

7 Cloud computing and e-HRM

Vinit Ghosh & Nachiketa Tripathi

Learning objectives

- Explain the evolution of HR technologies from legacy technologies to digital and cloud technologies
- Describe the cloud architecture in the form of key cloud features
- Discuss different cloud service and deployment models
- Examine the applicability and importance of cloud computing in various HRM functions, including talent acquisition, goal setting, performance appraisal, and learning and development
- Critically evaluate the advantages and limitations of cloud technologies and the corrective measures to be undertaken before HR cloud implementation

Introduction

Not too long ago, when people sent a consignment by courier or wanted to check flight status, they had to call the courier company or the airport/airline to check the latest status. Now they can simply click on the online link provided by the courier company or simply 'Google' the flight number to see the status in real time. Similarly, today, people can track the status of their pizza order through the App on their mobile phone and can even set a time when they want their pizza to be delivered or picked up. The delivered pizza is like a 'managed cloud,' where we can specify what and when we want—all online, anytime, and anywhere.

Modern organizations are fast realizing the need for agility and flexibility in their business operations to cater to the dynamic and ever-growing customer demands. The trickle-down effect of such need is also felt in the modern HRM functions. As described in Chapter 2, the role of HR has transformed from a mere administrative/support function to a strategic business partner. Traditional HR managers were often considered as 'policy police' because of their compliance-oriented outlook. However, in the due course of time, HR leaders have realized the long-term detrimental effect of 'enforcement' and 'compliance,' and started encouraging autonomy and innovation as part of regulated enterprise operations.

Modern businesses need HR policies to be dynamic and contingent on business strategy to attain maximum impact on effectiveness and higher competitiveness (Nigam, Nongmaithem, Sharma, and Tripathi, 2011). The support for HR's growing strategic

focus is facilitated through the advancement of information and communication technologies (ICT). Technology has had tremendous impact on contemporary organizations' knowledge management and human resource processes and practices. The use of technology in various HR functions has taken HR management in a new direction, which is commonly termed as electronic human resource management (e-HRM) (Hertel and Schroer, 2008; Stone and Dulebohn, 2013).

The strategic goal to relieve traditional HR from the repetitive administrative tasks can be fulfilled by seamless adoption of electronic-based HR processes and practices. Through e-HRM, physical capabilities are substituted leveraging digital assets that lower the HR transaction costs and headcount to a large extent (Stone, Stone-Romero, and Lukaszewski, 2006). In today's business world, most organizations are using a large number of HR metrics to audit their HR activities. For instance, with the support of analytics, the fast food restaurant giant McDonalds identified how staff demographics, management behaviors and employee attitudes interact to predict restaurant performance (Sparrow, Hird, and Cooper, 2015).

With the advancement in data analytics, organizations are trying to capture every single piece of internal and external business-related information to create customer value that can lead to customer delight. This has led the companies to adopt new tools and techniques that can store and manage such enormous volume of data and transactions. The real challenge that most companies face is to deal with the high purchase and maintenance cost of these sophisticated software packages. This is more so in the case of small and medium enterprises (SMEs) where due to limited budgetary allocations for infrastructure and technology developments, they fail to gain a competitive advantage over big firms (Simon, 2013). However, as emphasised in Chapter 5, relying on metrics and analytics is simply not good enough. These activities can reap the benefits if managers are given adequate information and they possess the capability to make better and different decisions. Managers should have seamless, real-time access to the current or changing state of human capital data (Sullivan, 2014).

Cloud computing, which is a web-based platform (Low, Chen, and Wu, 2011), is equipped with capabilities to handle complex business scenarios and can provide unbound scope for scalability, flexibility, and cost reduction. Cloud computing is the current shift in the way of accessing distributed applications, platforms, and infrastructures globally through the internet. It gives e-HRM the capabilities to develop reusable systems and processes that can attract, develop, maintain, and retain high-performing talent. This cutting-edge technology has large implications on organizational sustainability and success in a globally competitive market.

By implementing cloud solutions, SMEs can also compete in an innovative ICT¹ environment (Assante, Castro, Hamburg, and Martin, 2016) as these solutions are relatively more affordable. SMEs can use enterprise resource planning (ERP)² and customer relationship management (CRM)³ softwares without purchasing them but simply renting high computing data centers. Acumatica ERP and Zoho CRM represent two of the multiple cloud-based solutions widely used by SMEs (Baltatescu, 2014). 'Human capital management on cloud' is the need of the hour to enable business growth by developing innovative staffing models based on offshore talent, contingent workers and global talent mobility.

In this chapter, we provide an overall understanding of the relevance and importance of cloud computing in e-HRM. We start with some background information on legacy technologies, especially enterprise resource planning (ERP) that dominated the IT landscape

until the arrival of the cloud technologies. The section on cloud computing illustrates the importance of cloud technologies in today's HRM. An in-depth understanding of cloud-advantages in the form of various cloud features along with different cloud deployment models have been described in the section on cloud architecture. How cloud computing increases the efficiency and effectiveness of various HRM functions is covered in the section on cloud-based HRM. The section on customized off-the shelf HRM products provides a comparative view of the latest cloud-based HRM products available in the market. Finally, the advantages of being in a cloud-based environment and their limitations are described.

Evolution of HR technologies

The HR-Information Technology (IT) partnership has always been an outcome of strategic business choice. The traditional operating principles of mass production of the 1970s and 1980s are no longer valid; instead, organizations are moving toward tailored production and highly consumer centric customized systems. Therefore, re-engineering or major changes have been made to organizational structures, systems, and processes to cater to the dynamic business needs (Hoogervorst, Koopman, and Flier, 2002). Over the years, IT has been playing a crucial role in the alignment of such business strategies with HR strategies (Hoogervorst, Koopman, and Flier, 2002). The use of IT has reshaped the traditional business models built around the perimeter of time, distance, and functionality. Nowadays, the business models rely on a modular, distributed, cross-functional, and agile business process that enables work to be executed across boundaries of time, distance, and function (Ettlie and Pavlou, 2006; Kohli and Grover, 2008; Rai, Pavlou, Im, and Du, 2012).

