Strategic Information SystemsCutting-Edge Change Management For Ministry of Regional Municipalities and Water Resources (MRMWR),Sultanate of Oman

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Abstract— The objective of this research study is to provide analysis which justifies the need for continuous improvement in the strategic information systems at the Ministry. Research has shown that maintaining the traditional information systems development without improvement often ends in failure. In modern contemporary business operations, changes have strong effect or impact on the success of any project. Change management has become a huge factor and a vital component of information system development and implementation which in most cases have increased the chances for success in both management and project implementation. This is a conceptual study on the effect of information systems to change management in the field of Regional Municipalities and business management. The study justifies the importance of Strategic information system's support in organizational change. This study includes: the justification of the need for implementation of information systems change management; analysis of restraining forces change; Different strategies to overcome resistance to change; stages and evaluation of information systems implementation results. The study results generate framework to overcome change management challenges and barriers in the field of regional municipality activities as related to the implementation of information systems in the Ministry of Regional Municipalities and Water Resources in the Sultanate of Oman

Index Terms— Change Management; Information System; Strategic Transformation

1. INTRODUCTION

THE focus of change management has become one of the most pressing issues and subject of numerous studies. As a "complex process, managing information system development and implementation projects deserves a very high degree of attention" [1]. Change management is an important academia in higher educational institutions, executive workshops and seminars/webinars and an integral part of modern control theory. In spite of its implementation in most industries, companies continue to suffer setbacks in management expectations and are forced to mergers and acquisitions. In an inactive or organizations in crisis, remaining in the status quo seems pretty unappealing. However, in successful organizations, employees are even more likely to question the need for change management. Change management theory or concepts revealed that necessary need for the

implementation of the concept by management of companies in timely manner [2]. All organizations face challenges, either now or in the future which require change. At the same time, most companies are thriving not only because of the embodiment of previously counted innovations, but also by coincidence, and decisions, refuting conventional managerial and technical standards in their implementation and adopting dynamism. Change management process begins with the awareness of the problem of loss of efficiency or the threat specific problems in the future. This is followed by setting goals, while administrative project consists of designing new strategy, systems and governance structures relevant to changing conditions of activity[3]. All new organizational projects must be implemented with monitored progress.

MRMWR has finalized its IT vision and future State's IT architectures (application architecture and infrastructure architecture). In-order to implement the IT architectures and achieve the IT vision, the Ministry of Regional Municipalities and Water Resources have to identify and prioritize it's IT initiatives in the following categories as shown in Figure 1:

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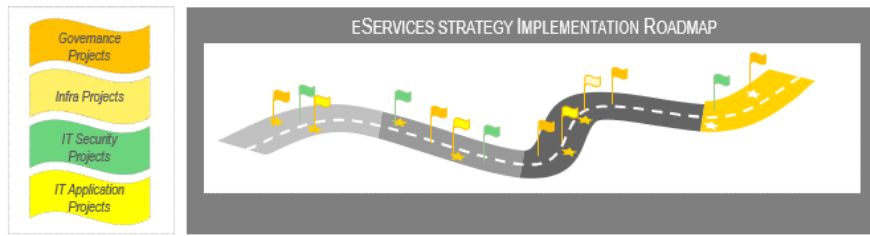
Figure 1. IT initiatives

For the implementation of IT Applications, a Strategic information systems (SIS) proposed to play the main role in the management of the Ministry of Regional Municipalities and Water Resources in recent years has changed dramatically. The change management concept relates to development of computer technology, software, and information management - provides not only the generation of reports, and accounting for all Regional Municipalities, it also brought infrastructural efficiency [4]. Modern Strategic information systems are complex integrated complexes that include modules which are responsible for almost all directions of the modern enterprise structures, such as Planning Management module, Financial Management module, HR system, Control module logistics and distribution, Document Management System, Marketing subsystem, Relationship Management client,Warehouse Management module, Inventory Management module, E-Services, Project management and Decision support system. Thus, in terms of program technology, SIS involve several software packages which include set of mechanisms, methods and algorithms to support the life cycle of information in the ministry. This also include three main processes: Data processing, information management and knowledge management [5]. Based on global perspectives, the development of corporate information systems could be extremely costly and a time-consuming process. Although, there are a number of application suite developed by major software companies like SAP, Oracle and others, but the implementation of such application suites require substantial restructuring of business processes, huge adaptation of the accounting systems and motivational organizational changes[6].

