The Dual Structure of an Organization

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We can identify two aspects of business organizations: organizations as “social functional device” and organization as “interaction space”. The first aspect represents the organizational structure designed to ensure that members of the organization as a whole work efficiently for realizing the given objectives of the business organization. The second aspect means the space where the members of the organization as individuals interact with each other in the organization. In this paper, the dual structure composed of these two aspects is shown while using the concept “organizational behavior rule” as the criteria of behavior and the relationship between the whole and the elements is explored. Such discussion contributes to development of systems theory on complex systems found in neo-industrial age.

Keywords: Organizational behavior rule; Social functional device; Interaction space; Self-Organization

1. Introduction

There is now growing interest in understanding organizations in terms of complexity and emergence, and we can find there strong appeal to new types or models of organization. One of the important components of such models is self-organization, where autonomous individuals having different knowledge base interact with each other to produce innovative solutions and/or new knowledge. But an organization is also a social device designed to ensure that the members as a whole work efficiently for realizing the given objectives of the organization. In this sense, individuals may not be autonomous enough to achieve the self-organization; they are more or less restrained.

Therefore, the relation between the individual as the element and the organization as the whole in organization studies could be a critical point for achieving autonomous and creative work in organizations. For instance, problems of concentration of power, decentralization of power, hierarchical control, and the organizational structure of decision-making have been discussed [1, 2, 4, 5, 18].

There are in the literature of systems theory some new views of the

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relation between the whole and its elements. For instance, the concept of autopoiesis and the micro-macro loop seen in complex systems theory has been applied to management system theory [8, 9, 11, 15, 16, 17]. However, the relation between the whole and the elements has still not been sufficiently elucidated.

The aim of this paper is to make clear this relation conceptually, and to suggest a new approach to the dual structure of organizations.

In the following section, adjustment process between individuals in the organization is analyzed. Each individual has a rule that guides his or her behavior. This behavioral rule has been made in daily life. In the organization, individuals make their organizational behavioral rules by taking into account the common rules of the entire organization. And, these organizational behavioral rules efficiently facilitate adjustment between individuals. As a result of adjustment, common rules of the entire organization are renewed. The relation between the elements and the whole seen here is so-called the micro-macro loop.

However, the relation between elements and whole in management systems is not so simple, because an organization has two aspects. In the third section of the paper, these two aspects of organizations are analyzed. An organization is a device designed so that individuals may efficiently accomplish their respective roles. Thus, "social function device" is the first aspect of organization. Since individuals perform various interactions in the organization, "interaction space" is the second aspect of organization. These two organizational dimensions are different. However, it is sure that both exist in any one organization. Interaction space and social function device form a dual loop in an organization through the individual. In the third section, the relation between self-organization and this dual loop in the management system is analyzed. A new point of view concerning the relation between the elements and the whole in the management system is shown.

The concept of "organization as interaction space" is important for the self-organization of the management system. Accordingly, the content of the "organization as the interaction space" concept is clarified by using the concept of "ba" (field) in the fourth section.

2. Organizational behavioral rules and micro-macro loops

If the elements and the whole are seen on the same level, the problem cannot be solved, that is, the phenomena of self-organization and emergence
of knowledge emergence is not interpretable.

The reason is that an organization on the level of its elements and on the level of its whole has different dimensions.

For instance, let’s assume that a certain person said as follows. “In the company where I am working, the relationship between superiors and subordinates is inflexible, and that is reflected in the wage system. However, in the project team by which I am working now, its atmosphere assures equal footing for all members. So it is quite pleasant for me to work in this company.”

He is using the same word “company”, but with different meanings. In the first case, it is an organization seen on the level of the whole. The latter “company”, however, is an organization seen from the level of the elements. In this way, two “organizations” with different dimensions exist within the management of one organization.

Then, how should we think about these “two organizations”? What is the meaning of each “organization”? And, how are these two “organizations” connected? We will discuss the answers to these questions.

Organizational structure is a network of communication between individuals. Each person in an organization should have an “organizational behavior rule” as a criterion of behavior to ensure adjustment within the network.

