applicant management systems that support internal workflows and communication processes between the HR-department and the specialized departments.

As figure 2 shows, Internet channels such as the corporate website or job-portals nowadays not only represent the most frequently used channel to publish job ads, but also contribute more than every second hire to the total of candidates hired by large firms (Figure 2).
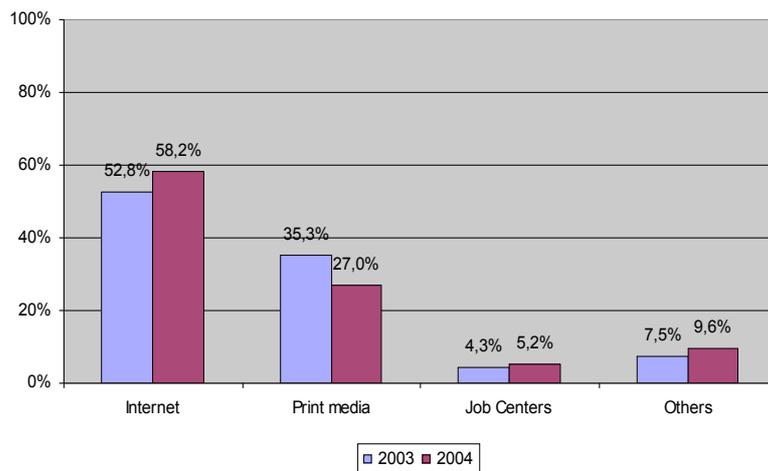
Figure 2. Ratio of jobs filled per recruitment channel (Keim et al. 2005)

Candidates can usually directly apply online using E-Mail or pre-structured forms (Armstrong 1995; Olfert 2003). Internet job portals hereby function as mediators between enterprises and applicants (Beck 2002) and increase the number of candidates that are reached.

As main reasons why E-Recruitment is used, companies note the potential time and cost savings. An electronic job posting is usually cheaper and can be placed more purposefully than traditional announcements in printed media (Beck 2002). It can be changed during the available time and also offers more possibilities regarding the variety and presentation style of information.

The pre-selection and final selection phase can be supported by information systems by using online questionnaires or more innovative e-assessment methods such as online games (Konradt and Sarges 2003). A substantial advantage of introducing an applicant management system is that such a system supports the administration of applicant data over the entire application process possible without changing the media type (Albert 2004).

To summarize, the survey showed that E-Recruitment solutions are already intensively used in most of the companies (for details see Keim et al. 2005). The longitudinal study showed that companies tend to implement IS-supported solutions in an incremental way. In the following we further analyze these results with findings from change management literature. Afterwards we derive a phase model describing the levels of development of E-Recruitment solutions that we identified.

3. The Influence of IS Support on Recruitment Processes

As we aim to analyze the influence of IS support on recruitment processes, we need to look at the organizational and structural changes that go hand in hand with the introduction of E-Recruitment. In the following, we classify these kinds of changes before we use our findings to present a phase model describing the levels of development of E-Recruitment solutions.

3.1. Classification of Change

Literature provides various approaches for modeling and understanding change processes. When analyzing the effect of IS support on recruitment processes, theoretical considerations lead us to the improvisational model of change (Orlikowski and Hofmann 1997).

The improvisational model of change assumes that technology-based changes cannot be accomplished with a strict planning and an execution along the plan such as described in the traditional three-step model of change from Lewin (Burnes 2004). The model rather assumes that "predefining the technological changes to be implemented and accurately predicting their organizational impact is not feasible." (Orlikowski and Hofmann 1997, p. 12). It assumes that changes that are based on technological implementations are more like an ongoing change process instead of an event with a defined endpoint (Gallivan et al. 1994; Mintzberg 1987). The different organizational and technical changes that take place within the change process cannot be anticipated in their whole (see also Mintzberg 1994). The model therefore defines three different kinds of change: anticipated, emergent and opportunity based.

Anticipated changes are planned changes that arise as intended. Emergent changes instead cannot be predicted in advance, but develop spontaneously and arise based on the developed innovations within the entire change process. Finally, opportunity based changes describe events that are "not anticipated ahead of time but are introduced purposefully and intentionally during the change process in response to an unexpected opportunity, event, or breakdown" (Orlikowski and Hofmann 1997, p. 13). The improvisational model of change especially seems to make sense in areas where IS supported solutions haven't been used to a deep extent, such as in recruitment.

