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An orderly decision-making process in disorderly organization structures

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Keywords

Decision-making; organized anarchy; garbage-can model; office management; computer simulation

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1. Introduction

This study examines Cohen, March, and Olsen's (1972) (CMO) garbage-can model, and reveals that many subsequent studies have misinterpreted CMO's original model. While many garbage-can studies refer to CMO's work as evidence that disorderly ("unsegmented") organization structures cause an disorderly decision-making process, this study points out that, in the original model, disorderly organization structures cause an orderly decision-making process such as "single-packed behaviors" and "single decision style." In addition, this study shows that this paradoxical result can be observed in real organizations, providing an office move case of a Japanese venture firm.

The garbage-can model is proposed by CMO as an extension of organizational decision-making theories (March and Olsen 1986). Classical theories of organizational decision-making emphasize decision-making as rational on the basis of expectations about the future consequences of actions. The major criticisms of these theories are excessive time and information demands that go beyond human bounded rationality (Simon 1947; March and Simon 1958), and the assumption that all participants in an organization share the same goals, or that conflict among them can be managed readily (Cyert and March 1963). Although bounded rationality and conflict are major phenomena, they do not exhaust the problems involved in matching theories of decision-making with many empirical observations, especially in organizations characterized by three general properties of organized anarchy: problematic preferences, unclear technology, and fluid participation. Under organized anarchies, organizations can be viewed as collections of choice opportunities looking for problems, problems looking for choice opportunities, solutions looking for problems, and decision-makers looking for choice opportunities. Decision processes are affected by the timing of problems, solutions, decision-makers, and choice opportunities, which are assumed to be independent exogenous streams flowing through organizations.

CMO translate this view into a computer simulation model and examine how decisions are made under organized anarchies. Based on the simulation model, subsequent studies have assumed that the garbage-can decision-making process works in such a way that the combinations of choice opportunities, problems, solutions, and decision-makers change randomly and, as a result, the decision style of each choice also changes depending on timing (Weick 1979; Hatch 1997; Scott 2003; Daft 2004). They considered "unsegmented" structures, in which problems, decision-makers, and solutions can move freely among choice opportunities as a condition for that process, i.e., a disorderly decision-making process emerges from disorderly structures.

To tell the truth, the subsequent studies, including CMO, have not examined well the original simulation model, and have not developed new models replacing the original model. Certainly, CMO described the simulation results well, using many output numerical data such as problem latency and activity, but they did not examine the simulation process directly. Analyzing the simulation results only by output numerical data often leads to misreading of the real simulation processes.

Therefore, this study rebuilds and examines the original CMO model, making its simulation process visible. As shown in the following, the simulation results of CMO model are paradoxical. Decision-makers and problems move together in a single pack under disorderly ("unsegmented") structures, and decisions are made using only one decision style without any regard to timing. That is, the combinations of problems and decision-makers do not change, and as a result, decision styles also do not change depending on timing. This decision process can be considered to be orderly; that is, an orderly decision-making process emerges from disorderly organization structures.

This study also shows that the paradoxical simulation results are observable in real organizations. This study provides an illuminative case of a Japanese venture firm characterized by a flattened organization structure and its large nonterritorial office, in which no one has a specific desk and there are no partitions. While this situation would make the work structure unsegmented, the employees rather gathered and sat in clusters than moved around and discussed various others in that office. Furthermore, these cohesive clusters seemed to leave most of the heavy problems unsolved without any regard to timing. This study not only makes the inside of the garbage-can clear but also relates it to the real organizational phenomena.