The content of an organizational behavior rule consists of the following.

a. Codes of information (the network of concepts, experiential knowledge, etc.)

b. Decision making criteria (values; beliefs; ideas, etc.)

c. Action patterns (behavioral styles; customs, etc)

That is, an organizational behavior rule is the prerequisite or prior condition for the work and communication of members of the organization. In other words, the state of the “whole” system is inputted into each “element” through each organizational behavior rule. This ensures adjustment among members of the organization.

For instance, it can be said that the traffic rules, manners etc. are the organizational behavior rule in the highway traffic system, which is one kind of organizational structure. In this case, smooth use of an expressway is achieved only when all drivers correctly observe the traffic rules, and is hindered if even one person violates those rules. Adjustment of the
behavioral rules among all agents is critically important. In a word, adjustment becomes possible when the rules of the whole are observed by the elements, through organizational behavioral rules.

Then, how does an individual assume the rules of the whole? And, how is adjustment process practiced?

We will examine these problems below.

Information input by the individual is the set of goal information $g$, environmental information $x$, and memory information $m$ based on experience of the past. Information output by the individual is implementation plan $u$. The transformation process from input to output is decided by an individual’s values, ideas, etc. The rule in this transformation process is the individual behavioral rule $f$.

Rule $f$ is a function which outputs the plan $u$ from the input of goal information $g$, environmental information $x$, and memory information $m$. In other words, the rule $f$ is shown as a map from input information space $I$ to output information space $U$.

$I$ is composed of the set $G$, $X$, and $M$.

$G$ is the set of goal information $g$.

$X$ is the set of environmental information $x$.

$M$ is the set of memory information $m$.

And, $U$ is the set of implementation plan $u$.

$$ u = f (g, x, m). $$

$$ f : I \rightarrow U. $$

$$ I = G \times X \times M. $$

$$ g \in G, \ x \in X, \ m \in M, \ u \in U. $$

(1)

Then how is mutual adjustment between individuals practiced? In adjustment process, information from other members of the organization is newly added to the input variables of the individual behavioral rule of each agent. The organization is composed of $N$ members. Each member agent is denoted by $i, j \ (i, j = 1, 2, \ldots, N; \ i \ j)$. Then, the individual behavioral rule of each agent is denoted by $f_i$. 

222
\[ u_i = f_i(G, X, M; \{f_j\}). \]
\[ G = \{g_i\}. \]
\[ X = \{x_i\}. \]
\[ M = \{m_i\}. \]
\[ (i, j = 1, 2, \cdots, N; i \neq j) \]

For instance, information like “I want to achieve \( g_i \). The situation is \( x_i \) now. Based on my experience \( m_i \) of the past; I will implement \( u_i \)” is exchanged between individuals. Naturally, adjustment is iterated over time. Adjustment can be called a process of converging on the result while continuing this iteration process. Therefore, each individual should correctly do a behavior forecast of other members while exchanging behavior rule \( f_i \), so that adjustment may proceed efficiently for all concerned. This iteration is a form of adjustment through mutual study and communication. It is a dynamic process divided into stages while the agents mutually exchange information. And, when each consents at a certain stage to some degree, they stop adjusting and decide on a plan.

Communication must be intimate, and free among individuals to ensure adjustment. However, it would be inefficient if all individuals exchanged all information regarding each problem.

Then, the following methods have been devised. The common behavioral rule \( R \) becomes the common element in each behavioral rule. This is, so to speak, the constitutional rule. “Organizational culture”, “institutions”, “structure”, etc. are given as examples of \( R \) [20]. Individuals correct behavior rules to suit the common behavior rule \( R \). [4].

However, because their ideas and work roles are different, perception of the common behavioral rule \( R \) differs more or less from individual to individual. Then, the common behavior rule which agent \( i \) recognizes is shown as \( R_i \). \( R_i \) and \( R_j \) are each a little different from the others. Agent \( i \) corrects each individual’s behavior rule \( f_i \) while accepting the common behavior rule \( R \) as \( R_i \).