Based on these findings we assume that organizational changes resulting from the usage of information technology in recruitment processes follow an incremental approach. Initially, simple solutions are implemented such as the posting of job ads on the career section of the corporate website. Based on experiences gained within these first implementations, opportunities are realized (emergent or opportunity-based changes) invoking other change processes and hence, implementing enhanced E-Recruitment solutions such as applicant management systems. These theoretical considerations were also supported by our quantitative research as described above. Motivated by this we developed a phase model describing the levels of development of E-Recruitment solutions that we present hereunder.

3.2. Levels of Development of E-Recruitment Solutions

After decades of intra- and inter-organizational business process optimization, one can identify different levels of development of IS support that evolved over time. These levels range from the support of individual processes or activities (e.g. IT supported accounting) over the support of complete business functions (e.g. Enterprise Resource Planning (ERP) suites such as SAP R/3) up to the support of inter-company processes (e.g. integrated B2B or supply chain management solutions) (see for example Brodie 2000).

From the results of our own quantitative research as presented above as well as based on findings in the change management literature we conclude that the same kind of development stages can also be identified within the area of E-Recruitment as depicted in Figure 3. We choose 'Degree of process integration' and 'Time' as two dimensions determining the defined phases. The degree of process integration represents the complexity of the used E-Recruitment solutions and serves as a criterion to differentiate the phases. The time dimension is not meant to state that all companies necessarily develop in that direction. Instead the model is supposed to show a general trend that we could identify regarding the E-Recruitment solutions as implemented by the companies that took part in our research. However, as we later show when discussing results from our case studies, we found most companies striving towards that direction.
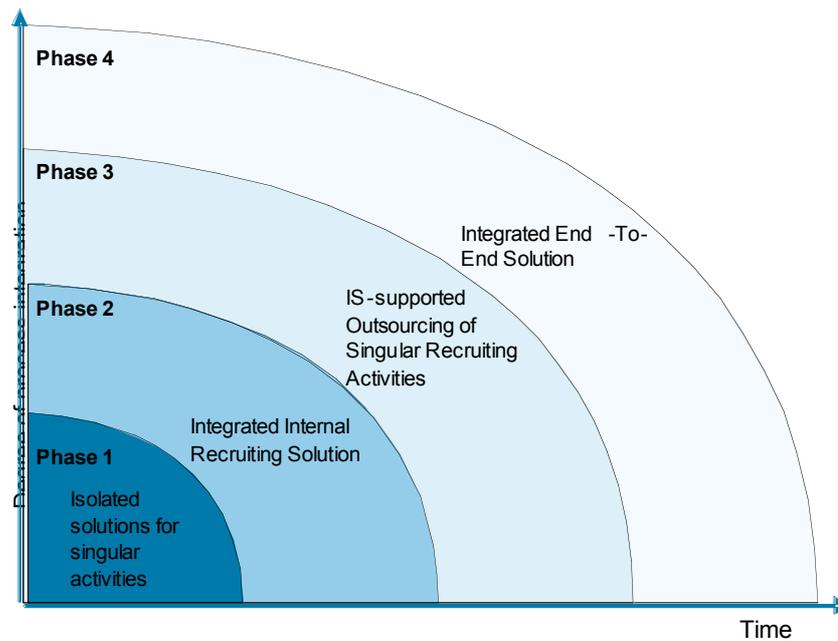
Figure 3. E-Recruitment Phase Model

The IS support of recruitment in phase 1 covers isolated solutions for singular activities within the recruitment processes. This includes first PC-based solutions from the 1980's that where used to store applicant data in computer systems. With the spreading of the Internet this phase also includes for example job postings on the corporate website as well as on Internet job portals. Also, searching the CV databases of these portals is included in this stage. In phase 2 companies utilize integrated applicant management systems. These systems support the whole recruitment workflow starting from personnel attraction actions and the posting of job ads and the management of internal processes following the entry of applications into the organization up to the final selection of candidates. Phase 3 includes the IS supported integration of external service providers into the company's IS supported workflow. Finally, phase 4 covers an end-to-end recruitment solution that allows applicant data to be transferred automatically between the company and all involved external parties without requiring media or format change.