The embracement of technology in the HRM was first witnessed in early 1970s when software was used by HR for employees' record-keeping purposes (Fitz-enz and Davison, 2002). In the due course of time, HRM has adopted technologies that re-engineered HR processes by automating specific HR functions or activities using business process management⁴ tools. In modern times, the HR department has become one of most technology dependent users (Ikhlap, Khan, Mujtaba, and Sadiq, 2012). As noted in Table 7.1, both the HR function and IT have evolved concurrently leading to the emergence of the e-HRM discipline.

During the 1990s, the need to reduce service delivery times led to the development and adoption of ERP products that relied on computer and internet technologies to integrate internal (organizational systems) as well as external systems (supplier side). In today's data driven market, the golden source of business data is not just restricted to customers' financial transactional information but also includes their non-transactional activities such as their tastes and preferences through various online surveys, posts, and advertisements

Table 7.1 Evolution of HR technologies

Decades	1980s	1990s	2000s	2010s
HR evolution	Personnel administration	Human resource management	Strategic human resource management	Digital/next generation smart HRM
HR technology	Mainframe	Client/server	Web-based	Cloud-based and mobile technology

Source: Authors.

in social networking sites. The information regarding future stakeholders/customers of the firm are equally important to take today's business decisions.

The birth of new smart technologies such as 'Big Data'⁵ and the 'Internet of Things (IoT)'⁶, have opened up opportunities to extract more information and insights from internal and external sources, allowing significantly better performance from the workforce. Today, managers proactively use social platforms (e.g., Facebook, LinkedIn, etc.) and mobile applications to improve employee engagement and collaborations across geographically dispersed projects. Organizations can judiciously use these technologies to capture the consumers' and employees' knowledge creation, sharing, and ideation for product and service innovation purposes. However, according to Triple-T⁷, a technology adoption evaluation model proposed by Obeidat and Turgay (2013), technology adoption within an organization can only be successful if it highlights the benefits that include cost savings, time and space efficiency, flexibility, scalability, and improved performance.

The roles and functions of HRM have continued to evolve with the adoption of new technologies. A few years ago, an ERP solution having an integrated HRM module was sufficient to run an entire enterprise. It offered depth and breadth of HRM functionalities (payroll, performance appraisal, training and development, etc.). However, ERP technologies and products had several serious limitations (Azevedo, Romao, and Rebelo, 2012), including:

- High software procurement and upgradation cost
- High customization required to meet user as well as business actual needs
- Monolithic and inflexible
- Longer implementation time
- Costly to configure and reconfigure
- Hierarchical rigidity and centralizing control and management
- Huge dependency on IT infrastructure and IT support.

As HRM functions became more strategic, the need for an integrated fully functional human resource information system (HRIS) was deemed necessary. This required the HRM discipline to adopt more advanced and state of the art technologies for enhanced HRM performance (Karimidizboni, 2013). Today, HRM capabilities are not restricted within an enterprise, but transforming toward a global delivery system of services. HRM applications are no longer seen as standalone 'boxes' but as highly flexible, scalable and abstracted services that can be consumed by employees anytime and from anywhere. Cloud-based computing is the new paradigm shift in accessing web-based distributed systems, platforms, and infrastructures globally through any mobile device (Low, Chen, and Wu, 2011), and equips modern HR leaders to build elastic and scalable solutions. This allows for quick response to change and cost savings.

According to 2017's Tech Trend Report by Deloitte Insights, digital, analytics, and cloud technology have been constantly bringing disruption and transformation in the way of doing business. HR Systems Survey by Sierra-Cedar (2016) revealed that 47% of global top performing organizations, 27% of the talent-driven organizations, and 34% of the data driven organizations have adopted cloud-based solutions. However, there are still many organizations that manually handle their data and incur huge costs in building data storage capacities. In this context, a significant cost reduction is possible with cloud-based computing (Aljabre, 2012; Conway, Carcary, and Doherty, 2015; Geczy, Izumi, and Hasida, 2011).

Gibson, Rondeau, Eveleigh, and Tan (2012) argue that large companies must focus on moving key HR practices toward cloud-based computing while SMEs can take advantage of its low capital expenditure. It is to be noted that SMEs, where latest HR technology adoption has taken place, have witnessed almost double the revenue per employee with a 12% increase in their overall HR, talent, and business outcome metrics (Sierra-Cedar, 2016). Moreover, according to the Deloitte report (Deloitte Insights, 2017), cloud-based software-as-a-service (SaaS) offerings can now be procured and operated without any long-term involvement of IT professionals. This indicates a gradual lowering of IT implementation costs of cloud-enabled solutions.

Cloud architecture

In line with other management fields, such as customer relationship management (CRM), the HR department requires high computational capabilities to make employee-related processes more efficient (in terms of cost and time/speed) and effective (better quality). To facilitate this, organizations need to provide HR managers with a computing infrastructure that integrates computation, services, and application components together as a 'ready-to-use' shared service and help them in analyzing and modifying HR systems and processes in a better way.

The latest technological advancements in cloud technologies offer the benefits that are desirable in most organizations. The technical features include:

- variable pricing (different prices at different times to use cloud services based on the available demand of that service);
- auto-scaling (dynamic determination and expansion of the service capacity to handle the incoming data load); and
- monitoring dashboards (maps and graphs for monitoring the performance of systems).

Thus, the cloud promises reliable services delivered through the next-generation data centres that are built on virtualized compute and storage technologies.