As a result, the organizational behavioral rule \( F_i \) is made up for the agent \( i \). \( F_i \) is the function composed of \( f_i \) and \( R_i \).
\[ F_i = (f_i \ast R_i) \]  
(3)

Therefore, the organizational behavior rule is completed as follows.
\[ U_i = F_i(G, X, M; \{F_j\}) \]  
(4)
Although $R_1, R_2, \ldots, R_n$ are more or less varied as mentioned before, they are acceptable because they were generated from the same $R$.

Therefore, an individual consents to other members’ behavioral rules $F_i$ easily, and a behavioral forecast of each other can be done adequately. The consequent mutual understanding makes it easy for plan $u_i$ to converge.

Such an adjustment never makes everyone's behavior similar. The base of such an adjustment is mutual understanding and cooperation under the condition that everyone has one’s values and the autonomy. A flexible, versatile organization behavior is born from this deep mutual understanding. Therefore, such an adjustment becomes important today when multinational companies which contain various, personal value and cultural distance increases.

As a conclusion, we can say that members in an organization make the organizational behavior rule $F_i$ by taking the common rule $R$ of the whole into the individual behavior rule $f_i$ supported by individual daily life.

Of course, self-adjusted process might be possible in a hierarchical organization. The necessary condition of self-adjusted process in a hierarchical organization is that the individual does not show a personal view of value as much as possible according to a common rule of the organization however. Such an adjustment method is unsuitable to today when an individual ability has developed, and cannot activate the organization.

3. Dual structure of organizations

“The device that accomplishes a social function” and “Space of the interaction between individuals”

As mentioned above, the individual makes organizational behavior rule $F_i$ by absorbing the common rule $R$ into the individual behavior rule $f_i$ supported by daily life. The individual then adjusts $F_i$ while communicating with other members of the organization. For instance, let’s assume that there are some members with quite different ideas. Naturally, it would not be easy for these people to arrive at a consensus of opinion if talking in places other than the company. However, even such people might come to be able to adjust their opinions voluntarily if working in the same organization. All of these people work together in acceptance of the same organizational structure, the institutions, and the organizational culture (the organizational common rule $R$). Finally, a new organizational structure, new institutions, and new organizational culture (the new organizational common rule $R$) will emerge within the organization as such people promote compromises and adjustment.
based on each one's organizational behavior rule $F_i$. This is the self-organization of management.

In this way, we can see that adjustment among separate elements becomes possible through the restraints placed by whole [6, 19], while at the same time elements make up the whole. This phenomenon is so-called the micro-macro loop [2, 10].

However, we cannot explain a social system like a management organization only by using the concept of such a simple micro-macro loop. This is because the relation between the whole and the elements creates a “dual structure”. This dual structure is the difference between a social system and a biological system.

What is the “dual structure” of the organization mentioned above?

For instance, let's assume that a certain person said as follows. “In the company where I am working, the relationship between superiors and subordinates is inflexible, and that is reflected in the wage system. However, in the project team by which I am working now, its atmosphere assures equal footing for all members. So it is quite pleasant for me to work in this company.” He is using the same word “company”, but with different meanings.

Below, we will think about this difference.

Originally, an organization means a “system that adjusts and controls various activities of people to achieve a specific goal”. This would imply two possible meanings of “management organization as social system.”

One is the “organization as a device for accomplishing a social function” to achieve a specific goal. Another is the “organization as a human interaction space” for individuals to perform various activities, and to adjust and control each other’s activity.

We will explain these models one by one.

To meet the needs of the market and the social environment, a management organization outputs products and/or service. Although the people who actually do the productive work in the organization are individuals, consumers consider that it is the “management organization” that produces those things.

For instance, the question for the consumer is not, “Which member of the management organization made it?” but “Which enterprise made it?” in the case of brand commodities, etc. Therefore, the management organization
bears the social responsibility toward consumers.

“Juridical person” is a concept that stands apart from the living individuals who actually produce, and shows the organization as an independent body. Actually, the goal of a management organization at the “juridical person” level exists independently of the individual in the organization. It is often the case that all individuals are not satisfied when the organization gets success.

Then, what is the basis of this organization for accomplishing a social function?

What maintains order within it? The answer is that the organization’s structure, its institutions, and its organizational culture have approved the order. These can be observed to some degree even from outside the organization.

Then, what is the “organization” for the individuals working there?

