The properties of Autopoietic Viable System

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Abstract: This research presents an investigation into the properties of the Autopoietic Viable System through a case study of X-corporation. X-Co. is No.1 in the convenience store industry. Through this study, we conclude that the activities of social autopoietic units and their chains produce viable systems. We will notice the meaning that Beer described that the heart of the enterprise is the human being.

Keywords: social autopoietic unit; chain of social autopoietic units

1 Introduction

According to Tsuchiya (2007), we will discuss the properties of an Autopoietic Viable System Model: ① the systematizing of external organizations and ② the sharing processes with using X-corporation. In addition, ③ the social autopoietic units and their chain produce viable systems. Their units and chains identify the individuality of organizations and practice of strategies.

The structure of this research is below. Section 2(1) introduces the definition of social autopoietic unit. 2(2) is the sketch of X-Co. Section 3 discuss X-Co. on VSM, and consider the autopoietic units around CEO to clarify the corporation culture (①). Section 4 is concerned the history of their strategies which has became a viable system. From this a viable system’s properties ①② in 1 are clarified. Section 5 is about the original brand strategy (③). Section 6 concerns with our small experiment to investigate these characters are supported by the chain of autopoietic units (③). From this experiment, it is clarified that every member of a viable system needs many of autopoietic units and their chain around them at individual level for getting solutions each other. Therefore we conclude autopoietic units and their chain are necessary for viable systems in last section.

2 Definition, and Sketch of X-Co.

(1)In above paper, the social autopoietic unit is defined. This unit can be derived from VSM with recursive theory, from the least recursion level, that is, individual interaction level. At this level, the structure and the function are coinci-
dent. This unit is composed of people who share mission and subject. It is composed of three roles; the subjective role is in the position which is taken by that of the operational unit in VSM, the parental role is in the position of management unit and other persons, whom we call the metasystemic role. The triangle of the diagram illustrates the three roles and the position of self (Figure 3-3 etc.).

Where self is regarded, its place is the overlap point in Figure 5-1, for instance. The meaning of the overlap point of the triangle is that each component should have three roles at the same time. This unit is a personal and temporal; members have to reconstruct it repeatedly at each problem, and they connect with each other, usually or sometimes with changing new members from outside (Figure 7). The chain of these triangles tries to make the higher structure and functions the same in the horizontal and vertical directions. From the structural point of view, the chain of triangles can sustain the whole structure. In viable systems, those units produce abilities among their members adaptable to each problem to conquer it and renew themselves with each social autopoietic unit, which is define as follows, according to Maturana and Varela (1980).

The social autopoietic unit is the unit organized as a network of processes of production of skilled components that have resolving ability as a subject. The members share processes that produce them, continuously reproduce them, and realize the network of processes for renewal of each ability through interactions which mean understanding, learning, motivation and supporting. Moreover, each member secures self-existence by constituting the network as the unit, and in its familiar relations specifying the topological domain of the realization as such a network. Further members can apply introspection in the network. It is important whether these units can make chains and cause a VSM-function to emerge. Therefore, a system could use these units and their chains for maintaining viability.

(2) X-Co. has been changing Japanese diet and lifestyle. It has reformed many firms around it. In their structure, the structure from Zone managers (ZM) to stores is sometimes thought of as a pyramid structure. Actually, they divide their area into 15 zones; each zone has 10 District managers (DM), and each DM has 7-8 Operational field counsellors (OFC). Each OFC takes charge of and is responsible for the guidance of 7-8 stores.

3 Peculiar situations

(1) System I : Management unit is each OFC and operational unit is each area’s stores. OFCs are managed by DMs, and DMs are controlled by each ZM. Every day, OFC, DM and ZM reports about the business activities in each store to metasystems through a POS-system. The specialties of X are: taking the franchise system; and the existence of DM-ZM. The reason why X-Co. takes the franchise system is that it is seeking viability for each store. The POS works well for DM-ZM and metasystems to report their daily statistics. Actually, only one objective is imposed on each store, which is to earn more than in the corresponding month of last year ratio. Each OFC also has objectives: to make each store achieves above its own goal; and to make its own average achievement exceed the average of the district managed by its own DM. Each DM has corresponding objectives, which are to make each district’s average exceed the average of the zone and make its monthly performance exceed that of the cor-
responding month of last year. Each ZM has the objective that the average profit that his and her own zone makes should exceed the average of all the zones. Therefore they are destined to improve their business and adapt the competitions inevitably.