The cloud users can access applications and data from a 'cloud' anywhere in the world on demand. The cloud users are assured of the fact that the services will be available all the time and can be accessed from anywhere. To achieve this level of service delivery, computing services need to be highly reliable, scalable, and autonomic to support dynamic access, dynamic discovery, and composability. This is supported through the distinct features that cloud architecture provides. In particular, as identified in Table 7.2, five essential elements of cloud computing need to be understood to appreciate cloud advantages (Chabrow, 2011).

Table 7.2 Key features of cloud computing

-
- | |
|--|
| <ul style="list-style-type: none"> • On-demand self-service: Employees and HR can avail service anytime and from anywhere • Multiple supporting platforms: Service requests can be made from any internet-enabled electronic devices • Resource pooling: Due to plug and play technology features, the users need not be conversant about the underlying software or hardware used • Rapid elasticity: Consumers can scale up and scale down resources on demand • Measured service: Consumers can measure the usage of the resources availed and pay accordingly |
|--|
-

On-demand self-service: Ad hoc requests of a customer can be served instantaneously without the intervention of any third person. Through the click of button from any electronic device, a consumer with an instantaneous need of a particular service (e.g., current year's employee performance) can avail computing resources (such as central processing unit [CPU] time, network storage, software use, and so forth) in an automatic self-serving fashion.

Multiple supporting platforms: The cloud architecture supports a broad range of heterogeneous platforms (such as mobile phones, laptops, and personal digital assistants [PDAs]). A consumer can have any one of such platforms to access the desired computing resources located remotely by using network service (e.g., internet).

Resource pooling: Consumers need not bother about the location, formation, and sources of the resources they are using through a cloud service as they are handled by the service provider. Multiple consumers can access the same software instance simultaneously without being concerned about the underlying software, data storage, and concurrent users. This is known as the cloud's multi-tenancy or the virtualization feature.

Rapid elasticity: Cloud provides unlimited resource provisioning, that is, the availability of resources. Consumers can scale up resources on demand at the time of peak requirement and can release them when they decide to scale down.

Measured service: Cloud technology comes with metering capabilities through which consumers can measure the usage of the resources availed. Although computing resources are pooled and shared by multiple consumers (i.e., multi-tenancy), measured services help the consumers to know how much resources they have used and the amount of money they need to pay for those cloud services. Therefore, cloud vendors can project a viable transparent pay-per-use business model to the potential customers.

Cloud service models

The cloud service models can further demonstrate the advantages of a cloud platform that are described below:

Software as a Service (SaaS): Cloud consumers can access various software hosted on a remote environment through networks using various clients (e.g., web browser, PDA, etc.). Although cloud consumers do not have any control over the cloud infrastructure, the different applications shared by multiple consumers are organized in a single logical environment on the SaaS cloud. Examples of SaaS include Salesforce.com, Google Mail, and Google Docs.

Platform as a Service (PaaS): Through this service layer, the cloud consumers can develop a customized cloud service for themselves. PaaS offers a development infrastructure including programming environment, tools, configuration management, and so forth. While SaaS provides consumers a hosting environment, PaaS is a developmental environment for them. An example of PaaS is Google AppEngine.

Infrastructure as a Service (IaaS): Apart from using the application software on the cloud, cloud consumers can directly use the IT infrastructures (processing, storage, networks, and other fundamental computing resources) provided in the IaaS cloud. Hardware level virtualization is done at this layer to provide consumers with unlimited computing capability. The basic strategy of virtualization is to set up independent virtual machines (VM), which are independent from both the underlying hardware and other VMs. This feature helps a cloud-enabled organization for disaster recovery preparedness as a running memory image of a server can be deployed on another VM at the time of hardware failures. An example of an IaaS is Amazon's EC2.

Cloud deployment models

More recently, four cloud deployment models have been defined in the cloud community. They basically represent the appropriate cloud environment in which the organization decides to make their services available. The decision to go for a specific environment depends on the organization's size, scope of accessibility, financial capability, and ownership.

Private cloud: This cloud infrastructure is owned solely by a single organization, and the cloud data center is managed by the organization or a third party regardless of whether it is located in-house or off-premise. The organizations with multiple existing in-house systems often set up a private cloud to increase their internal processing capabilities. The organizations that choose to operate in a private cloud often need data privacy and security and thus want to have full control over their mission-critical activities.

Public cloud: This is the most used cloud computing deployment model. The cloud service provider has the full ownership of the public cloud data centers and opens its applications and services to the general public. The consumers pay for their usage according to the charging policy set by the cloud provider. Most of the organizations prefer to choose this deployment model as this model is economical. Organizations, in this case, do not have to bear operational cost to maintain data centers and licensing fee for application software. Many popular cloud services are public clouds including Amazon EC2, S3, Google AppEngine, and salesforce.com.

Hybrid cloud: This cloud infrastructure is a combination of two or more clouds (private and public) connected by a standardized or proprietary technology that facilitates data and application portability between them. Organizations can transfer their non-core competencies on a public cloud while controlling core activities on-premise through a private cloud. For example, HR services as SaaS components could be provisioned on a public cloud or Private cloud. The inter-operability and security concerns over accessing an organization's private and public cloud can be mitigated through the use of virtual private cloud (VPC), which encapsulates the organization's existing IT services and the public cloud services. In fact, all corporate security policies still apply to resources on the cloud even though it is on the public cloud. VPC represents a perfect balance between control (private cloud) and flexibility (public cloud).

Cloud-based HRM

In the context of HR, cloud computing can leverage the effectiveness of HR services by making their processes transparent to employees and the general public. HR can provide employees with in-context direct access and collaboration services that they can access on demand and through any internet-enabled devices. The solution includes various self-service and social collaboration features, apart from provisioning on-the-go access to HR applications and tools. A wide range of reports and dashboards are also available in HR cloud-based applications. From the perspective of HR operations, Global HRs can access dedicated cloud hosted services (through SaaS) such as predictive analytics and workforce modelling and can develop customized cloud services (through PaaS). The various HRM functions where cloud computing can be beneficial are as follows.

