# A New Approach toward Corporate Strategy

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## Abstract

Today's rapidly-changing business environment requires firms to respond with competent decision-making more so than at any other time before. This paper illustrates an engineering-oriented corporate strategy that excels in its ability to cope with these environmental changes, the theoretical backgrounds of this strategy, and some of its practical applications. The general, multi-leveled approach represented here can be applied to any type of organization. The approach focuses on the processes of setting the strategic goals and determining the means to accomplish them in complex and dynamic environments.

## Introduction

The structures of civil society and industry, to name a few areas, have recently become more complicated and their futures are becoming extremely difficult to predict. The development of technology, such as the Internet, as well as other circumstances related to business practices have propelled and accelerated these changes. Due to the rapidly changing characteristics of these structures and their quantities, firms have constantly been required to craft increasingly sophisticated strategies to adapt.

A purpose expansion method, which originated from Work Design, helps to create strategic alternatives that are not based on previous experiences. The concept of a strategy based on a purpose-oriented approach provides original strategic alternatives. However, new attempts furnished with entirely new perspectives sometimes collapse when the scheme is diversified. Generally, when decision-makers try to craft a strategy, they encounter four main factors: environmental constraints, organizational restrictions, organizational experience or inertia, and time. This method focuses on balancing goals and actions in the process of implementing strategy by considering the aforementioned four factors, as well as triggers that emerge in an organization. The main process of the proposed method is to design the triggers that indirectly achieve the organizational goal.

## Historical Overview

### Strategy Overview

Because the concept of strategy is generally abstract, there exist many perspectives with respect to its formation and implementation. In fact, scholars and practitioners comment on the diverse aspects of strategy, such as, "there is no single, universally accepted definition of corporate strategy" by Mintzberg and Quinn[1].

However, business persons involved in this profession have found that a good strategy can involve some schemes of scientific logic. Actually, the original word 'strategy' derives

from the Greek words, 'stratēgos' and 'stratēgiā', which refer to a military general. It is not difficult to imagine that a general's managerial skills would be especially important in controlling his military forces in ancient times. Alexander the Great, for example, whose teacher, Aristotle, was a great philosopher, had been imbued with logical thought. This paper follows the logical tradition of strategy in order to make the strategy not only structurally sound, but also persuasive for the people who are involved in it.

### The first wave

The concepts of corporate strategy first appeared in the 1960s as the first wave of its development in what would later be categorized as prescriptive corporate strategy. The fundamental thought of the strategy was to determine a fit between a company's external situation and its internal capabilities in order to strengthen the company by focusing on relations between its market, product and internal organization. The focal point in this category is formal planning and the concept helped attract the attention of business executives by the general growth in the world economy at that time.

After successful completion of business diversification under the prescriptive strategy, many firms began to pay more attention to effective resource allocations among each diversified business unit. Product Portfolio Management （PPM）, for example, was highlighted as one of the most popular methods in the strategy related practices. As a result, the concept of SBU （strategic business unit） emerged which began to emphasize the competition among business units within a firm, as well as competitions among firms as a whole. It was the advent of competitiveness and this rapidly spread throughout business practitioners soon after.

### The second wave

The second wave emerged with the emphasis on some critical assumptions over the prescriptive approach in the 1980s. These assumptions include the premise that the future cannot be predicted accurately enough to have rational discussions and to choose alternatives correctly. The process of the strategies proposed in this thought was not always logical and the primal consideration was not to manage the goals in the way described as prescriptive strategy.

Finding excellent factors in the firm stimulated this idea, i.e. intangible management factors such as harmony among employees as a means to bring the firm success. Peters and Waterman's best-selling book[2] accelerated this idea. Also, an excessive emphasis on making elegant and refined configurations in the prescriptive strategy caused business people to halt its practice and drove them to new ways of thinking. People concerned have approved this traditional configuration oriented method for a long time, because the world economy was in a growth trend.

