Information Technologies in Human Resources Management - Selected Examples

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Abstract—Rapid growth of Information Technologies (IT) has had huge influence on enterprises, and it has contributed to its promotion and increasingly extensive use in enterprises. Information Technologies have to a large extent determined the processes taking place in an enterprise; what is more, IT development has brought the need to adopt a brand new approach to human resources management in an enterprise. The use of IT in human resource management (HRM) is of high importance due to the growing role of information and information technologies. The aim of this paper is to evaluate the use of information technologies in human resources management in enterprises. These practices will be presented in the following areas: recruitment and selection, development and training, employee assessment, motivation, talent management, personnel service. Results of conducted survey show diversity of solutions applied in particular areas of human resource management. In the future, further development in this area should be expected, as well as integration of individual HRM areas, growing mobile-enabled HR processes and their transfer into the cloud. Presented IT solutions applied in HRM are highly innovative, which is of great significance due to their possible implementation in other enterprises.

Keywords—E-HR, human resources management, HRM practices, HRMS, information technologies.

I. INTRODUCTION

IN globalization conditions, technology becomes the key factor in enhancing business growth and competitiveness. To gain a competitive advantage, increase innovation, enterprises have used the latest technological solutions, which affect their productivity and effectiveness. Technology exerts huge influence on human resource management (HRM) processes; in particular, the World Wide Web led to modification of numerous HRM processes, such as: planning, recruitment, selection, performance management, work flow, training, compensation and personnel service. Moreover, implementation of these systems improved the quality of services provided to stakeholders (e.g. applicants, employees, managers), and reduced administrative costs. Part of the Human Resource Management System (HRMS) is electronic human resource information system (eHRM) providing organizational stakeholders with access to HR information and specific HR functions via the Internet or intranets [1].

II. E-HR

Recently, the concept of e-HRM has been widely used; however it lacks one clear definition. According to [2], e-HR is the Internet-supported way of performing HR policies

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and/or activities [3]. Leaning on these intensions, S. Strohmeier defined e-HRM as the (planning, implementation and) application of information technology for both networking and supporting at least two individual or collective actors in their shared performance of HR activities [3]. Moreover, he indicated crucial aspects of e-HRM: technology and the fact that technology supports actors. Technology is necessary to connect usually spatially segregated actors and enable interactions between them irrespective of their working in the same room or on different continents, i.e. technology serves as a medium with the aim of connection and integration. Technology supports actors by partially – and sometimes even completely – substituting for them in executing HR activities. Hence, information technology serves additionally as a tool for task fulfillment. The planning aspect accentuates the systematic and anticipated way of applying information technology. Shared performing of tasks through at least two actors point out that sharing HR activities is an additional feature and underlines the aspect of interaction and networking. The consideration of individual and collective actors takes into account that e-HRM is a multilevel phenomenon; besides individual actors, there are collective actors like groups, organizational units and even whole organizations that interact in order to perform HR activities [3].

T. V. Bondarouk and H. J. Ruël 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 [4].

Studies conducted in enterprises have pointed out numerous benefits from e-HRM implementation that enables to classify the strategic benefits ascribed to e-HRM into seven groups [5]:

- generation of HR metrics to support strategic decision-making,
- automation of routine HR tasks and replacing 'filing cabinets',
- branding of organizations and improving the organizational image,
- freeing HR staff from administrative burdens and allowing them to undertake strategic people-management activities,
- empowering managers through development and support of management capacity to conduct HR activities,
- improving talent management through e-selection, self-assessment and e-performance management,
- transforming HR professionals from administrative paper handlers to strategic partners.

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Enterprises have more and more seen e-HR as competitive advantage and an opportunity to build a strategic advantage. However, e-HR researchers such as e.g. [6], [7] failed to provide any clear evidence for value creation capacity and possibilities of its measurement.

Researchers have indicated that implementation of e-HRM solutions is influenced by many micro and macro factors representing different perspectives. Micro factors refer to individuals who perform and use e-HRM, as well as their personal characteristics. Macro factors refer to organisations, groups, organisational units. Based on e-HRM research, H. Ruël and H. van der Kaap collected context variables presented in Table I [8].