This study suggests that SIS requites organizational change for sustainable governance. Management theory effectiveness emphasized different viewpoints and when practiced could provide a comprehensive understanding of this complex activity and help evaluate the effectiveness of SIS management implementation process in the Ministry. Therefore, in order to make a decision on implementation of the SIS (or individual modules), the Ministry of Regional Municipalities and Water Resources must pay attention to the following issues as analyzed and shown on Fig 2 below:
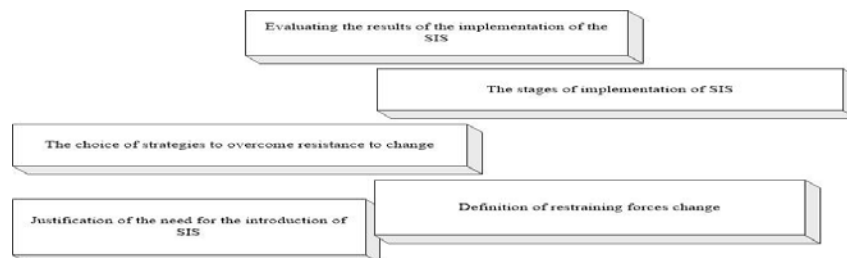

Figure 2: Main Steps of Change Management

As a policy decision, the Ministry of Regional Municipalities and Water Resources established a change management team to realize the implementation of E-services in various ways. This may reveal the need for solving any problems in the restructuring process of the Ministry, or could be based on information analytical views of activities of competitors. In so doing, it is important to consider the external and internal factors that contribute to the introduction of E-services in the Ministry. It is also important to identify all external factors in the implementation of modern development of information systems and technology's change taken into consideration the social, technological, economic and political factors [7]. In each case, it is hardly possible to identify all external factors, but the awareness of decision makers on a wide range of factors affecting the operation of the Ministry will allow the Management to identify the relationship between the factors and then determine the significance of each factor that would be much beneficial to the Ministry as identified and described in (Figure 3) and (Figure 4) below.

| Social factors	There is a growing number of young people who speak modern achievements of science and technology, new information technologies. The main responsibility for training and retraining of specialists with advanced knowledge, are educational institutions, which in their activities use the software and technical support for training facilities, distance learning, electronic textbooks, the syst of computer testing and others. Hiring professionals who have received relevant training in the field Information Systems(IS) and technologies that facilitate the implementation of IS issues for many organizations.
Technological factors	The scope of the use of information systems and technologies in the management and marketin expanding due to increasing possibilities and efficiency of telecommunications and data process systems. Computers made it possible to high-speed data and solve complex production probler Access to essential information resources via the Internet / Intranet network, electronic docume management system in enterprises, protection of transmitted information from unauthorized ac enterprise application integration technology, its operational analysis and data warehousing let manage increasing volumes of information.
Economic factors	Implementation of information systems has become a prerequisite for increasing the flexibili efficiency of the corporate governance system. Companies are increasingly resorting to the h modern IS and technology to follow the increasing internal and external flows of information, use analysis, forecasting, decision-making. Big investment in creating their own IS or maintaining e systems, software and specialists are forced company executives to focus on solving the problem. Information costs can be considered as an essential part of the transaction costs, and as a resource defines the conditions of access to the market and business efficiency.
Political factors	As a result of legislative and regulatory activity of the authorities tightened requirements for t reliability and timeliness of statistical information reporting companies. Business information sup a prerequisite for the completeness and timeliness of tax collection, which is the main condition f development of the state, which turns into the main consumer of information.
Market	At the disposal of company managers a wide range of management, information systems, softwar consultants, has its own methods of improving the competitiveness of the organization. There a variety of network and virtual organizations, whose activity is based on the principles of outsour
Competition	Maintain the competitiveness problem is that if the organization does not want to keep up with competitors, it needs to use modern technology and be ready to acquire and apply new developm

