

# A cybernetic modeling framework in higher education administration

## (Case study: Isfahan Medical Sciences University)

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**Abstract-** The main purpose of this research was to study cybernetic modeling framework in the Isfahan Medical Sciences University administration that was in the form of three questions with regard to model indices (decision making, leadership, equilibrium) were performed. Research methods was descriptive-survey and population consisted of all faculty members of Isfahan Medical Sciences University in the 2009-2010 academic year. To do sampling, after estimating sample size, 147 faculty members were selected randomly as statistical sample. To collect data, questionnaire of cybernetic model were used. Cronbach's alfa coefficient formula was used to determine questionnaire reliability which calculated at .90. Data were analysed using two levels descriptive statistics and inferential statistics. Findings showed that faculty members of Isfahan Medical Sciences University usage patterns of Cybernetic, in organizing its activities, the appropriate place. The results also suggest that the university, have a tendency to this pattern.

**Index Terms-** Cybernetics model, higher education, Isfahan Medical Sciences University

### I. INTRODUCTION

The world of today higher education, it is not first world. Although this may be commonplace, but it is an important fact. Today, change is a necessity, not an opportunity for higher education and universities. Students were transformed, their needs have changed, society has changed, governments have changed, as well as global life style has changed (Nechansky, 2007). Several advances have been made in recent decades in the organization and environment, and managers have been faced with a multitude of processes and organizational changes. The age of accelerating change has been called severe. Various organizations, including universities are faced with, these changes that were inevitable for the durability and survival, with its rapid and unprecedented change their tune. Also, changes in management practices and organizational leadership, is inevitable. Because traditional methods of leadership and management in today's changing conditions, lack the effectiveness it is necessary that the university leadership for the newer model need to be able to adapt to unknown phenomena in the uncertainty, through the appropriate organizations to provide guidance and requirements of complicated environment. Several models have been proposed for the management of educational organizations and universities and researchers have pointed out, university relying on specific models, are attempting to organize their activities. Acquaintance of university presidents with cybernetic management style and also led their organizations to use in such a way, more complete understanding has provide of the difficulties and complexities associated with their university functions (Birnbaum, 2003; Alwani & Shahqolyan, 2009). System approach provide a useful framework for managers and students of management can be to understand the organization and its components. This approach may provide a systemic view in the organization as a whole that to unite it components. Many of systems theorists used concepts, approaches closely related to cybernetics, control, communications, and feedback. However, systems theory focuses more on the system, while the cybernetic emphasizes more on how function system.

### II. BACKGROUND

Stafford Beer is father of management Cybernetic and also is the founder and professor in the domain of management Cybernetic. He was able the natural laws to associated with control was guiding of nature to organizational environment. He describes an efficient organization of cybernetic knowledge. Theories of Stafford Beer were derived of computer science, neural physiology, communication, logic and philosophy (Yolles, 2008).

Many words that begin with "cyber" is derived from the ancient Greeke word "kybernets" meaning steersman, steering and leader. Steersman mean that a skilled sailor, brings his ship safely to harbor (Yolles & Ye, 2010). Cybernetic in ancient Greece means the art of steering the ship was first used by Norbert Wiener as the science of monitoring, control and communication in the animal, and human machine (Wiener, 1948 ;Rudall, 2000 ; Negoita, 2002 ; Pickering, 2004 ;Glanville, 2004 ; Mezey, 2004 ;Majumder &

Majumdar, 2004; Lutterer, 2005; Nechansky, 2007; Scott, Shurvell, Maclean & Cong, 2007; Sutherland, 2007; Yolles, 2008; Trietsch, 2009; Rudall & Mann, 2009; Peters, Britz & Bulut, 2009; Brier, 2010; Nechansky, 2010; Rios, 2010). Cybernetic word reminiscent of the concepts of information, communication and monitoring and sense of control and feedback loops that comprises its central core (Zouwen & Smit, 2003).

In terms of scientific, Cybernetics knowledge speaks of self-regulated systems and is related with concepts of the Self-Regulating guidance and regulation. In this part, we refer to Stafford Beer "Father of cybernetic in management" that is well-known founders and masters in the field of management cybernetic (Pickering, 2004; Yolles, 2008). He describes as cybernetic as "the efficient organization knowledge". So far several definitions of cybernetic in the field of theoretical and practical aspects are presented.

Overall, Cybernetic is a young knowledge that of scientific based on common theoretical activities disciplines of sociology, biology, medical, physiology, economy, linguistics, psychology, logic, mathematics, engineering, control and information theory and automatic machines has occurred (Khajy, 2004; Sarnovsky, 2006; Peters, Britz & Bulut, 2009).

