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Mobile Office and Its Implications for ERP Systems: A Review of Literature

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Abstract: *The surprising growth of mobile technology has seen many benefits. During the recent decades businesses also try to benefit from this; one of them is mobile office / enterprise. When organizations become mobile-enabled, their ERP systems also face some implications which have to be carefully dealt with. The implementation of mobile-office forces organizations to reengineer some or all of its business processes, etc. If all opportunities offered by technology are carefully acquired, organizations should be prospering for sure.*

Keywords: *Mobile Office, Enterprise Resource Planning Systems, Implications*

I. INTRODUCTION TO MOBILE OFFICE

“Mobile office is the workspace of employees working out of their company office. They are usually equipped with a portable computer or any other mobile devices and connect to the company servers and Intranet using wireless technologies [1].

Organizations having implemented networks, communication technologies, issued its employees with portable devices such as smart phones, Galaxies, Blackberries, or any other handheld device doesn't imply that they have become mobile; rather this means that they have added small extension in the geographical scope of existing organizations. These organizations should change the way their employees work. Therefore, in addition to having a good amount of mobile workers with such devices, an organization has to change at least a portion of itself into a mobile enterprise; strictly speaking, it needs to rethink about the how its businesses are conducted, the way people interact and collaborate, as well as how the enterprise's resources are accessed, and the how the enterprise is going to adapt the technological changes, mobile-based in our case [2].

The low prices of mobile handheld devices such as PDAs, web-enabled cellular phones, Smartphones, and Tablets etc. and the improvements of open mobile standards have made the concept of mobile office grow by leaps and bounds. It was expected that by the year 2004 the number of mobile subscribers would increase as much as a billion [3]. With the successful growth electronic commerce (e-commerce) on the WWW and growth of the number of mobile devices and users, the need for m-commerce services (carrying out business transactions using mobile devices [10]) have been indirectly compelled. These m-commerce services and applications are categorized into two major groups; consumer-based and business-based. The consumer-based applications are the day to activities that people do; whereas the business-based m-commerce means the activities carried out by organizations that improve the businesses' productivity [3]. For example, in a mobile-office enabled enterprise, a sales executive who is meeting a client in the client's office can check the inventory and latest prices from the corporate main information system using a mobile device to get orders from the client details of which will be instantly updated to the main database.

Employees who work away from physical office are highly mobile and their communication and coordination happens very often synchronously but they are virtually located together. For mobile workers, the mobile systems they use for their communication are one of the most important tools [5].

According iPass Inc., the number of mobile workers is more than 187.9 million workers and Forrester Research expects that by the 2012 there will be more than 397.1 million workers will be mobile, which will represent 73% of the enterprise workforce in the world. Employees don't worry about the compliance, security, or any cost implications, what they need is the access and availability of corporate information wherever they are and whenever they need them. It is estimated in mobile devices more than 70% of corporate data are residing in any format and 75% of the enterprises don't have a comprehensive rules and regulations so as how to deal with the management as well as the security of all their mobile devices [6]. In the United States 50 million employees are mobile and they are away from their main office for 20% of their time and in Europe also the mobile workforce's size is growing rapidly [8].

In today's world, consumers purchase a huge amount of mobile devices which are not mere mobile phones but they have inbuilt miniaturized computers. Because of this trend, the mobile technology is pressured by the consumers and technology providers have to update themselves each day every second. Connectivity options are determined by the consumers. People are moving with Symbian OS based devices and Google's Android based ones and markets for such devices have risen up and a huge amount of mobile application packages are available. This speaks volume that people

of this era have become smart and they want more from the technology. They are impatient with obsolete office equipment and desktops [6].

The number of mobile work force is growing by rapidly and this trend pushes enterprises to provide their employees with mobile solutions. Mobile enterprise application users are group into two types namely field workers and information users. Field workers such as delivery drivers, service engineers, and inspectors need to have access to real-time information like schedules and emergency works to be attended [2]. The information users like executives, consultants, etc. need to have access not only to e-mails and schedules but also back end resources such applications in the ERP systems and databases with on-time availability of corporate information (such as CRM, SRM, stocks), etc.; this pressures ERP vendors to come out with innovative solutions that support mobility [2], [8].