Figure 3: External factors
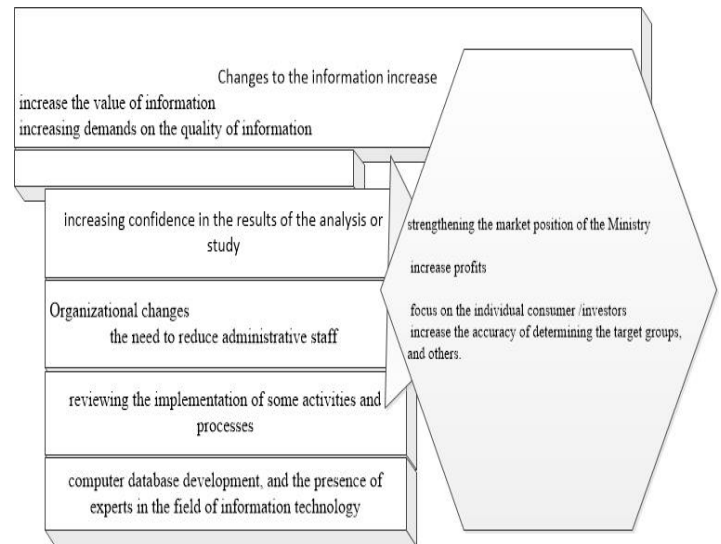
Figure 4: Internal factors

The Internal factors in change Management within the enterprise can be traced back through the prism of process problems and behavior, process issues which affect decision-making. Problems could be caused either because suggested solutions for change management not accepted or received too late, or the solutions are weak in terms of level of quality or unspecific objective[8]. Disruptions in the process of management behavior usually arise due to lack of effective communications between individuals in the ministry or departments, attributable to either customer orders are not executed effectively or their complaints are not resolved or supplier's invoice not paid etc.

2. MITIGAGING FACTORS TO CHANGE MANAGEMENT BARRIERS

There are many different techniques for monitoring and controlling all aspects of change management processes.

However, all methods can be used for different purposes and at different stages of the transformation process. The process must involve several requirements which is to demonstrate the need for change, the development of program of actions, drag reduction, supports in dealing with new challenges in a new environment, having a sense of duty, accelerating deployment of new initiatives and ideas, stimulating the initiative and creative approach to the achievement of prioritized objectives. Any organizations going through change often responds by setting a barrier mitigating factor against these changes [9]. There are many barriers that are common and this includes: links to copyright/privacy or trade secrets, the lack of time, resources and professionals with necessary skills. Considering the possible barriers in implementing a new information system in organization, a proposed framework and solutions will require conceptual classification of organizational structure into "technology", "organizational" and "personal" barriers [10]. Some of the barriers that do not fall under any of these categories were classified in the group of "other" (Fig 5).
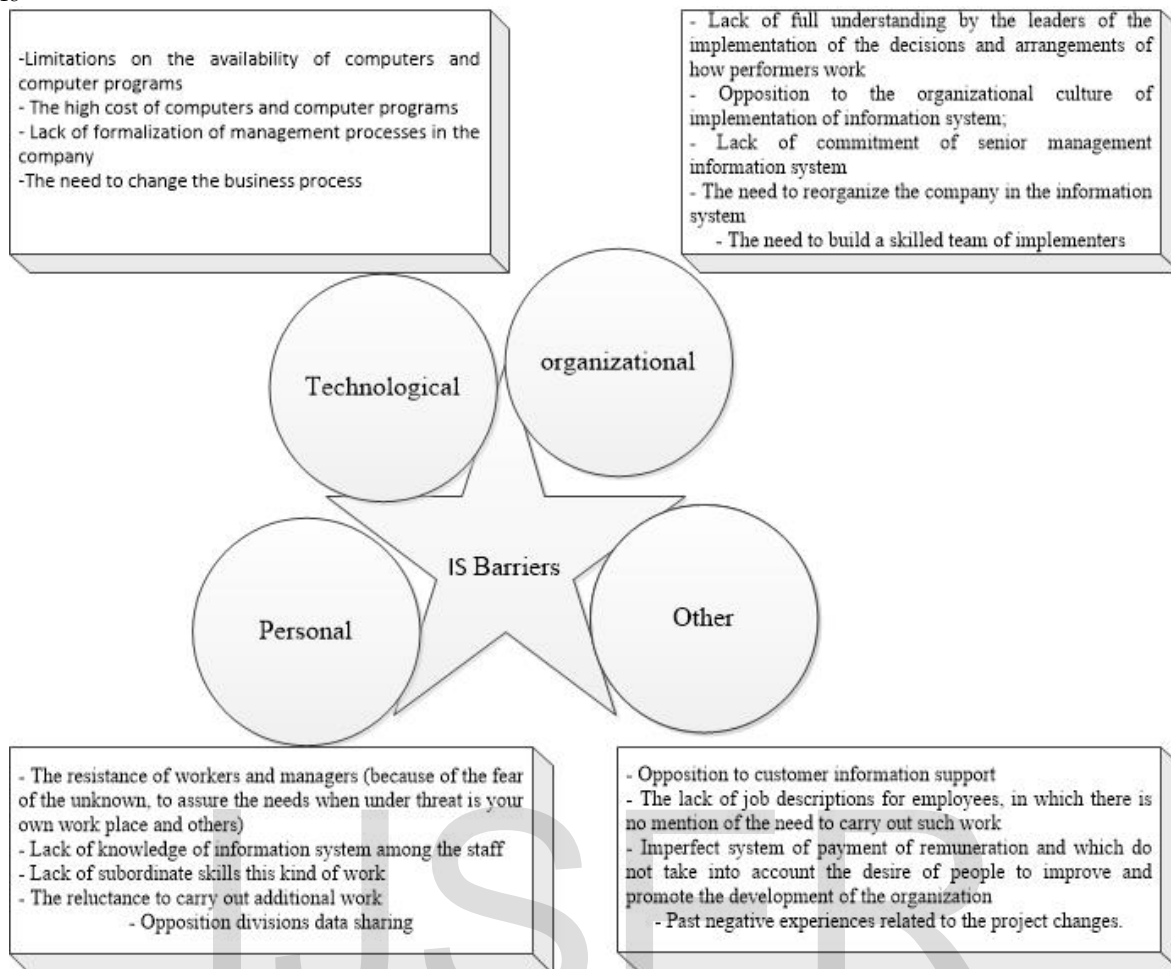
-Limitations on the availability of computers and computer programs
- The high cost of computers and computer programs
- Lack of formalization of management processes in the company
-The need to change the business process