Undoubtedly, the above mentioned organizational structure, institutions, and the organizational culture will greatly influence the individual in the organization. For instance, in an enterprise where the relationship between superiors and subordinates is inflexible, even those who don’t pay special need to their superiors will behave circumspectly toward superiors within the enterprise. In this manner, individual behavior and ideas are restrained by the rule of the “organization” as a “whole” independently of the individuals concerned [8, 9]. All members shared a common context because of this restraint.

Here, we should not forget the following.

When working, the individual employee does not perceive the organization from the point of view by which the organization is seen from the outside. For example, when the atmosphere around the post to which an individual belongs retains an old-fashioned style, that individual will not feel the enterprise advanced even if it is evaluated socially as an “advanced enterprise”. This aspect of organization, that which individuals feel and perceive while working, is that of the “organization as a space for interaction.” When working, individuals cooperate with other members in various ways. The communication space composed of individuals as “living people” appear there. The members working in this space have a common feeling. Only members who actually share the same experience can have this common feeling. Members who work on the same project, employees who joined a company in the same fiscal year, or members who participate in meetings related to the same business operation, etc. are examples of the
above-mentioned.

Such members feel a common order space through physically sharing common experiences with others. Individuals work while making common rules acceptable to those sharing the same experience, while at the same time being restrained by that common rule.

Common rules here are not fixed rules like organizational structure, institutions, and organizational culture, etc. They are changeable and flexible accepted only within that space. Examples are the human relationships that cooperative work creates, the role allotments naturally generated, and the atmosphere in the meeting place. These changeable and flexible rules are made by individual interaction restrained by the company-wide fixed rule that the “organization as a social device” invents. Therefore, these changeable rules come to be restrained by those of the “organization as a social device”.

As shown above, there is a clear difference between the “organization as interaction space” which the individual agents perceive and the “organization as a social device” which comes into contact with the outside environment and that carries out a social function. This is what we call the dual structure of organizations. In a word, management organization cannot be explained only by a simple micro-macro loop that creates relations between the elements and the whole. This should be adequate proof that we cannot analyze management organization only through the simple micro-macro loop concept, and should also consider the dual structure of organizations.

Undoubtedly, the relation between individuals and the organization is one between elements and the whole. Social systems like management organizations have various structural properties similar to those of other physical and biological systems. However, a social system like a management organization is definitely different from physical and biological systems in several points.

Firstly, in a social system the individual is an autonomous agent [3], not a mere part of a system. On the other hand, a tire has meaning only when it works as part of a car, just as the heart exists only for its owner. Thus the partial element of physical and biological systems has no meaning by itself. They are only “parts” of the “whole”.

In contrast, individuals who are elements of a social system are not merely parts that exist for the benefit of the whole organization. In reality, an individual cannot exist if there is no society. However, an individual is also a
goal-seeking existence possessing fundamental human rights.

The individual is a basic agent who can choose to belong to an organization at his or her own will, and can even belong to two or more organizations at the same time. Even if the organization disappears, the individual will remain. This autonomous property of individuals gives social organizations the same special characteristics that the interaction between individuals has, showing how initiative and motivation can change fixed organizational rules. This situation is quite dissimilar to other systems such as physical and biological systems.

Differences and relations between the two kinds of "Organization"

As previously mentioned, the “organization as interaction space” consists of members who share common experiences. On the other hand, even if a member who does not share a common experience is included, an organization will constitute a social device.

Here is a funny story. “I made friends with a man in the sports gym on the way home from work. We were always grumbling about the companies where we worked, convinced that we worked for different companies. But we later discovered that he and I were working for the same company!” This funny story shows that even people who do not belong to the same organization as a space of interaction are able to belong to the same organization as a social device.

When reading this, it might seem that the organization as a social device is the larger one, and that the organization as space for interaction is included within it. Indeed, the organization as interaction space has usually been included in the organization as a social device up to now. However, that relationship has been changing recently.