For reasons of maintaining efficiency, X-Co. does not recommend interacting within each store. The counselling system itself is the system of competition. On the other hand, the counselling system promotes the efficiency of own area with transplanting success cases from outside. Therefore, the counselling system works as the variety-absorbing channels (②).

What we should take note of is that each OFC and DM is in a dual role: that is, they have to promote each store’s business and to transplant successful examples to each operational element and each store. In other words, sometimes they have to become a channel between operational units. And an OFC has to perform as a System III to the owner of a good store (Figure 3-2). A DM usually behaves as a System III and III* to the OFC and each operational unit, but sometimes performs as a System II to the owner of a good store. A ZM is in System II usually to operational element, but behaves as a III to DMs.

(2) Other metasystems: Other metasystems also differ from the original organization chart. In System III (their scheme for the operational support headquarters) there is a description of two divisions, the operational division and the support division, because each has a different role. The former manages OFC, DM and ZM; the latter deals with complaints from customers. The business headquarters also constitutes System III and takes charge of legal affairs and general affairs. In its organization chart the training division is contained in the business headquarters, but its function should be in II, therefore we allocate it to II. The district merchandising division is in the commodity headquarters, but its role is connected with those of the development division and the operational division, therefore we allocate it to System III. In System IV, the role of the commodity headquarters should, in theory, be purely the development of new commodities. Moreover, in its original chart, the system control headquarters is constituted of the accounting, the information system and the accounting training division. Thus in the scheme based on VSM each headquarters is divided into several functions, therefore none has the concentration of authority. The authority is concentrated in the leadership of the CEO. Each metasystem concentrates on supporting System I as a staff. Namely, what sustains X-Co. is System I, that is, small stores of which there are more than 10,000 to maintain X-Co. as a system.

(3) Another characteristic is that they consider communication to be important for keeping their coherence. Especially the OFC meeting is held every Tuesday. This is important, be-
cause that meeting has all the OFCs and they bring their raw experience. After that has been shared, a concrete solution is made. Although they have a POS system, they never abandon direct communication.

(4) The social autopoietic unit of CEO: Sometimes X-Co. is talked of as a top-down organization. However, the constitutional style of CEO's social autopoietic unit suggests that it is not actually so. The CEO of X, has only one adviser - the honorary president of Y-Co. which is the parent company of X, on whom to rely himself. Therefore, his usual triangle, that is, the social autopoietic unit is always drawn as in Figure 3-3. He thinks he is in subjective role to the honorary president. He can use all managerial resources, therefore in the position of metasystemic role he can allocate them. Figure 3-4, 3-5 show that he usually occupies the parental role position. Namely, this is his attitude as CEO. He never makes himself place in the metasystemic role. In OFC meeting he always sits on the position of the subjective role to know the real problems and new cases. Figure 3-5 is a psychological triangle which reflects the syn-reference as same as Figure 3-2. What we should notice is that he regards the report of OFC meetings as System III and the reports from the two headquarters as System II in his metasystemic role. This is the evidence that X considers that first-hand information is important. Figure 3-4 means the initial stage of strategy, and Figure 3-5 means the situation of the second syn-reference in the performance stage. Therefore, the report of subject is positioned in System V. Syn-reference is offered by Heijl (1984). Namely, systems are defined in terms of an intersection between their composite identity and their components. Therefore, all systems are referred to by cooperating with components who participate in the system from one aspect. In contrast, we define the second syn-reference as the restricted self-reference from a system in which syn-reference is held. These are the conditions of being the social autopoietic units and their chain.

4 The systematizing of external units

In this section we consider the property (1) which we mentioned in the Introduction.

(1) The convenience store industry is small-scale retailing. Therefore they need frequent small lot replenishment of each item. However their stock range includes up to 2,400 items. When X-Co. started up, the relation of vendors and delivery businesses was divided vertically in Japanese society, and mass production and mass deliveries were conventional; they were in. In order for small lot replenishment to emerge, they had to
reorganize several vendors, dealers and delivery businesses to become competitive. Some companies responded to their demands. Therefore, the CEO has the Figure 3-3 triangle. Nevertheless, that reorganization was not simple, because they needed each truck to bring several commodities periodically. That was regarded as contrary to custom and impossible at that time.

