

# Japan Chapter Poster Session

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## History

System Dynamics history in Japan commenced in 1960s; several textbooks of Industrial Dynamics were published in those days. After that, many researchers used System Dynamics in their own field individually for about 30 years. Thereafter, System Dynamics researchers gathered and founded Japan Chapter of System Dynamics Society in 1990.

Since then, members were beginning to prepare the International System Dynamics Conference. We hold the 1995 conference hosted by Gakushuin University in Tokyo.

In 2006, Japan Chapter had over one hundred chapter members. As Research activities, Japan Chapter publishes an annual journal and holds regular research meetings and symposiums usually in Tokyo. The recent theme of the public symposium is "Sustainable Management for the Economic Crisis once in a century". This conference site was in Nagoya University, first conference outside Tokyo. We always welcome System Dynamics members or users who visit Japan. Several System Dynamics researchers have already had meetings hosted by Japan Chapter. Contact with our office is greatly appreciated.

## Bad News

### 1. Not expanding SD Education in Japanese universities.

It is difficult to open new SD classes. University curriculum in Japan is so classical that there are only a few simulation classes. Most of SD education in Japan depend on each professors who are interested in SD. They become older even their personal efforts continue.

### 2. SD application in business has leveled off recently.

Not only in education but also in business, using system dynamics in Japan remain stable. The reason is that we cannot escape vicious circle.

We must turn to the opposite.

Increasing good SD consultants → Verifying effectiveness of SD  
→ Increasing Demand for SD → Increasing good SD consultants

### 3. Declining international Activities

The attendants of last year's conference from Japan were only two.

The reasons:

There are a few here this year. There still remains language barrier. Business persons cannot afford to attend the international conferences. Professors do not have enough graduate students who are interested in SD. They are busy and no time to write a paper on SD.

## **Good News**

- 1. Increasing graduates students in some engineering field who are interested in SD and applying it to their studies.**
- 2. Contributions to SD Journal in Japan chapter are increasing. The quality of the journal papers are improving.**

## **What we try**

- 1. Campaign for attending 2010 conference in Korea.**
- 2. Emphasizing effectiveness of SD, especially for education in social sciences.**
- 3. Editing and publishing new SD text.**

### ***“Sustainable Management for the Economic Crisis once in a century”***

As Research activities, Japan Chapter publishes an annual journal and holds regular research meetings and symposiums usually in Tokyo. This year we hold an annual conference in Nagoya University on 23rd of May in 2009. The main theme was above. There were 12 presentations and 59 attendants.

#### **1. Process Modeling of Learning Behavior on e-Learning**

**Taichi Nishikawa, Toshihiro Noritake, Marie Nakano, Hidekazu Kurimoto**

E-learning is a flexible learning method that can be used regardless of the time and location. Therefore, e-Learning has become one of most important tools for worldwide business, education, and other social development. It is however said to be difficult to keep learners motivated throughout the course. To prevent learners from dropping out, “mentoring” is through to be an effective support strategy. It is still not known when, how, and what to mentor learners to increase efficiency, This paper reports the simulation results of process model based on the system dynamics to solve the above question,

#### **2. Prediction of CO2 emissions reduction from container ships at reduced speed**

**Satoshi Machida, Atsushi Moriyama, Kenji Ishida**

Japanese shipping companies are operating a large number of container ships. But they have indefinite factors to their service, for instance fuel oil prices and the changing cargo booking due to the economic boom or recession. Furthermore the emission of GHG from ships is coming serious social topic in these days. From IMO’s survey, estimated emission of CO2 form international shipping is amount 843 million tons in 2007. Reduced speed of the ship is a good way to improve this problem. Fuel oil consumptions and emissions of CO2 are increasing by the 3rd power ships velocity per hour. By reducing ship speed, emissions of CO2 will

decrease. In particular container ship is operating faster than the other type of ships. It is effective way. There would be a reason of decline amount of transportation and traffic jam at the entrance of the harbor or narrow strait. In this simulation we will reveal effects and issues of reducing speed ratios.

### **3. Bioenergy Production and Utilization for Transportation Energy in Energy in Rural Society**

**Mizuki Koyama, Ryoza Noguchi**

Bioenergy is now in the spotlight as a renewable energy for rural society, A scenario including diffusion of electric vehicle, biomass production by using abandoned cultivated land, population change, and improvement of fuel consumption for electric vehicle in Tochigi prefecture was used in this research. Biomass energy flow model with multiple kinds of business crop and energy was proposed, then the simulation based on energy flow model was able to clarify the possibility of bioenergy utilization for transportation energy in rural society by using system dynamics model.

### **4. Modeling and simulation of a Sewer System in Nagoya City**

**Masahiro Nagao, Ikuya Watarai, Mitsuru Sano, Hidekazu Kurimoto**

A sewer system model around Tenma bridge in Nagoya city (about 90 ha) that can estimate the amount of combined sewer overflow (CSO) is established by popular system dynamics software based on sewer ledger. The CSO's contain not only stormwater but also untreated human water and is discharged to nearby streams or rivers without treating a sewer system, therefore, they are a major water pollution concern in many cities. The simulation outcomes agreed to the measurement CSO data on July 3 and October 15, 2005 well. In order to reduce the amount of CSO, we evaluate the expansion effect of sewage pipes and the effect of the effect of the introduction of sewage retention tank at a wastewater treatment plant. Either measure has understood the CSO reduction effect is achieved.

