

Management Strategies of Enterprise Mobile Application in Mobile Internet Environment

Mengli Li^{1, a}, Xumei Zhang^{1, b *} and Xingshan Wang^{2, c}

¹School of Economics and Business Administration, Chongqing University, Chongqing, 400044, PR China

²Inspur Group Co.,Ltd., Jinan, 250101, PR China

^a20140202009t@cqu.edu.cn, ^bzhangxumei@cqu.edu.cn, ^cwangxsh@inspur.com

* Corresponding Author

Keywords: Mobile Internet; Enterprise Mobile Application; Mobile ERP; BYOD

Abstract. Rapid development of mobile Internet induces the surge in demand of enterprise mobile application. In order to satisfy management requirements in such environment, a growing number of enterprises implement mobile ERP strategy. However, the access of mobile Internet and the extension of enterprise information management to mobile terminal intensify the complexity of the operation environment of ERP and enhance the difficulty of collaborative management between mobile terminal and PC terminal. Further, these changes result in problems on mobile device management, mobile security management, enterprise mobile application integration and mobile social platform management. Then we analyze reasons of these problems in mobile Internet environment in detail. Based on these analyses, we pertinently put forward the management strategies of enterprise mobile application in mobile Internet environment.

Introduction

Increasing advance of mobile Internet and mobile devices has reshaped people's work and life overall. According to the statistical data from the Ministry of Industry and Information Technology of the People's Republic of China, up to January 2016, mobile Internet users have reached 980 million in China [1]. Rapid development of mobile Internet drives enterprises' revolution of operation pattern and business process, which promotes the surge in demand of enterprise mobile application. More and more enterprises implement mobile enterprise resource planning (MERP) in order to satisfy management requirements in such environment. Meanwhile the development of mobile devices and mobile Internet technology establishes a solid foundation for ERP's mobile application. Enterprise Mobile Application (EMA) [2] is designed based on mobile business needs, which extends ERP scenarios to mobile terminal, and is simple to operate. The implementation of EMA allows employees to use fragmented time to work, solves the problem of "last one kilometer" in information technology effectively, and is an important means to promote the innovation of enterprise operation management mode in mobile Internet environment.

The initial researches on EMA focus on its framework, for instance Dabkowski and Jankowska (2003) [3], Al Bar et al. (2011) [4]. These scholars introduce the implementation of EMA framework from the technical aspect. Instead, we primarily analyze problems of EMA and its management strategies from management perspective. With the increase in relevant researches, Cailean and Sharifi (2014) investigate when and how the concept of "Mobile ERP" has evolved through a literature review [5]. Nowadays, with the development of mobile devices, more and more scholars pay attention to BYOD [6] strategy and its corresponding issues, such as Singh (2012) [7], Miller et al. (2012) [8] and Tokuyoshi (2013) [9]. They all discuss the BYOD's security problems. The above literature introduce the concept of MERP, the framework of EMA and security issues brought from BYOD from different aspects, but they lack systematic research on management problems that may be encountered in implementation of EMA under BYOD and the corresponding management strategies.

Based on the management needs in mobile Internet environment, we intend to analyze main problems of EMA in the process of furthering the MERP strategy, diagnose corresponding reasons in the management process, and finally propose the management strategies of EMA.

Problems of Enterprise Mobile Application in Mobile Internet Environment

BYOD strengthens the difficulty of management

The implementation of BYOD strategy can improve employees' work efficiency and speed up the ability of enterprises' technological innovation. But BYOD devices such as personal computers, smartphones and tablets vary from product type, operating system to hardware configuration, which extremely influence the office experiment of mobile devices. The variety of mobile devices brings great challenges for mobile device management. Employees' haphazard usage pattern also results in vulnerability of mobile devices. Moreover, the usage of BYOD devices will increase communication costs of employees. The mixture of employees' personal tariff and business tariff, the different rates of employees' different levels make the situation even worse. How to balance the relationship between cost control and employees' motivation is the management issue that must be solved when enterprises carry out BYOD strategy.

Vulnerability of mobile devices triggers mobile security issues

The usage of BYOD is adapt to mobilization and can encourage the enthusiasm of employees. But enterprises' and private sharing of the devices leads to data obfuscation and employees' free access to enterprise data, which increase the risk of enterprises data leakage. Meanwhile, vulnerability to damage or lose and faster renewal speed may lead to lose or damage of digital content. In addition, the openness of mobile network changes the enterprises' relatively closed network architecture, aggravating the difficulty of mobile network security management. Powerful function of mobile devices results from the development of mobile application, but with the advance of hacker technology, sources of application risk are more diversified and covert, which further increase the difficulty of mobile security management.