After their start, X-Co. took up the joint delivery system for supplementary foods, such as instant noodles and confectionery and so on. Moreover, they expanded it to cosmetics, frozen foods and milk step by step. There was the result of improvements in information technology. X started to establish some joint enterprises, integrating small businesses. The expansion of X, the business relationship increased and business connections are themselves made systemic by the relationship with outside. Namely, a viable system can only couple with only other viable systems. In other words, X’s activities is the evidence that the viable system makes the systematizing of external units (1).

The reason that so many firms have established exclusive subsidiaries is that X sets two conditions: that is, that all the commodities should carry warranties; and that there be simultaneous responses to each store throughout Japan. Consequently, each store has decreased its stock as much as possible. The commodity headquarters does not need to develop new commodities, because they only need to check goods which are introduced from vendors. This strategy has resulted in X having many own-brands. At present, the own-brands represent more than half the stock carried. This is the source of advantage of X, and the evidence of (1).

(2) Behind this expansion lies the progress of POS. The information-system development division has had initiative as a System III *, but these upgrades are basically outsourced. In X, POS works like a nervous system, and influence outside firms which are systematized by X. Moreover this is concerned with (2) the sharing processes on the surface, because the system requires quick responses. From this point, we know that the system is subject to coupling with other systems, because if it has coupling with other unities, it cannot maintain efficiency, and sometimes it can lose its viability.

5 Commodity strategies

(1) Now we investigate the property (2). X-Co. recommends more than 100 new commodities every week out of all new commodities. Each System I, DM and ZM has to select them and their quantities, and to decide which commodities to suspend every day, because each store is restricted to its catchment area and the characteristics of their customers are different. Therefore each owner and OFC is always worried about the cost of disposal. Many kinds of foods are changed, often several times a day, having short shelf lives. They have to restrict the expense. Therefore all workers need to know the properties of each commodity. They use POS data and counselling with the OFC to get new knowledge. Each DM, OFC and ZM has different priorities. For instance, on 16th September 2002, the new recommended commodities were 139 items. Among them there were contained two confectioneries for moon-watching parties, one was famous but ready-made goods, another was X’s own-brand. Both were only available for one night. Each owner had to decide the amount of every commodity in each store. While they have to receive advance orders for Christmas cakes and Beaujolais nouveau, which both involve long term planning. Each DM and ZM has to consider the whole management of each
district and zone. Thus each OFC and owner always must make management decisions. We can point out two reasons why they need managerial awareness. One of them is that they have to earn a surplus, because each store has to pay a franchisee. Owing to the best sales, each owner is apt to choose FF and the Daily. But FF needs several rotations a day, because these items cannot be kept for a long time. Therefore he has to consider the loss. Each owner cannot pursue an immediate profit. Every owner is required to be aware. Another reason resulting from the previous one is to establish X as a viable system. This is because in one sense, each operational unit and each store has to be and is viable, therefore a viable system is constructed from many viable systems.

(2) As an expansion of the systematizing of external units, let us consider the following case. K-beer brewer, planned to develop a new brand, and they needed value added. They desired to trade with X, because the new brand needs an active chill control, especially during transportation, to keep the yeast alive. The key test was the degree of freshness. Therefore they needed X’s transport system, and also appreciated the business result of another brand in X the previous year. K-beer brewer’s idea was to develop and establish a new brand to compete against their rival company. The pilot sale was started in the east Tokyo Zone in July 2002 for 9 weeks. The plan was discussed in the OFC meeting, which reached certain conclusions. One of them was setting the service price at K-beer brewer’s expense, and other was sales methods. These cases have the same formation of the chain of social autopoietic units in the centre to confirm strategies and progress.