Talent acquisition: This is a vital HR function aimed at finding the right people at the right time for the right job. Cloud-based HR recruitment enables organizations to source, assess, and hire the best available talent locally and globally. The cloud-based *Crowdsourcing*⁸ enables organizations to shift from a captive based labor model to a more

efficient, effective, and flexible web-based job outsource model. In this context, they can benefit from a combination of global labor rates, more specialized skills, and more specialized task-management processes. Leveraging the benefits of business process automation and big data tools, an intelligent recruitment strategy can be formulated. Cloud-based talent acquisition tools are designed for targeted recruiting campaigns and can automatically access multiple network-based channels such as candidate portals, referral networks, and job board forums.

This software is able to create new potential candidate profiles after matching them with the organization's internal high performer profiles. Using tools such as applicant tracking, interview management, and requisition management, recruiters and hiring managers can streamline their hiring process. A potential candidate gets engaged in the organization's process by availing on-demand recruitment services such as enquiry services, interview scheduling, and offer letter management, and thereby develops a positive brand image of the firm. Some cloud-based talent acquisition softwares (e.g., Oracle HCM) allow the incorporation of video and other rich media content to increase candidates' engagement and conversion during the hiring process.

Goal-setting: It is a part of performance appraisal process and involves development of some action plans for employees to motivate and direct them toward a specific goal, which is generally tied to an organizational goal. Managers generally set SMART (specific, measurable, achievable, relevant, time-bound) objectives, aligned with overall business goals. A cloud-enabled goal setting process equips a manager to set specific or cascading goals at individual, teams, and at departmental levels, which can be tracked throughout the year with real-time alerts and reporting. Authorized cloud users can set individual task milestones that they can track and modify on a real-time basis. Employees can receive reminders for their goals or task deadlines in their mobile devices integrated with the cloud. HR department and line managers can set one-to-one meeting plans, set agendas, and send diary invites to employees through cloud-based video, audio and other applications. Cloud-based HRM software (e.g., SuccessFactor's Perform and Reward) allow managers and senior leaders to get a full overview of all performance goals. The managers can also get an insight into whether goals are aligned with business priorities.

Performance appraisal: This is one of the important HR functions where employees get evaluated on the basis of their performance on the set goals. The result of the evaluation is closely linked with an employee's promotion and compensation. Cloud-based appraisal makes it easier for HR and line managers to analyze and enhance employee performance by providing continuous feedback. HR can set multiple appraisal plans according to the employee's competency, hierarchy, and career aspirations. Each plan can have a unique combination of workflow, reminder rules, forms, scoring rules, and visibility rules. Appraisal plans can be integrated with employee goal sheets.

A 360-degree feedback system as a SaaS component allows superiors, colleagues, and subordinates to provide feedback on an employee's goal completion. Email or mobile message reminders can be sent to appraisers to remind them of the due dates. This facilitates meaningful performance management conversations throughout the year through cloud enabled systems without restricting performance appraisal to a fixed time period. To make performance reviews effective and efficient, HR cloud software (e.g., Success Factor's Perform and Reward) provides a dashboard-style view of an employee's performance with up-to-the-minute data on job quality, skills assessment, and positive and negative feedback (Rist, 2017).

Rewards and recognition: A fair system of rewards and recognition goes a long way in creating a committed workforce. A visually appealing key performance indicator

dashboard, commonly known as a competition leaderboard, can be set up and used as a visual aid to motivate staff, as well as to identify top performers for rewards and recognition. Similar to multiple appraisal plans, HR can design ready-to-go reward program plans integrating with the employee appraisal process. Employees can select from the list of reward plans available to them and can then manage, modify, and monitor their rewards program through any mobile devices.

Learning and development: Learning and development needs of employees are to be carefully handled to meet the organization's strategic development plans. HR analytical tools can assess the training needs of an individual, group, or department from the skills and competency gaps reported during interviews, performance appraisals, customer feedback, and self-development plans. Employees can avail the trainings and certification programs onsite or remotely in the cloud-based information system.

Enterprises can outsource their training programs to other training providers, which in turn deliver customized training materials, expert opinions, and techniques over the internet in cloud. Employees can access such programs at any time through electronic devices and earn credit points on successful completion. Through this internet-enabled training platform, working days loss over training programs can be avoided. On the other hand, continuing professional development (CPD) activities such as qualifications and certifications acquired by employees and effective evaluation of training programs can be tracked seamlessly using cloud-enabled HR systems.

For instance, Hyatt, one of the leading hotels, immensely benefitted by implementing cloud-based training programs. By embracing cloud-based training solutions, it trained its 10,000 employees spread over 54 countries in a very cost-effective manner (Taylor, 2016). Cloud technology helped their employees to access and watch training videos in their native language using their mobile phones.

Compensation management: It is one of the important outcomes of organizational development strategies. The presence of assistive cloud computing functions such as statistical analysis can help to design effective compensation plans for multinational firms operating in different locations around the world. Customized compensation plans can be easily deployed on a cloud platform and the system can immediately respond to it together with other existing compensation policies. Online self-services related to accessing compensation data and compensation policies can result in a paperless HR compensation system.

Virtual HR: Navimipour, Rahmani, Navin, and Hosseinzadeh (2015) have proposed a new class of HR in the era of cloud computing called virtual HRs (V-HRs). HR functionalities spread over geographic and organizational boundaries can collaborate together via the 'Expert Cloud' sharing knowledge, skill, expertise, and experiences to quickly solve any business problem. Through this expert cloud, employees can experience all time availability of V-HRs who can solve their immediate problems or queries through discovering, ranking, message sending, and knowledge sharing over the internet. These specialized HR services in cloud are called Expert as a Service (EaaS), which provide customers with transparent access to experts, knowledge, and skills remotely over the internet.

