

Education is a System

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ABSTRACT— *Education is the effort to develop human's potentials of the students, such as their physical creations, tastes and intentions/works as well, therefore their potential come to be real and functioned in their own life. Basic of an Education is human's universal dreams or wishes. The aims of education is preparing a person as an individual to have balance in his/her united organs harmoniously and dynamically to achieve the aims of the man's life. To achieve the education aims, a System is needed to use all important sources to implement the mechanism of education itself. Education is as a system, include sum of components, such as input, output, instrumental input, environmental input.*

Education system can be in effect as an open system that is continuously linked to its outside environment and influenced by its environment as well. Therefore it happens a process of giving and taking information, energy and all available materials in the environment.

The use of analysis system in education aims is to maximize the achievements of the education objective efficiently and effectively through systematical thinking process. If close education system is implemented, the conduction of education activities would be implemented in a way of instruction or teaching corridor. In other way, the open system tends to be implemented in a way of guiding and caring.

Keywords--- System, education, opened system

1. INTRODUCTION

System is one reality phenomenon happened in all process., biologically and non biologically as well. One system is formed by sub-systems which are integrated, since they are all continuously influenced each other and go for the same direction. System can be stated as a group or series of elements, components or organized variables, interacting and influencing each other in an integrated way. The idea of Contemporary System has been fast developed and applied in some different fields and conclude broad areas. We can see the application of the system theory in living systems theory, organizational systems theory, sociology and sociocybernetic, biology system, dynamics system and psychology system

Pidwirny (2006) stated that a system is assemblage of interrelated parts that work together by way some driving process. While McLoid (1995 and 2003) explained that a system is an integrated of elements, that they all work to achieve one objective. All system consist of main elements: inputs, transformation and outputs. Then Kuhn (1974) explained that a common element of all systems is knowing a part of the system that give chance to know another part of the system.

Organization that consist of units working together to produce optimal performance, conducting activities based on a system. The success of an organization is highly influenced by capabilities of all sub systems, supporting each other in a synergy way. This will be done, if all sub systems understand all functions of sub system and know all the impacts. In Organization, an individual often only understand what he/she does, but does not understand the impacts from his/her work for other units in organization. Besides fanaticism act is often emerged, it seems that only his/her unit has important roles in organization and other unit has not important roles at all. This phenomenon shows that there is not a systematically thinking process. This causes members of organization do not understand the whole contexts of organization. Therefore, what we call ego-sector is emerged. A loss is often happened, caused by lack of ability to synergy with others and waste of cost, energy and time.

System theory has two basic concept, as subsystem concept that see the connection between division as cause and effect. The second is see the multiple causation is linked each other, that each part is a complex (group) which its

factor connected to each other (Owens, 1987). System is an organized or a complex of wholeness circle, a compilation or integrated of things or units that forms a complex wholeness (Tatang M. Amirin 1992:10)

Organization is a group of individuals interacting to achieve a certain objective in a working system or roles. Organization has sub-systems interconnected and needed each other to strengthen organization itself to achieve its objective. Organization is a group of people working together in a division to achieve the same goal (Schermerhorn, etc, 1997:9). The objective is not only for the organization, but for the importance of the society as well.

2. SYSTEM APPROACHES

System can be defined as a compilation of sub-systems linked each other. Organization is a system will be seen as a whole, consists of related parts (sub-system), and the system/ organization will interact with the environment. In simple way, a system can be defined as a group or compilation of organized elements / substances, components or variables, interacting each other and integrated.

System model drawn by Bertalanffy, is known with General System Theory (GSI) that has characteristics as follows: (1) organization inputs; usually get from the environment, such as raw materials, human resources/people, capital and information, (2) transformation process; activities in organization, such as production system, controlling, administration (3) outputs; output produced to environment, example products, profit, information (4) feedback; responses. Every organization has approaches in its system that conclude applying concepts and suitable strategy from system theories to simplify understanding about organization and managerial practices.

Every components formed into an organization is important and has to get full attention, therefore decision making can be implemented effectively. System theory generate concepts:

1. Futuristic concept, such as well-known is cybernetics concepts. This concepts mainly related to the effort in implementing discipline of knowledge/ studies, such as studies in behavior, physics, biology and technique. Cybernetic concept in fishery and marine sectors can be seen on making postal development spatial plan, where in making process involving many discipline of studies such as spatial planner/expert, fishery expert, environmental expert, oceanography expert, etc.
2. Synergy concept, the principle is producing output by using a system will have a higher result than if it is without using a system or run by itself. Activities done together from separated parts, but they are connected each other will effect higher result than if they work by themselves and separately.