- Lack of full understanding by the leaders of the implementation of the decisions and arrangements of how performers work
- Opposition to the organizational culture of implementation of information system;
- Lack of commitment of senior management information system
- The need to reorganize the company in the information system
- The need to build a skilled team of implementers

Technological

organizational

IS Barriers

Personal

Other

- The resistance of workers and managers (because of the fear of the unknown, to assure the needs when under threat is your own work place and others)
- Lack of knowledge of information system among the staff
- Lack of subordinate skills this kind of work
- The reluctance to carry out additional work
- Opposition divisions data sharing

- Opposition to customer information support
- The lack of job descriptions for employees, in which there is no mention of the need to carry out such work
- Imperfect system of payment of remuneration and which do not take into account the desire of people to improve and promote the development of the organization
- Past negative experiences related to the project changes.

Figure 5. Barriers in the implementation and use of information systems

The barrier's classification shows all of the problems encountered by users of the information systems in organization which would cause lower productivity and constant errors in the transmission and analysis of information. The presence of several constraints have significant impact on the demand of Ministry of Regional Municipalities and Water Resources in the IS processes. Uppermost is the budget constraint in acquiring modern and intuitive information systems and technologies.

3. STRATEGIES TO OVERCOME RESISTANCE TO CHANGE

The main reasons why people resist change as follow:

a. Narrow proprietary interest: This reason is when there is instability in an individual's beliefs that he may lose something of value as a result of the changes. In addition, company employees often resist change

b. Lack of Trust and Misunderstanding on Change. If there are no effective communications between management and employees, it creates mistrust and lack of understanding in the minds of the employees

c. Differences in assessment of the situation. Employees often have different opinions on the importance and timeliness of proposed change

d. A low level of readiness to change. Many employees find it difficult to adjust to proposed change and comes as an unexpected ideas.

Among other reasons, allocate:
- Peer pressure;
- Limitation to changes;
- Previous bad experience on management changes.
In order to overcome resistance to change, it is important to examine different strategies and advantages and disadvantages of each strategy in relation to the described change

