Decision Making in Information Technologies Governance of Companies

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Abstract. The article deals with archetypes of information technologies governance, defined as rights and boundaries of responsibility of certain officials or internal departments in conditions of information communication environment of companies. It is offered to add traditional classification of archetypes of IT governance by archetype "Democracy", which is characterized in accordance of a right to form input data relative to IT-decisions to users – company's customers. The use of the archetype allows better promotion of new products, and in time-reacting to customer's requirements to improve product quality and information services. The matrix of IT responsibility, preparation of which is aimed at standardizing of decision-making processes in IT companies, is presented. Drawing matrix of IT responsibility with the help of function performance of familiarization of managers at various levels with IT governance basics will facilitate coordination of their actions. Matrix is proposed to form at the annual planning of IT business processes.

1   Introduction

Managers and business owners realize that risk reduction during the decision-making essentially depends on the amount and accuracy of information about the object of management, and business processes in which these decisions should be standardized and integrated into corresponding information model.

Therefore, decisions systematization and standardization in information technology (IT) governance are adopted in order to increase the efficiency of business process faces an important task of management companies that requires detailed study.

The article includes such sections, as research description of effective IT governance and traditional forming of IT Governance Matrix (2), our vision of IT Matrix as informational model for decision-making in IT activity of the companies (3), conclusions and perspectives (4).

2   Analysis of Recent Research and Publications

The study of information technologies in companies' management is devoted the works of foreign and native scientists: P. Weill [1, 2], J. Ross [1], M. Broadbent [2, 3], A. Brown and G. Grant [3], G. Walker [4], W. Van Grembergen and S.De Haes [5], O. Spivakovsky et al. [6] and others.

The analysis of scientific sources showed that the IT governance focused on the management and use of information technologies to achieve corporate objectives to increase efficiency. Effective resource management is focused on timely processing of growing volumes of information, operational data exchange between internal departments and external data exchange with customers and partners.

IT Governance, IT Infrastructure Library (ITIL) outlines the extensive set of management procedures that are intended to support businesses in achieving value for money and quality in IT operations. These procedures are supplier independent and have been developed to provide guidance across the breadth of IT infrastructure. ITIL is a framework of best practice approaches intended to facilitate the delivery of IT services high quality [8].

ITIL is now being adopted and used across the world as the defacto standard for best practice in the provision of IT Service. Although the ITIL covers a number of areas, its main focus is on IT Service Management [9].

We agree with US scientists P. Weill, J. Ross, M. Broadbent, O. Spivakovsky who understand IT governance as a business process associated with the recognition of rights in decision-making and limits of responsibility to encourage the desired behavior by the use of information technologies [1, 2, 6].

Effective IT governance should be focused on solving three main issues:
1. What decisions should be adopted to ensure the effective management and use of IT?
2. Who should make these decisions?
3. How will decisions be implemented, and how will monitoring of implementation be conducted?

Information model for the decision of the first and second questions is provided by the traditional IT Governance Matrix (Table 1), offered by P. Weill, J. Ross, M. Broadbent [1, 2, 3], its elements require the further detail research.

The purpose of the traditional IT Governance Matrix is a model-pattern illustration of the allocation of responsibility in the information technologies governance, which balances the mechanism of rights establishment and decision-making for the company, consisting of many departments [1, 6].

Table 1. IT Governance Matrix (Input - who forms the input data; Decision - who makes the final decision), *[1,2, 3]*

Solutions Archetype	IT principles		IT architecture		IT Infrastructure		Business applications needs		IT Investments	
	Input	Decision	Input	Decision	Input	Decision	Input	Decision	Input	Decision
Business Monarchy										
IT Monarchy										
Feudal										
Federal										
Duopoly										
Anarchy										

One or more official persons are responsible for the approval of each of the five types of key decisions in IT Governance. It is possible the division of responsibilities to regional offices, branches, geographically distant from one another, or key business processes of companies (production, research and development, sales, delivery, accounting, personnel accounting, marketing, etc.). As a rule the majority of people participate at the preparatory phase, preceding the making decision in the process of forming necessary information for final approval.

IT governance involves determining who will be responsible for selecting input data and who will take part in decision-making of each type.

The presented IT Governance Matrix (Table 1) contains representation of two components of decision making - incoming data forming (marked Input) and who will make decision (Decision).