II. ENTERPRISE RESOURCE PLANNING

Enterprise Resource Planning systems are also called as ERP (pronounced as “E R P”) systems. Ellen F. Monk and Bret J. Wagner define ERP systems as *programs are core software used by companies to coordinate information in every area of the business*. These ERP systems are enterprise-wide information systems found in organizations and coordinates the information in functional areas such as Accounting and Finance, Supply Chain Management, Marketing and Sales, and Human Resource Management, etc. of the business [11]. The ERP System integrates the planning, management and usage of resources in all functional areas of the organization. Flow of information across all departments of the organization are integrated by this ERP system, this is its major objective [4]. The typical application modules of an ERP system are shown in the Figure 1.

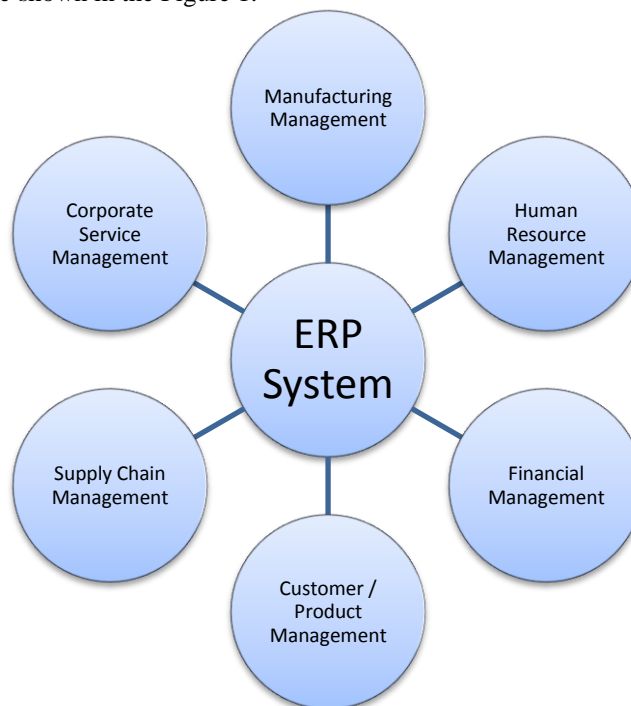


Figure 1: ERP Application Module, Source: [4], pp. 315.

Companies that want to have ERP system can get this by different ways. If they already have information systems for each functional area, they can write programs that will make each standalone programs to *talk* to each other. Another option is to write complete enterprise-wide system from scratch that is custom built and migrate the existing data (if any) into the newly built system; this will be a costly and risky effort. Yet another option is to go for commercially available ERP packages. Well know ERP vendors are SAP AG, Oracle, and Peoplesoft, etc., Microsoft has also become one of the well-known.

For small organizations, rather than buying and installing the ERP system, which will cost for software package as well as hardware infrastructure, they can enjoy another option of going for Application Service Providers (ASPs) who offer this ERP packages as a service online (SaaS – Software as a Service). The advantage will be that these companies need not have to buy all modules; they can purchase the license for selected modules, thereby the cost will be far less [4].

III. IMPLICATIONS FOR ERP

If an employee or an executive can check inventory levels, feed order details, see items ordered, have a view of order status of an item, invoice a customer in customer’s premises, and perform other most common tasks online while on mobile or if executives can have updated or real time management reports and summaries of the business available in a mobile device i.e. if they can have information from their ERP/CRM [4] to their mobile devices, these will be great and welcome functionalities of any system [2]. Leading ERP system suppliers have developed mobile versions of most commonly used modules of their packages [2], but the growing vendors of ERP systems have come out with this feature as soon as possible otherwise their future will be questionable.