In Figure 5-1, triangle A is the same as in Figure 3-4. Every strategy starts from this formation. In Figure 5-2, the right side is constituted of System III. This expresses the flow of information. Triangle A means the decision at state ② after getting the trial beer ① in Figure 5-2. Triangle A is changed to B, that is ③, and in this situation the CEO still occupies the parental role. The COO et al. are in the subjective role. They can ask the metasystemic role which is the board meeting and so on. Next, the COO sits in the parental role position and tackle the pilot sale which is C. At C the trial policy was examined from ④ to ⑨. In the performance stage, System I plays the leading part; that is, the information flow starts from (1) and (2). (2) means the flow of POS data. After arrangements with the vendor (4) this strategy was adopted officially (5), and concrete procedures were decided in (6) and (8), and at the same time performed...
(7). However we have to say this trial sale was a failure, because the OFC meeting allowed every store to decide whether to participate or not, and then allowed them to secede on the way. The OFCs took advantage of this trial sale to reinvigorate each participating store. We guess that the OFC meeting did not want to impose an extra burden on the owners, because that was the season of the midyear present. We consider that the OFC meeting always uses these pilot sales to stimulate System I, because in that case they had set a low price up at the vendor’s expense. From above discussion, property 2 is clarified. Every strategy is taken following the same procedures for the instruction to each store. In addition, the reason for this firm being called ‘top-down’ is that it takes its starting point from A to B in Figure 5-1. This is the answer to Section 3 (4).

6 Small experiment:

In this section, we investigate property 3 of autopoietic viable systems. We carried out an experiment in the area of sales of everyday dishes. This trial made all part-time workers think about the characteristics of each commodity, and those of their area. Moreover we wanted to derive their positiveness as a side effect. This made us notice the importance of the social autopoietic units, their chains and their influence on the system. Namely, the autonomy is sustained and derived by the social autopoietic units from each other. We can say this is the ultimate source of viability. This experiment lasted for 6 months from May 2002, after the OFC took charge of this area in April. Before he arrived, all stores chose some goods from the new recommended commodities without thinking, and depended on X-Co., but ignored POS data.

(1) Background: This area is constituted of X’ s stores whose basic features are below (In this section all numbers have been changed on grounds of confidentiality). The OFC was watching to see whether No.7 would improve, because that would decide the owner whether to renew the franchise or not. This contract had lasted almost 15 years. Moreover, in No.7 the owner and the part-time workers both used the common educational tool which X says is for part-time workers. However, the owner of No.7 could not have the part-time worker meeting regularly, because he and the other owners in same area could not catch up with new commodities at X’

<table>
<thead>
<tr>
<th>Table 6-1: The outline of each store at Apr. in 2002 (Manager means a person hired by that store’s owner.)</th>
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<tbody>
<tr>
<td>No.</td>
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<td>Type</td>
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<td>Licences</td>
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<td>Central figure</td>
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<td>Ave. sales of Apr.</td>
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<td>Ratio compared to year before</td>
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<td>Person in charge of Daily</td>
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<td>Charge of non-Daily</td>
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<td>Education</td>
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<td>Common tool</td>
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<td>Part-meeting</td>
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(Symbols representing attitude to part-meeting: ×-negative; Δ-passive; ○-positive.)
s speed. Therefore, their communication was not complete, especially between and within the responsibility of charges, but it was at least better than others as shown in Table 6-1. Only Nos.1, 4 and 5 bettered their previous year’s sales record. However in each store, the owner was passive about holding the part-time worker meeting. The reason they could earn enough was that the unfolding plan of the store and the quality of commodities were superior which did not need any meeting.

(2) Perspective: The reason that the OFC focused on No.7 was below. The location of No.7 is in inside a residential area, but there are four bachelor apartments. Therefore No.7 ran short of several commodities during a night. Nevertheless owner did not know how to manage. Therefore, the sales of No.7 were below those in the previous year.

Initially, the OFC investigated the coefficient of utilization. This is a simple figure where the number of purchases is divided by the number of customers, for each category of food. According to that, No.7 was in the middle position of this area in the fields of rice balls, sandwiches, original confectionery, everyday dishes and chow mein. However in the noodle and picnics fields, No.7 was in first place. Moreover, in other fields of the FF and Daily categories, No.7 hovered around the bottom. Inversely, Nos.1, 3 and 5 occupied the upper position in each item and No.5 had the original manual for part-time workers. The OFC concluded that there was a possibility that No.7’s results were due to its location, especially the many bachelors. Therefore we started on a rich assortment of everyday dishes, of the sort that it was possible to sell to make a pair of picnics.