### **5. The Simulation of effect on regional economy by cluster construction**

**Shintaro Nishimura, Kenji Iahida**

The ideal method of "the cluster" is examined as a model case in Kobe to break off a problem related to stagnation and economic activities of the economy of these days, and the suggestion of the technique and the solution is studied.

The construction of "Kobe maritime cluster" is examined for the purpose of tying various industry of Kobe to a maritime.

In the cluster policy, breaking a limit of the economy by the creation of an innovative business is expected.

For the creation of this innovative business, industrial harmony by the information collection is attempted in the Kobe maritime cluster.

In this study, various industry of Kobe is examined by using the system dynamics simulation of the plan that harmonizes by the information collection, and it aims to propose the method of operating the system of consolidating information on the Kobe maritime cluster by the system dynamics simulation.

### **6. A model for macro management in the economic crises**

**Hidenori Kobayashi**

In this address in front of audiences suffering from the economic crisis unprecedented

in history I like to propose a recommendation that the method of system dynamics modeling and simulation is a good remedy for it. I also show a SD model of Japanese macro economy for the sake of macro managerial decision makers who are common people in the society. The model and its use will be displayed for them in order to make them revise their mental models for themselves. That shall help them circumvent the crises in the future.

## **7. Is Japanese Manufacturing Style (so-called MONOZUKURI) really robust?**

**--A Causal Loop Diagram and Modeling Approach--**

**Shiro Fukushima**

Japanese Manufacturing Style (so-called MONOZUKURI) is said to be one of the specialties of Japan, and it has been conventionally argued in various academic areas. This paper tries to reconsider the structure which gives strength and weakness of Monozukuri. There are three layers of positive causal loops (strength): (1) professional spirits on Monozukuri at an individual level, (2) trust-based style of management as an in-house management-policy at an individual corporate level and (3) trust-based transactions on R&D and parts-supplier-network (Keiretsu) at an inter-corporate level. However, these strength loops are shown to be easily turned out to be weak ones, This paper identifies five exogenous variables that turn the strength to the weakness: those are (1) other countries' efforts, (2) technological standardizations, (3) momentary incentives, (4) a pressure from other management policy, and (5) a pressure from market-based transactions. The companies which adopted trust-based style of management have robustness in profit to the technological standardization.

## **8. The Modeling of AISAS Marketing Process**

**Fumito Kondo**

Traditional marketing known about it has AIDMA (Attention Interest Desire Memory Action) marketing process; however, it has changed to AISA (Attention Interest Search Action Share) marketing process because of popularization of the Internet. In the AISAS marketing model, active consumer's behavior directly impacted to business successes. This paper tried to recognize by System Dynamics Modeling, how sales force can make the most of AISAS process for business successes.

## **9. Verification of Hypotheses about Causes for Instability in Business Fields**

**Norihiro Matsumoto**

Business is the system of which dynamic behavior is foreseen with difficulty. This article is results of computer experiments performed in order to analyze instability of supply chain systems. Chapter 2 shows that a cause of oscillation is delay on a balancing feedback loop like as the goal seek model. Chapter 3 shows operating conditions for minimum cost of a stock management model as an element of supply chain, which were calculated by virtual management on a computer. Chapter 4 shows operating conditions for minimum cost and instability of the beer game model built as a simple supply chain, which were also calculated by virtual managements.

From the above experimental results, it was clarified that combinations of design variables derived from computer experiments for minimum cost of supply chains are too difficult to understand logically. Since almost managers cannot derive optimal condition logically for business complex system without computer optimal tools, the managers should start to calculate optimal conditions using virtual management systems, and then construct logically

future business scenarios based on the calculated optimal values.

## **10. The Design of Supply Chain and Strategic Planning**

### **Using System Dynamics Modeling**

**Shoji Koike**

System dynamics (SD) modeling is a methodology for studying the dynamics of real-world system. The supply chain dynamics and environment can be captured in a SD simulation model. This paper presents a methodology to predict behavioral changes in maintenance service supply chains due to endogenous and exogenous influences in the short and long term. The key feature of business is that the success or failure of supply chains is determined in the marketplace by the end customers. Initially, SD describes the causal relationship from the underlying structures of the system problem. A success and failure dynamic model of supply chains is developed using system dynamics simulation. Using this model, strategic planning is made at a very early decision making stage. Through a case study, strategic planning framework is developed analyzing the dynamic impact of different policies responsiveness of a supply chains.

## **11. Simulate the running cost of LNG ships on system dynamics**

**Haruki Mitsufuji, Shintaro Nishimura, Hidetoshi Arima, Kenji Ishida**

These days, crude oil price is keeping in high condition and it will be influenced to operate LNG vessel. The construction of the LNG vessel is rapidly advanced cause of LNG demand is increasing in worldwide. So we tried to simulate steam turbine (ST) and oil burning diesel with re-liquefaction (DRL: Dual Fuel Diesel) that is prospective of alternative population for ST including initial cost by powesim. We got result DRL has more advantage than ST.

## **12. Model Based IT Investment Mangement**

**Satoru Myojin, Dai Isobe**

It is difficult to evaluate IT investment because of complicated causal relations between investment and its outcome. In general, companies decide to invest IT according to simple rules such as '1-3% of sales revenues'. Recently interesting relations between Intangibles and IT investment were reported by Brynjolfsson and Hirano. We investigate effectiveness of System Dynamics to use for 'understanding IT investment alignment to strategic scenario'. Finally we propose System Dynamics adoption to IT Investment management process.