

An Intelligent and Adaptive Model for Change Management

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ABSTRACT: *At present, the continuous and rapid changes that are taking place in the world today makes the change management models crucial to any organization. The existing change management models are outdated and often contradictory, which demands for new change management models to allow organizations to survive in the currently high competitive environment. In this paper, an intelligent and adaptive model for change management is developed that taking into consideration all the positive and/or negative effects (factors) that may take place at any time and any place. Based on these factors, accordingly, the proposed intelligent and adaptive model can efficiently find the reasonable solution then adapts to the exiting situation to avoid any failure of organizational management. This paper attempts to show how the proposed model can be effectively implemented in change management process.*

Keywords: Change Management, Decision Support System, External Environment, Internal Environment, Processing System

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1. Introduction

Change management is crucial strategy to every organization in order to adapt to the rapid changes that are taking place in the world today. Change management has its roles in various fields nowadays, such as pollution prevention, fertilizer, water resource, energy, raw materials management, pesticide residues and etc. (Todnem By, 2005). Although change management has been around for a while, it becomes more popular recently for its role in initiating significant changes to work procedure and culture. Moreover, the outdated change management models are often contradictory, which call for new models for managing such change. Generally, a change management model is built of a set of processes and procedures that is employed to ensure that significant changes are implemented in an organization as response to the environmental changes (Kerzner & Kerzner, 2017). Change management involves three aspects, these are: people, processes, and culture (Rosemann & vom Brocke, 2015). The process of change management includes planning, initiating, realizing, controlling, and finally stabilizing the change processes on both, corporate and personal level. Change management also covers other related aspects that effects management,

such as strategic direction or personal development programs for staff (Alkhafaji & Nelson, 2013).

Data collected with the every change management process is critical. This is because organizational change is not an exceptional events nowadays, but it is an ongoing process, which makes the models of 'business as usual' becomes insignificant to most organizations. Moran Brightman (2001) defined change management as "the process of continually renewing an organization's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers". Accordingly, data analysis of the previous process of the rapid and continuous changes becomes critical to the success of the future change management. Collected and processed data helps in understanding the factors, techniques and risks that are involved with the change management process (Laudon & Laudon, 2015). These three components form an integrated change management strategy that mitigates risk, builds ownership and addresses the changes required to ensure long-term success (O'Brien & Marakas, 2006).

This paper proposes a new model that utilizes an intelligent and adaptive model for change management. In this way, the change management is carried out in effective way immediately as responding to any changes of external and/or internal environmental changes. Using this approach has been hypothesized to ensure that the correct selection is guaranteed. The rest of this paper is organized as follows: Section 2 presents the related work. In section 3, the details of the proposed approach are described. Section 4 is devoted for the evaluation and finally, Section 5 is a conclusion.

2. Preliminary and Related Work

According to Graetz (2000) "increasing globalization, deregulation, the rapid pace of technological innovation, a growing knowledge workforce, and shifting social and demo-graphic trends, few would dispute that the primary task for management today is the leadership of organizational change". Although it is on demands, the existing change management models are outdated as they focused on research cases for business organization based on the human factor. Nevertheless, Kuipers et al. (2014) reviewed the existing literature on the change management and identified four factors by which change is influenced and through which the change management is taking place, these are: context, content, process and outcomes.

The context refers to the internal and external factors, such as policies, political and economic changes. As response to the context, Macleod By (2012) studied the effects of the context on the change management of public sector organizations and analyzed the benefits of using historical context data in make decisions about the management techniques in public sectors. Similarly, Modell (2001) addressed the context influence in healthcare organization. While De Boer et al. (2007) studied the context in education change management. These studies illustrated the influence and benefits of the context using use cases with context-related data analysis. The content refers to the strategies of the organization, such as the management structure and hierarchy (Paul Battaglio Jr & Condrey, 2009). The existing literature on content-based change management focused on the effects of policies in public sectors that are related to public organization. Schout (2009) discussed and criticized the existing change management techniques in relation with the change in policies and regulations within public sector organization and highlighted the benefits of reflecting the change management based on the details change in the policies as parallel to using the historical data in change management technique. The processes refer to the periodically organizational process, duties and roles. Erakovic Powell (2006) proposed three ways for change management based on the process influence, these are incremental change management, radial and reductive.