TABLE I
CONTEXT VARIABLES IN E-HRM RESEARCH AS INDEPENDENT VARIABLES

Micro	Macro
Support from colleagues and managers	Organization size
Information availability and accessibility	Department size
HRM practices	Duration of existence of HRIS department
Employee skills	Computer experience of the firm
Employee behaviour	Cross-functional teams
Computer and Internet literacy	Nationality of the firm
Personal characteristics of individuals	Multicultural context
Characteristics of the technology	National culture
Degree of involvement in e-HRM design and implementation	
Managerial compulsion to use e-HRM	
Privacy and data security	

Implementation of e-HR solutions depends on e-HRM acceptance which is related to the degree of involvement in the design and implementation of e-HRM, the perceived usefulness of e-HRM technology, the degree of managerial compulsion to use e-HRM, and the perception of privacy or data security related to e-HRM acceptance [9]. It is also necessary to draw attention to employees' ability to use computers and their Internet literacy.

Recently, HRM has been considerably influenced by cloud computing which allows application software to be operated using Internet-enabled devices. One of the cloud computing models is SaaS (software as a service) where users may have access to application software and database which are available in the cloud. The market has observed a continuously growing interest in SaaS-based solutions, as by 2015 58% of respondents will have a SaaS HRMS, compared to a maximum of 51% that will have a licensed HRMS solution. 38% of organizations that currently deploy SaaS HRMS solutions are those with a single SaaS HRMS, as well as those that have combinations, which always include at least one SaaS HRMS within their organizations but may also include a licensed HRMS [10]. Enterprises choose SaaS HRMS due to benefits including [10]:

- up to 100% less technology staff depending on employee size from either HR or Information Technologies (IT),
- faster time to value from deployments that take about half the time,
- improved user experience,

- higher customer satisfaction.

It tools available on the market are used by enterprises to a different extent. The Sierra-Cedar Human Capital Management (HCM) Application Blueprint shows level of adoption of the following solutions among 1063 unique organizations in the USA [10], which is presented in Fig.1.
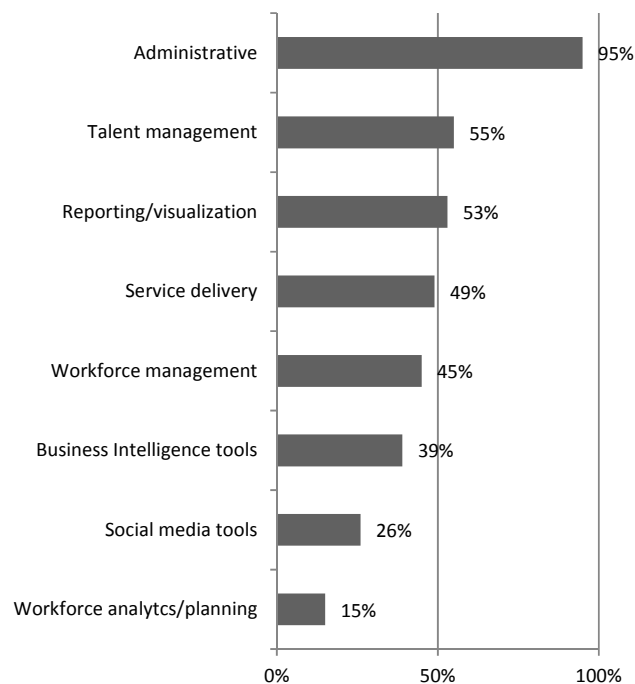

Fig. 1 Adoption of applications in USA enterprises

Administrative applications containing Core HRMS, Role/Competencies Management, Payroll, Benefit Admin, Embedded HR Analytics, Embedded HR Social was adopted in 92% of surveyed organizations. Second most popular area using apps was talent management (55% adoption) and service delivery (49% adoption).

III. INFORMATION TECHNOLOGIES IN HUMAN RESOURCES MANAGEMENT

Results presented above show high variation of IT solutions used in HRM, therefore the aim of this paper is to evaluate the use of information technologies in human resource management by enterprises. These practices will be presented in the following areas: recruitment and selection, development and training, employee assessment, motivation, talent management, personnel service. There will be presented research made by Sierra-Cedar among 1063 unique organizations in the USA [10], which shows utilization and practices of IT solutions in human resources management.

A. Recruitment and Selection

Available technology solutions have led to transformation of the recruitment and selection process, which brought about changes in the manner of collecting, using and disseminating information about applicants and employees. The purpose of

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recruitment is to encourage employees to respond to a published job advertisement. Many passive ad forms have been used, such as e.g.: web-based job ads, job boards, and more interactive ones such as online job fairs. E-recruiting attracts greater numbers of applicants but the quality of applicants when compared to traditional methods of recruitment is not higher [11]. Internet recruitment as the means by which organizations and their agents use Internet-based technologies to develop relationships with potential job candidates, generate applicant pools, maintain viable applicants, and encourage desired candidate to join those organizations [12].