2. Garbage-can model and its widely accepted view

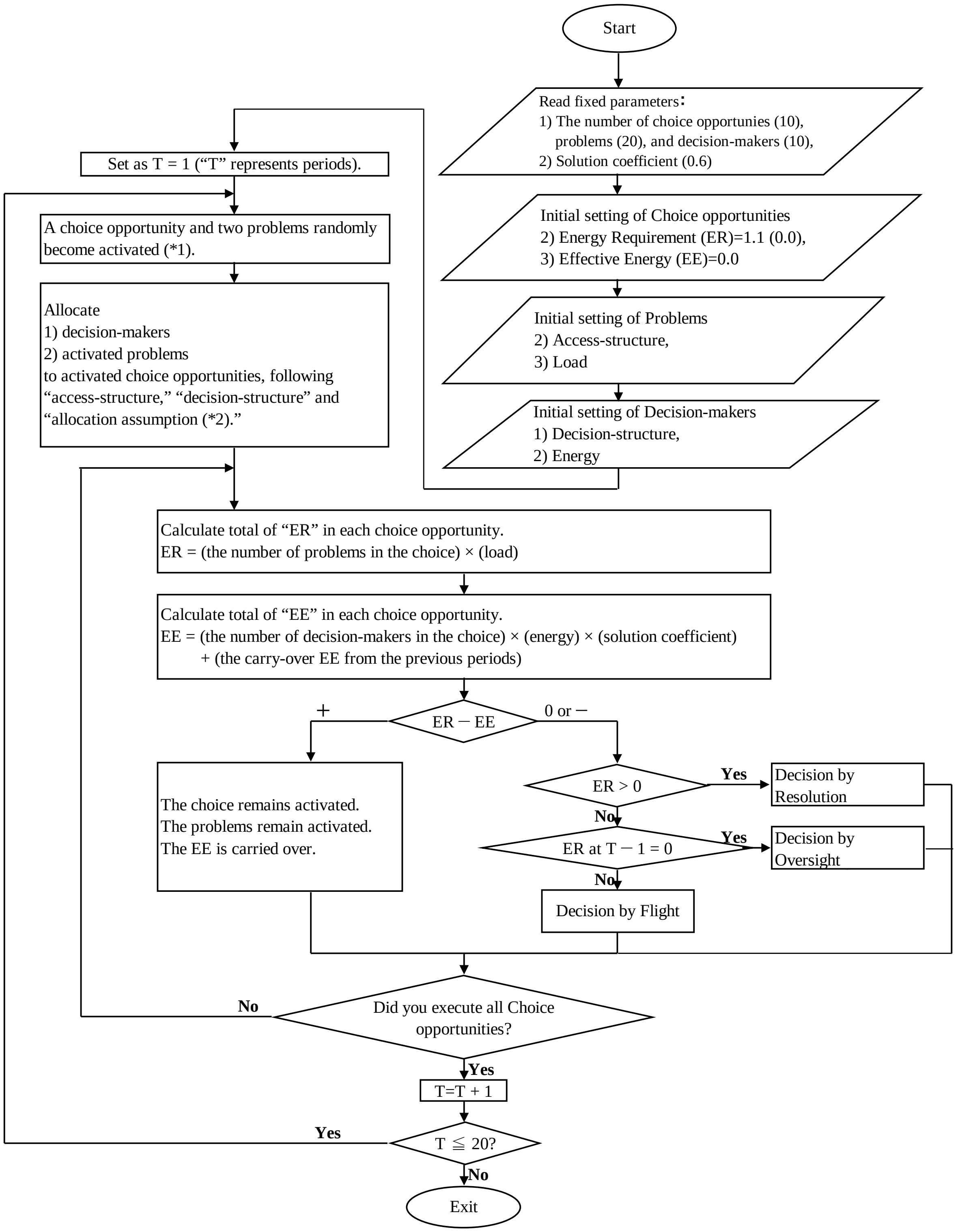
2.1 The original garbage-can model

Garbage-can model is a model of decision-making in organized anarchies; that is, in situations that do not meet the conditions for more classical models of decision-making in three important ways. One is problematic preferences: the inconsistent and ill-defined preferences that decision-makers often possess. As CMO noted, decision-makers are as likely to discover their goals through action as they are to understand them prior to choice. Second, organized anarchies have unclear technology. People have only a loose understanding of means and ends. Organizational participants gain knowledge by trial-and-error learning, but without clear understanding of underlying causes. Third, organized anarchies are characterized by fluid participation. Decision-making participants come and go from the decision process, with their involvement depending upon their energy, interest and other demands on their time. Therefore, anticipating who will actually be involved in a decision is difficult.

Therefore, the garbage-can model describes the accidental or random confluence of four streams: 1) choice opportunities, 2) problems, 3) solutions, and 4) decision-makers. Choice opportunities are occasions when an organization is expected to produce behavior that can be called decision, such as contract meetings, budget committees, and compensation decisions. They arise regularly and collect problems, decision-makers, and solutions. Problems are concerns of people inside and outside the organization. They may involve such things as logistics, resource allocation, or scheduling. They may involve issues of lifestyle, fairness, or correctness. They may involve conflicts among participants or between them and outsiders. Solutions are answers to problems that may or may not have been recognized. Decision-makers devote their energies to making choices. They are involved in one choice opportunity at any one time, but they move from one choice opportunity to another. Decision-making occurs in a stochastic meeting of choices looking for problems, problems looking for choices, solutions looking for problems to answer, and decision-makers looking for something to decide.

CMO translate the situations of decision-making into a computer simulation model and examine how decisions are made. The image of the simulation model is as follows: Choice opportunities are viewed as garbage cans in the model. Various kinds of problems, energies, and solutions are dumped by participants into choice opportunities, as if they threw garbage into cans. When the total energy in a choice opportunity exceeds the requirements to solve the problems there, the choice is made, as if a full garbage can were cleared out.

Figure 1 illustrates the flow chart of the simulation model. The model has four fixed parameters: (1) number of choice opportunities, 10; (2) number of decision-makers, 10; (3) number of problems, 20; and (4) the solution coefficients for the 20 time periods, 0.6 for each period. The solution coefficient defines the effective energy devoted to a choice opportunity by the decision-makers.



*1: The model consists of 20 periods of time. All choice opportunities and problems emerge in the first 10 periods, and no new ones are introduced in the last 10 periods.
*2: In unsegmented structures, each problem and decision-maker has access to all choice opportunities. Therefore, from all activated choice opportunities, decision-makers and activated problems choose the one closest to a decision.
*3: At the first period or in the case of the choice appearing newly, "ER at T - 1" is zero.

Figure 1: The flow chart of CMO simulation model.

The model has two organization structures: “access-structure” and “decision-structure.” Access or decision structures are a list of choice opportunities to which the problem or decision-maker “has access.” These structures are of three types: (1) Unsegmented (each problem or decision-maker has access to all choice opportunities), (2) specialized (each problem or decision-maker has access to only one choice opportunity), and (3) hierarchical (the number of accessible choice opportunities differs depending on the organizational level; the higher the level, the more accessible choice opportunities there are). This study focuses on unsegmented structures because this type of structures, as noted later, has attracted most of the attention in the literature.

The simulations are conducted according to the following rules:

1) One choice opportunity and two problems are randomly chosen and activated. The model consists of 20 periods of time. Therefore, all choice opportunities and problems emerge in the first 10 periods, and no new ones are introduced in the last 10 periods.
2) Decision-makers and activated problems are attached to activated choice opportunities. There are no structural limits in unsegmented organization structures. Therefore, from all activated choice opportunities, they choose the one closest to a decision. As explained below, when the effective energy (EE) exceeds the energy requirement (ER), decisions are made. Thus, problems and decision-makers enter the choice in which ER − EE is minimal. This assumption is called “allocation assumption.”
3) The ER (energy requirement) of each choice opportunity is calculated based on problem load (the amount of energy required to solve).