The second wave is now categorized as the emergent strategy. The basic concept of this thought is that the final object is unclear and that elements are developed as the strategy proceeds. However, many excellent companies chosen in the aforementioned book met financial difficulties afterwards, and people assumed that the strategies in this category were not always perfect. To date several schools of thought on strategy formation have been reported. Mintzberg, et al., for example, introduced ten different schools of thought[3].

At any rate, firms must cope with unexpected results due to rapid changes in economical, political and social structures, and people should coordinate the discontinuity of business trends. People also notice the other prominent features regarding the current business environment such as the complexity in which business practices are closely influenced by one another. In these situations, scientific methods, which rationally analyze the prevailing

situations and wisely point out the key factors, seem to work well.

# Scientific Approach

The scientific method is modeled upon both reasoning and experimentation that depends upon the reciprocal interplay of observable data and generalization. During this process, an idea is first postulated and then developed into a tentative hypothesis based on reasoning. The reliability and accuracy of this reasoning is tested by evaluating its consistency with other hypotheses and observed data. This process is repeated until there is either agreement between reasoning and observation or the original idea is discarded. If reasoning and experiment eventually match, the hypothesis is viewed as a theory.

This scientific process is especially valuable when the situation is large and complex. Since the process specifically examines each focal point, it is possible to conquer the difficulties involved in analyzing large and complex situations. In the discipline of strategy, analyses in economics, especially micro-economics, have played vital roles not only in analyzing business environments but also in decision making for the firms. Some other scientific methods such as statistics have also contributed to making and evaluating corporate strategy. Indeed by nature, corporate strategy integrates the whole scope of the firm and then generalizes the complexities sufficiently to persuade firms to employ scientific methods.

## *Engineering-based strategy*

Corporate strategy is specific to a firm because each firm has its own different and explicit conditions to cope with. A weak point of solely utilizing analysis methods is that the strategy cannot pursue individual needs that are unique to each firm. This necessitates strategy needs to be a more tailor-made solution to concretely help the firm. Engineering approaches, by definition, provide specific solutions under different circumstances. Thus, it might be worthwhile to establish a method utilizing a more aggressive approach compared to traditional ones.

The specific engineering based strategy provided in this paper satisfies all five elements which are inevitable to strategic decisions suggested by Lynch[4]. According to Lynch, a strategic decision must: be sustainable, be distinctive, offer a competitive advantage, exploit linkages between the organization and its environment, and have vision.

## *Background*

In general, complexities with regard to making strategy occur in several aspects, and these are classified as follows:
（1） vagueness regarding a firm's objective, especially when it is evaluated qualitatively
（2） dilemmas in decision making for multiple objectives
（3） instability of substantial method to reach the goal, unclear direction and magnitude to proceed, difficulties in evaluation
（4） difficulties in evaluating rapidly changing environments

For the above problems, many scientific tools have been well developed to cope with them. Some examples include analyses in economics that have contributed to solving （2） and （4）, AHP （Analytic Hierarchy Process） developed by Saaty, and Fuzzy Theory by Zadeh for solving （1） and （2）. This paper particularly deals with Work Design Method （WD） in order to overcome problem （3）. An appropriate goal setting and a logical way to reach the solution are provided by the strategy itself. This paper shows a method that tries to solve the goal

related problems by utilizing WD with a systems science approach.

The purpose of showing the new method is to introduce it to business practitioners who desire an effective and efficient strategy making process. This method is especially effective when the environmental change is so large that firms cannot afford to apply their previous successful experiences directly. Moreover, simply adapting the previous glorious idea might be dangerous if it is applied without full consideration of the current situation. The method of WD has the power to create a new logic to reach the goal, it might be beneficial to exploit the concept of WD to cope with the instability of (3) above. The logic should be free from the past and unique enough so that it can be exclusively adapted for each individual firm.

## Outline of the Method

### Some premises

The method introduced in this paper is highly practical and employs the following business practitioners' experiences as underlying conditions in constructing its whole strategy concept.

