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## OPEN SOURCE SOFTWARE ADOPTION IN KAZAKHSTAN

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### 10.1 INTRODUCTION

Intensive development of open source initiative is connected with number of advantages, which are common in implementation of software with free licensed contract [21]. Firstly, public access to software code decreases the cost price of implementation because of the iterative usage of the code. Opportunity of independent implementation and development of any free software creates competition and involvement of more professional programmers. Publicity of software code also assists it. OSS allows free distribution and multiple usage of software without any licensed fees that is why it allows decreasing the expenses on certification of software, used in public organizations. Expenses on implementation and adoption of OSS for national needs are spent not on purchase of the foreign product, but on development of the local products. It means that domestic companies using this business model can be valuable executors of software.

As a developing country, Kazakhstan needs to possess its own infrastructure and to find its niche in information communication technology (ICT) industry, based on OSS. Especially, all large-scale projects should be developed on OSS [8]. One of the ways to migrate to OSS is to entrust migration to OSS in public organizations. Once government formulates guideline of OSS migration, or organizations start to adopt OSS solutions, they will start to receive benefits shortly.

That is why main objective of the study is to determine

these issues in public sector of Kazakhstan and make recommendations to solve them. The paper is organized as followings:

- (a) Literature Review that summarizes previous works on OSS usage in the world, development of OSS in Kazakhstan, particular, and overview of existing adoption models.
- (b) Methodology describes how data was collected, which instruments were used.
- (c) Results and Discussion discusses the current situation in the Ministry.
- (d) Conclusion.

## **10.2 USAGE OF OSS**

According to the research conducted by Red Hat and Georgia Tech to measure OSS adoption by region, Europe is on high positions in the world, where France, Germany and Spain are the countries with the highest level of OSS use [18]. These countries have more awareness about OSS and have strong “OSS first” policies in public sector comparing with other countries all over the world. In almost all countries of Europe local government totally switched to OSS. Countries like Sweden, UK, Belgium, Spain, Italy, Finland, and Netherlands published policies for encouragement and consideration of OSS. Denmark and Netherlands are mandating open standards. The main reasons for them choosing OSS are value of money, security, transparency. In particular, Germany, France is leading in developing OSS in Europe [6].

One of the governments in the world that has developed the complete OSS implementation guideline is the Malaysian government. It is known as Malaysian Public Sector OSS Master Plan (OSS Master Plan) and was published in July 2004 [11]. The Master Plan is a long term roadmap for achieving the OSS vision and objectives [11]. Within this plan the OSS framework was designed and developed to provide guidance for implementation. Seven strategic thrusts were identified [13].

The OSS implementation strategy in Malaysia has been divided into three phases for five years. The first phase is focused on setting a foundation like formulation of guidelines and implementation of small pilot projects [23]. Phase II is aimed on accelerated adoption and Phase III is self-reliance; here use of OSS is anticipated as significant. Now, ninety-seven percent of public organizations have migrated to OSS: 703 out of 724 agencies are using OSS [15].

Choosing the right strategic choice and following all the guidelines could lead to successful usage of OSS. Before organizations start the process, it needs to identify aspects, which express desire to adopt OSS [20]. According to Rossi et al., the main aspects that should be considered are followings:

- (a) Political aspects, related to governmental tasks, goals and stimulation of innovation.
- (b) Economical aspects, for reducing the costs and market development.
- (c) Social aspects for distributing knowledge and supporting team work.
- (d) Managerial and/or technical aspects, especially quality of the applications in terms of stability and reliability, transparence, support and security.
- (e) Legal aspects, for licensing and liability.

### **10.3 OSS IN KAZAKHSTAN**

The main perspective of real innovative development of national IT-market depends on creation of national software industry. Nowadays, IT industry is staying almost in one place in Kazakhstan [22]. Small sizes of software market do not give companies opportunity to get enough orders, especially from public organizations.

Many experts think that blind copying of other countries' experiences, attraction of foreign experts and IT companies can cause great financial spending and hold political and economic

development of the country [22]. Dmitriy Kan, head of Sun Microsystems mission in Kazakhstan and Asia, believes that development of software offerings based on OSS is the best choice for development and to enter global markets.

Now, Kazakhstan is in its first steps to adoption of OSS. There is several software companies in Kazakhstan, that chose development based on open standards, and one has already developed operational system based on OSS [15]. Arta OS operational system was developed especially for educational institutions in order to cut spending for purchasing the software. Developers tried to make it similar to popular operational systems, which are common to users. In 2009 more than four hundred schools switched their computers to Arta OS [15].