   ER = (the number of problems in the choice) × (load)
4) The EE (effective energy) of each choice opportunity is calculated based on decision-maker’s energy (ability to solve problems) and solution coefficient.

   EE = (the number of decision-makers in the choice) × (energy) × (solution coefficient)
   + (the carry-over EE from the previous periods)
5) CMO assume that a decision is made whenever the decision-makers present at a choice opportunity (aided by whatever solutions are available) have enough energy to overcome the load of problems that are present. More specifically, if ER–EE is equal to or less than zero, the choice is decided. However, if ER–EE is greater than zero, the result is the opposite. In this case, the choice and the problems there remain activated, and EE is carried over to the subsequent periods.

6) By their definition, decision does not always mean “resolution,” and there exist “oversight” and “flight” as the other types of decisions.

Resolution: There are problems associated with a choice opportunity, and the decision-makers attached to the choice bring enough energy to meet the demands of those problems. The choice is made and the problems are resolved. More specifically, if EE > ER > 0, the decision is made by “resolution.”

Oversight: Sometimes a choice opportunity arrives and no problems attach themselves to the choice. All the problems in the system are attached to other choices. In this situation, a choice is made with minimum time and energy. It resolves no problems. More specifically, if ER in the present period and ER in the previous period = 0 (however, in the first period, or in the case of a new entry choice, this equals the initial setting of ER), the decision is made by “oversight.”

Flight: Sometimes a number of problems have been associated with a choice opportunity for some time. Since they collectively exceed the energy of the decision-makers attached to the choice, the choice is not made. When another choice opportunity becomes available, the problems leave the initial choice to attach themselves to another. After the problems are gone, the original choice is made. It resolves no problems. More specifically, if ER in the present period = 0 and ER at the previous period > 0, the decision is made by “flight.”

2.2 Widely accepted view on the garbage-can model

CMO translated the ideas noted above into an explicit simulation model, and examined the decision-making behavior using many output numerical data. However, their simulation results are so complicated and confusing that the subsequent studies, including that of the original authors, have referred mainly to the following two implications. First, decision-makers, problems, and solutions move around choice opportunities, and their combinations change randomly in the decision-making process (“random behaviors”). Second, decisions are made depending on timing and, therefore, decision styles randomly change over time (“random decision styles”). Decisions are sometimes made by resolution, but also by oversight or flight. As CMO state, “A major feature of the garbage can process is the partial uncoupling of problems and choices. Although decision-making is thought of as a process for solving problems, that is often not what happens. Problems are worked upon in the context of some choice, but choices are made only when shifting combinations of problems, solutions, and decision-makers happen to make action possible. Quite commonly this is after problems have left a given choice arena or before they have discovered it (decisions by flight or oversight)" (p.16).

Besides, subsequent studies by the original authors insist that this decision-making process can typically be observed in unsegmented structures. As Cohen et al. (1976) state, "In situations in which load is heavy and the structure is unsegmented, intention is lost in the context-dependent flow of problems, solutions, people, and choice opportunities" (p. 37). As stated by March and Olsen (1986), "In the absence of structural constraints within a garbage-can process, solutions are linked to problems, and decision-makers to choices, primarily by their simultaneity" (p. 17). March and Olsen (1989) state, "in purest garbage-can situation, we assume that any problem and any decision-maker can be attached to any choice" (p. 13).

Standard textbooks on organizational theory reflect the implications stated by the original authors. These textbooks often use the words "random" and "disorderly" to explain the garbage-can decision-making process (Weick 1979; Hatch 1997; Scott 2003). As Daft (2004) notes,

> With the concept of four streams, the overall pattern of organizational decision-making takes on a *random* [italics added] quality. Organization decisions are *disorderly* [italics added] and not the result of a logical step-by-step sequence. Events may be so ill-defined and complex that decisions, problems, and solutions act as independent events. When they connect, some problems are solved, but many are not. (p. 467)

Many academic articles and case studies regard the garbage-can decision-making process as disorderly. Kingdon (1984) assumes that the combinations of the four elements will change randomly: "The solutions and problems that come to the fore might change from one meeting to the next, as given participants attend or fail to attend" (p. 86). Although studies casting doubt on the garbage-can decision-making process have been published since the late 1980s (Pinfield 1986; Levitt and Nass 1989; Mezias and Scarselletta 1994), they share the view that the garbage-can decision-making process itself illustrates the disorderly association of the four elements. Strategic decision studies also consider the garbage-can model as the most anarchical and fluid mode of decision-making (Eisenhardt and Zbaracki 1992; Das and Teng 1999). Many academic studies also assume that unsegmented structures cause this disorderly decision-making process (e.g., Grandori 1984). Padgett (1980) tries to accommodate the garbage-can model in hierarchical organizations, and this idea itself shows that many studies assume that the garbage-can decision-making process can be typically observed in unsegmented structures.

In sum, the widely accepted view of the garbage-can model is that unsegmented (disorderly) structures lead to a disorderly decision-making process, which is defined by "random behaviors" and "random decision styles."