Thanks to the development of information technology, it has become possible to communicate with any person anytime and anywhere. As a result, the organization as the space for interaction occasionally exceeds the range of the organization as social device [14]. For instance, joint development of new products by a maker and by unspecified consumers through the Internet might be one example. In this case, an “organization” as a space for interaction is certainly constituted between the maker and those unspecified consumers. However, it is difficult to say that this “organization” is included within the range of an organization as a social device such as a “juridical person”.

As another example, we can take Silicon Valley. Silicon Valley is an accumulation zone of the information technology industry. But the essence of
Silicon Valley is not in the accumulation of “organizations as social devices”. It is a place where people in search of new information technology work together, and exchange information and knowledge. A lot of enterprises are concentrated there, but the area is one interaction space. Individuals move from enterprise to enterprise within Silicon Valley. This is because the identification with the “organization as interaction space” named Silicon Valley is stronger than that with any “organizations as social device”. Thus, organizations as interaction spaces will develop more and more until they exceed the range of the organization as social device.

Here we may return to our earlier example. It is assumed that a certain person said as follows. “In the company where I am working, the relationship between superiors and subordinates is inflexible, and that is reflected in the wage system. However, in the project team by which I am working now, its atmosphere assures equal footing for all members. So it is quite pleasant for me to work in this company.”

The former “company” shows the organization as a social device, and the latter shows the organization as an interaction space.

Various “organizations as interaction spaces” exist in one management organization. From a meeting of 5-6 people to a company-wide project team or a project team run jointly with another enterprise, there are various levels within the interaction space. Silicon Valley is a typical example of a very big “organization as interaction space”. And, the level of a common rule in interaction space becomes various in every level of interaction space. Those rules, exist from the operational level to the meta-level, and include criteria for the sales analysis and control relations between individuals. We would note that all these rules are a dynamic, changeable order generated in the space at certain times. The characteristics of these rules are different from those of common rules in the “organization as a social device”.

In the context of organization as a social device, order is created by the control rule ensuring that results approach the organization’s goals. Therefore, the role of such order is to offer guidelines to ensure that all individual behaviors conform to the organizational environment.

On the other hand, new interaction spaces are progressively formed within the organization. Order in this space is made by control rules that promote interaction in the organization according to specific situations, in other words, to coordinate individual behavior effectively and functionally.

Here, it might appear that organization as social device is equivalent to formal organization, while organization as interaction space equates to
informal organization [4]. However, the difference between the two kinds of organization is not the same as that between “formal organizations” and “informal organizations”. A project team, for example, is undoubtedly a formal organization even if it functions as an interaction space. To cite another example, members of an industrial group might cooperate “informally” because it would become illegal were they to cooperate officially. Even this type of organization, however, might be an organization as social device. The difference between organization as social device and organization as interaction space is not one between formality and informality, but one between sustainable for a given period whole systems and dynamic whole systems.

“Organizations as social devices”, are expressed through fixed results of sales, rates of return, etc. On the other hand, “organization as interaction space” can be felt and recognized only through the dynamic expression of the power relations within the space and the degree of vigor at any given moment. So, it is an organization that cannot be seen from the outside.

Here, we assume the usual case where an organization as interaction space is included within a management organization as social device. In fact the two are closely connected, and the relationship between them can influence strongly the self-organization of the management organization. Let us think a little more about this.

_Dual loop of organization_

We can readily imagine that there is some connection between “organization as device to accomplish a social function” and “organization as interaction space for individual members,” since individuals acting within the management organization also create the space for interaction among themselves. The result of their interaction is the organization as social device. Therefore, the two organizations are naturally connected; the problem is the way in which they relate to each other.

Let us assume, for instance, that a certain enterprise decides to introduce a “performance-based” principle company-wide. The “performance-based” principle, “seika-shugi” in Japanese, means a system by which the company pays an employee according to his or her measured performance, such as their sales-record.

Adoption of this principle is a decision taken at the level of “social device” relating to the enterprise as a whole. When this performance-based principle is implemented in individual work units, however problems at the level of “interaction space” appear. Various reactions to the performance-
based principle when applied to a particular interaction space can be imagined.

[a] Though the performance-based principle was decided company-wide, the piecework system that it implies cannot be accepted. We (employees; the same hereinafter) entirely reject extension of the performance-based principle for our work unit.