Table 1: Advantages and Disadvantages Of Strategic Approach to Change Resistance

Strategic Name	Strategic Approach	Advantages of The Strategic Approach	Disadvantages of The Strategic Approach
Education and information	Informing people about the change, open communication, which implies the ability to ask questions and express concerns	Informing and promoting open governance. Employees can be informed of the change, for example, at a meeting of the labor collective. Provision of information to avoid unnecessary rumors and concerns about a possible reduction in workforce	N/A
Participation and involvement	The initiators of change should be ready to listen to people who are affected by the change, as well as provide them with additional information and support	Additional information can be obtained primarily from the Heads of departments, which will affect the implementation of the IS. Their inclusion in the change will improve the process of change.	This strategy delays the process of change as it involves the allocation of time to negotiate, to collect additional information and its systematization.
Help & support .	Support includes learning new skills, stress management, meetings, moral support For example, all employees of the relevant departments can be given the opportunity to undergo free computer courses, including on the Internet (at the expense of the company).	Technical project implementers should have moral support from management – discuss relevant issues and problems and help in work progress.	It takes a lot of time, also organized courses could be quite costly and in most cases cannot be effected.
Negotiations and Agreements	Tactics compensation "losing" side, for example, compensation for employees who were laid off or change the amount of work - offer higher salaries	It is obvious that not everyone can get the benefit in the implementation of changes, "losers" may have great power. Negotiations and agreements will reduce resistance to change.	Formal agreements may set a precedent for the company.
The manipulation and exaggeration of the role	Group exhibiting resistance provided key role in ongoing developments (or imitation key role)	If successful, it is possible not only to reduce the resistance, but also to achieve support	If people feel that they are being manipulated, this approach can promote or enhance the resistance.
Explicit and implicit coercion	The extreme measure related threats, such as reductions or deprivation of premiums, etc.	The advantages of this approach can be obtained if there is no time to attract other people to take actions.	For this approach to succeed, the manager must have sufficient strength.

4.STAGES OF IMPLEMENTATION OF INFORMATION SYSTEMS MANAGEMENT CHANGE

The change management theory have several stages of the development:

1) **Preparation**: At this stage, it formulated the essence of the upcoming changes, the analysis of its necessity, and also revealed the differences between the current and desired state of affairs at the Ministry .

2) **The unfreeze**: At this stage, the training of personnel for the upcoming changes. People are convinced of the need to abandon the old ways of working and to begin to develop new ones. This is necessary in cases of resistance to change. Key

management issues at this stage linked with the choice of means of communication.

3) **Change** : At the direct implementation of the changes necessary to choose a certain strategy.

4) **Freeze**: The change fails if the consolidation change (freezing) is neglected. There is a risk that routine cases are not able to successfully complete the freezing process. In this case, careful monitoring and control of the freezing stage should be adopted.

4.1 Evaluation of the results of the implementation of IS on Change Management

Costs associated with the development of specific Information System is relatively easy to measure, at least directly. Typically, they can be measured using technical analysis of the system. Indirect costs arising from delays in implementation of information systems, or with the resistance to organization changes, it is virtually impossible to assess. However, in comparison, it is much more difficult to obtain clear evidence of expected benefits than expected costs. In applying the "Change Management theory" to the analysis of the implementation and evaluation of IS, it may be difficult to assess any gain attributed to the process [11]. For example:

-benefits are realized for a long period of time;

-nature of the intangible benefits;

-strategic and competitive benefits are difficult to quantify;

- results from the introduction of IS are indirect and therefore indistinguishable from the results of other input factors;

4.2 Noteworthy Approach To Assessing The Benefits Of Implementing SIS:

Direct benefits - a direct result of the innovations that are easily measurable. Direct benefits are usually associated with a decrease in costs, for example, reducing the work of data entry due to the e-ordering system, reducing the amount of paperwork.

4.3 The Indirect Results – This is the implementation of information systems and technologies in the business process which include:

- Intangible benefits that can be attributed to specific areas of application of information systems, such as decision support systems to improve the structure of the user experience;

- Indirect benefits, which are seen as the result of further investment, based on introduction of new system. For example, the introduction of the local area network in the company contributes to the development of internal infrastructure, which will be the basis for the different modifications of information systems and programs;