To tell the truth, the subsequent studies, including CMO, have not examined well the original simulation model, and have not developed new models replacing the original model. Certainly, CMO described the simulation results well, using many output numerical data such as problem latency and activity, but they did not examine the simulation process directly. Generally speaking, multiple simulation runs of the same model may differ from each other, due to differences in initial conditions and stochastic events, and the results are, therefore, often path-dependent. To understand the results often requires understanding the details of the history of a given run (Axelrod 1997). Analyzing the simulation results only by output numerical data is more likely to misread the real simulation processes. Therefore, this study rebuilds and examines the original CMO model, making its simulation process visible. As shown in the following, the simulation results of CMO model are paradoxical. Besides, the paradoxical result is observable in real organizations.

3. Simulation results

3.1 Verification analysis

We can reconstruct the simulation model precisely because CMO state the source code in the appendix. CMO also state the random number they used and the order in which the actions of problems and decision-makers are simulated, we must be able to obtain results identical to CMO. To examine this, I used the measures of "problem activity (the total number of time periods a problem is activated and attached to a choice, summed over all problems)," "decision-maker activity (the total number of instances any decision maker shifts from one choice to another)," and "decision difficulty (the total number of time periods during which a choice is activated, summed over all choices)." This is because 1) CMO describe the computational algorithms of these measures in the source code, and 2) they accurately report the results of these measures.

Table 1 shows the numerical equivalence between CMO and the reconstructed model. The differences in detail are due to rounding errors. I reconstructed the simulation model using Fortran 90, Microsoft Excel 2003, and so on, and corrected rounding errors. As a result, I obtained the identical results, respectively. Therefore, we can conclude that the simulation model was reconstructed precisely.

Table 1: The precision of the reconstructed model

Measures		CMO	Reconstructed model	Corrected model
Mean problem activity				
	Light load	114.9	114.8	109.1
	Moderate load	204.3	201.3	192.5
	Heavy load	211.1	210.0	225.3
Mean decision-maker activity				
	Light load	60.9	61.0	62.0
	Moderate load	63.8	66.0	78.2
	Heavy load	76.6	76.9	65.7
Mean decision difficulty				
	Light load	19.5	19.5	18.3
	Moderate load	32.9	34.1	42.6
	Heavy load	46.1	46.1	36.5

Note: The corrected model corrects the initial value of energy requirement (ER) of choice opportunities from 1.1 to 0.0.

However, I came across a strange setting when examining the source code. The initial value of Energy Requirement (ER) of choice opportunities was set at 1.1 as if there were problems in the choice opportunity from the beginning. Then, I corrected the value from 1.1 to 0.0. Table 1 shows the results of this corrected simulation model. Despite the great differences from CMO at some points, we should consider these results as true ones.

3.2 Output data analysis

Table 2 shows the number of each decision style under unsegmented structures and each problem load. In CMO model, there are three types of energy distribution of decision-makers, and four combinations of problem and choice opportunity entry times. Therefore, there are 12 types of parameter setting for each problem load. Because one simulation run consists of 10 choice opportunities, 120 in total emerge. As shown in Table 2, every decision style is resolution under light and moderate load, but is flight under heavy load. This result is relatively robust to the amount of decision-makers' energies and solution coefficient. In the simulation, the equation deciding whether a choice is made or not is as follows.

(The number of problems) × (load) ≤

(The number of decision-makers) × (energy) × (solution coefficient) + (the carry-over energies)

Load, energy, and solution coefficient no more than affect the different side of the equation. Therefore, each parameter setting shows almost the same result. In sum, it is not "random decision styles" but "single decision style," which indicates all choices are made by only one decision style, to be observed in unsegmented organization structures.

Table 2: The number of each decision style in unsegmented organization structures.

	Resolution	Oversight	Flight
Light load	120	0	0
Moderate load	120	0	0
Heavy load	0	0	108

Note: There are three types of energy distribution of decision-makers, and four combinations of problem and choice opportunity entry times. Therefore, there are 12 types of parameter setting for each problem load. Because one simulation run consists of 10 choice opportunities, 120 in total become activated. All choices are made by resolution under light and moderate load. One-tenth of choices are not made and all the others are made by flight under heavy load.

3.3 Simulation process analysis

Figure 2 shows a simulation process under the light load. I scaled down the figure by half for simplification: Five choice opportunities, ten problems, five decision makers, and ten periods. The essence of the results does not change in spite of the scaling down. In this figure, inverted trapezia are choice opportunities, and circles and squares in inverted trapezia represent problems and decision-makers respectively.

Choice opportunity "3" (C3) and problem "4" (P4) and "9" (P9) become activated at the first period. C3 is the sole activated choice and is accessible for all decision-makers and problems. Thus, all decision-makers and activated problems (P4 and P9) enter C3. Because the effective energy EE is greater than the energy requirement ER (>0), C3 is made by resolution. Then, the simulation moves on to the next period. C2, P0, and P7 become activated. In the same way as in the previous period, all decision-makers and activated problems (P0 and P7) enter C2. EE is greater than ER at C2, and the choice is made by resolution. In this way, all decision-makers gather at the new choices and resolve new problems at once.

Figure 3 shows a simulation process under the heavy load. C3, P4, and P9 become activated at the first period. P4, P9, and all decision-makers enter C3. The decision-makers reach the next period without a decision because the problems are too heavy to solve (ER > EE). C2, P0, and P7 become activated at the second period. Because the initial values of ER and EE of the new choice C2 are equal to zero, this choice is closest to a decision (ER − EE = 0). Moreover, C2 is accessible for all decision-makers and problems. Thus, all decision-makers and activated problems (P0, P4, P7, and P9) enter C2. C2 is not made because ER (loads of P0, P4, P7, and P9) is greater than EE (energies of all decision-makers). The old choice C3, however, is made because it has no problems (EE ≥ ER = 0). Its decision style is flight. ER at the first period is greater than zero because there were the problems P4 and P9. All decision-makers and all activated problems move in clusters from a choice to another new one, depending on the allocation assumptions. The old choices are always made by flight because all problems have left the choices. In sum, it is not "random behaviors" but "single-packed behaviors," which indicates problems and decision-makers move together from choice to choice, to be observed in unsegmented organization structures.