(1) Although the environmental change is drastic, it is not realistic that the organizational structure of the firm is completely changed by exchanging its resources and so on. Each firm contains a kind of tradition or particular workplace condition that works as a certain energy or internal inertia prevailing in the organization.

(2) Even partial organizational improvements are limited in how they impact the whole organization; however, they work well when they contain a reasonably effective 'trick'. The effect of the trick should be sufficiently strong to achieve the goal by influencing the whole organization over time.

### Strategy making process

Under the above premises, the strategy making process continues as follows:

(1) In order to achieve this improvement, a specific goal must be set in advance. This also helps the firm to gather its employees' diversified power at the same time.

(2) The goal is derived from the organizational purpose that is equivalent to the firm's direction. A level of the goal and a substantial solution to achieve the goal must be carefully checked in relation to various conditions such as the environment and the internal resources that the firm possesses.

(3) The solution comes from a set of operations that is partially installed in the organization. It consists of a small set of logic but offers a sufficiently strong improvement. It is designed by a systems approach based on WD.

(4) If the solution cannot effectively reach the goal by all means available, then the level of the goal might be too high. In that case, the level must be carefully changed with consideration of its original purpose and the process repeated. This particular process of checking between the goal and its possible solution is itself a strategy crafting process, because the process also requires a check on the other related conditions such as the aforementioned five elements of strategic decisions. In this proposed engineering based method, the particular process is called a strategy system.

As a result, the introduced method incorporates concepts from both prescriptive and emergent strategies. The strategic goal can be achieved along with the daily activities of an organization, i.e. to affect the long-term direction of an organization. To summarize, the whole process of crafting strategy from a firm's mission setting to the implementation can be