Arta company, that developed Arta OS, has become an expert of using OSS in Kazakhstan. Bolat Basheyev, the head of the company, stated three main advantages of OSS. The first and the main advantage of OSS usage is acquisition of software for free and paying only for technical support. The second advantage is high level of security, as programmers all over the world can audit the whole system, and the third advantage is flexibility of open standards to environment and ability to adapt to external factors [15]. However, lack of specialists holds adoption process despite of all advantages of OSS.

In order to increase level of OSS awareness initiative organizations started to open. In spring of 2010 IBM opened IBM Center of Innovation for Linux and Open Standards in Kazakhstan [15]. The main objectives are to support and promote development, and also contribution in distribution of open standards among private and public organizations of Kazakhstan. IBM corporation started to cooperate with leading universities of Kazakhstan. It is believed that this center will give young specialists an additional knowledge in OSS and teach them how to use it in practice. Also, it supports promotion of open standards, which help different technologies work together.

Another organization that focuses on instruction about OSS to mass is Open Source Center. The main objective of the center is

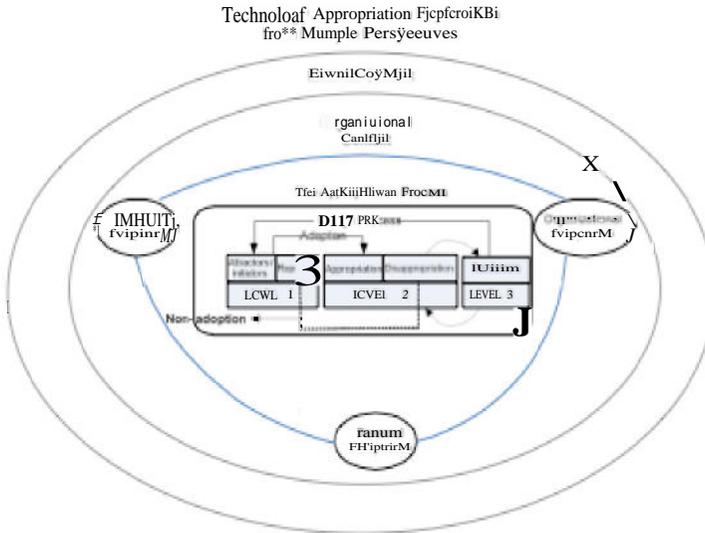
to provide as much information and materials about OSS products as possible and to show other alternative of proprietary software. Mikhail Tyunin, who is in charge for Open Source Center, believes that OSS can seriously impact development of IT industry in Kazakhstan [1].

#### **10.4 ADOPTION MODEL**

Adoption of technologies is a set of stages that each organization takes in order to adopt technology. This set of stages is a choice that made by managers, basing on certain factors. The adoption process can only be successful, when technology is accepted and integrated into the organization [5] and all individuals continue to employ the technology in a specific time period [2]

Officially, scholars have been categorizing adoption models as traditional and hybrid or combined models. Traditional models are the most famous and usable models as theoretical base for adoption process. However, each of the models has limitations that should be taken into account. For instance, diffusion of innovation model, suggested by Rogers [19], one of the first adoption models, focuses more on personal acceptance of technology and does not focus on other factors. Lewin's change model, in its turn, aims on organizational adoption, but not on personal side.

This research is based on Multiple Perspective of OSS Appropriation (MPOSSA) presented in Figure 10.1. It is a combined framework of Model of Technology Appropriation (MTA) [9], the Multiple Perspectives Theory [14], and it intends to fill gaps in adoption from different perspectives and can be used in studying organizational context [16].



**Figure 10.1** Multiple Perspective of OSS Appropriation (MPOSSA) Framework

External context is related to external factors that can influence organizational decision [3]. In case of OSS adoption current software market, competition with proprietary software vendors, and support from government [3] are other factors playing an important role in making decision.

Organizational context gives the picture of the organizations generally: goals, strategies, working flow. It helps understand management level, its motivations, how it works.

The levels of OSS appropriation identify the progress of OSS usage in organization. Descriptions are illustrated in following table.

**Table 10.1** Levels of appropriation (Nor Zairah, Rose Alinda, 2007)

<b>Levels</b>	<b>Description</b>
Level 1	Organization is not using OSS at all. It is in a stage of exploring OSS and deciding whether to adopt it or not.
Level 2	Organization has already started to adopt OSS, but still evaluating its usage.
Level 3	OSS is stabilized and integrated with organization activities.
Non-adoption	Organization may not be interested in OSS adoption due to some reasons.

Organizational perspective focuses on capacity of the organization to adopt the technology. The factors like size of the organization, organizational structure, current strategy and top management support influence adoption process [19].