Dispersion of the EMA intensifies difficulty of integration with ERP system

The system of EMA disperses severely, such as mobile order management, mobile customer management, which are designed just for part of the employees from some departments. And some of them are developed by reference to PC terminal, which fail to innovate according to the features of mobile devices and mobile user experience. In addition, due to rapid development of information and communication technology, enterprises' information systems are constantly updated and increased. It cannot be well integrated between EMA system and existing ERP system because of the different in the ages, tools, languages and operation platforms of systems development.

Enterprise mobile social platform is difficult to be implemented

Communication way has been changed by the mushroom growth of social network. Especially when post-80s, 90s generations become a main force of enterprises, socialization of enterprises becomes a popular trend. But majority of employees' work habits have been formed, which leads to low acceptance of socialization work style. And the lack of effective coordination mechanism among employees, partners and consumers makes the social platform more difficult to be implemented. Furthermore, massive interaction in social network generate massive data, how to store these data, how to apply big data analysis technology to mine useful information for enterprises management and optimization, and how to make use of the relevant information to make decision automatically are problems that must be solved when enterprises build mobile social platform.

Management Strategies of Enterprise Mobile Application in Mobile Internet Environment

In order to guarantee the mobile strategy more effective, we put forward the management strategies of EMA based on possible problems mentioned above, as shown in Fig.1.

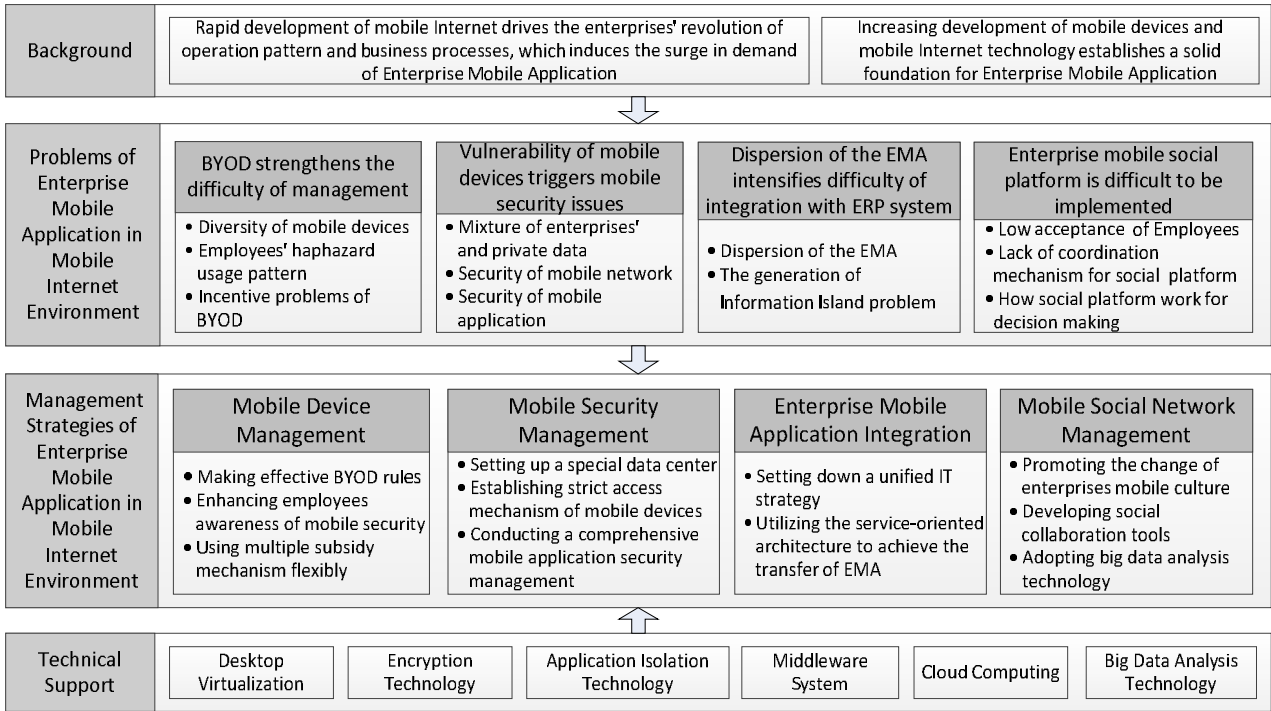


Fig.1 Management Strategies of Enterprise Mobile Application in Mobile Internet Environment