represented as follows（see Figure 1）.

```
┌─────────────────────────────────┐
│  Define organizational objective │
└─────────────────────────────────┘
                 ↓
┌─────────────────────────────────┐
│     Analyze the environment      │
└─────────────────────────────────┘
                 ↓
┌─────────────────────────────────┐
│ Recognize internal resources capability │
└─────────────────────────────────┘
                 ↓  To be specific in terms of the organizational structure
┌─────────────────────────────────┐
│        Seek the solution         │
└─────────────────────────────────┘
                 ↓  Logic creation
┌─────────────────────────────────┐
│ Reconsider both the goal and the solution │
└─────────────────────────────────┘
                 ↓  Long-term
┌─────────────────────────────────┐
│      Implement the strategy      │
└─────────────────────────────────┘
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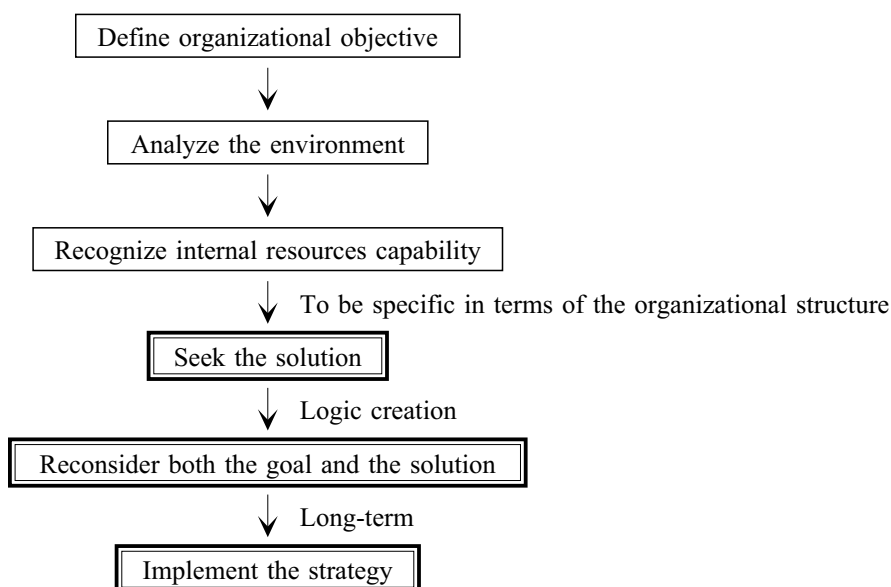
**Figure 1　The whole strategy process**

## *Interpretation of the mechanism*

The main part of the engineering method in the whole process is the construction of the strategy system where appropriate goal setting and the creation of a solution by WD are intensively pursued on a highly demand driven basis, that is tailor-made. A reconciliation between goal setting and its possible solution is performed by considering every possible factor concerned. The boxes delineated by the bold line in the above chart designate the strategy system part of the method.

But why does the partial organizational maneuver work to achieve the corporate goal? In general, a result from operations in an organization is highly influenced by the following four factors; resource capability, environmental forces, inertia as a condition in the organization and time as a length of operation. It is commonly observed that even under the seemingly same configurations of influential factors, the result is satisfied in one case and not in others. The answer is that, in the successful case, this happens because a part of the organization favorably receives a stimulus from the partial improvement towards the good result. The partly astir organization eventually transmits this stimulus to the whole. In the unsuccessful case, this does not occur.

The introduced method calls this stimulus a trigger. Therefore, constructing the strategy system exactly depicts how triggers emanate by considering the specific goal and four factors. Notice that the trigger must not be included in the four factors but it represents the independent fifth factor. Also, notice that if the strategy system is limited in area and activity, then the engineering approach can be employed exclusively.

One simple example of the trigger is a reward system that gives employees an incentive to work harder. The organizational goal such as a revenue increase must be determined beforehand. But notice that the reward itself is not a trigger; the true trigger is the incentive that drives employee to sell more of the company's products or services. However, the reward is one of the actions, which others may match to the specific trigger to attain the organizational goal more effectively. The strategy system is to identify a necessary and sufficient trigger under a certain condition. The whole concept of the strategy system is depicted as
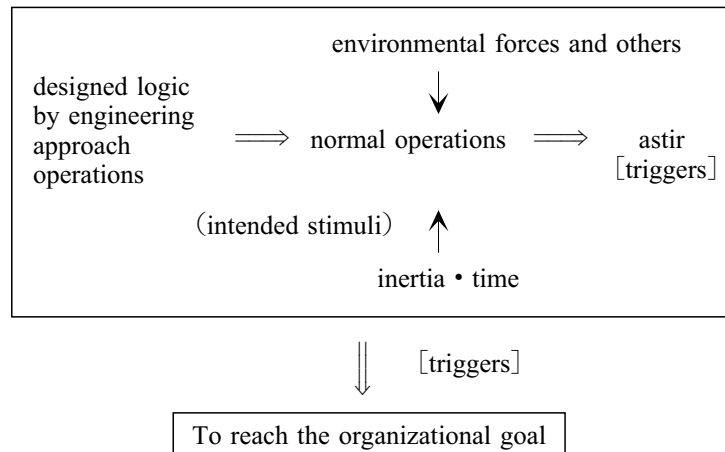
follow（see Figure 2）.

environmental forces and others

designed logic
by engineering
approach
operations $\Longrightarrow$ normal operations $\Longrightarrow$ astir
[triggers]

（intended stimuli）

inertia・time

[triggers]

To reach the organizational goal