In this regard, we can use view Robert Birnbaum (1998) in the book "How work universities". He characterizes four assumed organization to display different patterns of management in university organization:

- a. Bureaucratic university (with rational structure and decision making)
- b. Collegiality university (based on equal division of power and values in society)
- c. Political university (competition over power and resources)
- d. Anarchical university (series of autonomous actors)

Birnbaum believes that these models are correct but incomplete, and Cybernetic University pattern as a combination of these patterns has the advantages compare to other models. (Toroghi Bydabady, 2005). In this model, the university as a system that functions is controlled by vertical feedback loops that creating and strengthening of the university structure and horizontal feedback loops that are at the root in the social system. This model refers to features of the models which can organize activities for the university systems in the new age, to be used.

Cybernetic model has four main indices:

- 1) Decision making: The decision making characteristics in the Cybernetic pattern include in numerous resources of decision-making, making a gradual or stepwise, avoid impulsive action (hasty) and focus on a few new variables instead of spending great time to analyze the possible results (Birnbaum, 2003, p. 196).
- 2) Leadership: Leadership Characteristics at Cybernetics University of are awareness into the change importance and dynamics and reform in the organization, recognition of the organization and its activities, Support of university activities, participation of other members in the leadership and management of university (Birnbaum, 2003, p. 217).
- 3) Equilibrium in the management: The purpose is balance conservation between organizational systems and attention to systems that has reduced of acceptable level and generation of restrictions for other systems that are threat involving everywhere (Birnbaum, 2003, p. 241).

### III. METHODOLOGY

This study was descriptive survey. The study population included all faculty members Isfahan Medical Sciences University in 2009-2010 academic year. To do sampling, after estimating sample size, 147 faculty members were selected randomly as statistical sample. Measuring instrument was a questionnaire-based study of Cybernetics background and scientific literature related to research. This questionnaire contained 25 questions and is with range five-item Likert scale. In order to determine its validity, content and face validity were used and were determine that this questionnaire possesses content and face validity and the questions were applicable to the subject and research purposes is approved by the experts. Formula for determining the reliability of the questionnaire was Cronbach's alfa that was estimated at .90. To analyze the data, the two-level descriptive statistics (frequencies, percentages, mean and standard deviation) and inferential statistics (t-test for univariate, multivariate analysis of variance and Levine test) was performed.

### IV. FINDINGS

**First question:** How university of Isfahan is using decision making item of cybernetic model in its affair?

Also, inferential analysis to determine the significant level of testing. "t" showed that obtained results average (3.24) was greater than (3) and it can be concluded that from viewpoint of members, decision making aspect of cybernetic model is used.

**Second question:** How university of Isfahan is using leadership item of cybernetic model in its affair?

Also, inferential analysis to determine the significant level of testing. "t" showed that obtained results average (3.35) was greater than (3) and it could be concluded that from the perspective Isfahan university administration by faculty members, leadership aspect of cybernetic model is used.

**Third question:** How university of Isfahan is using equilibrium item of cybernetic model in its affair?

Also, obtained results average of (3.38) was greater than (3) and it could be concluded, that from the perspective of faculty members, of equilibrium aspect of cybernetic model in Isfahan university administration is used.

**Table 1: Test results t, amount average use of cybernetic model indices in the Isfahan Medical Sciences University administration from the perspective of faculty members**

The research questions	The average level	The average	SD	t	Significant level
The first question (decision making)	3	3.24	0.81	5.55	0.001
The second question (Leadership)	3	3.35	0.82	7.90	0.001
The Third question (equilibrium)	3	3.38	0.81	8.47	0.001

## V. CONCLUSION

Results concerning the implementation of Cybernetic model aspects at Isfahan Medical Sciences University administration showed that based on view point the faculty members, the model of Cybernetic at the University is present. The results of decision making based on the model of Cybernetics at Isfahan Medical Sciences University showed the status of faculty members in decision making is appropriate. In the other words, items such as decisions based on a predetermined process, to determine the necessary measures to deal with environmental challenges, to gather information before making decision, managers make decisions independently, clear decision making, immediate solving problems in the sub-units, numerous sources and references at decision making. Decision making is one of the most important management practices. Yolles & Ye (2010) argue that group decision-making in the cybernetic systems is an intelligent factor in solving problems. Findings of the present research findings is coordinate to Bazrafshan Moghaddam (2006) findings because in the aforesaid research was also reported that Ferdowsi University of Mashhad in the decision making component is consistent with the pattern of Cybernetic.

The results of the status leadership indice based on the model of Cybernetics at the Isfahan Medical Sciences University indicates that these components are implemented in university based on the pattern of cybernetic. In other words, items such recognition manager of university activities, Support of scholarship and quality research, manage the activities of work unit, Intelligent interventions to address existing problems in current operations, led to processes that the release of information in the university.

The results of the equilibrium in the management of status based on models of cybernetic at the University of Isfahan indicates that the balance in university based on cybernetic system. In other words, from the perspective of faculty members in cases such as the managers advocating of the bureaucratic, political, collegiality elements, being appendix president to the complex network of universities, the growing restrictions on some units that are extreme, being aware university president the variability of the University, to strengthen activities in areas where there is no acceptable level of support and commitment to shared values and interests of minority groups in the university. The in the equilibrium management of properties and the subject of Cybernetics Systems. Rios(2010) has also been reported.

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