The outcomes refer to the experiences gained by the change and which should contribute to the management of the future changes (Armenakis & Bedeian, 1999). A literature review on the change management outcomes showed that the outcomes of the change management are four types, these are: readiness for change, commitment to change, openness to change and cynicism about organizational change (Choi, 2011).

Various studies have focused on change management with reference to the outcome. Paul Battaglio Jr Condrey (2009) studied the change management from outcome perspective in public sector, while Lindquist (2006) studied the outcome in change management in private sector.

Overall, despite that there are different factors are influencing the change management techniques, these factors are usually represented as data that needs to be analyzed and processed. Change management in public and private sectors have been found to be equal in recent studies (Kickert, 2010; Klarner et al., 2008). Accordingly, these is a need to develop a change management technique for general purpose based on analyzing and processing previous data from the aforementioned factors.

2.1 Environment and the Business Strategy

In the process of understanding the change management, the environmental behavior of companies and organizations have been studied, analyzed, classified and evaluated. Accordingly, models for the change management have been developed to address such changes. The current researches have created a formal environment management models. Kolk Mauser (2002) gave an overview on the process by which the development of such environmental management models can be implemented. Besides, model analysis and model evaluation in term of characteristics, strengths and weaknesses have been discussed and clarified. Generally, the state-of-the-art change management literature has provided typologies and non-linear models to deal with organizational and strategic complexities. Models are starting to pay more attention to the management side. To overcome problems of operationalization, sector specificity, environmental performance evaluation systems have emerged more recently. Although there is no comprehensive performance assessments, the tenets of such a system can be delineated.

2.2 Decision Support System (DSS)

Decision Support System (DSS) is an information system that supports decision-making in a variety of domains and is intensively used in the business field. DSSs implements various techniques for organizational management, operation, and planning. In case of rapidly changing environment, developing a decision making become more challenging even for a well-established decision making models. DSS is implemented with an associated knowledge-based systems such as databases or web-based resources. A good DSS helps the decision makers to find useful information from a combination of inputs, raw data, and knowledge and business models to identify and solve problems and make the correct decision (Liang et al., 2005). There are several ways to classify DSS applications and not every DSS fits exactly into one category, but may be a mix of two or more architectures. Generally, DSS are classified into six frameworks: Text-oriented DSS, Database-oriented DSS, Spreadsheet-oriented DSS, Solver-oriented DSS, Rule-oriented DSS, and Compound DSS (Aiello et al., 2018).