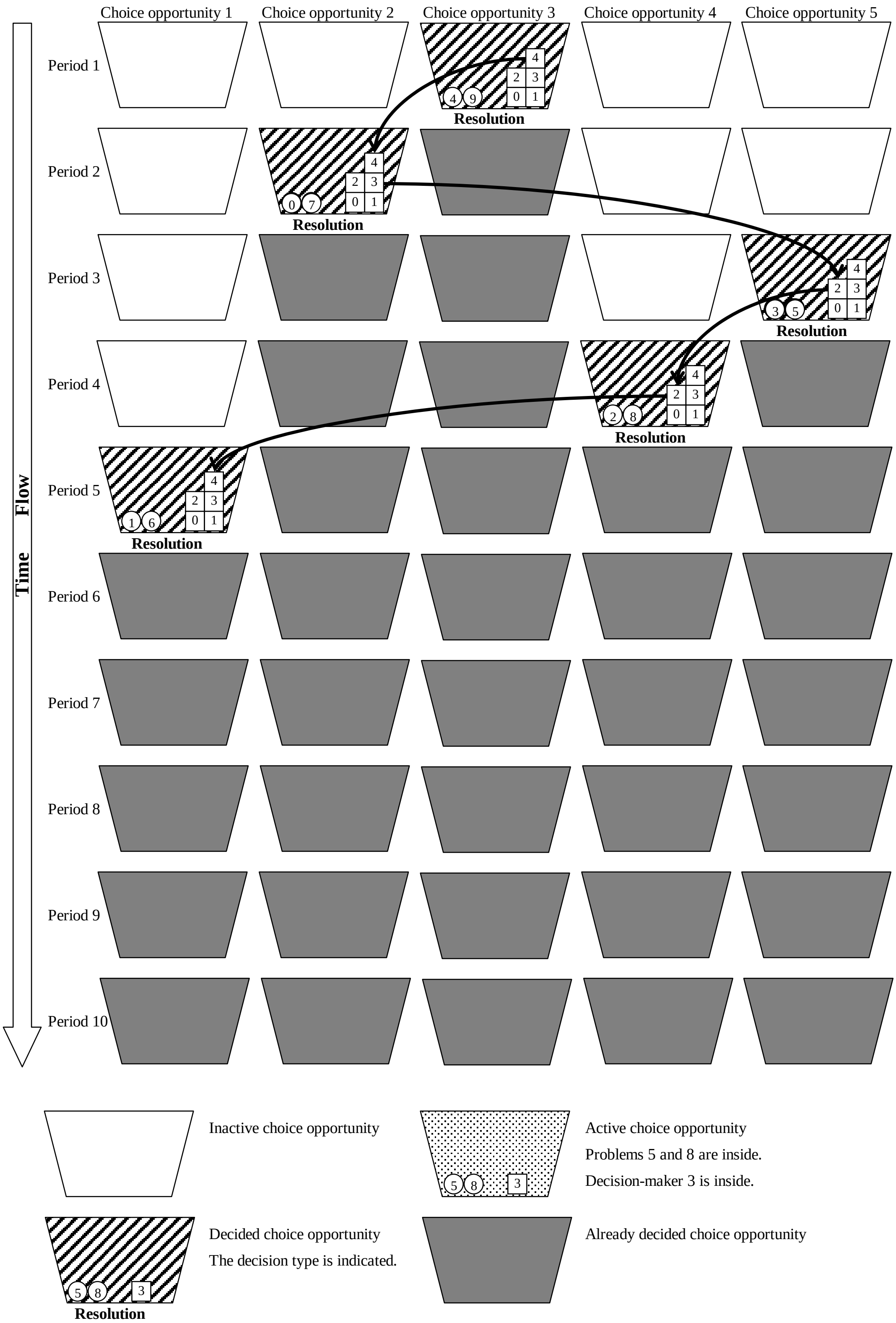


Figure 2: A simulation process under unsegmented organization structures and light load.