The OFC made the categorized metrics of prices and sorts for the new recommended commodities in everyday dishes for No.7’s owner and part-time workers, because they could not pay any attention to everyday dishes and they did not know the property of each dish.

After that, the owner and all part-time workers could choose commodities appropriately and think about the characteristics of their area, which was a more important effect. What we should notice is that at that time everyday dishes had a vague position in the commodity strategy of X-Co. Therefore the OFC thought that, if the trial were successful, it would become a whole-company-strategy.

(3) Initial subjective role: However not all components of No.7 could understand how to improve their initial sales and our intentions, and nobody received the proposal of the OFC favourably, except two. They were leaders of the night shift. In addition, initially they were just in the subjective role, that is, they only responded to the proposal of OFC. At that time, the owner had already made up his mind to cancel the contract with X-Co. However, the young leaders of the night shift came up with some original ideas and persuaded their owner.

Their original ideas were ① keeping a rich assortment of commodities suited to the customers, especially the younger generation; ② selling the new recommended commodities; ③ responding to the sensitivity to air temperature; ④ service. Concretely, they proposed the following. Their first suggestion, with using the categorized metrics and the characteristics of the area was to anticipate customer demand. They did not neglect the service in order to anticipate. Moreover, they decided to avoid choosing similar commodities, but not to narrow the range. Their concrete suggestion for idea ② was to display new commodities on the eye-line position on the shelves for sales promotion.
For (3), they decided to order more detailed weather forecasting. They assumed the final order had to be the most important, because the sales of No.7 were concentrated at night. From (4), they took good care to talk with customers about goods and recommend new ones and side dishes. In addition, they encouraged the owner and other shift leaders, and educated to another part-time shift workers. The owner had to change his mind, thus taking the subjective role, and the young night shift leaders took up the parental role.

(4) Development: The tables below show part of this small experiment. We cannot show all figures for all commodities, but the OFC offered all to his operational unit. According to the tables above, No.7 has been improving gradually, and other stores improved. At June, No.7 occupied the first place in almost every field except rice balls, sandwiches and confectionery. The second place was occupied by No.5, because its owner’s awareness was extremely high and he was the first to imitate No.7. As we have already said, one of the properties of an autopoietic viable system is the sharing processes. Moreover, each store increased trading items of everyday dishes more than before, and earned better on each item. Finally, each store exceeded the previous fiscal year’s figures for similar commodities. In addition, every component referred to POS. During this period No.7 referred to POS 426 times a week on average, No.5 661 times, No.3 433 times and No.1 368 times. Each store had three times more opportunities than before, and the tendency of each to do so was in proportion to its business record. In addition, many workers ordered and proposed improving commodities to the OFC and DM to match with the characteristics preferred by customers in their own areas, especially in term of size, taste, price and any special offers. We think that this situation reflects their positive attitude. Each time, DM had the negotiation with the commodity headquarters.

After six months, the business record of this area was notable, and our experiment had finished, but the OFC continued to examine the figures for three more months, and he reported to the OFC meeting. The OFC investigated the coefficient of utilization every month, but behind the background he noticed many things and we found there were many creations of social autopoietic units and their chains. They support each store and their domain viable.

(5) The social autopoietic unit: For the purpose of this experiment, their relation was transferred as shown below, because they needed to be reborn as entities adaptable to each other and confirm their activities, in spite of the fact that the subject was tiny and tentative.

Figure 6-1-1 shows the initial situation, where the two night shift leaders were in the subjective role. In 6-1-2, they occupied the parental role and encouraged the owner. Then in 6-1-3, the owner informed the other part-time leaders of the night shift leaders’ ideas and told them to implement them. In 6-1-4, their plan was shared by all part workers. After that, the OFC learned how to improve from this case study. This is shown in triangle 5. Figure 6-2 should be described on Figure 6-1, especially 6, which has to be on triangle 2. That is, triangle 6 means that the OFC taught this case to other owners. In addition, triangle 7 means the coping with improvement in other stores, that is, it is same as triangle 3, and on the left side of triangle 7 there are triangle 4 for each store. If new workers participate, they will be involved in triangle 4. Triangle 8 means that the OFC was encouraged to report this movement to the OFC meeting.
by the DM and ZM. After the same experiment was tried in each part of Japan, X-Co. decided this trial should become official strategy. This process is shared now by all stores. X-Co. started to offer many more kinds of everyday dishes than before, and offered both these and their continuing items in small and large sizes. The various commodities are delivered to each domain in proportions that reflect the characteristics of the area.