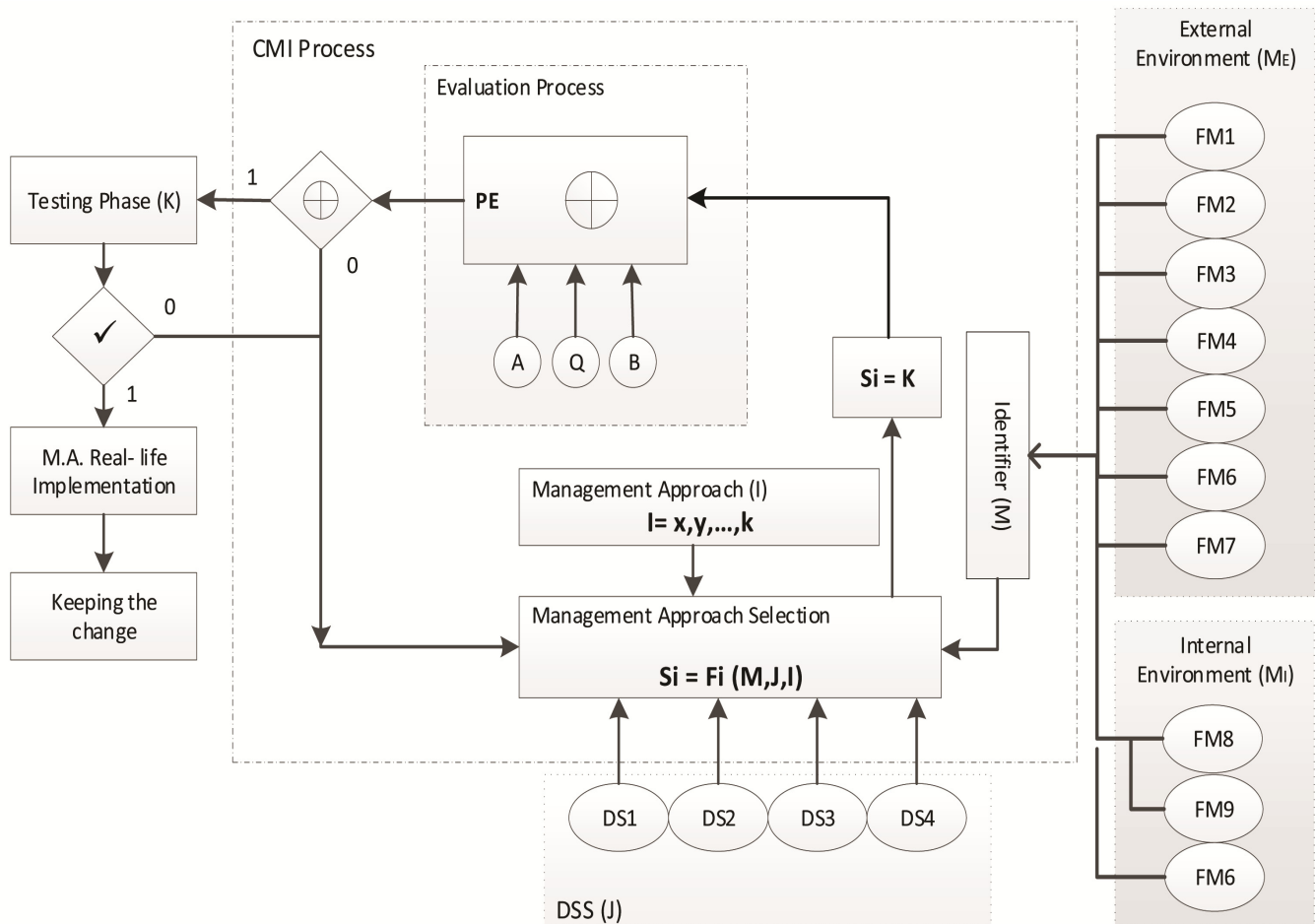


Figure 1. An Intelligent and adaptive model for change management

3. The Proposed Model System

In order to overcome the limitations of the current environmental management models in a rapidly changed environment, an intelligent model is proposed in this paper. The proposed “Intelligent and adaptive system for management in rapidly changed environment contains various components that are integrated to produce reasonable and acceptable results as given in Fig. 1, these components are: the external environment factors, the internal environment factors, decision support system elements and a change management intelligent process.

3.1 External and Internal Environmental Factors

An organization is related to the community and the surrounding environment from which it obtains the resources and to which it supplies products and services. Organizations and environments have a mutual relationship. On the one hand, an organization is open to, and dependent on, the social, financial, regulations and market status and conditions. For instance, without the financial recourses and the human capabilities, the organization is seize to exist. An organization has to obey and follows legalizations and other requirements imposed by the local government, as well as following the trends of the market and competitors. Besides, organizations must respond to any political change inside or outside the country. Overall, the external environments factors of the proposed model are: the political, social and organizational bylaws, the economical, competition, and investment requirements and the environment and ecology requirements. The internal environment factors are: Human resources, budget and financial situation, and the products/ services factor (see table. 1).

Index	Factor	Index	Factor
FM1	Political	FM6	Investment Requirements
FM2	Social	FM7	Environment and Ecology
FM3	Organization Bylaws	FM8	Capital and Budget
FM4	Economic	FM9	Economic Situation
FM5	Competition	FM10	Products/Services

Table 1. External and internal environmental factors

3.2 Decision Support System (DSS) Factor

Organization’s DSS must contains the following resources in order to be able: the organizational database that contains information about the internal factors, information resources for the external factors, planning and marketing studies (See table 2).