**Figure 2　The whole concept of strategy system**

## *Strategy system*

A concrete and substantial criterion as a goal is to help capture the intangible and rather subtle situations both in and out of a firm.  This adequate goal setting and the pursuit to accomplish it enable the firm to be competitive.  Now, the basic concept of strategy system is a goal oriented logical system.  The method of Work Design constructs the logical system. Some fundamental ideas that lie in the thought are described below.

（1） An input is an original material to be transformed into an output.  The properties of both input and output are the same.

（2） A trigger generates a stimulus to help the transformation from the input to the output.

（3） A Markov Chain in mathematics assures the theoretical background of this method. This suggests that the goal can be achieved after a long period of time; i.e.  not instantaneously.

Some simple examples explain the whole picture of the system.  Consider a juice vending machine.  In this case, a sold juice can is certainly the output but a coin thrown in the machine is not the input.  It is apparent that there are differences in the properties of a coin and a juice can.  The coin is a trigger to generate the goal, and the input is a juice can prepared to come out of the vending machine.  The coin is not necessarily the only trigger; another form of a switch may also be a trigger.  The purpose of installing the vending machine and other conditions determine the most effective and efficient manner to construct the whole system.

Another example shows the trigger more specifically.  In the above example, the trigger is designed as a part of the system element but it is normally produced while conducting the operation in the organization.  Then take a look at the next example, a juice cooling system cooled by dry ice.

In this case, the input is juice, and the output is a cup of iced juice.  An installed partial system for generating a trigger, the cooling temperature, is dry ice.  The dry ice is employed as a partial system in this case, but some other can be used to replace it.  The decision of the specific action is the result of considering the whole process of the strategy system（see Figure 3）.  The process covers the following:

（1） confirmation of the objective: cooling the juice.

（2） checking the level of the goal: what temperature the output juice should be.

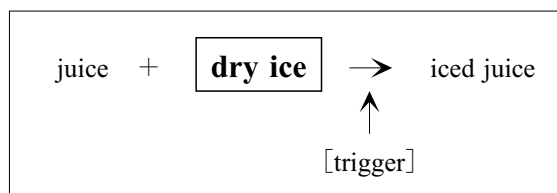（3） coordination between the goal and the solution: capability of keeping dry ice and other

**Figure 3   Strategy System**

　　　alternatives besides dry ice
（4） evaluation of the whole system: effectiveness, efficiency, competitiveness, profitability.

　　　In a typical example of the strategy system in a firm, its input is an inactive organization and its output is a sufficiently active organization that pursues a firm's goal.

## *Work design*

　　　The basic idea underlying the engineering approach based strategy is the creation of an entirely new scheme which is novel and does not utilize past experiences.  The method of Work Design works well for that purpose, because it was originally devised as a tool for building operational flows.  Nowadays, it is used in numerous areas such as computer systems design.

　　　The procedure of WD begins by defining the original purpose of the design and setting its functional operation in order to cope with the purpose.  The next step is to design the purpose of the previously set functional operation and to represent its solution as a next functional operation.  The procedure repeats itself until it reaches the point where the whole set of functions generates a trigger for the organizational goal.  This is a logic creation process and is called the "purpose expansion method" of WD[5].