Technical perspective can be seen from two perspectives: OSS technology to adopt and other technologies to be affected with adoption process. The main factors that can influence adoption process can be cost, reliability, functionality and others [10]. This list can be extended as there are many criteria, which should be followed on the way to choose and adopt technology.

Personal perspective focuses on individual's attitude on adopting the technology. In this study technology acceptance model (TAM) (Davis, 1989) is used as a base. The model consists of two groups of factors that define whether individuals will use technology or not, they are perceived usefulness and perceived ease of use. "The degree to which a person believes that using a particular system would enhance his or her job performance" was defined by Fred Davis as perceived usefulness, and "the degree to which a person believes that using a particular system would be free from effort" as perceived ease-of-use (Davis, 1989). The model has value only in explaining individual adoption of technology. It has success only in adopting of narrow range of technology. That is why it was decided to use TAM.

From the discussion above it is obvious that MPOSSA framework is the best to consider in OSS adoption process, as it

focuses, in particular, in OSS adoption and covers important aspects of organizational adoption.

## **10.5 METHODOLOGY**

This research utilizes qualitative and quantitative research methodology. The instruments used to collect the data are case study, questionnaires, interview, and observation. Case study was conducted in the Ministry of Oil and Gas of the Republic of Kazakhstan, as their management expressed interest in migration to OSS. It is also important to notice that organizational structure in the ministries of Kazakhstan is same, so the results can be appropriated to other ministries. Interviews and questionnaire are developed based on MPOSSA framework described in literature review.

Qualitative data for the research came from interviews. Head of department of administrative functioning and public procurement and staff of management of IT and organizational functioning were interviewed. The interviews intended to understand current IT infrastructure of the ministry. Interview with head of department of administrative functioning and public procurement gives the picture on OSS adoption from organizational perspective. Interview with staff from management of IT focuses on technical perspective of the adoption process. Besides, interview questions in some way cover personal perspective of the adoption.

Distribution of questionnaires to the staff as end-users gives the researcher individual attitude on OSS adoption. Questions were developed to identify level of OSS acceptance on individual level.

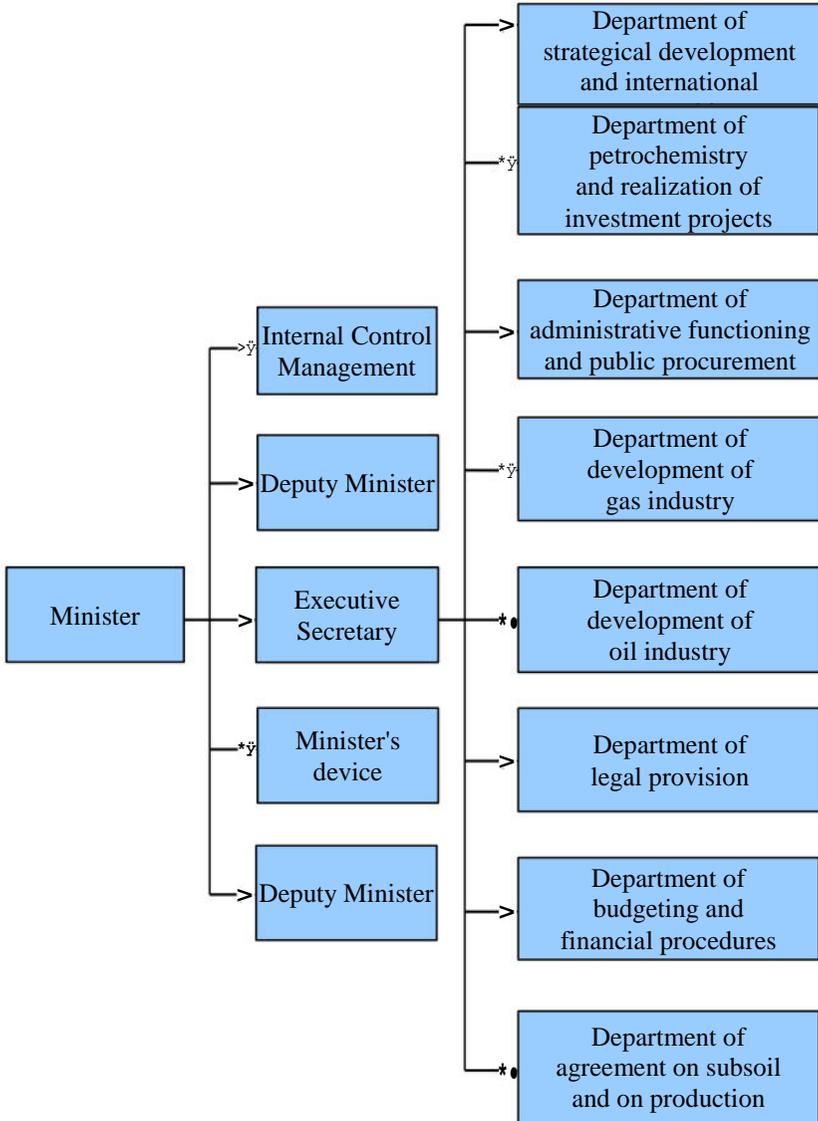
## **10.6 RESULTS AND DISCUSSION**

Ministry of Oil and Gas of Republic of Kazakhstan is central agency in Kazakhstan that carries out formulation of government