Technology offers potential job candidates possibilities of interactive job search, participation in online assessment or checking required competencies, reading a company blog, signing up to follow a recruiter's Twitter account or participate in online recruiter chats, which increases user involvement and leads to more careful information processing.

The use of social media for recruitment purposes has become a common practice as 93% of recruiters have used or plans to use it to support the recruitment process [13]. Sierra-Cedarsurvey found that nearly half of all recruiters use strategically focused, social-enabled recruiting processes. Early adopters of social-enabled processes show a link to 8% higher revenue per employee [10]. Jobvite survey has shown that 94% of recruiters use LinkedIn, 66% use Facebook, 52% use Twitter, and 21% use Google in their recruiting efforts. Attention should be paid to a tendency of using social media in recruitment as 73% of recruiters plan to increase their investment in social recruiting in 2014, while 83% of job seekers flock to Facebook, LinkedIn remains recruiters' top social network. Despite the proliferation of social media, 82% of recruiters believe their social recruiting skills to be proficient or less [13].

Tools which may be used in the e-selection process are the following [14]:

- Electronic Job Analysis (EJA),
- electronic job application and initial screening,
- electronic tests and assessments,
- electronic interviews,
- decision-making based on e-selection based on combining predictor scores,
- evaluation of e-selection systems.

An example of recruitment software is Zoho Recruit, which is an easy-to-use Applicant Tracking System (ATS). This application can be used by departments and staffing agencies to track job openings, resumes, contact candidates and filter the candidates based on your organization needs, without missing a talent. It also gives the possibility to build a resume database, to schedule interviews, create and publish job openings on websites using Zoho Recruit tools. Moreover, it integrates the entire recruitment process starting from requisition submittal to posting the job on the website, scheduling interviews and tracking candidates' progress based on the hiring process [15].

ZOHO Recruit gives you the possibility to reach wider spectrum of candidates and filter the candidates based on your organization needs, without missing a talent, to build the resume database, schedule interviews, create and publish job openings on the website using Zoho Recruit tools. ZOHO Recruit is also available on Google Apps and it is connected with social media like LinkedIn, Twitter and Facebook. It also enables you to automatically capture and import resume information from email attachments, your website, Outlook inbox. Candidates may track all activity on your Zoho Recruit portal, view upcoming interviews, scheduled calls, new job postings, update competences. Candidate resumes are transferred into Zoho Recruit candidate database and you can format and brand them easily before sending them off to clients [15].

B. Development and Training

Learning and development activities make a major contribution to the successful attainment of the organization's objectives, and investment in them benefits all the stakeholders of the organizations [16]. Nowadays organizations are constantly looking for new forms of learning and development activities. Studies have shown that IT tools are more and more frequently used for employee development purposes, indicating that over 25% of corporate training hours are now online, and nearly 40 % of these solutions are technology-supported [17]. This also stems from the fact that employees gain knowledge and their satisfaction is positively related to their post-training motivation, self-efficiency and knowledge, and studies have shown that e-learning provides greater flexibility, efficiency, convenience for trainees and decreased costs compared to traditional training methods [14]. Research on the use of technology to facilitate HR processes indicated that it typically enhances efficiency, and decreases costs associated with HR transactions [18].

E-learning uses various active learning techniques like simulations, games, role playing, mobile and social learning, storytelling, avatars and virtual reality. This area has seen an ongoing growth and the e-learning Trends Forecast for 2015 is the following [19]:

1. Learning and Performance (L&P) departments will become profit centers. Planned transformation of learning and performance departments from a cost center to a profit center is the main focus for their departments in the coming year. Moreover, big data will force tracking eLearning ROI and effectiveness.
2. SaaS (School as a Service). Companies will become their own schools and academies where they build, market and manage their own online degree and certification programs.
3. MOOCs (Massive Online Open Courses) move mainstream and require authentication. MOOCs will move from employee training to recruiting, vendor education and consumer education. However, they will be fee-based and will require learners to sign up with their real names, addresses and emails.
4. Gamification will be the new problem-solving tool – not just a tool to enhance learning.

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5. MVC (Minimum Viable Course) Development will become the norm in tech and software industries to shorten product launch cycles.
6. E-Learning moves from "seat time" to competency and in doing so become more personalized. Questions and feedback will be tailored to the learner's proficiency level, interests, and personal motivators. By learning about learners, e-courses will help adults learn in the manner, pace and method which suits them best. Personalized feedback systems are mostly handled through Artificial Intelligence (AI) subsystems.
7. You'll be wearing your learning. "Wearable eLearning" will be incorporated as a "while-you're-doing-it" app. Radical eLearning design changes will be required for the mini screen.
8. Freelance eLearning ID (instructional designer) rates will decrease; salaries for full-time IDs – with specialized skills - will go up.

