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# Nature of value and emergent synthesis

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**Abstract**

Ueda et al. (2008) proposed the value creation model based on emergent synthesis. He also argues that whole value of an artifactual system should be co-created through the interaction among various agents in a society. This paper discusses how we could understand whole value of societal systems could be emerged through the interaction among various stakeholders who pursue different aspect of values. Moreover the paper addresses the relationships between different aspects of values including price, function, or satisfaction with an example of service system in which includes customers, employees and business entities.

 *Keywords:* emergent synthesis,value,co-creation,service

## 1. Introduction

In recent years, artifactual systems underlying our society such as financial, information, security, labor or welfare systems become more complex and unstable in the world contrary to the progress in science and technology. Those systems sometimes bring unexpected results through dynamic interactions among various stakeholders and environment. Therefore we should rethink those systems as a complex system [1] again and explore how we can maintain those systems in a society.

The concept of "emergent synthesis", which is proposed by Ueda in late 1990's, is a scientific challenge to create feasible solution in complex systems [2]. Fig. 1 illustrates the concept of "emergence". Emergence is "the formulation of structural order representing new functions, characters, and actions through an interactive and dynamic process where global behavior is expressed by local interaction among elements and the global behavior restricts such elements' behavior." Ueda asserts that a notation of configuration from parts to a whole is actualized when we regard a process from a required function to an adaptive structure as not simply "design" but "synthesis" [3].

As shown in Fig.2, Ueda subsequently proposed the model of co-creative decision-making based on the emergent synthesis that creates an effective solution as a whole system through mutual interaction among various agents [4].

In the co-creative decision making model, it is important point to note that agents often cannot know other agents' purposes. Additionally environment is easy to change. Therefore the co-creative decision making under incomplete information is essential. Although those points are important, we should look at the mechanism of how feasible solutions could be emerged through the interaction among various agents with different purposes or valuations in order to attack actual social problems. In fact, in many existing social systems, we often face various trade-off among some different values or dilemmas for selecting possible options including different policies to solve existing problems. Therefore the authors believe that value of an artifactual system should be evaluated using multiple metrics from various viewpoints such as economic, functional, psychological, ethical, or social sustainability viewpoints. However, how can we manage different values simultaneously in a complex system? Moreover, how can we synthesize the value as a whole against values for individual stakeholders?
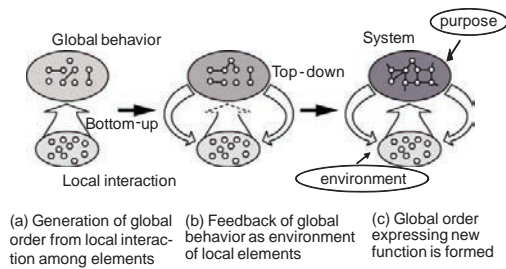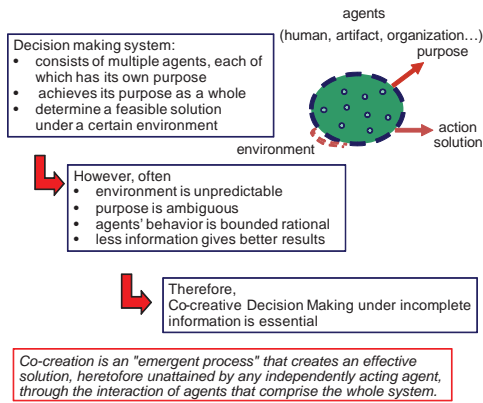
Fig.1. Concept of emergence [2].



Fig.2. Model of Co-creative Decision-making [4].

In this paper, it discusses how feasible solutions of societal systems could be emerged through the interaction among various stakeholders who pursue different aspects of value with an example of a service system which includes customers, employees and business entities.

## 2. Three aspects of value of artifacts in society

When we discuss the value of artifacts (products or services), we usually think of, at least, three different aspects of value: price, function, and satisfaction. For an example of value of products, a typical car comparison website usually provides consumers information on functionality of cars, actual selling prices in the market, and reputation of users /specialists. Based on such information, consumers compare many cars and choose one which will meet their ideals. However it is not easy for consumers to consider those three aspects in a comprehensive manner under limited information. In consequence, consumers often take a decision-making strategy to meet criteria for adequacy, rather than to achieve an optimal solution, as Simon named it "satisficing" [5].

Fig. 3 illustrates three aspects of value (price, function, and satisfaction) and those relationships. Traditionally, those aspects have been studied from different perspectives in some research areas such as economics, engineering or psychology.
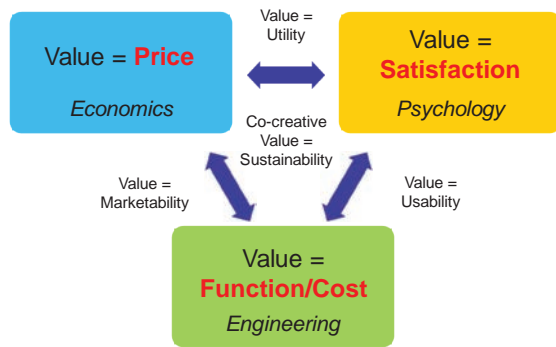


Fig.3. Three aspects of value

In economics, utility basically represents satisfaction experienced by the consumer in consuming a good. It is also defined as a measure of preferences over set of goods or services. Moreover, in economic surplus theories, consumer surplus is generally defined as a monetary gain obtained by consumers who have "willing to pay" price for a good which has its market price. On the other hand, producer surplus usually represents profit of producers who has "willing to sell" prices in a market. Considering those ideas, it could be said that the value of products/services are emerged as "price" in a society from the standpoint of economics.

On the other hand, engineering seemed to have more focused on "cost" rather "price". In Value Engineering [6], they have discussed how to improve the "value" of artifacts using an examination of function. In other words, the value is defined as the ratio of function to cost. On the other hand, Value Engineering has no direct concern with market price or customer satisfaction.

In Psychology, although value for human could not be observed directly, it has been discussed from emotional, cognitive or behavioral viewpoints. However, it is less discussed on the relationship between satisfaction and functionality of artifacts, except for the field of ergonomics.

As discussed above, science and technologies have studied different value of artifacts from various perspectives. However, authors believe that we need interdisciplinary approaches to maintain societal systems. From the emergent synthesis viewpoint, we should consider those aspects of value to clarify how whole value of an artifactual system could be emerged through the interaction of various agents in a society.

## 3. Service system and emergent synthesis

The importance of service industries are continuously increasing in many countries in the present century. With accelerating globalization and informatization of business activities, service systems become more complex and diversified. A typical service system represented by retail, restaurant or medical services includes many customers and employees. Therefore the sustainability of service systems is crucial not only for economics but also for maintaining quality of life of local people.

As illustrated as Fig.4, the service system is often represented as a triangle of customers, employees and