Customized off-the-shelf HRM cloud products

Enterprises generally choose customized HRMS cloud solutions from well-known software vendors such as Oracle (HCM Cloud), SAP (SuccessFactors), and Workday to name a few. If an organization is maintaining some HR applications (say payroll on PeopleSoft), Oracle fusion offers an advantage that the organization can choose to retain

running the payroll application on premise while migrating other functions on Oracle Cloud. Oracle has acquired different company products for different purposes; for instance, its integrated HCM cloud relies on Taleo—a software product that Oracle has acquired for talent recruitment purposes. Thus, for some organizations, Oracle's product acquisition and product co-existence strategy has added complexity in the firm's software acquisition and deployment strategy.

SuccessFactors offers customizable HR solutions like performance and learning. However, for the employee payroll system, it relies heavily on traditional SAP's on-premise payroll functionalities. Workday is well known as a SaaS provider, but it is yet to enrich its product functionalities by offering complex time-driven scheduling features. It also needs to come up with more localized payroll systems to become a true global HRMS cloud solution provider.

Evaluation of a cloud-enabled enterprise

Advantages: Modern business demands a unified cloud solution to drive and maintain its growth. It has been found in research studies that cloud-based computing solutions for payroll, compensation, recruitment, and performance management increase efficiency of the HR department (Bose, 2011; Celaya, 2015). The move toward integration of enterprise business functionalities and offering shared-cloud services are closely associated with the overall business strategy. The common data model architecture of a cloud platform helps to explore new market opportunities by providing immediate access and information through the financial management, human capital management, and sales management services in the cloud. Revenue analysis through predictive analytics and budgeting tools can help an organization's top management to determine which region can be targeted for market expansion.

The *cloud embedded HR collaboration* services can help to allocate resources for the targeted expansion. Through the use of the *predictive modeling* feature of human capital management services, HR can draw up a list of star performers. Using *cloud collaboration services*, meetings and interviews with recruitment experts and business unit heads can be arranged for the final selection of candidates. Using *self-service procurement services*, unit heads can open requisitions for new human capital resources. The *integrated cloud-enabled work-flow engine* routes the request in a sequential or parallel fashion to the business integrated mail inboxes of appropriate authorities for approval.

As the cloud services are designed on a *distributed service-oriented architecture*, global enterprises can adhere to cross country specific rules and policies while delivering their services to the respective country users or employees. Through the *business activity monitoring dashboards*, top management can analyze the performance of a team vis-a-vis the goals set and can take appropriate actions on deviations.

Limitations: Despite the above advantages, it is widely acknowledged that organizations are still struggling to find the right HRMS cloud product that perfectly fits their business, HR, and IT strategy. Unless they find the right fit, it is not possible to avail and maximize the cloud advantages. Quoting CompTIA's Fifth Annual Trends in Cloud Computing, van Eijk (2015) highlighted the following challenges faced by organization in implementing Cloud:

- Up to 40% of firms identified the learning curve as a key challenge.
- 23% to 34% were challenged by vendor lock-in.

- 44% had moved their cloud infrastructure or applications since adopting cloud—an exercise they cited as being costly and more difficult than the initial migration itself.
- Companies were finding it difficult to shift their business practices along with their new cloud strategies.
- 56% of respondents cited developing cloud expertise as a major hurdle.

Data security and privacy is the foremost concern of all cloud users as the user loses physical control of the servers hosting all the sensitive information. This aspect is further examined in Chapter 15. There is always a possibility that sensitive information may be compromised on the public cloud due to a lack of security controls. Cloud vendors make prolific use of third-party services and infrastructure (Baltatescu, 2014) and it is quite possible that their data privacy and security policy are very different from that of client enterprises. The enterprise cloud users should ensure that the vendor can provide data protection and security in the event of any disaster in the form of disaster recovery procedures that may include hosting the data on different servers in different locations.

Another major concern for cloud services customers is the risk of *vendor lock-in*. In such cases, customers become dependent on a certain vendor and are unable to change the vendor without incurring substantial losses or without substantial switching costs (Baltatescu, 2014). This issue can be addressed if vendors use compatible operating systems or adhere to open source software. Otherwise, the licensing rules and use of proprietary software can *hinder the establishment of open standards and interoperability* between cloud services providers.

Major concerns over data security and privacy, as well as lack of standardization and interoperability between cloud platforms are the major reasons for slow cloud adoption in highly sensitive data handling industries. In a recent research study on the enablers and barriers to cloud adoption in organizations, Celaya (2015) found that leadership support acts as a contributing factor for successful cloud implementation, whereas *lack of subject knowledge* impedes its success.

Measures for successful cloud implementation: One of the biggest challenges in a successful cloud implementation is to create a *climate for cloud adoption* as this technology is still in its nascent stage and enterprises can ill-afford financial and operational risks. A rigorous *cloud readiness assessment* on the organization's needs, assets, and capabilities should be performed before migrating any system on a cloud environment. It is recommended that rather than going in for a big-bang, whole-of-enterprise cloud implementation approach, organizations should take an *incremental approach* and start cloud migration with small pilot projects. Further, cloud computing *training* should be imparted across all management levels to successfully embrace cloud as the next-gen business enabler.

As cloud computing is based on a distributed service-oriented architecture, a clear *cloud governance framework* comprising of the management of identified and deployed services, and ownership and authorization of cloud-based systems and services has to be in place. The existing control models should be redesigned to support cloud centric service management along with a revision of existing policies and procedures. A *cloud service delivery management group* should be set up to manage the contracts, operational-level agreements, and service-level agreements (SLAs) for cloud-based services (Open Data Center Alliance, 2014).