[b] Though we are not happy with the performance-based principle, the company-wide decision to adopt it cannot be disregarded. We will reluctantly go along with principle in this work unit.

c] We will basically follow the performance-based principle in this work unit because the company adopted it. However, when problems appear, they will be pointed out, and we will propose company-wide measures to revise the performance-based principle.

[d] We will positively follow the performance-based principle, completely accepting it as a company-wide decision by which this work unit is bound.

An aggregation of the work units like [a] would not constitute an effective enterprise.

In a work unit (interaction space) like [b], vigor would be lost. In addition, the performance-based principle would eventually crumble if such work units multiplied. Such a situation would restrict the functioning of the entire organization as social device.

Case [c] shows that the organization as social device and the office level (organization as interaction space) are firmly connected. In this case, a dual loop between A (social device level), B (interaction space level), and C (individual level) can be depicted as follows.

<A: The rule in the organization as social function device (the performance-based principle)>

<C: Restraints on individual behavior and changes in individual rules (Individuals make efforts to achieve results)>

<B: Changes in the rules of individual offices (interaction spaces), and new kinds of interaction (New team organization and new evaluation based on the
performance-based principle) >

<C: Restraints on individual behavior and changes in individual rules (Agreement with criticism of the performance-based principle based on experience) >

<B: Demands or proposals for new rules resulting from interaction (A new performance-based principle and a new work style based on the revised principle) >

<A: A new rule (an improved performance-based principle) acting as a social function device >

We call this process the dual loop of an organization. Feedback is essential from “organization as the interaction space” that it positively accepts the performance-based principle to the “organization as a social device” after implementation of certain measures. It is necessary to move to the process of c as soon as a problem arises from the performance-based principle within the “interaction space”.

In case [d], this dual loop seems to be working perfectly. There is no problem as long as case [d] reflects the actual situation in the work unit, but we need to watch for cases where case [b] is actually latent in case [d].

The following can occur if the dual loop does not function effectively. It is not rare in an organization for members to agree to some principle in a general way but to disagree when the same principle is applied to them. This is understandable since the problem might be perceived accurately only after having been reduced from an abstract one to a concrete one. It is important to find a compromise between the overview agreement and the difficulties arising at the concrete level. However, this will prove impossible if the dual loop is not functioning smoothly.

For instance, the following are cases often seen in company organizations.

Assuming that discussions on the long-term plan and on the corresponding organizational change have made progress in the conference room, managers declare universal agreement and a plan is resolved. However, people who have declared their agreement in the conference room, once the conference is over, begin to express reservations or even opposition: “The
logic is certainly correct but…” or “Because the plan lacks practicality, it will not succeed”. Long-term planning, organizational change, etc. are rules of the level of the social functional device. If the "strength" of the interaction space in the conference is weak, individuals must affect to accept long-term planning and organizational change, as we saw. However, the organization as interaction space does not function, various individual behavior rules cannot be made the best use of to implement company-wide rules like long-term planning and organizational change, which consequently fail. Because the dual loop is not functioning smoothly, correspondence between rules of the organization as social function device, of the organization as interaction space, and of the individual level cannot operate, and those rules will not function.

Of course, even when a double loop of the organization does not function smoothly, the organization as "device" might continue. However, in such an organization the organizational efficiency is bad, the whereabouts of the responsibility is indefinite, and it is not activated, because the relation between the organization and the individual is opaque.

When rules of three levels grow up on the spiral, a progressive self-organization of the management organization will be seen. Self-organization in management is that each rule changes when necessary thanks to the dual loop's efficient functioning. What is essential is that the dual loop must be able to change itself of any time of the interaction space level, if there are problems for customers or individuals in the rules at the level of social device.

It should thus be clear that the "organization as interaction space" is the key if the dual loop of an organization is to function efficiently [12].

In the next section, we will look a little more into the nature of the "organization as interaction space".

4. “Ba” as interaction space

Because the expression “organization as interaction space” is not in common use, we cannot easily imagine its nature. However, we would draw attention to one general concept that is quite similar, the Japanese word “ba”, meaning “field”. [11, 13, 17].