Formulating the whole life cycle management strategies of mobile devices

In order to deal with the problems mentioned in section 2, we present the following management strategies:

(1) *Making effective BYOD rules to regulate the usage of employees' own devices.* In the implementation of BYOD, the product type, operating system and hardware configuration should be appropriately restricted to ensure the safety of mobile devices and minimize the possibility of the abnormal usage. In the using phase, the BYOD devices should have a thorough inspection to ensure the security of mobile devices and applications on them. IT department should monitor and analyze employees' usage behavior, stop the device immediately and carry out further test to prevent the system from being attacked once identifies the abnormal behavior. In the recovery phase, such as turnover of employees, loss or damage of the devices, IT department can uninstall related applications, erase company data, and eventually write off the device remotely.

(2) *Enhancing employees' awareness of mobile security and cultivating their good usage habits.* For advocating employees to establish sensitive awareness of mobile safety and help them to develop good usage habits, enterprises need to provide regular mobile security training to let employees know how to install and use EMA properly, how to prevent mobile network being attacked and data leakage. Moreover, enterprises also need to conduct irregular mobile security test, so that employees can be aware of the lack of security-conscious, and then strengthen establishment of correct usage behavior.

(3) *Using multiple subsidy mechanism flexibly to heighten employees' enthusiasm to bring their own devices.* Purchasing-subsidy policy and data-plan-subsidy policy can be used to encourage employees to buy mobile devices in accordance with the regulations. Then, in the process of using devices, enterprises should establish a sound subsidy mechanism including periodic quota system, proportional reimbursement system, mixed reimbursement system and so on to fully mobilize the enthusiasm of employees on the basis of controlling the cost of BYOD.

Establishing a comprehensive protection system based on user identity authentication

To achieve omnidirectional security protection from mobile terminal, wireless network to traditional network, following management strategies are proposed:

(1) *Setting up a special data center to meet the requirements of mobile data processing and data security.* A special data center enables employees to upload and download data according to their authorities whenever and wherever, and achieve file sharing and synchronization effectively between

mobile terminal and PC terminal. Then using desktop virtualization technology, enterprises can place work and personal content in different user interfaces to fully isolate the enterprises' and private data and achieve mutual privacy and protection between the data. When mobile devices are damaged or lost, employees can remotely recover the relevant data through the data center to keep the continuity of work.

(2) *Establishing strict access mechanism of mobile devices to facilitate the construction of integrated protection system.* Through analyzing data accessed by employees from different levels, departments and positions, enterprises should establish strict access system to ensure that only legitimate users can visit the authorized information. A special password protection mechanism should be established, and it had better to use different cryptographic techniques to deal with different levels of security risk. In the process of data transmission, enterprises can use high strength encryption algorithm and abstract algorithm to reduce the risk of data leakage and ensure the consistency, real-time and integrity of data.

(3) *Conducting a comprehensive mobile application security management to ensure the security of information assets.* EMA should be isolated from existing applications by application isolation technology to guarantee the EMA independent access. An enterprise application store should be created to manage EMA from issue, download, install, use, upgrade to finally uninstall. In the using stage, IT department should monitor the usage of EMA and conduct application log analysis. Once identifies the abnormal behavior, IT department must immediately stop the usage of EMA, and carry out further test to prevent the system from being attacked.

Building a service-oriented integration framework between EMA system and ERP system

Because the integration of EMA system and ERP system is the key to implement MERP strategy, we put forward the following management strategies:

(1) *Setting down a unified IT strategy to guarantee the minimum intrusion of EMA system to ERP system.* IT strategy is developed to meet business' needs and achieve strategic enterprises objectives. It's the basic strategy for the development direction of enterprises' information system and the guiding principle of enterprises' informatization. In order to ensure effective integration between mobile terminal and PC terminal and eliminate Information Island, it's necessary for enterprises to set down unified IT strategy to guarantee minimum intrusion to the existing IT system.