In the mean time, this chain of units could connect to the centre triangle of X-Co. Namely, it grew to triangle C in Figure 5-1. After triangle A and the same process as in Figure 5-2, this experiment was justified. It is easily guessed that many of units and their chains yielded and vanished around the main chain from this area to the centre of X-Co. drawing outside vendors.

From the above experiment, we can conclude that the social autopoietic units and their chains produce the system, repeatedly improving the abilities of participants. Their work is different from the motivation, because it is omnipresent, positive and it can take the variations with time, and self-producing. Therefore, we can define and use the social autopoietic unit.

7 Conclusions

(1) From the above discussion, we can conclude a viable system has three properties which are

1. the systematizing of external organizations,
2. the sharing processes and
3. the social autopoietic units and their chain produce viable systems. We think these are essential for viable systems. It can be pointed out that if a system has more than two recursions - or if there is at least one way in which we can think so - if it is to be viable, the system has to have the recursion of viable systems below. That is clear from the last part of section 5 (1). In the particular example presented, each store can be seen as being entirely independent from X. This is impossible because they are offered every business resource by X-Co. Inversely, a viable system has to emerge as viable above recursion. The logics of this is the same as property ①. Therefore, a viable system can connect with other viable systems, and try to systematize others. About property ②, this is clear that System Ⅲ can transfer a successful example to other operational elements from units making a chain as in Figure 6-1 and 6-2.

In X none of the components can run away from competition, because decisions between them are made by comparisons with their last records and seeing whether or not they exceed the averages of their domain and area. Therefore it is suggested that they need a counsellor, for example the OFC; and to cooperate with each other; that is, inevitably they make themselves a team, and they need the social autopoietic unit. In the same way, each viable system and its participants cannot run away from competition for progress, therefore we have to change and

Figure 6-1

Figure 6-2
improve ourselves.

(2) In the social autopoietic unit, all components need to be adaptable, to acquire know-how and progress. In the experiment described above it is clear that a social autopoietic unit (Figure 6-1-1) made a chain (Figure 6-1, 6-2), and that chain realized the strategy. The chain of social autopoietic units can connect the system from below, and make it transfer and share some strategies. Therefore property 3 is clarified.

We know that they are necessary components, because they participated in the chain of triangle positively. Moreover we know that the overlap points which were occupied by them offered the axis of the next development. We should judge people’s importance from the frequency that occupies overlap points. However, what we can do is to believe the possibility of people.

A capable owner of each store must think of himself as being in a management unit as in Figure 3-2. However, each owner has a supportive triangle as an impressive autopoietic unit, including the CEO. This was shown in Figure 3-5, but this time it has been described from the owner’s position. This has both internal and external correspondences with Figure 3-5, and from the lowest recursion level. Figure 7 shows each owner’s mental and actual triangle, that is, it expresses the syn-reference in X-Co., and this is the opposite of Figure 3-5. Namely, we can justify the conditions of being producing the social autopoietic unit and making its chain, which we mentioned in the last part of section 3.

Figure 7 expresses the systematizing of external organizations in the lowest level, because each owner uses the vendors as System II. Therefore, we can conclude that the social autopoietic unit is the prototype of VSM, and this supports the conclusion (1) presented above.

(3) I think this research could be a foundation for knowledge management. It is clear that knowledge is a core for viability. VSM expresses the conditions of viability for all unities. In addition, I think that the standpoint of this research is advantageous, because it is possible that Autopoietic VSM will give another explanation to ‘the knowledge spiral’ from the viewpoint of daily activities. We regard each unit as making tacit knowledge and each chain assimilates and sublimates these to its future nourishment. Usually, the front line of units in each operational unit connects with the outside environment. In this research autopoietic units can emerge in every realized subsystem. Thus, in the perspective of this research, knowledge management is a special case of Autopoietic VSM.

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