3. OPEN SYSTEM

Bertalanffy contributed on system theory, it is well known as an Open System theory. Open System has steady state. Therefore it seemingly has many characteristics from paradox life system in a view of physics law which is consequences from this facts. Bertalanffy (1968) assumed paradigm system on aspects of chemistry studies, biology, and mathematics where finally a system will be at the equilibrium point, like a physiology process.

System in a organism called an open system, since it is influenced by a lot of factors outside the organism itself. According to Ludwig Von Bertalanffy, a system called opened if activities are in the system influenced by its environment, while a system called closed if all activities are in a system not influenced by any changes happened in its environment. In Bertalanffy model, theory stated by common principles of opened system and limitation of conventional model. This theory considered coming from application for biology, information theory and cybernetics, but potentially it can be applied on other studies/ knowledge. Open system has dynamically interaction with its environment, by transmitting and receiving energy as well. Basic model of Open System is interacting among its components.

A simple system usually has a limit interaction with its environment and physical function. In other side, biology entity built from separate different parts. Bertalanffy (1969) stated, “the reason to dominate segregation in nature life seemingly segregation put into a partial system, showing an increasing complexities in a system. Progressive segregation can cause progressive mechanism, create less dynamics responses of a system and regulation difficulties. But mechanism increasing implied a fixed rules and controlling condition that make system is more efficient in completing a certain task. The effect of progressive segregation and mechanism result final product that is the increase of complexities system of open system. A close system, often focused on conventional physics and analyzed research approaches, isolated from its environment. In balance condition, a close system does not need energy to environmental conservation, and get the energy from it.

3.1 Characteristics of Open System

Open System is a relatively new theory and still have many questions that have not yet solved by this theory itself. The development of open system theory is based on two sources, first living biophysics of an organism and second the development in chemical industry, where beside the emerged reactions, it considers efficiency of elements and other benefits. Thermodynamic theory called irreversible thermodynamic is a generalized theory comes from physical theory

Even though open system shows extraordinary characteristics, in certain conditions it is on a steady state position. This condition lies on a distance between equilibrium point and a real condition. Open System has dynamic

interactions with its environment, while transmitting and receiving energy as well. Steady state shows extraordinary characteristics with clarity on equifinality. Equifinality is a condition that is obtained by having some potentials. This term is different from an objective, when describing a complex system. This term is also meaning that one equifinality can be achieved by many different roads/corridors, even if starting from different conditions. In equifinality organization implied how organization can create the same superior competitiveness based on a different substantial competitiveness.

Based on thermodynamic principle, open system can maintain itself from unexpected possibilities and organization. Open system which is more complex, actually is on biology studies analyzed by Burton, Rashevsky, Hearon, Raegner, Denbigh and other writers. In order to do a job, a system not has to be in an equilibrium condition but it tend continuously try to reach the equilibrium point. To be in a equilibrium point, a system should be maintained in a stable condition. Therefore, Character of open system is a condition that is highly needed for a sustainable working capacity by an organism.

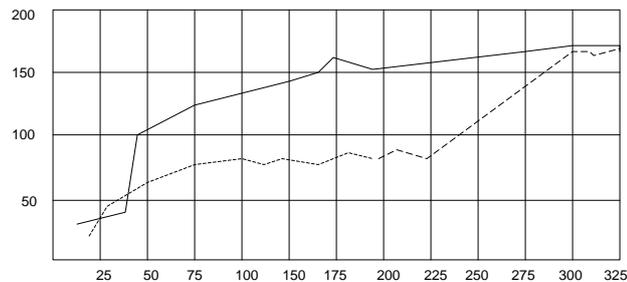


Figure 1: Equifinality of Growth

Steady state often be present in an open system, highly depend on a present condition and decided by system parameter. An interesting consequences of this condition is, first, system composition in a steady state remains constant, although component ratios not based on a balance reversible chemical reactions, but based on happened reactions and part of them are irreversible.

Secondly, ratio of steady state component depend on a constant system, not environment condition. While constant condition depend on current catalyst and constant reaction. In open system will happen overshoot phenomenon and false start when it start from the point in an apposite side of steady state.

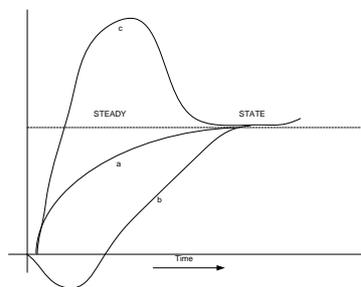


Figure 2: Asymptotic approach 9a), false start 9b0, and overshoot, (c0 in open system Schematic.