The purpose of this article is to establish the basic types of decisions that more fully reflect the problem of IT governance, and to review and supplement the categories used in traditional IT governance matrix to improve the performance of companies.

3 Our Vision of IT Matrix for IT Governance

Researches of IT governance of companies are conducted by scientists. They found the indication of high performance of IT governance is a large percentage of managers who hold leadership positions and can accurately describe the governance of IT in your company [1, 2, 3, 7]. The fact that managers of big companies are not familiar with IT governance principles, increases problems of companies' management.

We offer Matrix of IT responsibility, complementing the classical IT Matrix and establishing responsibility for the decisions and monitoring their performance by introducing new categories in matrix:

- who implements the decisions (marked Implem);

- who advises and supports the implementation of the decisions (marked Advise);
- who controls the implementation (marked Control) (Table 2).

The implementation of the proposed sub processes of IT governance reflects the variety of decisions made using information technologies in practice and they improve the company's efficiency.

IT responsibility Matrix advisable to make during the annual planning of business processes using information technology.

The employees who will be responsible for key aspects of IT governance, such as formation of IT principles, IT architecture, IT infrastructure needs of business applications and IT investments should be identified. According to the authors' point of view, Matrix of IT responsibilities should serve as reference, informing managers of different levels with the basics of IT governance. Putting together of the matrix and bring to the attention of certain employees will contribute to the consistency of their actions on the use of information technologies.

Each archetype corresponds to certain officials and companies' organizational units, which are involved in such sub-processes of IT governance as forming the input data, decision-making, implementation of IT decisions and control (Fig. 1).

Each of represented archetypes has advantages and disadvantages in terms of IT efficiency. In particular, there is the high motivation of decision-making under the influence of the archetype "Business Monarchy" However, the professional opportunities of top management or company's owners don't allow considering all the requirements for IT investments, and the participation in making many other highly specialized decisions in the field of modern information technologies. There are some problems impeding the efficiency of IT governance process if leaders try to participate in a large number of decisions.
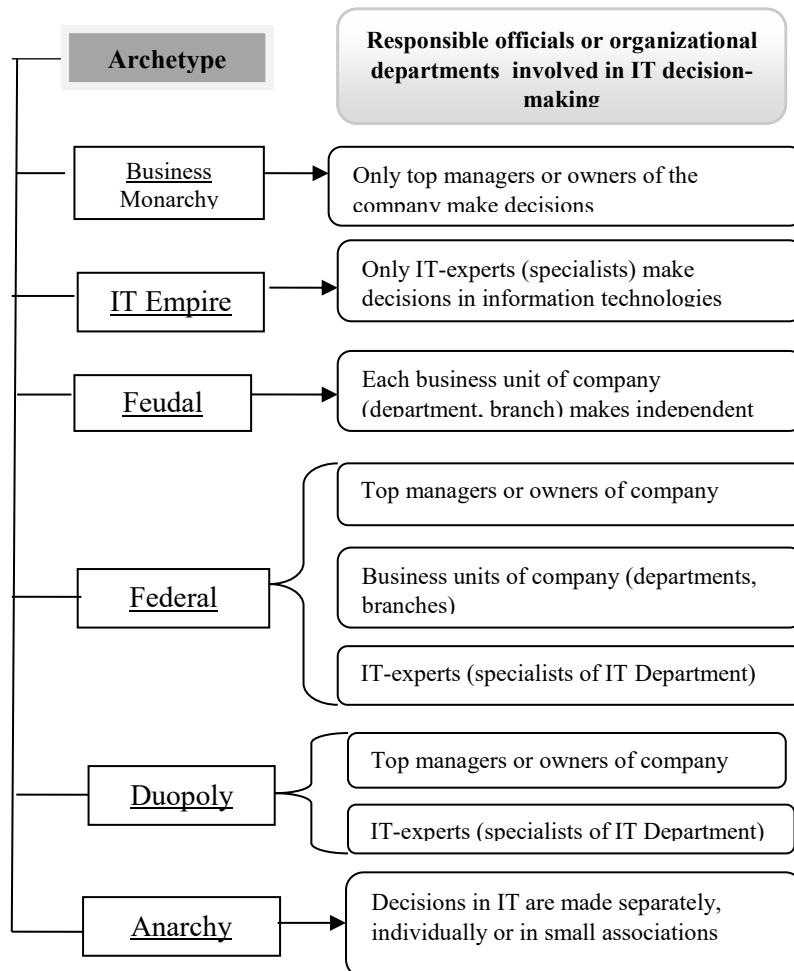
Carefully designed IT principles promote transparent decision-making process that determines the behavior of staff; it corresponds to top management vision and it creates conditions for greater display of creative potential.