In Japan, this word is used on a daily basis in expressions like, “Nothing could be said in that ba”, or “We enjoyed the ba yesterday.” It implies both a spatial range and a situation where something is caused to happen (or not happen). In a management organization, phrases such as, “We
could do nothing but agree in that ba” or “There is no ba for such an idea in the company” are frequently heard.

“Ba” is composed of acts by individuals, but at the same time it has rules by which the individuals are restrained. “Ba” is born as a result of cooperation by elements in the situation. And “ba” promotes cooperation between those elements through feedback of meta-level information on appropriate behavior. Rules in “ba” are dynamic and flexible. In addition, when a “ba” is strong it can even revolutionize the structure, institutions, and culture of the entire organization.

As the preceding paragraph indicated, “ba” looks very much like “organization as interaction space”. We will show how “ba” works in management organization by employing the behavioral rules that were core concept of section 1. Information input to the individual is goal information g, environmental information x, and memory information m. Information output by the individual is implementation plan u. The transformation rule from the input to the power output is called individual behavior rule fi. Because of the varieties of this transformation rule fi, adjustment becomes difficult. Accordingly, the assumption by each member of the common behavioral rule R of the organization into their fi, forming transformation rule Fi, so as to smooth adjustment were set out in section 1.

Here, \( F = F_i \) is shown as a set of the individual organizational behavior rule Fi.

Sign \( F_i \) is used in the sense that \( F_i \) is a dynamic set of the developing Fi through adjustment. Taking the common behavior rule R into individual behavior rule fi makes Fi. Therefore, this set of Fi is thought to be an order space by which the following are shown. “How should the whole become? What should individuals do toward that end? How should they cooperate with other individuals?” The set of Fi shows the relations between elements, the relations between the element and the whole, and characteristics of the entire whole at the same time. This \( F = F_i \) is our concept of “ba.”

At first glance, it might seem that the organizational behavior rule R is equivalent to “ba”. However, it is not only the common behavior rule R (R recognized by each member) that restrains individual behavior. In adjustment process, one member's organizational behavior rule Fj of which other members' behavior rule fj and Rj are composed, also restrain the individual behavior of agent i.

In practice, it is F, the dynamic set of the organizational behavior rule Fi, that denotes “ba”.

Ninako Makino
Figure  The dual loop of the organization

5. Conclusion

We have considered the controversy over whether an organization is an organic or inorganic body. Because the basic elements of an organization are employees, it could be considered an organism.

However, a management organization is a device designed so that its members may efficiently accomplish their respective purposes. In any social process, a device that facilitates individual selection and improves selection ability is needed. A management organization does so by modeling selection process by means of conversation, mutual agreement, compromise, instruction, and so on.

W. Ross Ashby, the pioneer in systems theory, called a system that accomplished such a function – an “intellectual amplifier [3].” The character of an “intellectual amplifier” is, that is, created by human ingenuity. So a management organization has also the same character.

A management organization, that is, has both organic and inorganic characteristics. In this conclusion, we will take the opportunity to think about the dual structure of management organizations.

In general, a system has been thought of as comprising a whole and its elements, together with the relationship between those elements.

However, we have seen that it is not always possible to solve problems
only by considering the relation between whole and elements. The whole is more than simply the sum of its elements. Even if a whole is understood, some aspects of its elements may not be. This applies to all systems, both physical and biological including, of course, to management organization systems. Consequently, new system theories, like complex systems theory have appeared to take a new view of the relationship between a whole and its elements [8, 9, 15, 16]. However, there are still many unclear points concerning this relationship.

Apparently, the problems lie in the approach that considers a whole and its elements as existing within the same dimension, or as part of the same concept. Especially in a social system like a management organization as described above, the whole is a rather inorganic thing while its elements comprise an organism; whole and elements are situated in quite different dimensions. Therefore, to elucidate the relationship between them it is necessary to take this fact into consideration.

Accordingly in this paper, we thought about the organization at the level of its whole and of its elements separately. The former is “organization as social function device”, and the latter is “organization as interaction space.” We sought to elucidate how these two types of organization build a dual structure.

When social systems like a management organizations are analyzed in the future, this dual structure will have to be elucidated clearly if that analysis is to be effective.

References