“The mobile enterprise is an emerging organizational form that has resulted in a paradigm shift of how business is done” [2] and mobile office is inside the mobile enterprise (see Figure 2), and organizations have recognized the reason for adopting mobile information and communication technologies. Mobile Information and Communication Technologies (mobile ICT) was in immature status in the year 2000 [2] but now it has grown a long way. Implementation of mobile ICT in enterprises creates new core competencies, brings competitive advantages, and new markets [2].

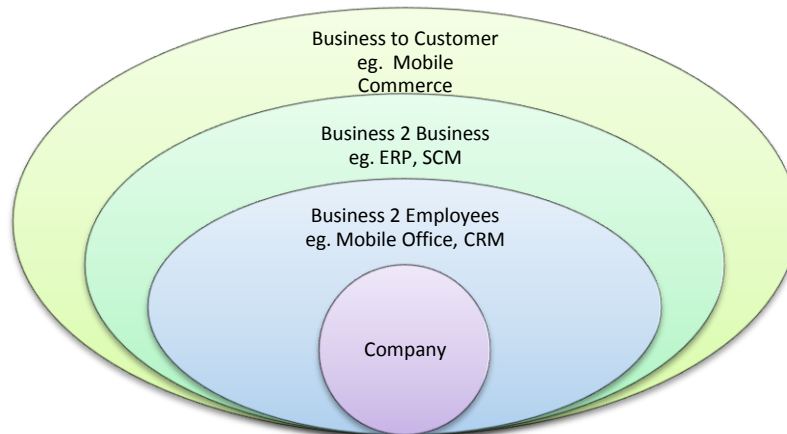


Figure 2: Categories of Mobile Enterprise Solutions: Source [2]

ERP systems have all organizational information that mobile workforce and other employees (top to bottom) on the move need. With the improved mobile connectivity such as 3G and 4G (it is said that 4G has been designed for enterprise use [5], fast growing technology improvement in mobile device manufacturing and their availability in varying prices (in previous years Blackberry was the dominant and oligopoly for mobile e-mail), the need for mobile access to corporate information resources has become an ordinary need for any organization. Moreover, mobility solutions can reduce costs and costly computing devices are likely to be substituted by smaller, portable, cheaper handheld devices [2]. Organizations have started to realize the huge potential that mobile ICT has to offer [2]. This is another implication of the mobile office for ERPs.

Although companies may be ready to adapt any new technologies and be flexible to accept any major changes in their business processes, among many successful implementations, there are failure points were unexpected or undesired results and utter failures when these companies tried to incorporate mobile technologies; because leaders in many organizations failed to realize the fact that enable their organizations ‘mobiled’ would change the business model (how a business operates to make profit [10]).

Bandwidth [2] is one of the primary challenges. For example getting list of 1000 customers with their profiles and history or downloading a partitioned portion of the database or synchronizing with central database would be a painful task if the mobile worker is in a bandwidth mobile connectivity area. Though the ERP vendor has designed sophisticated and colourful apps that run on any mobile device, without the required bandwidth and with inconsistent connectivity, mobile ERP implementation would be signaling disappointments.

Mobile ICT is still maturing [2]; although has grown, the common standards are established very slowly; networks’ data rates are upgraded continuously, very slow introduction of new mobile devices capable of handling large amounts of enterprise data and introduction of new lucrative enterprise mobile applications are now only starting to come [2].

Security and the integrity of mobile office and ERP and assurance of the data [2] is another implication because the data exchanged between devices are exposed to many hackers and intruders,

Concerns about the encryption method to be adopted, no guarantee that the mobile device that a mobile worker possesses will not be stolen or lost, threat of worse malware; this concerns will cause the decision makers to think seriously about going mobile, result will be that there will be concern about bringing the ERP to mobile.

Including modules for mobile devices in existing ERP solutions; will ERP vendors provide free or nominally priced mobile apps or need middleware? What about existing IT infrastructure with huge investments; if they had been designed without foreseeing the mobile technologies, have to be re-designed?