It should be noted that the mentioned phases are not meant to be strict as in reality of course hybrid forms can occur. However, based on results from more than a dozen case studies we could identify most of the small and mid-sized companies as currently being in phase 1 whereas many large-scale enterprises can be assigned to phase 2 and to a smaller degree to phases 3 and 4 (Keim et al. 2005). In the following section we present two concrete case studies showing the effects of IS-supported recruitment solutions in a real-life environment. We then discuss the results in relation to the presented phase model.

4. A Case Study Approach

Before presenting the concrete case studies, we now start with a description of the purpose and method of our validation approach. Based on derived research questions, we present two case studies in detail. We discuss the results in relation to the presented phase model and derive managerial guidelines for managing E-Recruitment projects.

4.1. Purpose and Method of the Case Study Approach

Methodologically our overall research approach is based on two aspects. First, the questionnaire-based survey is used for a quantitative analysis. Its results show general E-Recruitment trends that can be identified within the companies examined. The main results have already been discussed in the sections above. Second, case studies with selected companies are used for a qualitative analysis in order to gain a deeper insight into the trends identified from the quantitative analysis. One concrete purpose of the case studies is to verify our assumption that one can identify different levels of development of E-Recruitment solutions. As our assumption is not easily discernible we use deductive testing for validation purpose (Lee 1989). We derived the following questions from our assumption, which can be evaluated more easily and can therefore be used to test the assumption indirectly.

1. Which recruitment activities are carried out supported by information systems?
2. To what extent is the introduction of E-Recruitment instruments accompanied by organizational changes and changes in the intra- as well as inter-organizational processes?
3. Can we identify different levels of development according to the phase model?
4. Do companies follow an incremental approach when implementing E-Recruitment functionality?

Questions 1 and 2 are seen as a precondition for the succeeding questions as they examine the actual state of IS support in the analyzed enterprises. Questions 3 and 4 are directly related to the presented phases and are therefore used to validate the model.

Throughout the last years of our research we conducted more than a dozen case studies by interviewing recruitment managers from thirteen enterprises from the Top-1000-companies in Germany (based on revenues) as well as from four SMEs. Two of these case studies were repeated after one year in order to follow the companies in their development. The interviews were conducted by two researchers and lasted about two hours. The talk was pre-structured and the questions carefully chosen, elaborated and refined based on Eisenhardt (1989) and Yin (2003). The transcripts and our interpretations were validated by the managers in order to ensure a common understanding and avoid any misinterpretation.

Due to space limitation, we will present the results of only two of these case studies in detail. This is done in order to show the effects of E-Recruitment in a real-life scenario. After shortly presenting the company itself, we first discuss specific challenges that required the company to change their recruitment processes. We continue with discussing the concrete implemented E-Recruitment solution and end with an evaluation of the change. The studies are set in relation to the E-Recruitment phase model as described above and thus aim to answer our research question.

4.2. Case Study One: A Healthcare Enterprise

The selected company is a global leading healthcare enterprise with the two sections pharmacy and diagnostics, and is strongly focused on innovation.

Challenges

The enterprise has a permanent need for highly qualified applicants and plans to recruit more than 400 new employees in 2004. Due to the good reputation in the target group of scientists, approximately 32.000 applications were received this same year. Beginning of 2003, the company started an extensive E-Recruitment project with the following two goals:

1. Increase of the applicants' quality as well as the quality of the match between applicants and job requirements.

2. Reduction of administrative effort in the processing of incoming applications and thus lowering of process time and costs.

E-Recruitment Solution

As starting point for the E-Recruitment implementation, the internal processes were redefined. Primarily, interaction between the central recruitment centre and the decentralized HR departments in the individual divisions and locations was redesigned. In the past, only the contact data of applicants were stored in a central module mainly to support communication processes. Paper or E-Mail applications were not centrally captured, but passed on to the decentralized HR departments to be processed. Therefore it was quite difficult to track the applicant status. Candidates that were rejected for a specific department, but would have been possibly relevant for another one, were exchanged between the decentralized units only sporadically.