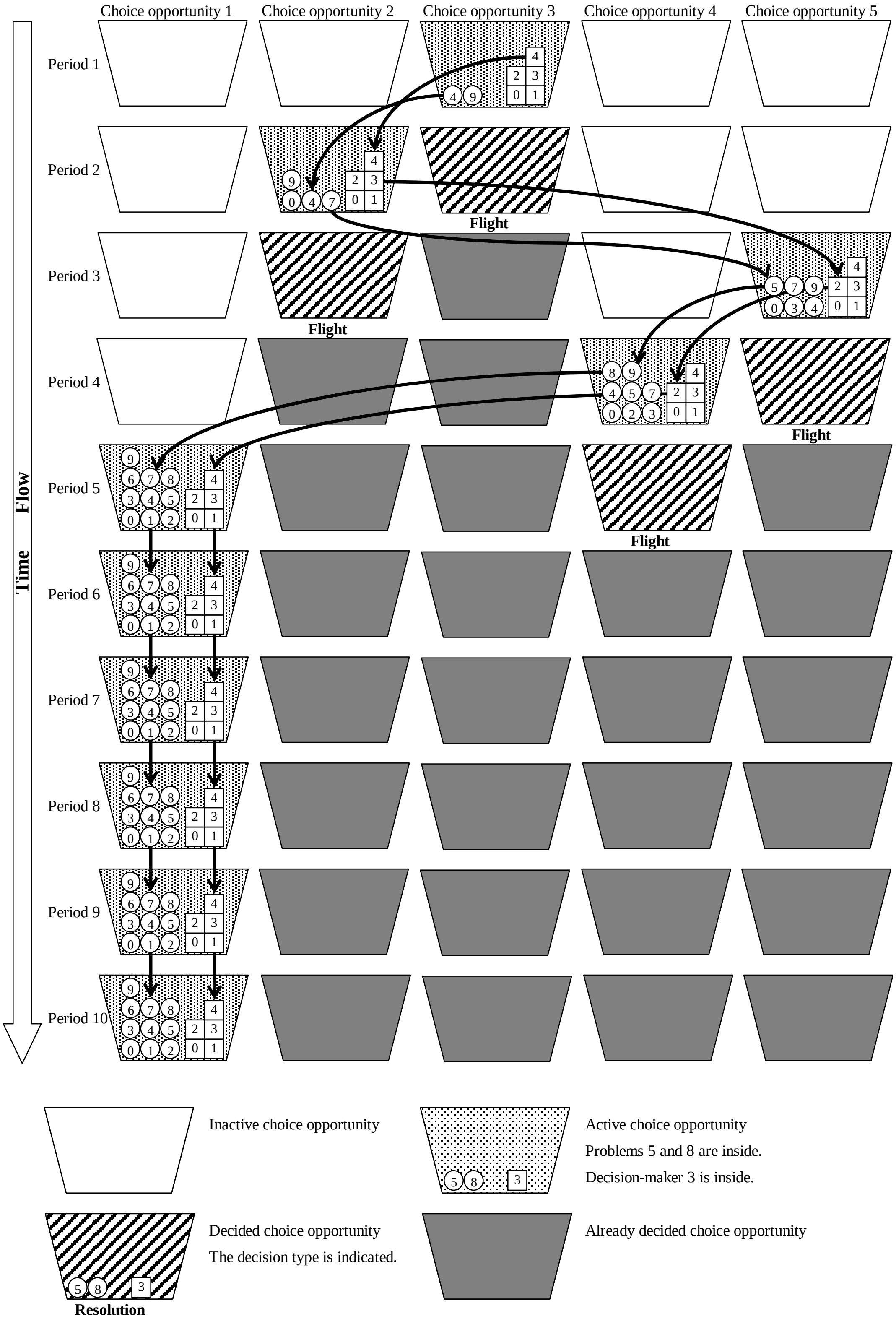


Figure 3: A simulation process under unsegmented organization structures and heavy load.

The genuine results of the simulation model are paradoxical. The unsegmented organization structures lead to an orderly decision process defined by “single-packed behaviors” and “single decision style.” “Random behaviors” and “random decision styles” in unsegmented structures may be mere illusions having been created by the subsequent garbage-can studies. To tell the truth, CMO (1972), the original paper of the garbage-can model, pointed out the orderly decision process, especially “single-packed behaviors.” CMO state as a simulation result, “a typical feature of the model is the tendency of decision makers and problems to track each other through choices. … both decision makers and problems tend to *move together from choice to choice* [italics added]” (pp. 9-10). CMO, however, did not refer “moving together” in their conclusion section (see the quotation stated in the second section of this paper). As a result, the subsequent studies have omitted the sentence about “single packed behaviors” and have left only the sentence “tracking each other.” March and Olsen (1986) only state, “decision makers and problems tend to track one another through choices” (p.18), as a feature of the unsegmented structures. March (1994) only states, “decision makers, problems, and solutions tend to track each other through the system” (p.202), as well. Therefore, separated from “moving together,” “tracking each other” has become interpreted unconsciously as the “random behaviors,” and this misinterpretation has spread. This might not have occurred if CMO had examined not only the numerical simulation results but also the simulation process as this study did.

4. A case of disorderly (unsegmented) organization structures

In this section, we will show that the genuine but paradoxical simulation results are observable in real organizations, providing an illuminative case. This case study investigates a Japanese venture firm in the telecommunications industry, which we refer to as “X.” Its main business is system and application program development for cellular-based internet services. This company has no formal organizational chart. The employees are able to get together and disperse flexibly during each project. The company has offices in Tokyo and Kyoto; research for the study was conducted in the Tokyo office, which is a nonterritorial office where no one has a particular desk and almost no visible partitions exist. This office setting would make work structures more unsegmented. Some studies have assumed that, in this type of office, each employee’s neighbors change from time to time, and employees tend to communicate with their numerous neighbors, especially those with whom they are relatively unacquainted

(Allen and Gerstberger 1973; Allen 1977; Sundstrom and Sundstrom 1986). This suggests "random behaviors" in the garbage-can simulation model. As shown in this section, however, "single-packed behaviors" can be observed in this office arrangement.

Nearly 60 percent of the employees in the office are engineers; the others are engaged in sales and administrative roles. Most engineers come to the office every day and spend most of their time in the office. They design, develop, and improve systems and programs through face-to-face communications. Of course, the office had advanced IT capabilities, and the engineers interacted by e-mail or other electronic medium. However, they usually decided important issues at face-to-face meetings.

The number of employees at the Tokyo office had risen to about 50 by October 2004. Because this number exceeded the capacity of the office, the freedom of movement of the employees was restricted at that time. Thus, in November 2004, the company moved to a new, large, and nonterritorial office.