- Strategic benefits that result in the development of a new business strategy, a more successful positioning of the organization and others [12]. This classification scheme is shown as a matrix in Figure 6 below. The horizontal axis shows the difference between the measured and measurable benefits, vertical - between the benefits from the implementation of Information systems, and other factors.
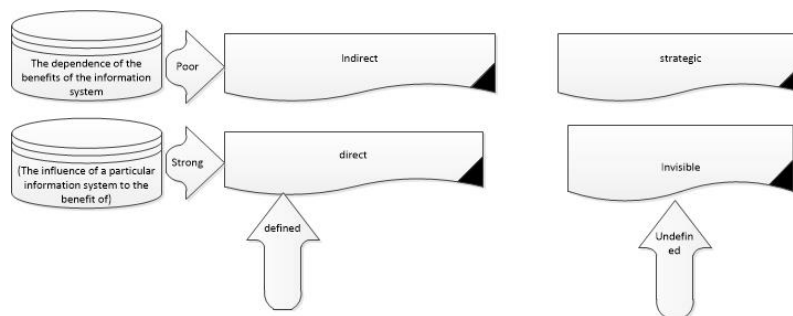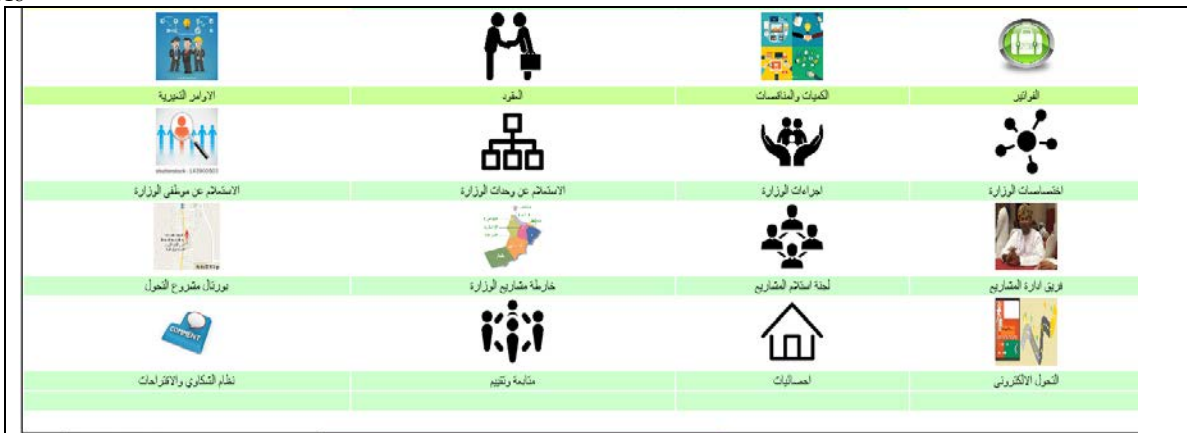

Figure 6: Classification scheme

4.4 Screenshots of Developed IS and Achievements of Change Management Team At MRMWR

5. RESULTS

In modern economy, business conditions are changing very quickly. Rapid technological progress leads to the

emergence of new technologies, which are developed on the basis of new products and services. Around the new technologies and products form a new municipality market. The economy is growing, increasing individual and social well-being, changing consumer demands and the structure of demand, providing different structures and management systems, violating this standard process will reduce the effectiveness of   management. Under the pressure of external and internal circumstances, business enterprises are forced to change their own strategies, systems and management structure. Otherwise, their performance in an increasingly competitive environment

5.1 Table 2: Changes Associated With Implementation of IS

Changes	Characteristic changes
"Changes in activity"	- Enhance decision-making process - Reducing decision time - Positioning the organization in a more successful stage - Focus on the proportion of a particular request
"Information changes"	- Increase the amount of information used for decision-making - Improve the quality of information - Development of internal infrastructure for various modifications of information systems and programs - Reducing the amount of paperwork - Increasing the credibility of the analysis results - An increase in the quantitative information relative to quality - Preference IT intuition
"Organizational changes"	- Increased status of enterprise information services - Increased demand for enterprise information departments - Control of the enterprise units - Reducing the number of administrative staff - Greater decentralization of activities - Reducing the use of foreign agencies and services

6. CONCLUSION

It is important to note that continuous adoption of traditional systems of management without change

can be quickly called into question. The one who manages to get ahead of the competition and the first to offer the market a new and more effective management decisions, as a rule will ultimately have a competitive advantage.

Automated and Intelligent systems have been used to analyze logs records related to the behaviors of employees in many various cases that help determine whether the implementation of information been successful in bringing any changes. Possible changes in the management of the Ministry related to the implementation of information systems, are shown in Table 2 below.

development and improvement in the new information age becomes riskier than creating new future strategic plan. Currently, the use of Information System is becoming a prerequisite for increasing the flexibility and efficiency of the Ministry of Regional Municipalities and Water Resources systems. Requirements for corporate and Strategic IS and providing them with software, have accelerated to such a level that the Ministry can no longer just ignore the key points in the process of their development and implementation. The same can be said about the level of work in the direction of the increased costs of operation, which significantly raises questions about the need to develop a management strategy for this process and evaluate each stage of IS implementation. Important sources of information involve implementation methods that requires independent management changes. However, it is very rare to have or effect only one particular method or approach to successfully implement the restructuring of the organization. In many cases, executives and managers have to use several methods of intervention. Experienced managers often use flexible methods of intervention to support the changes and apply multiple methods as appropriate. As a rule, this choice is more effective when implemented at the initial stage rather than the final stage.

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