3.2 Open System and Cybernetics

The nature of open system model is interaction happened dynamically among components. Base of cybernetic model is a present feedback, where the feedback can maintain desired values to achieve the objective. Cybernetic theory is based on feedback and information. Both can complete each other, although each of them has differences and limitation. Open system model in kinetic formulation and thermodynamic didn't talk about information. On the contrary, feedback system is thermodynamics and kinetic which is closed without a presence of metabolism.

Cybernetic can be applied when a system to be analyzed, is involved in a closed loop signals; that is, when action of a system cause some changes in its environment and those changes give feedback to a system through information (responses) that cause a system to be adjusted to a new condition; system changes influence its behavior. Relation of "cause-effect circle" is needed and sufficient for cybernetic perspective.

Contemporary cybernetic start as inter disciplined study that connect areas in control system, circuit system, machine technique, sample logic, biology evolution, neural science, anthropology and psychology in 1940's.

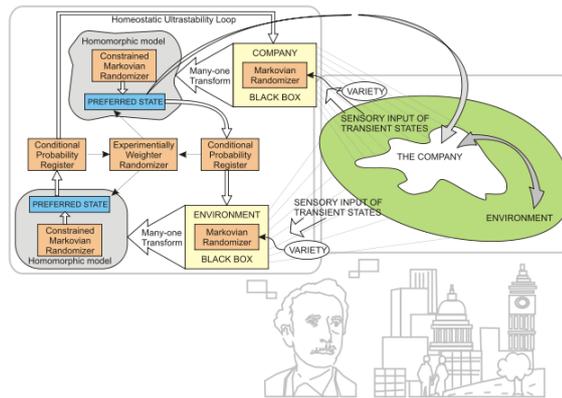


Figure 3: Model Cybernetics

4. ORGANIZATION AS AN OPEN SYSTEM

When study organizational behavior, we often find organization term as an open system. Organization is understood as a group of people work together to reach a certain objective. Organization is not entity that standing by itself, but there must be an environment which is as an organization vehicle to be lived in, grow and develop.

Since organization need environment, it may be called that organization is an open system. In producing products and services, organization take resources from external environment and convert or change them to be products and services that are ready to be reprocessed or directly consumed/used by end user, which are returned to its environment where they are bought by customers. Those cycle goes continuously until organization is close down.

Organization is as an open system, seemingly seen as living organism in a certain medium. To be survived in life, organism keep sustainable interacting with its environment, taking food from its environment, then convert them into energy and then energy and its waste will release to its environment.

The following Chart describe how organization works as an open system.

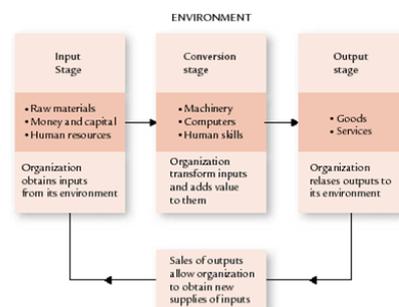


Figure 4: Organization is an open system

The above chart explains that organization contained by its environment where organization take resources such as raw materials, money and capital, and human resources as well. Process of taking resources is often called as a phase of getting input. Then those resources are changed by using machine, computer and controlled by human's skill to add value on those resources. After conversion phase, next comes to output phase where the resources changed its form to be products and services that are ready to be released to the environment through selling process. Selling process is actually a process to get back the input to be processed into forms of products and services. All processes are aimed to ensure sustainable living and growing of the organization.

Input-output concept is often called as a linear model, theory that explain how the system can be described in a real world context. A theory that moved from a common concept to be a specific concept which shows logically, rationally and orderly, made efforts for getting the answers toward efforts that connecting input and output values to have cost efficiency as a result.

Organization is a system that create and maintain its environment contain of a complex human interaction (both inter- individually and or internal group). Organization with an open system can be described as a phenomenon of a light of candle fire, it's rays radiation will influence environment condition in its surrounding. In open system, organization that has a broader system, people will actively interacting with external system available in their environment. For

example, School organization, has to be seen as a connection among human behavior and their context. Organizational behavior is focused on school as a system.

Organization (system) is in environment (supra-system) where inside of it contain also sub-systems (administration equipment in organization). Borderline between sub-systems made by disconnected line that means between division can be inter-permeable. Among sub-systems involved can influence each other through connection of interactive and adaptive components. Problems happened in one division can be a threat toward the whole function (Owens;1987)

Organization is an open system is an organization that interacting with the environment, in other words, organization that receive something from a system and release it to other system. Organization is as an open system, since it always interacts with its environment. Open system is a system connecting with its outside environment. This system receive inputs and produce outputs for outside of its environment or other sub-systems, therefore it must have a good control system. Environment can be treated in two ways, organization that is loaded by changes and the other side, environment is influenced by the organization. Organization's environment consists of micro and macro environment.