## *Theoretical background*

　　　The theoretical aspect of this method is supported by the theory of Markov chain.  Now, let $C_i$ be a set of operations in an organization, and $C_i \leftrightarrow C_j$ an operational flow between them.  Notice that $C_i$ can be defined in many ways depending on its level of concern, but it consists of discrete-time and represents a finite number of operations.  The flow defined like this should have a particular direction but is, in fact, flexible.  This flexibility happens through the influence of many factors from outside the organization, namely environmental forces.  The most crucial fact is that it is not only the operations themselves, but also how they are connected which decides the organizational achievement.  It may be obvious, but this means that even for an organization that possesses the best assets, a satisfactory result will still depend critically on how skillfully it manages them.  The result of the achievement thus evaluates whether the organization is active or not.

　　　This whole phenomenon is non-deterministic, and it is common to treat these cases as a probabilistic procedure.  Also by definition, $C_i$ always occurs before $C_j$ if $i < j$, and the $C_i$ can happen anytime, i.e. it is not restricted by the time factor.  These conditions satisfy the properties of a Markov chain and the stationary process.  The crafting strategy is to install a partial organization that is designed by WD which then leads the whole organization to a desired form, such as an active organization that achieves the goal.  Mathematically this represents a partial system being added to a whole system or a change in the values of transit probabilities.  This cause a flow in the system to reach a certain set, an ergodic set, which then holds the property of an absorbing state.  Note that the set of probabilities decides the direction of the

flow in the long run. As a result, the creation of an appropriate formation of probability is what produces a trigger to achieve the goal. See more details in the Appendix below.
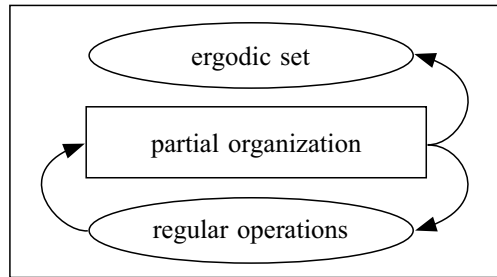


**Figure 4   The whole scope of strategy**

## *Example of strategy system*

This example was chosen from experiences that were conducted in NEC Corporation, Japan over the past 40 years. The company, obviously, did not directly follow the method proposed in this paper. They did not realize that their means of direction could, with some modifications, be a method used in the future. In fact, what they did helped them to achieve great success which led to their method being introduced to the public. Harvard Business School, for example, used the method in a class as the first strategy related case from Japanese companies.

The 1960s and early 1970s were a time of 'Catching up' for Western companies. After that was the time of 'Global Standard' followed by the time of 'Empowerment'. In each of these three times, NEC defined the company as a place to become strong, delicate and attractive respectively. Then for each of these objectives, NEC specifically set goals for each time span. These goals included expanding its size, achieving excellence, improving its core competencies, and becoming a visionary company.

Now, in order to pursue its goals, a partial organization was installed in the whole organization. It was a set of logical operations aimed at bringing the whole organization towards a desired direction by generating triggers. As one example, NEC set a goal to become larger in the 1960s, and declared that it wanted to expand into a one billion dollar company (in US dollars). At the same time, it employed advanced managerial tools, mainly from American companies, such as QC (quality control) and ZD (zero defect). QC and ZD generated some triggers for NEC to become bigger by increasing its revenue. QC and ZD raised product quality by highlighting the importance of group work. This improvement worked from the bottom up and led to improvement from workers, cost conscientiousness in the company, etc.
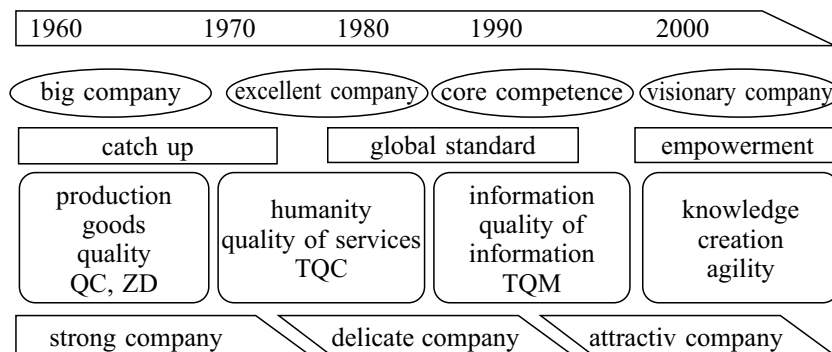


**Figure 5   The change of goals for NEC Corporation**

Notice that all of these are expected influences generated by QC and ZD which act to achieve an increase in revenue; thus, the satisfactory operations are now in an ergodic set in the mathematical expression above.