Because of fact that the use of information technologies can increase the level of standardization and integration of business processes, the role of IT professionals and business executives is becoming more closely linked.

The IT decision-making has joint character. If business leaders shift the responsibility for the success of IT use on IT professionals, as it happens when you select the archetype "IT Monarchy", such control is often inefficient and brings financial losses [1, 7, 13].

Successful firms are different because they don't only accept good IT solutions, but they build IT decision-making process more effectively. Successful firms involve in decision-making process qualified employees of the company, it meets the democratic archetype of management, such as a "Federal structure" or "Duopoly."

Table 2. IT responsibility Matrix: Input – forms the input data; Decision - takes decisions and responsibility; Implem - implements the decisions; Advise - advises and supports the implementation of the decisions; Control - who controls the implementation *(author's design)*

Decision / Archetype	IT principles					IT architecture					IT Infrastructure					Business applications needs					IT Investments				
	Input	Decision	Implem	Advise	Control	Input	Decision	Implem	Advise	Control	Input	Decision	Implem	Advise	Control	Input	Decision	Implem	Advise	Control	Input	Decision	Implem	Advise	Control
Business Monarchy																									
IT Monarchy																									
Feudal																									
Federal																									
Duopoly																									
Anarchy																									

Archetype	**Responsible officials or organizational departments involved in IT decision-making**
Business Monarchy	Only top managers or owners of the company make decisions
IT Empire	Only IT-experts (specialists) make decisions in information technologies
Feudal	Each business unit of company (department, branch) makes independent
Federal	Top managers or owners of company Business units of company (departments, branches) IT-experts (specialists of IT Department)
Duopoly	Top managers or owners of company IT-experts (specialists of IT Department)
Anarchy	Decisions in IT are made separately, individually or in small associations

Fig. 1. Archetypes of decision making in IT Governance

Involvement of specialists, the use of information technologies at various levels of company and different points of view determines the most important strategic of IT uses and gets the better results for company.

At the archetype "Anarchy" decisions are made and implemented individually in small groups without clearly established control and responsible, making subordinate to a single corporate center, may be typical for the beginning or end of the company's activity. Usually, this model of IT governance is temporary and should be transformed into a more manageable archetype, otherwise the company will not be able to ensure the integrity of IT architecture, continuity and quality of IT services.

Recently, significant influence in decision-making of companies with IT infrastructure and software applications is exerted by their customers or users of services. Companies, which are involved in online sales, computer games constantly

collect and analyze the wishes of the clients. For instance, the company Wargaming.net is one of the largest global publishers and developers of massively multiplayer of online computer games and associated services for a variety of platforms, is testing new versions of games using own customers – players, collecting negative reviews to further improvement of software online games.

This strategy gives the companies a significant competitive advantage because it allows saving costs in software development and marketing, and it allows responding to high demands of customers concerning the quality of software and information services, and it acts as advertisement and attracts a great number of new active customers. In other words, this is a version of interactive feedback of customers.

Therefore, we propose to add to the traditional classification of IT governance by the archetype "Democracy". This archetype of IT governance could be characterized by giving rights on forming the input data and consulting for some IT decisions to users – customers of company.

The final decision-making, the implementation and control traditionally is under such archetypes as "Business Monarchy", "IT Monarchy", "Feudal", "Federal structure" or "Duopoly". That is concentration of responsibility for decision-making within the company. The proposed name of the archetype - "Democracy" conforms to the stylistics of political archetypes imposed by reputable scientists in IT field, because as a political regime democracy in state governance means power of people, and the archetype "Democracy" symbolizes a significant impact of clients and users of companies' IT activity.

As an example, we drew up the matrix of IT responsibility for Ukrtelecom Joint Stock Company. Ukrtelecom is one of the largest companies in Ukraine, which provides a full range of telecommunication services in all regions of the country. For this company IT governance is one of the key business processes, because Ukrtelecom JSC created the highest-capacity of national data trunk network in Ukraine on the basis of modern technology which allows providing customers with modern telecommunication services in almost all residential areas of Ukraine.