Open System will reach to a certain dynamic level or dynamic balance. In the other side, this system still has sustainable capabilities to continue the works and do transformation to other parties. This system has continuously rotation process, that cause power of life can be sustainable. Organization is viewed as dynamical thing changing all the time. Inputs coming from outside environment, is received by an organization. Then organization process them is as one of its activity to reach organization's objective. The results of this process are sent and received by environment, in a form of products or services as well. This result is felt by society as an environment element of that organization. Environment will give feedback to organization which is used as new inputs to be produced and processed in organization. In that way, organization will reach the level of balance which is dynamic with its environment. Since organization is stimulated to get new potency for continuing its life.

Open System underlines the connection and dependencies among elements in organization, which are social and technological elements. Organization is considered as a series of interconnecting variables, where changes in one variable cause changes in other variables. Open Organization System is not only opened for its environment, but also opened for organization itself. Open System adjusts to the environment by doing changes in compositions and processes of components inside organization itself.

5. EDUCATION AS A SYSTEM

Education as a system consists of a group of components. Those components are such as raw inputs (new system), outputs(graduations), instrumental inputs (teachers, curriculum), environmental inputs(cultures, demography, politic and security). Education system can also be seen in a macro scope. As subsystem, field/area of economy, education and politic, each of them is as a system. Formal, non formal and informal education are subsystem of educational field as a system and etc.

5.1 Education System Analysis

The use of system analysis in education is aimed to maximize achievement of education objective efficiently and effectively. Main Principle of the use of System analysis is that we are requested to have systematical thinking, meaning that have to consider all components involved in education problems to be solved. Good components support in formulating a good system. But good components are not sufficient to ensure the achievement of the system's objective optimally, if those components are functional disconnected with other components.

In a big scope, one system can be seen interconnected with other system. It is happened naturally, since each system is basically only one aspect of a life. Meanwhile, we need all aspects of life, therefore every aspects needs establishment and development.

Education Organization is open system, has additional behavior consequences. School as sample is a subject of two external power which naturally decide the internal management of school. Professional standards and expectations that pointed to the teacher through training, accreditation association, demands from colleague, relation between education and industry, annual rules is a few of professional influences available at school.

The second power of influences coming from a broader sociology cultural influences, influences a valid norms in school. This comes from differences available in community tradition standard, law, a valid rules and as well as a western culture in a broad scope of view. Application of close system into education object, is formed by running education activities system with using teaching corridor. Meanwhile, open system tends to use guiding and caring corridor.

Target of teaching system, especially developed in school education, is a positively concrete things, which is in forms of skills. Skills in reading, writing and counting. Education material in subject matter is mapped in a textbook form, that is a handbook/text book arranged by a certain pattern (a teaching agenda). While guiding and caring point to 'output' or result from a series of educational implementation according to object form, methods and system as the mention above. The result is in form "intellectual intelligence", that is creative capabilities to create all beneficial changes for daily life sustainability and development.

Education is a special system of a sum of components, interconnecting where a new system is raw input to be processed into graduation (output). Teacher and man power non teacher , administration, school, curriculum, educational budget, tools/medium and infrastructure are some instrumental inputs that make possibilities to implement the process of raw materials becoming outputs. While cultures, economy factors, surrounding society, demography, politic and country are environmental factors or inputs.

The use of system analysis in education, aimed to maximize the achievement of educational objective efficiently and effectively. Components in education system need to be known well, so component that has some weaknesses and need to be improved and developed, can be functioned to maximize system's performance. If objective of the system has not yet well achieved, some of it can be reached with efforts as follows: (1) improve component which has weaknesses; (2) find connection among components with weaknesses, and (3) improve component or connection among weakness components.

6. CONCLUSION

After scrutinizing the above study, the conclusion are :

1. System is a group of interconnected sub-systems. Organization is a system will be viewed as a whole, consist of sub-systems, and the system./organization will be interacting with the environment.
2. Open system is a system that interact with the environment. In the opposite, close system is a system that disconnect with the environment. All organization are open system, although in a different level.
3. Organization is open system, that is organization interacting with the environment or receiving input from a system and releasing to other system.
4. System thinking obtains a big popularity and
5. a broad acceptance. But the use of it may mislead if we don't know the basic principles of it. Basic principle of system thinking is system logical which is more useful if it is joined with the effort to analyze condition through do the research.
6. Education is a system, consist of a group of components such are raw input, output, instrumental input, environmental input. As subsystems, such as fields/areas of economy, education and politic which each of them are as a system. Formal education, non formal and informal are sub-systems of education field as a system.

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