policy, coordination of management processes in oil and gas, petrochemicals and transportation of hydrocarbons. The main functions of ministry are the followings:

- (a) Participating in development and realization of government policy in sphere of oil and gas industry and transportation of hydrocarbons.
- (b) Implementation of inter-sectored coordination in the areas of oil and gas, petrochemicals, transportation of hydrocarbon raw materials and major pipeline transport.
- (c) Ensuring the development of energy sector in terms of hydrocarbon.
- (d) Engage in international cooperation on joint development of hydrocarbon resources, including in the Kazakhstan's part of the Caspian Sea.
- (e) Ensuring the reproduction of hydrocarbon resources and their sustainable use, including associated gas.
- (f) Ensuring the implementation of the competence of authority resulting from the production-sharing agreements.

The Ministry consists of several departments. Each department has its functions and responsibilities. Figure 10.2 below represents the structure of the Ministry.



**Figure 10.2** Structure of Ministry of Oil and Gas of the Republic of Kazakhstan

Management of IT and organizational functioning is part of department of administrative functioning and public procurement.

It is responsible for providing informational infrastructure using modern information technology and to promote use of information technology in order to increase productivity of working process. There is head of the management, one chief expert and one expert working in the management.

The management accomplishes strategically functions such as:

- (a) Development of strategic plans for adoption of new information technology solutions.
- (b) Development and implementation of information technology solutions.
- (c) Rendering consulting service in usage of information and office technology.
- (d) Provision of repair job of computers and office techniques.
- (e) Processing, storage of information related to ministry's activities.
- (f) Provision of documentation and training on usage of information and office technology.

The main focus of the current IS/IT strategy is support of working process using ICT in the ministry, and management of IT and organizational functioning is responsible for implementation process. From organizational perspective of MPOSSA model, the main issue would be lack of policy towards OSS as an alternative in purchasing software. The management level does not consider any other alternatives to proprietary software in order to decrease spending.

From technical perspective, migration to OSS will not bring serious changes, if the process is leveled. Total migration in several stages will require less spending comparing with radical decision to migrate. At the moment, infrastructure itself needs modifications, some of the hardware and software, especially end users computers, is outdated. So, it should not cause additional spending or any other modifications.

The outcomes of survey were quite surprising. Most of respondents expressed interest in OSS and willingness to use it on

their working places.

Table below summarizes current situation in the Ministry of Oil and Gas of the Republic of Kazakhstan.

**Table 10.2** Current Situation in the Ministry of Oil and Gas of the Republic of Kazakhstan

No	Title	Problem Description	Solution
1.	Lack of alternatives to proprietary software	There is no alternatives for purchasing software solutions	Suggest OSS as alternative to proprietary software
2.	Lack of OSS policy	There is no formulated OSS policy	Develop OSS policy as a part of ICT strategy
3.	Lack of stable working infrastructure	Sometimes unstable work of infrastructure causes loss of information	Suggest OSS based applications that provide basic services.
4.	Lack of active sponsorship	There is no person in charge, who manages OSS implementation process	Approve new team, who will manage OSS implementation
5.	Low level of OSS awareness	Staff have not enough knowledge	Provide trainings to introduce OSS to the staff
6.	Lack of specialists in OSS	There is not enough staff specialized on OSS	Attract OSS specialists
7.	Personal resistance	63% of respondents expressed willingness to use OSS	Make a group of interest

## 10.7 CONCLUSION

Based on all the data above, followings can be concluded:

(a) Kazakhstan is its incipient level in OSS implementation.

- (b) Public organizations should consider OSS as an alternative to proprietary software.
- (c) OSS policy should be formulated as a part of ICT strategy within organization.
- (d) OSS policy should consider four areas: technical, organizational, managerial, and personal.
- (e) OSS adoption process should have levels in period of time.
- (f) OSS team should be created to manage implementation process.
- (g) OSS specialists can be attracted if needed.
- (h) Organization should collaborate with OSS organizations and software companies that focus on OSS.
- (i) Managers should provide trainings and documented guidelines of usage for end-users to decrease level of resistance.

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