Summary

The e-HRM's goal to have standardized HR processes by designing a common system across the organization can be achieved through a cloud-based HR system. A cloud based

HRIS reduces the total cost of ownership and increases the system efficiency many folds. However, the implementation of a cloud-based HR system is tightly linked with the overall business strategy of a firm. The reasons for the failure of most of the cloud-based implementations are generally misdirected objectives, application of wrong implementation methods, and misalignment of organizational competencies with business goals.

In future, the scope for HR technologies will not be restricted within or across organizational boundaries but will seamlessly get integrated with the human capital life cycle to tap an individual's likes, dislikes, and aspirations. Organizational researchers have started realizing the importance of 'implicit motivation,' as subconscious goals are becoming important predictors of an employee's performance (Shantz and Latham, 2011). A cloud-based business intelligence, process automation, and human-centric analytics have the potential to unearth latent factors. It can help HR to design and allocate tasks well suited for an employee's personal and professional growth in organizations.

In conclusion, while cloud computing offers immense opportunities to deploy state of the art technologies to provide better, cheaper, and faster HR services at a global level without having to incur heavy upfront costs, organizations need to take a very cautious long-term approach to this nascent technology trend by adopting a comprehensive cloud readiness assessment and governance framework, underpinned by well-crafted service level agreements with the service providers.

Case study: ABC Corporation's cloud journey—A bumpy road to success

ABC Corporation, which operates in more than six countries across the globe with more than 15,000 employees, has been steadily increasing its market share in the retail business space. According to US trade analysts, big players such as Walmart and Sears could pose a serious threat to brick and mortar companies like ABC. The newly appointed Chief Information Officer (CIO), Mr. Vikrant Sen, had observed that the organization was still maintaining huge spreadsheets for its supply chain planning and procurement. Moreover, information silos resulted in lack of communication, collaboration, and consistency across organizational departments.

The CIO of the company had started the cloud initiative in early 2017 with a vision to develop a faster and a collaborative communication environment. Building a new private data center was ruled out due to its high implementation and maintenance cost. Migration of organizational data to cloud seemed to be a feasible cost-effective solution. Moreover, the organization had expansion plans in Southeast Asia, and therefore the need for a reliable, scalable, and flexible IT infrastructure and a platform for an easy business process management and deployment was urgent.

However, the cloud implementation team could not meet the deadlines and the final implementation date kept shifting. Mr. Sen arranged an internal stakeholder meeting and identified the following barriers for cloud implementation.

- Most of the departments were not ready to change their on-going process of handling data and services. The departments were not aware of non-value-added activities of their business processes. Lack of coordination between IT and business resulted in misidentified or unidentified to-be cloud services.

- Regional HR office was reluctant to expose their sensitive employee information to the cloud environment.
- Lack of a centralized data management policy and procedure hampered the process of planning, creating, managing, protecting, improving, and disposing of organizational data. Every department had their 'own way of doing things.'
- Selection of a specific cloud vendor was a big issue as the suppliers and distributors of the ABC Corporation had different cloud providers. Incompatibility and security issues regarding data exchange between different cloud providers created panic among ABC Corp's IT personnel.

Mr. Sen realized that his 'big-bang' approach toward cloud implementation was a hasty decision. A comprehensive cloud readiness assessment and a well-planned data migration strategy were required under such circumstances. The migration strategy should also be underpinned by a well-assessed cloud vendor selection mechanism. After critically analyzing the issues pertaining to data security, data quality, and governance, Mr. Sen decided to go for a pilot cloud migration project with a few selected departments. Positive results started emerging within months of cloud implementation. The time for preparing critical HR reports was reduced from weeks to a few hours. The process efficiency observed in some business operational areas astounded Mr. Sen, and according to him, 'We have regained our confidence on cloud and we are now confident that we can deliver service with much more agility and confidence.'

Case study questions

- What prompted the CIO to take the decision to make ABC a cloud-enabled enterprise?
- What were the challenges faced by ABC Corp's cloud implementation team?
- How did the company address cloud implementation challenges? What were the key success factors?

Debate: Is cloud computing a passing cloud?

Introduction

Cloud computing has been creating quite a buzz lately in the technology space. However, two different schools of thought exist regarding the hype versus reality of cloud computing in the business world. According to some techno-market analysts, the emerging cloud concept has given rise to 'inflated expectations' among business leaders. The hype has been predicted to fade away in the near future when businesses start encountering major cloud integration challenges and face diminishing returns of the technology adopted (Washke, 2017). On the other hand, tech-trend reports say that the scalability, flexibility, and the cost benefits that are being realized by early adopters will create a stable market place for cloud among the

major players in the field. The pay-offs of cloud adoption in different domains and applications can move this technology to the 'plateau of productivity,' and thus, cloud computing can remain in the technology landscape for years to come (Adamuthe, Tomke and Thampi, 2015; van Eijk, 2015).

Arguments in favor

1. As most of the cloud adopters perceive their organization's sensitive information might be compromised on the public cloud due to its lack of security and control on the data, they may prefer private clouds over other deployment models. Therefore, the value propositions of other cloud deployment architectures may not be fully realized by an organization.
2. Cloud service providers have their own proprietary software and SLAs with clients. Lack of an open standard of communication between different cloud providers often leads to the problem of 'vendor-lock in' (van Eijk, 2015).
3. The laws and regulations that are enforced by different countries on 'data sovereignty,' making it difficult for cloud providers to store other country's data in a digitized format (Leinwand, 2017).
4. Cloud adopters often face integration challenges while implementing cloud across the organizational business areas. Although cloud computing is supposed to reduce IT support cost, organizations often end up spending more on IT to resolve integration issues.
5. As cloud computing is an emerging technology, lack of knowledge on the cloud domain among the top management personnel impedes its success. Top management often does not want to disturb the status quo and is reluctant to change the way of doing business.