Through IS support of the redefined processes the company aimed at creating a central storage facility for all incoming applications, creating an enterprise-wide, uniform and comprehensive view of all applicant data. This was intended to then lead to an easy data exchange between the central recruitment centre, the decentralized HR departments and the decision makers within the specialized departments. Based on the redefined processes, standard software was introduced to support the applicant management. The software was adapted to the described internal processes. In the course of introducing the new software, the strategy concerning the accepted application channels was changed. So far, paper and E-Mail applications were accepted. After the change, E-Mail applications are no longer accepted. The application form on the corporate website is communicated as the preferred application channel. The company put the focus on its own website and Internet job portals as primary recruitment channels. For this purpose the corporate website was integrated into the new applicant management tool. Job ads are now published automatically on the website as soon as they are entered into the system. Also, XML-interfaces automate the data exchange with job portals.

From the applicant's perspective, a profile can be created and directly used to apply for one of the listed job positions. The profile is permanently stored in the system, allowing the applicant to re-use it for other job offers. The latter functionality gives the enterprise the possibility to create an applicant pool. Thus, the enterprise achieved the desired uniform view on all applicant data in a central candidate pool. This pool is used by the recruitment department to check and pre-filter the applications. Relevant ones are passed on to the decentralized HR departments to be further processed without changing the media type. In addition, the system supports all necessary communication processes as well as the tracking of the applicant status over the entire application process.

Evaluation of Change

By introducing the IS-supported applicant management system and the associated reorganization of the affected processes, the enterprise achieved several advantages. Only six months after the go live of the front end, 30 percent of all incoming applications are retrieved through the new online application procedure, so that the data can be transmitted to the applicant management system automatically without additional transformation stages being required. The reply time to the candidates could be reduced. A significant reduction of costs and operating time was achieved.

While executing the change, the enterprise realized further possibilities based on the existence of the candidate pool. We classify these possibilities perceived as opportunity based changes. For example, the candidate pool today is also used to increase internal mobility by also modeling applications from current employees. Also, a set of actions and events is

planned for specific talents that now can be found via search functionality on the candidate pool. Based on our presented phase model the enterprise can be seen in phase 2 as they introduced an integrated internal recruitment solution.

4.3. Case Study Two: A Semiconductor Manufacturer
The company is one of the worldwide leaders in the manufacturing of semiconductor products. Over 30.000 employees develop, produce and distribute products in the area of integrated circuits and electronic semiconductor products.

Challenges
One of the major challenges is the recruitment of qualified applicants for the technical departments of the company. The enterprise assumes that in future there will be a lack of graduates of engineering science courses both, in Germany and worldwide. The global alignment of the enterprise and the international 'War for talent' in the technical oriented areas requires among other things the efficient, web-based management of applications, a requirement that was seen by the company very early.

E-Recruitment Solution
A specific software solution was developed to fulfill the specific requirements of the enterprise. The software is continuously enhanced and offers, aside from its own functionality, multiple interfaces to different external systems like Internet job portals or web-based applicant management solutions (ASP). The main goal was to develop a solution that can quickly and flexibly be adapted to new conditions and easily be configured for local requirements of country and region specific needs.

After introducing the new software solution all applications are now collected in a central candidate database. The HR department can search this enterprise-wide candidate pool for suitable applicants that fit to the requirements of open job positions. Using special Meta-Search-Engines, inquiries from the internal system can be extended both, by own as well as by selected external commercial personal record databases. Independent of the profile source, the candidates are afterwards presented in the form of a standardized hit list.

The software contains basic functionality to support the recruitment workflow. However, the subsequent electronic processing of applications has been outsourced to external service providers, using special interfaces to the external applicant management systems. This allows the company to adapt the applicant management to new conditions whenever necessary and to process applications in a cost and time-efficient way. Furthermore agency interfaces are used to include external personnel consultants into this process.

In order to transfer applications directly into the applicant management system, the company prefers applications submitted via the online form on its corporate website or via Internet job portals. However, traditional application channels are still open to candidates as the enterprise wants to avoid loosing qualified candidates due to a restriction in the choice of the application channel. The relation between paper based and online applications is quite balanced. Within the online applications, 60 percent of the documents are retrieved via the online form of the corporate website. The remaining 40 percent are sent by E-Mail.