4.1 Data collection

The Japanese venture firm case study was based on simple questionnaire surveys, interviews, and observations at the company's Tokyo office. I conducted questionnaire surveys 2 weeks before the move (mid-October 2004) and again 3 months after the move (end of January 2005). The questionnaires were identical with 50 yes/no questions on the employees' attitudes developed by Takahashi (1997a; b) and 15 yes/no questions on the atmosphere within the office. I administered the premove survey to 51 employees (all the employees) and obtained 48 responses. I administered the postmove survey to 50 employees (all the employees) and obtained 41 responses. Nearly 86 percent of the respondents were male and 60 percent were engineers. About 60 percent of respondents were regular staff. These proportions were in line with those of the entire organization. There was also no significant difference between the proportions in the premove survey and those in the postmove survey. I also conducted twenty interviews with eleven employees (of about 45 to 60 minutes each) from September 2004 to November 2005. The interviewees consisted of executives, general managers, managers, and ordinary employees in sales, engineering, and administration. In these interviews, I asked about their work patterns and attitude in the office. In addition, I observed their behavior in the office about twice a week from October 2004 to March 2005. For the analysis, I selected the following items from the questionnaire survey.

Restrictions: The limited space before the move detracted from the advantage of nonterritorial offices because the employees could not move around freely and could not interact well with others. I selected the following two items as an indicator of these restrictions:

R1. There is enough space to gather at once if necessary: 0 = yes, 1 = no.

R2. You find it difficult to stand up and move around in the office: 1 = yes, 0 = no.

Behaviors: We tend to assume that employees move around and interact with others in a large nonterritorial office. They will consult the members of other working groups and aid other projects as circumstances demand. This is considered "random behaviors" because the discussion partners change depending on timing. I selected the three items as an indicator of the employees' behaviors. The higher these items, the more frequent the change of discussion partners.

B1. The work atmosphere enables you to consult a member of another group (division or unit) about problems in your business: 1 = yes, 0 = no.

B2. Because the work of others can be seen, it is easy to consult them or offer them assistance in a timely way: 1 = yes, 0 = no.

B3. Because the work of others can be seen, you can help them in emergencies: 1 = yes, 0 = no.

Decision style: As an indicator of decision style, I selected the item which had been used to measure the degree of decisions by flight in Takahashi (1997a; b). The higher this indicator, the more frequent the decisions by flight. According to the simulation results, decisions by flight must decrease or increase drastically under unsegmented organizational structures.

D1. When you can avoid completing your assigned tasks long enough, they sometimes become unnecessary: l = yes, 0 = no.

4.2 Unsegmented structures in a large nonterritorial office

The limited space restricted the employees' movement before the office move. One employee said that he and his project members had to go to a restaurant outside the office because there was very little space to gather in the office. In observations at the time, employees arriving late at work had few choices regarding where to sit.

The office move, however, removed this restriction. The questionnaire sample was divided into the premove group (where N = 48) and the postmove group (where N = 41), and the mean value of "restrictions" items R1 and R2 was calculated in each group. The mean of R1 and R2 of the postmove survey shows a significant decrease at the 1 percent and 10 percent level compared to the premove survey (Table 3). In fact, the workspace had an area of only 139.50 square meters before the move, but increased to 486.30 square meters after the move. This large office enabled employees to move around and interact with one another easily.

Company “X” was characterized by a flattened organizational structure (a venture firm), a nonterritorial office, and large office space. There were few structural constraints on the employees’ movements and interactions. The company built up the unsegmented structures.

Table 3: Comparisons between the premove and the postmove group

	Pre-move (N = 48)		Post-move (N = 41)		
	Mean	SD	Mean	SD	t-value
Restrictions					
R1	.34	.479	.88	.331	6.184**
R2	.77	.428	.90	.300	1.748+
Behaviors					
B1	.88	.334	.61	.494	3.003*
B2	.85	.357	.73	.449	1.434
B3	.88	.334	.78	.419	1.183
Decision style					
D1	.55	.503	.55	.504	0.029

Note: ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

4.3 An orderly decision-making process in a large nonterritorial office

Contrary to assumptions that individuals would communicate with a wide range of employees, the employees in the large nonterritorial office felt that contacts outside their own project teams had decreased, that is, discussion partners did not change depending on timing. In fact, the means of “behaviors” items B1, B2, and B3 were 0.88, 0.85, and 0.88 before the move, but they fell to 0.61, 0.73, and 0.78 respectively after the move (Table 3).

The employees had a pronounced tendency to work in close proximity with others participating in the same project. Project members needed to join forces to handle the requirements of the customers. Their nonterritorial office was convenient in this respect. Project members could work near the person with whom they wanted to cooperate and could sit together. If a desk was assigned to each of them, each had to work separately at his or her desk. Moreover, they could gather at once due to sufficient space in office. As there was lack of enough vacant spaces for gathering before the move, they had to wait for the conference room to become vacant before they could convene even a casual meeting. Further, each employee often fell into line with his or her own project team. For example, in the past, employees often went to lunch with the members of other project teams. After the move, however, each group came to work at its own pace. Thus, when they reached a stage where they could take a break, they went to lunch with their own project members.

Although decisions by flight must have drastically decreased or increased according to the simulation results, the mean of decision style (D1) remained 0.55, which suggests decisions by flight did not change at all. However, according to the interviews, decisions by flight seemed to prevail among the cohesive groups. A regular meeting, in which almost all the employees took part, was held every Monday. The objective of these meetings was to provide a forum in which the problems of each project team could be discussed. The agendas were not ad hoc solutions but fundamental problems and their eventual solutions. For example, trouble with a customer was discussed. In this case, the participants did not discuss how to explain the situation and apologize to the customer; rather, they revealed through discussions that the cause of this trouble was accepting an order that was more than they could handle. They then discussed solutions such as personnel policies of securing a sufficient workforce and management policies of not receiving impossible orders, in order to ensure that such problems would never be repeated. These fruitful discussions, however, were not followed by concrete actions. Because individuals in each project were fighting to meet tight deadlines, the outcome of the regular meeting was low on their list of priorities and was postponed.