In 2012, companies spent $164 billion on training, of which $56 billion was allocated to e-learning [20].The larger simulation-based learning market, which includes corporate training games, is expected to grow even more from $2.3 billion in 2012 to $6.6 billion in 2017. Altogether, the learning games market will grow from $3.9 billion to $8.9 billion in 2017. Much of the growth will come from apps that target the mobile market [21]. One of the vendor solutions in e-learning is Skillsoft through which 19 million people have developed their competencies. These solutions use cloud-based learning solutions and mobile solutions available in 20 languages [22].

C. Employee assessment

Employee assessment is really important process of human resources management because it has influence on improvement and increase of employee results and remuneration system which encourage organization to look for new methods and solutions for this key process. Research show that in 93% of U.S. organizations surveyed electronic performance management system is utilized [10].

Online performance appraisal system is a software program that facilitates the completion of performance evaluations online. It can be an MSS tool such that only managers have access to this system or it can be a combination of MSS and ESS, in which employees also have access and can provide information into the system [23].

Nowadays enterprises use not only self-assessment, 360-degree feedback but also social media. Using Social communities for performance appraisal supports to provide goal alignment, performance support, and kudos. It is supporting shared goals by enabling individuals to find experts on goals. Enabling collaborative goal creation and using Social tools for team-based collaboration and work updates on goals. Performance Management now has the highest percentage of Mobile-enabled HR process adoption, and respondents indicate plans to increase adoption to 40% next year [10].

D. Motivation

Motivating employees is to getting them to move in the direction you want them to go in order to achieve goals. One of the tools used to motivate employees is gamification which was defined as the process of game-thinking and game mechanics to engage users and solve problems [24].A good working theory for why people are motivated to play games maintains that there are four underlying reasons, which can be viewed together or separately as individual motivators [24]:
• for mastery,
• to destress,
• to have fun,
• to socialize.

Participants perform tasks and meet challenges that allow fulfilling user needs. Among internal and external motivators, the following game mechanics are used in the games:
• Status – the user has an opportunity to improve their status in a given community (proficiency levels and badges).
• Personal and group competition.
• Achievement and self-improvement displayed on progress bars, rankings or levels of difficulty.
• Sense of community and possibility to contact other people having similar needs and interests, and a chance for self-expression due to forums, e-mails, chats.
• Altruism, due to exchange of virtual items and credits.
• Threat for the user or group to which he/she belongs.
• Loss aversion which may appear due to fast progress at the beginning of the game, giving the user the sense of building the virtual welfare which is not easy to be given up.

E. Talent Management

Talented people have become the most important factor in enterprise competitiveness. Moreover talent management is so difficult that enterprise use talent management technologies in various flavors to recruit, identify and develop talents. Managing recruiting, selection, and staffing via the internet may require the addition of some new skills to an HR generalist's or recruiter's skill set but does not fundamentally change the principles underlying good recruiting, selection, and staffing [25].

Overall adoption of the Talent Management category in 2014 was 55% [10]. The study by Sierra-Cedar points to slight increase in adoption levels for all individual Talent Management applications. Particulars concerning Talent Management Applications in 2014 are presented in Fig.2.

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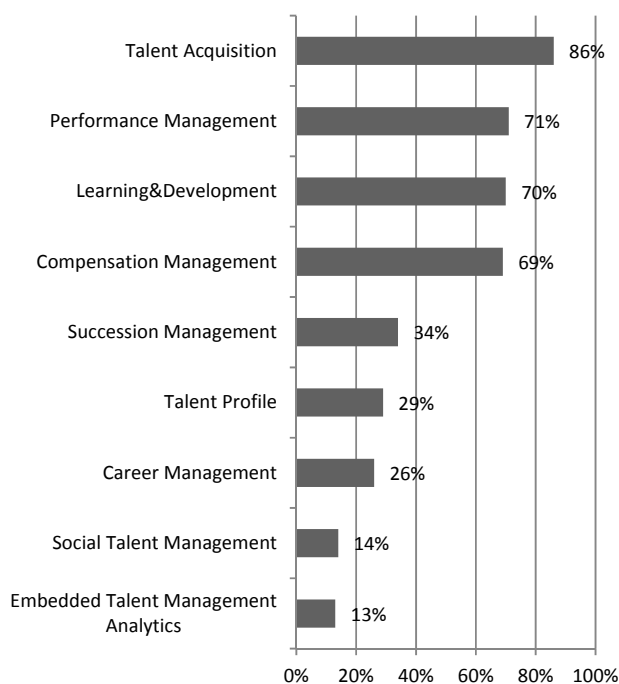Vol:9, No:6, 2015

Fig. 2 Talent Management Applications

Organisations have increasingly implemented the concept of Integrated Talent Management (ITM). Major practice areas that corporations typically cite as making up their integrated talent management strategies are [26]:

- recruiting,
- compensation and rewards
- performance management
- succession management
- engagement and retention
- leadership development.