Evaluation of Change
By recruiting candidates via website and Internet job portals, the creation of internal and external candidate pools and the usage of web-based assessments and exit interviews, the company already supports many of its HR sub-processes by information systems. By doing so, significant cost and time-savings were achieved. The outsourcing of various applicant management functions allows high flexibility regarding the processing of applications. This

strategy makes it possible to react to applications in a professional manner independent from the actual amount of applications coming in. The high number of applications can now be processed based on defined service levels, like for example within a specific time frame.

The actual change process was implemented gradually based on the good experiences that resulted from IS support. To that extent, the first development of the E-Recruitment software can be seen as planned change whereas the numerous following changes and extensions were realized as opportunities. As the enterprise has integrated external service providers such as personnel marketing agencies and executive search companies into the workflow and has also implemented a university relations management tool, they can be considered as being in state 4 of the E-Recruitment phase model presented above. The international roll-out of several software modules might be considered in a next stage.

4.4. Discussion of Results

The examined enterprises achieved substantial improvements by using E-Recruitment functionality. As main advantages both companies stated (1) cost savings and (2) process time reductions. The former includes the decrease of administrative costs by automated or semi-automated electronic communication with applicants and internal divisions as well as a decrease of processing costs for unqualified candidates using IS-supported pre-screening and selection. Further cost saving potential could be realized by using online job postings that are much cheaper compared to postings in printed media. Major time savings were realized by faster internal and external communication processes using electronic media. Applicant data are now processed faster between the departments and applicant management systems decrease the administrative effort in all phases of the recruitment process.

The second case study showed in particular the suitability of outsourcing some parts of the recruitment process to external service providers such as the conception of job advertisements, the digitization of applications, the communication with the applicant or the pre-selection of candidates. Besides this, outsourcing leads to a high degree of flexibility and permits enterprises to react to fluctuations in the number of incoming applications appropriately without loosing service quality.

It of course needs to be mentioned that the two presented case studies describe companies that work in different industry sectors and conduct different types of work. Further research should evaluate the differences in the level of development of E-Recruitment solutions in relation to these aspects. However, under the given restrictions, the case studies in general proved the validity of the E-Recruitment phase model as the analyzed companies can be assigned to one of the defined phases (this is also true for the other case studies that were not presented in detail in this paper). Most of the companies seek to reach the next phase due to the good experience made with E-Recruitment and due to the high potentiality for realizing further time and cost savings.

4.5. Managerial Guidelines

From our quantitative as well as qualitative analysis we can conclude that companies incrementally implement changes related to E-Recruitment. Beginning with the IS support of isolated parts of recruitment such as the posting of open positions, companies implement more and more IS solutions as they see a high potential for cost and time reductions. We derive the following managerial guidelines for conceiving and managing E-Recruitment change projects:

- The successful attraction and acquisition of applicants over the Internet is an important step serving as basis for other E-Recruitment capabilities. Candidates should be pushed to apply via online forms instead of unstructured E-Mails as this allows storing the applicant

data in a structured way and thus creating internal candidate databases. These databases can be used to automatically search for qualified applicants and to more easily process candidate profiles between departments using applicant management systems.

- The introduction of applicant management systems can lead to great time and cost savings. These systems can support internal processes such as the automatic posting of job ads, response management and the internal communication processes between departments.
- Due to the current situation in parts of the labor market, many companies are faced with a high amount of applications that cannot be manually processed. Our case studies show that some companies already use information technology to help the recruitment personnel in pre-selecting qualified applicants.
- HR-Managers need to actively communicate and promote the advantages brought about by the introduction of E-Recruitment. This is important in order to facilitate the diffusion and adoption of these IS solutions.

5. Conclusion

Based on quantitative research as well as findings from existing literature, we showed the increasing importance of information technology for recruitment processes. After discussing the different forms of IS support we developed a phase model describing different levels of E-Recruitment adoption. To verify the model we conducted case studies with German companies from which we presented two examples in detail in this paper. The results show that enterprises generally can be assigned to one of the defined phases regarding their E-Recruitment usage. Most of them change their processes in an incremental approach. This is related to the fact that most companies get aware of the substantial time and cost savings that can be realized supporting their recruitment processes with IS. Based on these findings we derived managerial guidelines for conceiving and managing E-Recruitment projects. We believe that this research has important practical implications as the different levels of E-Recruitment adoption identified give hints on what to consider when implementing change within the recruitment function in order to increase the firm's competitiveness and at the same time provide high-quality services to qualified candidates.

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