Ukrtelecom JSC is the leader of the fixed high-speed Internet access market and is dominant in the fixed telephony market [12].

Ukrtelecom provides all kinds of advanced telecommunication services throughout Ukraine, namely:
- international, long-distance and local telephony;
- data transfer and VPN construction services;
- Internet services, including *Ukrtelecom Internet service,* high-speed Internet access for the fixed telephony subscribers;
- permanent IP-connection via dedicated line;
- hardware and virtual hosting;
- rent of non-switched dedicated telecom channels;
- video-conference communication;
- wire communication;
- telegraphy;
- mobile services (TriMob operator) [12].

Archetypes and relevant officials and departments involved in the adoption, implementation, support and control decisions on IT principles at Ukrtelecom are

presented in IT responsibility Matrix (Input – forms the input data; Decision - takes decisions and responsibility; Implem - implements the decisions; Advise - advises and supports the implementation of the decision; Control - is informed after the execution of decision and who controls), Table 3.

Data for compiling IT responsibility Matrix of Ukrtelecom were collected from open sources: the company's website [11], statistical data of the company [11] business analytical articles [14-16].

Table 3. IT Principles as a part of IT responsibility Matrix on the example of JSC Ukrtelecom (author's design)

Solution / Archetype	IT principles				
	Input	Decision	Implementation	Advise	Control
Business Monarchy					
IT Monarchy	Scientific and Technical Council			Scientific and Technical Council	
Feudal					
Federal			The regional branch of Ukrtelecom; Heads of technical services of regional branches; Directors of the Center of sales and service		
Duopoly		Director of Ukrtelecom; Scientific and Technical Council			Director of Ukrtelecom; Scientific and Technical Council
Anarchy					
Democracy					

Table 4 shows the archetypes and the relevant officials and departments involved in adoption, implementation, maintenance and monitoring decisions to IT architecture of JSC Ukrtelecom.

Table 4. IT architecture as a part of IT responsibility matrix on the example of JSC Ukrtelecom (author's design)

Solution / Archetype	IT architecture				
	Input	Decision	Implementation	Advise	Control
Business Monarchy					
IT Monarchy				Scientific and Technical Council	Scientific and Technical Council
Feudal					
Federal	Scientific and Technical Council; Head of technical services of regional branches; Director of the Center of sales and service		Directors of telecommunication regional branches of Ukrtelecom; Heads of technical services of regional branches; Director of the Center of sales and service regional branches		
Duopoly		Scientific and Technical Council; Heads of technical services of regional branches			
Anarchy					
Democracy					

IT Infrastructure of JSC Ukrtelecom, archetypes and key officials and departments involved in the adoption, implementation, support and control decisions are presented in Table 5.

Table 5. IT infrastructure as a part of IT responsibility matrix at JSC Ukrtelecom *(author's design)*

Solution / Archetype	IT infrastructure				
	Input	Decision	Implementation	Advise	Control
Business Monarchy					

	Input	Decision	Implementation	Advise	Control
IT Monarchy				Scientific and Technical Council Heads of regional branches of technical services	
Feudal					
Federal	Directors of telecommunication regional branches; Head of technical services of regional branches; Director of the Center of sales and service		Heads of regional branches of Uktelecom; Directors of telecommunication regional branches; Heads of technical services of regional branches; Director of the Center of sales and service regional branches.		
Duopoly		Scientific and Technical Council Heads of regional branches of Uktelecom			Scientific and Technical Council Director of Ukrtelecom Internal control department
Anarchy					
Democracy					

Table 6 shows the archetypes, key officials and departments involved in the adoption, implementation, support and control software solutions on the example of JSC Ukrtelecom.

Table 6. Business applications needs as a part of IT responsibility matrix on the example of JSC Ukrtelecom *(author's design)*

Solution / Archetype	Business applications needs				
	Input	Decision	Implementation	Advise	Control
Business Monarchy					

Archetype	Input	Decision	Implementation	Advise	Control
IT Monarchy				Scientific and Technical Council; Heads of technical services at regional branches	
Feudal					
Federal	Directors of regional branches; Heads of telecommunication centers at regional branches; Heads of technical services at regional branches; Director of the Center of sales and service		Heads of regional branches; Directors of telecommunication regional branches; Director of the Center of sales and service at regional branches		
Duopoly		Scientific and Technical Council; Head of Uktelecom			Scientific and Technical Council; Head of Ukrtelecom
Anarchy					
Democracy					

Table 7 presents the main archetypes and officials, departments involved in the adoption, implementation maintenance and monitoring of IT investment solutions at JSC Ukrtelecom.