Nowadays information systems play a very important role to help organizations perceive changes in their environments along with helping organizations to act in their environments in the right way. Information systems are used for environmental survey, helping managers to identify external and internal changes that might require an organizational response. Environments usually change much faster than organizations. Accordingly, a failure may occur due to the inability to adapt to rapidly changing environment and a lack of resources to sustain even short periods of troubled times. New coming technologies, new products

Index	Element
DS1	Internet
DS2	Database
DS3	Marketing Studies
DS4	Planning

Table 2. Decision Support Decision Elements

and changing of public tastes and values put strains on any organization's culture, politics, and people. Many organizations do not cope well with large environmental changes. The inertia built into an organization's standard operating procedures, the political conflict raised by changes to the existing order, and the threat to closely held cultural values typically inhibit organizations from making significant changes.

3.3 Model Description

This subsection discusses the mechanism by which the system works and how the parties interact with each other to give the correct and positive change that can put the organization in the right path and avoid any failure of business.

The proposed model for change management is described as a system, which similar to any system, by inputs, processing and outputs (with iterative mechanism in some cases). According to Figure 1, variable M is external and/or internal environment(s) factor(s), M may be one or more of the following factors: external (political factor, social factor, organizational bylaws factor, economical factor, competition factor, investment requirements factor, or environment factor) and internal (human factor, capital, budget econ. situation and products factor). Variable J refers to decision support system(s) (DSS); J also may be one or more of the following: planning studies, information source (WEB), marketing studies and data bases. Variable I refer to method(s) of management (for example centralized, distributed and etc.).

The processing stage of the system includes a management method (approach) selection and evaluation process. The management approach selection step is based on the main inputs (M, J, I) and selects the best method that will be suitable to a current situation of organization taking into account inside and/or outside effects. An intermediate result is the output of the previous step will go through the evaluation process. The evaluation process is a subsystem that can measure and evaluate a selected management approach based on AQB; AQB is a combination of three inputs which are:

- **A:** Stands for the employees' level of acceptance to apply a new management approach measured in percentage.
- **Q:** Stands for quality measurement, and it refers to the percent by which the new management approach can meet the quality standard requirements within a given organization.
- **B:** Stands for a budget of an organization and show in which percent organization's budget can support a new selected approach of management.

The output of the evaluation process can be negative or positive. In a negative case, a loop back step will be carried out to select another management approach while in a positive case, the selected approach for change management will go through a testing stage (phase) for few weeks to ensure that the selected approach is a right choice otherwise; the loop back process will take place. After a positive result of the testing phase a select approach of organizational management will be confirmed.

4. Evaluation and Results

Evaluation phase depends on the following factors:

- Human resources factor (A) that measures the acceptance rate of the new management approach among human resources in an organization.
- Budget and economic situation of an organization factor (B), which involves questioning about whether the budget and economic situation can support and endure the consequences of applying a new management approach.
- Quality factor (Q), a new approach of management should achieve minimum requirements of quality issues within an organization.

To explain the evaluation process that is proposed, the system suppose that each of given factors, A, Q and B can be represented using 2-bit code, each combination of these bits reflects a percentage of a given factor to the evaluation process. This percentage reflects the performance of the system for the change management as the following:

- 00: 0%
- 01: 25%
- 10: 50%

• 11: ≥ 75%

The evaluation process have to ensure that some of evaluation process factors output a minimum value of 50% such as B and Q while the A factor can be 0% in some special cases. Table 3 illustrates some of AQB factors that presented in combination of 6 bits (2 bits for each factor) along with results of the evaluation process in a proposed model.

AQB	Output	Results
000000	0	×
000001	0	×
.....
001011	1	✓
001010	1	✓
.....
100000	0	×
.....
101010	1	✓
111111	1	✓

Table 3. Evaluation Process

5. Conclusion

In this paper, a new model called ‘an Intelligent and adaptive model for change management’ has been developed. The given model can be used to carry out change management based on an intelligent system to avoid organizational failures and to help it to be sustainable. All outside and inside factors were taken into account. In future, some cases will be experimentally implemented to show the efficiency of the model, an enhanced algorithm that explains the work of the proposed will also be developed.

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