Arguments against

1. Cloud computing is the only effective solution to handle the 'data explosion' complexities. It enables businesses to take informed decisions by giving them a platform to access, store, consolidate, analyze, and expose business data and services (Baguley, 2013).
2. The inherent scalability and flexibility features of cloud computing architecture allows small to large businesses to build rapid product designs or service prototypes before moving into actual production or market.
3. Cloud implementation benefits include almost zero software license fees, low hardware implementation, and low maintenance costs. Pay-per-use facility allows companies to scale up and scale down their consumption level depending on the available market demand.
4. This emerging technology has just passed the 'early adoption' phase. It is well accepted that the longer the company has been working with cloud, the fewer concerns it will face regarding data securities and control issues (McKendrick, 2012).
5. The real essence of cloud computing can be reaped by any business through the alignment of its business strategy with the cloud implementation strategy.

Useful references

- Adamuthe, A. C., Tomke, J. V. and Thampi, G. T. (2015), "An empirical analysis of hype-cycle: A case study of cloud computing technologies," *International Journal of Advanced Research in Computer and Communication Engineering*, Vol. 4, No. 10, pp. 316–323.
- Baguley, J. (2013), *How cloud computing is changing the world . . . without you knowing*. The Guardian. Available from www.theguardian.com/media-network/media-network-blog/2013/sep/24/cloud-computing-changing-world-healthcare.
- Leinwand, A. (2017), *3 Things companies must know about data sovereignty when moving to the cloud*. The Enterprisers Project. Available from <https://enterpriseproject.com/article/2017/1/three-things-companies-must-know-about-data-sovereignty-when-moving-cloud>.
- McKendrick, J. (2012), *From annoyance to harmonizer: Cloud computing's maturity curve*. Forbes. Available from www.forbes.com/sites/joemckendrick/2012/06/28/from-annoyance-to-harmonizer-cloud-computings-maturity-curve/.
- Waschke, M. (2017), *Cloud failures can occur anywhere on the hype cycle*. InfoWorld. Available from www.infoworld.com/article/3188044/cloud-computing/cloud-failures-can-occur-anywhere-on-the-hype-cycle.html.
- van Eijk, P. (2015), *The cloud hype is over—Are your clients ready for reality?* ITpreneurs. Available from www.itpreneurs.com/blog/cloud-hype-over-ready-for-reality-cloud-certification/.

Video learning resources

- Cloud computing: Explains the benefits of cloud computing over traditional IT resources by emphasizing its flexibility, scalability, and lower total cost of ownership (TCO): www.youtube.com/watch?v=ae_DKNwK_ms
- Software as a Service (SaaS): Explains the three-tier cloud architecture along with few commercial software products used across these three-tiers: www.youtube.com/watch?v=36zducUX16w
- Cloud HR: Explains how HR can leverage employee training, learning, and development through cloud enabled business operations: www.youtube.com/watch?v=rTPHOGGrFpz8
- HR as a shared service: Demonstrates how HR capabilities can be deployed as shared services in cloud to increase organizational efficiency by combining Salesforce capabilities: www.youtube.com/watch?v=7oU1omWcBrk
- HR cloud readiness: Demonstrates the requirements and challenges to be taken care of during the implementation of a HR cloud solution: www.youtube.com/watch?v=vOQ8dKQW95M

Notes

- 1 ICT or information communication technology uses information technology to integrate enterprise communication services (mail, chat, instant messaging, video conference, audio, etc.), which enable users to access, store, transmit, and manipulate information.
- 2 ERP or enterprise resource planning products are business process management software that uses its inbuilt, customizable, and integrated applications to manage business functions.
- 3 CRM or customer relationship management products manage and analyze customer centric data throughout the customer lifecycle to improve business relationships with customers.

- 4 Business process management is a systematic way of designing, executing, and controlling business processes linking people, business functions, and technology.
- 5 Big data represents very large data sets that are mainly used for predictive analysis purposes.
- 6 IoT is the acronym for 'Internet of Things,' which comprises smart devices embedded with electronics, software, sensors, and network connectivity to collect and exchange data.
- 7 Triple-T is known as technology trade theory, which evaluates any specific technology adoption intentions by outweighing the adoption disadvantages from adoption advantages.
- 8 Crowdsourcing is the process of obtaining information or input online from a large set of people for completion of a particular project or task.