Another implication is that handheld devices which are designed for general purposes (Bring Your Own Devices - BYODs) have their own operating systems and platforms and ERP Systems that resides on corporate servers on the LAN have their own data formats [4] and in order to make this corporate server that is running the central database of the ERP and its various programs to ‘talk’ to handheld devices, there arises the need for middleware; this gives rise to compatibility issue as well. Moreover “The mobile ERP is still being in its early development stage and companies are trying to completely understand remote access solutions” [4].

ERP System’s programs have their Graphical User Interfaces (GUIs) optimized for desktops; ERP vendors need to design mobile compatible solutions [4].

IV. CHANGING BUSINESS PROCESSES TO ENCOURAGE GREATER MOBILITY

Oxford Advanced Learner’s Dictionary defines a process as a series of things that are done in order to achieve a particular result and set of or a collection of business activities, that have clear starting and ending points and done in

sequence (sometimes simultaneously), that are performed to achieve a clearly defined goal can be called a business process for example purchasing an item or part is a process [2]. In the past twenty years, to improve the efficiencies and the effectiveness of enterprises, the business process reengineering and organizational restructuring were the popular methods [7]. When an organization is becoming digital or when it modifies the way the organization's information systems, there will be some pressures for the organization to redesign or reengineer some or many of its processes [2].

When an organization implements mobile office, changes in its business processes will be inevitable and such organizations will be *reengineering* its processes; the set of activities performed to achieve a well-defined goal will be fundamentally changed (Business Process Reengineering – BPR). For example, in order to determine discount rate for a customer, a sales representative will log into the company's mobile-CRM or mobile-ERP to get all history of the customer; here the set of activities (process) is changed from when the company was not mobilized, sales representative would definitely like this; people never dislike changes; but the dislike being changed [1].

The concept of BPR has now changed as Business Process Redesign which focuses from doing a change in a single process up to changing the entire processes in an organization and another extension of the BPR is called Business Process Management (BPM) which combines both redesign and workflow systems [2].

When an organization wants to change its processes to encourage mobility, it has to tackle certain issues such as technical challenges, issues related with the management, tactical and organizational factors [2]. The following can be done to execute changes in the business process [2]:

- Management might not be well-aware of the importance of the changes to be made; the team implementing the mobile technology should justify so that the top management's vision, its support will be available for the successful implementation of the changes [2].
- The implementing team should design the processes that are clearly in alignment with the strategic goals of the organization.
- Adoption of mobility requires a big cultural change at many levels in the organization; therefore it has to be addressed.
- Human resource management issues have to be addressed carefully; training for staff, educating the staff about the positive outcomes of the project such as the financial benefits through improved profits, improvements in way business activities, etc.; making the employees understand the changes as positive move will pull their fullest support for the successful implementation of the mobile technology in the office.

BPR projects attempt to convert management's subsystems like style, values, and measures, employees' jobs, their skills, and culture, information and communication technology, and also the structure of the organizations [13] and 50% - 60% of BPR projects have failed in the past [13] because they try to bring in changes radically (revolutionary) on constraints such as political, organizational, etc. therefore the management should realize that BPR projects should be "*less radical, more holistic, and more incremental*" (evolutionary) [12],[13]. Many software tools are available to help change business processes and 'map' the processes careful mapping is critical [1] for the mobile office implementation project's success.

As elaborated above, therefore, bringing in mobile technologies in-house not only requires changes in the hardware and software of the enterprise but also changes in processes, human resources, etc.

V. CONCLUSION

The above study explained the concept of mobile office which is inside the mobile enterprise and ERP systems and did a survey about the implications of mobile office on organizations ERP systems. When trying to convert itself into a mobile enterprise with full-fledged ERP system with mobile technologies, organizations will have to change their business processes also. BPR should not be made radically or at once; they have to be implemented incrementally by considering not only the technological issues but the managerial, strategically, as well as human related issues as well; careful implementation will never end in any failure points.

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