## Conclusion

An ideal corporate strategy that leads the firm to a sound business structure could be logical and filled with intangible and non-quantifiable humane factors at the same time. For the proper implementation and execution of a strategy in a firm through its activities, the contents of the strategy should be easily understood and willingly accepted by all people in the firm. In order to include each individual's diverse objective and direct it to the complete strategy, a precisely designed goal and a logical methodology for achieving the goal are essential. In addition, in the rapidly changing business environments that currently exist, firms are required to adopt strategies that are more effective and efficient. These would be logically constructed strategies, or more specifically, tailor-made engineering strategies. The Work Design method based on systems science assists in the building of the logic, and a Markov chain explains the whole behavior of the system clearly.

Examples of this strategy concept are abundant. A sprout of this new concept can be seen in the case of NEC's past strategy making processes. It was indeed rather primitive, but it explains the whole scope of this new strategy.

### Appendix

Let $Z(n)$ be an operation at n, and $C$ be a set of operations such as $C = \{C_i, ..., C_n\}$.
$P(z(n+1) = C_i \mid Z(n) = C_j) = P_{ij}$, where the whole operational flows are expressed by a transition probability matrix
$\mathbb{P} = [P_{ij}], P_{ij} \geq 0, \Sigma P_{ij} = 1, (i, j = 1, ..., n)$.
Now, define a binary relation, $\sim \subset C \times C$ over $C = \{C_i, ..., C_n\}$. Then on a state transition diagram
(ⅰ) There exists a path from $C_i$ to $C_j$. And (ⅱ) there also exists a path from $C_j$ to $C_i$.
$C_i \sim C_j$ $(i = 1, ..., n)$ represents an equivalent relation and this satisfies as follows:
(ⅰ) $C_i \sim C_j$ (ⅱ) $C_i \sim C_j \rightarrow C_j \sim C_i$ (ⅲ) $C_i \sim C_j$ & $C_j \sim C_k \rightarrow C_i \sim C_k$.
Now, let $[C_i]$ be a subset of $C$, $[C_i] = \{C_j \mid C_i \sim C_j\} \subset C$. Then,
(ⅰ) $Y[C_i] = C$ (ⅱ) $[C_i]I[C_j] \neq \phi \leftrightarrow C_i \sim C_j$ & $[C_i] = [C_j]$.
$[C_i]$ is called a component, and a set of $C$ can be divided into each independent component. This is expressed as $C/\sim = \{[C_i] \mid C_i \in C\}$.
In the aforementioned example, an active (or inactive) organization is a component.
Next, define a new binary relation $\leq \subset (C/\sim) \times (C/\sim)$, and also define a semi-ordinary relation.
Where a path is from $C_i$ to $C_j$, $[C_i] \leq [C_j] \leftrightarrow$ on a state transition diagram.
If a component $[C^*]$ satisfies $(\forall_i)([C^*] \leq [C_i] \rightarrow [C^*] = [C_i])$, then $[C^*]$ is an ergodic set. If a set is not ergodic, it is transient. Again in the previous example, a firm pursues a state in the organization to reach an ergodic set from a transient set. This transition can be possible after a certain period of operations; this transition is verified by the following theorem.
Let $\mathbb{P}$ be $\mathbb{P} = \begin{bmatrix} I & R \\ O & Q \end{bmatrix}$. Where I is a unit sub matrix, $O$ is a zero sub matrix, $Q = [P_{ij}] (1 < i, j \leq n)$.

$(\forall_j)(\exists_i)(i \leq 1$ & $P_{ij} > 0)$ $\sum\limits_{1 < i} P < 1$ for any $j (1 < j)$. C for $i \leq 1$ is called an absorbing state. Then,

$Ab \equiv \{C_1, ..., C_l\} \subset C$, also $\mathbb{P}^k \equiv [M]$
Each component of $M$ progresses $I \rightarrow I, R \rightarrow R_k, O \rightarrow O, Q \rightarrow Q^k$, respectively (generally $R_k \neq R^k$)).
[Theorem] (proof omitted)
(ⅰ) $\lim Q^k = 0$ (ⅱ) $(\forall \varepsilon)(\exists_n)(\forall p_0)(\forall m > n)(P(z(m) \in Ab) > 1 - \varepsilon)$, where $P_0$ is an initial distribution.

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