References

- Aljabre, A. (2012), "Cloud computing for increased business value," *International Journal of Business and Social Science*, Vol. 3, No. 1, pp. 234–239.
- Assante, D., Castro, M., Hamburg, I. and Martin, S. (2016), "The use of cloud computing in SMEs," *Procedia Computer Science*, Vol. 83, pp. 1207–1212.
- Azevedo, P. S., Romao, M. and Rebelo, E. (2012), "Advantages, limitations and solutions in the use of ERP systems (Enterprise Resource Planning): A case study in the hospitality industry," *Procedia Technology*, Vol. 5, pp. 264–272.
- Baltatescu, I. (2014), "Cloud computing services: benefits, risks and intellectual property issues," *Global Economic Observer*, Vol. 2, No. 1, pp. 234–237.
- Bose, I. (2011), "Cloud computing and its impact on corporate HR practices," *Advances in Management*, Vol. 4, No. 12, pp. 57–58.
- Celaya, T. A. (2015), "Cloud-Based Computing and human resource management performance: A Delphi study" (Doctoral dissertation, University of Phoenix).
- Chabrow, E. (2011), *5 Essential characteristics of cloud computing*. InfoRisk. Available from www.inforisktoday.com/5-essential-characteristics-cloud-computing-a-4189 (Accessed 25 August 2017).
- Conway, G., Carcary, M., and Doherty, E. (2015), "A conceptual framework to implement and manage a cloud computing environment," In: *Proceedings of the Sixth International Conference on Cloud Computing, GRIDs and Virtualization*, Nice, pp. 138–142.
- Deloitte Insights (2017), *Tech trends 2017: The kinetic enterprise*. Deloitte University Press. Available from www2.deloitte.com/us/en/pages/technology/articles/technology-consulting-tech-trends-collection.html (Accessed 25 August 2017).
- Ettlie, J. E. and Pavlou, P. A. (2006), "Technology based new product development partnerships," *Decision Sciences*, Vol. 37, No. 2, pp. 117–147.
- Fitz-enz, J. and Davison, B. (2002), *How to measure human resources management (3rd edition)*. New York, NY: McGraw-Hill.
- Geczy, P., Izumi, N., and Hasida, K. (2011), "Cloudsourcing: Managing cloud adoption," *Global Journal of Business Research*, Vol. 6, No. 2, pp. 57–70.
- Gibson, J., Rondeau, R., Eveleigh, D., and Tan, Q. (2012), "Benefits and challenges of three cloud computing service models," In: *Proceedings of Fourth International Conference Computational Aspects of Social Networks (CASoN)*, Sao Carlos, pp. 198–205.
- Hertel, G. and Schroer, J. (2008), "Electronic human resource management (E-HRM): Personalarbeit mitnetzbasierter Medien," In: Batinic, B. and Appel, M. (Eds.). *Medienpsychologie*. Berlin, Heidelberg: Springer, pp. 449–475.
- Hoogervorst, J. A., Koopman, P. L., and Flier, H. V. D. (2002), "Human resource strategy for the new ICT-driven business context," *International Journal of Human Resource Management*, Vol. 13, No. 8, pp. 1245–1265.
- Ikhlap, K., Khan, A. F., Mujtaba, B. G. and Sadiq, U. (2012), "The impact of information systems on the performance of human resources department," *The Journal of Business Studies Quarterly*, Vol. 3, No. 4, pp. 77–91.

- Karimidizboni, R. (2013), "Human resources information system," *Interdisciplinary Journal of Contemporary Research in Business*, Vol. 4, No. 10, pp. 1004–1017.
- Kohli, R. and Grover, V. (2008), "Business value of IT: An essay on expanding research directions to keep up with the times," *Journal of the Association for Information Systems*, Vol. 9, No. 1, pp. 23–39.
- Low, C., Chen, Y. and Wu, M. (2011), "Understanding the determinants of cloud computing adoption," *Industrial Management & Data Systems*, Vol. 111, No. 7, pp. 1006–1023.
- Navimipour, N. J., Rahmani, A. M., Navin, A. H. and Hosseinzadeh, M. (2015), "Expert Cloud: A cloud-based framework to share the knowledge and skills of human resources," *Computers in Human Behavior*, Vol. 46, pp. 57–74.
- Nigam, A. K., Nongmaithem, S., Sharma, S. and Tripathi, N. (2011), "The impact of strategic human resource management on the performance of firms in India: A study of service sector firms," *Journal of Indian Business Research*, Vol. 3, No. 3, pp. 148–167.
- Obeidat, M. A. and Turgay, T. (2013), "Empirical analysis for the factors affecting the adoption of cloud computing initiatives by information technology executives," *Journal of Management Research*, Vol. 5, No. 1, pp. 152–178.
- Open Data Center Alliance (2014), *Master usage model: Business strategy enabled by Cloud Rev 1.0*. Available from <https://opendatacenteralliance.org/article/business-strategy-enabled-by-cloud-master-usage-model-rev-1-0/> (Accessed 27 July 2017).
- Rai, A., Pavlou, P. A., Im, G. and Du, S. (2012), "Interfirm IT capability profiles and communications for cocreating relational value: Evidence from the logistics industry," *MIS Quarterly*, Vol. 36, No. 1, pp. 233–262.
- Rist, O. (2017), *The best performance management software of 2017*. Available from <http://in.pcmag.com/cloud-services/102377/guide/the-best-performance-management-software-of-2017> (Accessed 25 August 2017).
- Shantz, A. and Latham, G. (2011), "The effect of primed goals on employee performance: Implications for human resource management," *Human Resource Management*, Vol. 50, No. 2, pp. 289–299.
- Sierra-Cedar (2016), *2016-2017 HR systems survey white paper, 19th annual edition*. Available from www.sierra-cedar.com/white-papers/ (Accessed 25 August 2017).
- Simon, P. (2013), *Even small companies can tap big data if they know where to look*. Available from <https://hbr.org/2013/12/even-small-companies-can-tap-big-data-if-they-know-where-to-look> (Accessed 25 August 2017).
- Sparrow, P., Hird, M., and Cooper, C. L. (2015), "Strategic talent management," In: Sparrow, P., Hird, M., and Cooper, C. L. (Eds.). *Do We Need HR?* London: Palgrave Macmillan, pp. 177–212.
- Stone, D. L. and Dulebohn, J. H. (2013), "Emerging issues in theory and research on electronic human resource management (eHRM)," *Human Resource Management Review*, Vol. 16, No. 2, pp. 229–244.
- Stone, D. L., Stone-Romero, E. F., and Lukaszewski, K. (2006), "Factors affecting the acceptance and effectiveness of electronic human resource systems," *Human Resource Management Review*, Vol. 16 No. 02, pp. 229–244.
- Sullivan, J. (2014), *Top 15 design principles for talent metrics and analytics*. Available from <https://drjohnsullivan.com/articles/top-15-design-principles-talent-metrics-analytics/> (Accessed 25 August 2017).
- Taylor, T. (2016), *Hyatt turns to cloud-based employee training solution*. Available from www.hrdiver.com/news/hyatt-turns-to-cloud-based-employee-training-solution/427031/ (Accessed 25 August 2017).
- van Eijk, P. (2015), *The cloud hype is over—Are your clients ready for reality?* ITpreneurs. Available from www.itpreneurs.com/blog/cloud-hype-over-ready-for-reality-cloud-certification/ (Accessed 28 March 2018).