The study by Sierra-Cedar showed that respondents identify their Talent Management approach as being a point solution, an ITM suite, or HRMS-based with at least two Talent Management modules on their HRMS. In 2014, 71% of respondents used some form of Integrated Talent Management, and 62% of qualified organizations had Integrated Talent Management solutions on their HRMS. A trend that will be observed in the future will be the change of Integrated Talent Management solutions, which is planned by 31% of organisations in the next 12 months, to the largest extent into SaaS development models [10].

F. Personnel service

Employee self-service (ESS) is defined as a corporate web portal that enables managers and employees to view, create and maintain relevant personnel information, e.g. about benefits, payroll, vacation time and flex spending [27]. ESS can support basic functions, e.g.: informing (e.g. factory agreements, vacation rules), interacting (e.g. access to personnel files), transactions (e.g. application for leave, travel expense claim), and delivery (e.g. payslips, training videos) [27].

An important factor affecting ESS implementation as well as its effectiveness and efficiency, is user acceptance. The study by U. Konradt, et al. has shown that organizational support and information policy were positively related to ease of use, usefulness was positively related to satisfaction and system usage, ease of use and usefulness were negatively related to user strain and ease of use fully mediates the relation between organizational support and strain as well as between information policy and strain [27]. Service delivery automation delivers at least 15% in administrative savings when pervasive employee and manager self-service and a shift to shared service with an HR helpdesk application is adopted. Moreover, adoption of the full suite of workforce management applications delivers administrative savings and cost reductions resulting in 33% operating income growth [10]. Companies decide to implement such solutions to reduce HR costs and shorter cycle times, when employees are more self-sufficient.

SAP is one of the leading companies offering self-service systems for employees and managers. Employee software provides personalized information, tools, and services your employees need to do their work, manage their own important life and work events, and focus on contributing to business goals. It gives the possibility to check work fitness, update time sheet and access training courses [28]. Solution for managers can empower them to oversee their employees and budgets more efficiently, enable your business teams to pull data and perform transactions to make better, smarter decisions for building and developing your workforce for future success. It also gives the possibility to identify, retain, and reward your talent, recruit the right people when you need them and make better decisions based on financial and logistic information at your fingertips [29].

IV. CONCLUSION

Development of information technologies has led to changes in human resource management by enterprises, as well as in the areas of collecting, gathering and using data in the decision-making process. What is more, technology brought about changes in the nature of jobs (e.g. online jobs) and relationships between individuals and organizations (e.g. video recruiting). IT-based HRM becomes a common practice, in particular in recruitment and selection, development and training, employee assessment, motivation, talent management, personnel service processes. This points to their more and more common application and to emergence of a number of new tools used by enterprises, which has been presented above. In the US, companies have most often used administrative applications; talent management, service delivery and workforce management apps are used less frequently. The currently observed trend has been to combine individual HRM processes into a single Human Resource Management System, and 88% of organizations will look at software-as-a service as a replacement for their existing HRMS [30].

All company actors, that are both the executives and employees, gain benefits from development of new technologies and innovation that include the use of HR metrics to support strategic decision-making, reduction of administrative costs, managers' empowerment and transforming HR professionals from administrative paper handlers to strategic partners. Despite broad dissemination of IT solutions, researchers have pointed to a danger that HRM may become more technology-focused, rather than employee-focused, and HR as a whole may be viewed as more of a management "tool" and less as a valued strategic partner [14]. What is more, authors pointed out that the current systems have a number of limitations, including the fact that they employ one-way communication systems; they are impersonal, passive and may preclude individuals with low computer skills from gaining access to jobs [14].

In the next three years, American enterprises are planning to implement initiatives related to business process improvement (64%), service delivery (40%), talent management (37%), HR system strategy (35%) [10]. Technology development on the other hand, will exert strong influence on solutions applied in this respect, including the increasingly common use of cloud-computing, mobile solutions and the use of social media.

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