The questionnaire result may be due to the double-meaning of D1. “Assigned tasks” in D1 may not only mean reforming personnel policies and management policies, but also mean struggling to meet a deadline. Ideas for company-wide policies are longer-term and often obscure, but approaching deadlines are short-term and often clear, and therefore they never fade away. As a result, respondents assuming the former case would answer “yes” but those assuming the latter case would answer “no.” The question D1 should have been reconsidered in this case.

In sum, the employees tended rather to cluster together in each project than to change discussion partners depending on the situation. This suggests “single-packed behaviors.” In addition, though not having been shown in questionnaire survey, the members of cohesive clusters seemed to leave fundamental problems unresolved and to be busy with their current work. Decisions by flight permeated these groups; in other words, “single decision style” under a heavy load was observed.

5. Discussion and conclusion

In many garbage-can studies, disorderly (unsegmented) organization structures have been considered to be a typical situation of the garbage-can decision process characterized by “random behaviors” and “random decision styles.” As shown so far, however, the genuine simulation process of the original garbage-can model is that disorderly (unsegmented) organization structures cause an orderly decision-making process characterized by “single-packed behaviors” and “single decision style.” In addition, this paradoxical simulation result can be observed in real organizations.

We should reconsider how unsegmented organization structures give rise to an orderly decision-making process. The causal mechanisms of the simulation results are as follows: Decision-makers and activated problems try to enter the choice closest to a decision depending on the allocation assumption, and all of them have access to that choice because each of them has access to all choices. Thus, all of them enter the new choice. As this process is repeated, decision-makers (and problems) move in clusters from one choice to another (single-packed behaviors). Decisions are made using only one style (single decision style) due to solid participation. Above all, flights dominate under the heavy load.

Allocation assumption, which is that problems and decision-makers enter the choice opportunity closest to a decision, plays a critical role. The idea of this assumption is conceived from Cyert & March’s (1963) “feedback-react decision procedures” (Cohen et al. 1976). According to Cyert & March (1963), confronting complex and uncertain situation, decision-makers make decisions by “feedback-react decision procedures,” to avoid uncertainty. They avoid the requirement that they correctly anticipate events in the distant future by using decision rules emphasizing short-run reaction to short-run feedback rather than anticipation of long-run uncertain strategies. To put it briefly, they tend to solve pressing problems rather than develop long-run strategies. Considering the production-level decision as an example, decision-makers may forecast sales and develop some long-run production plans on paper, but the actual production decisions are more frequently dominated by day-to-day and week-to-week feedback data from inventory, recent sales, and sales staff.

The cohesive group members of company “X” would have behaved according to the allocation assumption. If the members could not meet the project’s deadline, they would be unable to receive orders from their customer in the future. Thus, they were working hard to meet close deadlines and were caught up in a continuous stream of short-term, urgent tasks. They could not afford to spend any time looking deeply at the long-term important problems. The issues discussed at the regular meetings were so serious that they could not be solved with improvised solutions alone. As in “feedback react procedures,” they put new choices (i.e., urgent tasks) ahead of serious problems.

In situations where “feedback react procedures” were reasonable, the large nonterritorial office was convenient for members of each project to get together rather than communicate across projects. The project members could work together in their large nonterritorial office (i.e., unsegmented structures) without depending on timing because they did not have to wait for conference rooms or spaces’ being vacant. Whenever a situation requiring urgent response emerged, all members could join forces in an all-out effort to respond. The project members moved in clusters from one choice to another.

In order to improve our work, however, we must also examine what happens in other types of organizations. Although many empirical studies on garbage-can model have been conducted in educational organizations such as universities in the U.S. (e.g., March and Olsen 1976), the case of this study is of a different type of organization (a venture firm in cellular-based internet services) functioning in different culture (Japan). Therefore, many other possible explanations can be considered. One is that in a more collectivist culture (Japan), “single-packed behaviors” are more likely to occur, even if this takes longer in a territorial office. In this regard, however, many cultural studies have not necessarily supported the hypothesis that Japanese are more collectivistic than Americans (Matsumoto 2000). Second is that the members of profit-oriented organizations may feel more preoccupied with responses to their customers, and may cooperate with each other. Besides, members of small groups may be acquainted with each other and may tend to become more cohesive than those in large organizations. These are not controlled in this study, and future research should address how these differences of organization type affect the result.

We can also consider some variations of the original simulation model. First, the structural limits on movement of problems and decision-makers to and from choice opportunities can be verified across wide ranges. Thus, the model can be used to explore the consequences of garbage-can processes in relatively tightly coupled systems, containing hierarchies and division of labor, as well as in less tightly coupled systems that have been the primary focus of attention so far. Exploration of temporal contexts in highly structured organizations has hardly begun. Second, it is more natural to consider that choice opportunities and problems continue to be introduced into an organization. The original model consists of 20 periods of time. All choice opportunities and problems emerge in the first 10 periods, and no new ones are introduced in the last 10 periods. Third, the model may be varied by altering the allocation assumption. It is possible to imagine various rules by which problems are initially attached to choices and by which they move. The original model assumed movement to the accessible choice closest to a decision, but it is possible to explore the implications of assuming various forms of inertia in movement or to increase random elements in movement. Fourth, assumptions about how choices are made can be modified. The model assumes that there are both energy demands (carried by problems) and energy resources (carried by decision-makers and solutions), and that choices are made when energy resources exceed energy demands. These future researches will provide many useful implications.

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