(2) *Utilizing the service-oriented architecture to achieve the transfer of EMA from PC terminal to mobile terminal.* Since there are some customized or purchased applications, enterprises can utilize the middleware system to achieve the transfer of EMA from PC terminal to mobile terminal. More concretely, a systematic analysis about mobile office sense and mobile user from different departments and positions should be conducted. It should be combined with enterprises' current situation to find out their mobile application requirements, such as mobile logistics, mobile inventory, and mobile sales. Then by comparing the similar needs, it should be decided which applications can be transferred from PC terminal to mobile terminal. Eventually enterprises can take advantage of the mobile virtual desktop or open interface with secondary development to achieve the final transfer.

Creating a mobile social platform for employees, partners and consumers

Management mode based on socialization activates employees' creativity, motivates them to collaborate with each other more effectively. To promote implementation of mobile social platform, we propose the following strategies:

(1) *Promoting the change of enterprises mobile culture to help employees to form new thought pattern.* Social work style is a human-centered, unstructured and mobile work style, changes traditional work style which is system-centered, highly structured and passive, thus posing great challenges to employees accustomed to traditional one. Only when enterprises promote the change of mobile culture and mobile work style, employees' new thought pattern can be formed and mobile work habits can be developed.

(2) *Developing social collaboration tools to encourage the collaboration among employees, partners and consumers.* Enterprises should establish internal network, partner network and consumer network to improve employees' perception and accelerate the participation of partners and consumers

for collaborative creativity and decision-making. When building internal mobile social platform, enterprises can develop internal social collaboration tools such as topics, blogs, and Wikipedia based on the employees' social graph, workflow, work content, search/aggregation and so on. So these tools can help to achieve cross-level and real-time communication, accumulate and disseminate internal knowledge.

(3) *Adopting big data analysis technology to exploit the auxiliary decision-making function.* Along with the development of cloud computing, and the emergence of public cloud, private cloud and hybrid cloud platforms, enterprises can store massive data in different cloud platforms based on their needs, and then achieve on-demand computing via internet and virtual technology. Enterprises can conduct social analysis on personnel interaction, topic discussion and thinking collision by big data analytics to improve social experience and develop new social business mobile applications. According to the analysis of social network data from internal and external users, enterprises can mine the business opportunity, release market information and achieve synergy and innovation of businesses. What's more, heterogeneous data produced in social collaboration network should be analyzed to assist decision-making.

Summary

Rapid growth of mobile Internet requires enterprises to implement mobile ERP strategy to alter the enterprise management mode and response to the market changes quickly. Enterprises have recognized the necessity of implementing MERP under mobilization. But there still exist a series of problems in the management of EMA because of the difficulty of BYOD management, the vulnerability of mobile devices, the dispersion of EMA and the implementation of enterprise mobile social platform. Aimed to these problems, we propose the management strategies of EMA in mobile Internet environment. Enterprises can utilize these management strategies to implement EMA to obtain the sustainable competitive advantage.

Acknowledgements

The authors acknowledge funding from the National Science and Technology supporting Program of China under the grant number No. 2015BAF05B01, as well as the contributions from all partners of the mentioned project.

References

- [1] Information on <http://www.miit.gov.cn>
- [2] B. Unhelkar, S. Murugesan. The enterprise mobile applications development framework. IT Professional Magazine. 12 (2010) 33.
- [3] A. Dabkowski, A.M. Jankowska. Comprehensive framework for mobile ERP system. Proceedings. 14th International Workshop on. IEEE. (2003) 890-894.
- [4] A. A.I. Bar, E. Mohamed, M.K. Akhtar, F. Abubhashish. A preliminary review of implementing Enterprise Mobile Application in ERP environment. International Journal of Engineering & Technology. 11 (2011) 77-82.
- [5] D.A. Cailean, K. Sharifi. Mobile ERP: A literature review on the concept of Mobile ERP systems. Master's Thesis in Informatics, Jönköping University, Sweden, (2013).
- [6] G. Thomson. BYOD: enabling the chaos. Network Security. 2012 (2012) 5-8.
- [7] N Singh. BYOD genie is out of the bottle—"Devil or angel". Journal of Business Management & Social Sciences Research. 1 (2012) 1-12.
- [8] K.W. Miller, J.M. Voas, G.F. Hurlburt. BYOD: Security and Privacy Considerations. IT Professional. 14 (2012) 53-55.
- [9] B. Tokuyoshi. The security implications of BYOD. Network Security. 2013 (2013) 12-13.