Table 7. IT investments as a part of IT responsibility matrix on the example of JSC Ukrtelecom *(author's design)*

Solution / Archetype	IT investments				
	Input	Decision	Implementation	Advise	Control
Business Monarchy		Head of Uktelecom; Members of the Supervisory Board;			

		Chief Accountant			
IT Monarchy					
Feudal					
Federal	Head of Finance and Economics Department; Directors of regional branches; Heads of telecommunication centers at regional branches; Heads of technical services of regional branches		Accounting Department; Financial and economic department; Heads of regional branches		The members of supervisory board, Director of Ukrtelecom; Chief Accountant; Scientific and technical council; Internal Control Department
Duopoly				Scientific and technical council; Head of Financial and Economic Department; Accounting Department	
Anarchy					
Democracy					

Thus, the creation of matrix of IT responsibility, securing rights and responsibilities of officials and departments of the company by solution making and monitoring under selected archetypes will promote the standardization of decision- making process related to information technologies in companies.

Analysis of archetypes' use at IT decision making conducted on the example of JSC Ukrtelecom (Table 8) showed that the archetype "Federal structure" is most often used at formation of input data and execution of solutions; the archetype "Duopoly" is often chosen to make solutions and monitor their implementation; the archetype "IT Monarchy" is used on the stage of consultation and support of decision implementation; administrative decisions according to the archetype "Anarchy" are not accepted, it indicates a certain level of orderliness and consistency in the company's IT governance system; the archetype "Democracy" is also not used by the company in IT making decisions, which shows the unrealized potential for attracting Ukrtelecom clients to improve the company's IT services in terms of generating incoming data.

Table 8. Analysis of frequency of archetypes' use at making solutions in IT governance (at JSC Ukrtelecom) *(author's design)*

Components of making solution process	Quantity of archetypes' use of decision making						
	Business Monarcy	IT Monarchy	Feudal	Federal	Duopoly	Anarchy	Democracy
Input data formation		1		4			
Decision making	1				4		
Implementation of solutions				5			
Consulting and support of solution's implementation		4			1		
Control		1		1	3		

The involvement of specialists in various activities (managers, IT specialists, technical specialists, accountants, economists) in decision-making process as to the use of information technologies is the condition of successful management; it is needed for modern corporate companies with extensive organizational structure for ensuring of objectivity, transparency of management.

The definition of archetypes as the rights and limits of liability of certain officials or organizational units in the formation of information-communication environment of company will allow making key decisions of using information technologies effectively and consistently under the strategy, chosen by top managers in company governance.

4   Concluding Remarks and Future Work

We propose the IT responsibility matrix as information model, it forms division of responsible for informational technologies governance: who forms the input data; who makes decisions and takes responsibility; who implements the decision; who advises and supports the implementation of decision; who is informed after decision's implementation and those who carries out the control.

Submitted matrix of IT responsibility is convenient visualization tool, which is part of modeling process of information technologies governance for effective distribution and control of responsible for types of IT activity of company. Preparation of IT responsibility matrix is aimed at standardizing of decision-making processes in IT companies.

Preparation of IT responsibility matrix of JSC Ukrtelecom confirmed that to ensure effective and objective IT governance at various stages of adoption, implementation of

IT decisions and monitor of their implementation, experts of different profiles and organizational departments, committees of companies with different activities should be involved in this process.

Building the matrix of IT responsibility through performance of functions of managers at various levels with the basics of IT governance will facilitate coordination of their actions on the use of IT.

It is offered to add classification of IT governance archetypes by the archetype "Democracy" which is characterized by giving rights on forming the input data for some IT decisions to users – customers of company. The use of this archetype of information technologies governance in some aspects of its IT activities, selected by the company, responding to requirements of customers to improve the product quality and information services; it serves as means of advertising and attracts new active customers.

In the future we plan to collect and investigate data for a more detailed analysis of economic advisability, confirming the approach proposed by the authors on the formation and use of the IT responsibility matrix in the management of companies.

Some questions and goals of IT Governance cross with IT Infrastructure Library – approach to IT-infrastructure service management. Interconnection between these issues will be analyzed in the future research.

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