A Platform For Business Games - From Game Playing To Game Making: The Case Of Yokohama National University

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ABSTRACT

Business games should be designed such that teachers can freely create and modify them as required. This paper discusses the Yokohama Business Game (YBG), which is a platform for business game development created by Yokohama National University. It facilitates the application of business games not only to education but also to corporate management in the real world.

INTRODUCTION

The Faculty of Business Administration of Yokohama National University offers subjects on business game as regular courses in undergraduate and graduate schools (Shirai, 2008). In undergraduate school, students participate in a business game as players and experience the management of a company in a simulated industry through a computer program. As players, they acquire a deeper understanding of corporate management by gaining experiences in applying their knowledge of marketing, accounting and logistics.

In graduate school, each student is required to analyze the corporate system during the course of developing his/her own business game. Since business game development involves modeling of the target business, students can conduct a concrete analysis by distinguishing the main factors affecting the target business and define the relations between them in the modeling process. Owing to the evaluation and criticism received from others after playing the developed game with them, the developer can locate factors that were previously unnoticed. Furthermore, the developer can analyze the quality of operation of the business model by playing the developed game with multiple players and can compare the management results.

THE NECESSITY OF "DO IT YOURSELF" TO BUSINESS GAME

Business games are of two kinds: those that require a computer and those that do not. They can be further classified into the following three types:

1) Game played only by people
   This game is played by a person against other persons. Apart from the players, it also requires a referee or a facilitator to support the progress of the game.

2) Game played by a person who uses a computer to calculate and input decision making
   This type requires a computer to support the actions of the players and a referee, though it is the same as type 1. The computer calculates the market share of each player in a skeptical economic environment that is created virtually, and it provides the result of the calculation to the players.

3) Interactive game between a person and a computer
   This game is represented by the game software operated by a computer. Basically, a person plays the game, and the program installed in the computer acts as the competing player.

Owing to the development of the Internet, business games that use computers and networks are very prevalent today. In this paper, we discuss type 2 and assume that a class is conducted by using lecture and game playing simultaneously. In this situation, it is essential to use a business game that satisfies the class requirements given by the teacher; ready-made games may not be appropriate as teaching materials. In this sense, teachers are required to develop business games by themselves. However, it is not always easy for teachers who are unfamiliar with computer science to develop business games because it is necessary to conduct programming through a computer language. Thus, it is essential to use tools that enable such teachers to develop business games as teaching materials. Moreover, standard business games are also necessary as samples for implementation and development.

A PLATFORM FOR BUSINESS GAMES

In order to create a tool that satisfies the above requirements, we are developing the Yokohama Business Game (YBG) as a system for the development and operation of business games (Shirai and Tanabu, 2003) (Shirai, Tanabu, et al, 2003). The YBG facilitates easy packaging of business games created on the computer by teachers and students who do not have expertise in computer programming by providing descriptions in a special-purpose language for business games. Its functions include facilitation and calculation to support the operation of business games. Teachers develop business games and collect them in the server. Learners gain access to the server as players and input data of the management decision in the business game. The server notifies them of the business results. While a business game is being operated, it allows for questions and answers between the teacher and learners as well as consultations and negotiations among players.

MODELING APPROACH USABLE BY ALL

In the MBA program, students will develop their own business games. We selected the following three steps to model the business structure in a company and industry so that everyone can easily package a business game on the computer. YBG will support students and teachers in Step3.

1) Step 1: Concept model
   Factors in the business process notating ambiguous and unstructured expressions in natural language are clarified by using a diagram. Students will draw their models by Excel or PowerPoint. The best notation of models for business game is under consideration (Shirai, 2005).

2) Step 2: Logic model
   Concrete factors that compose business and the relations between them are defined as mathematical and logical formulas based on the concept model of Step 1. Students will make some numerical formulas.

3) Step 3: Implemented model
   Following the logic model of Step 2, students will make some source codes by text editor. Then YBG translates the source codes written in a special-purpose language into a computer language in order to package them on the computer.

Figure 1 displays a example of the concept model created by Step1. This model covers the procurement of parts in the parts market, manufacturing of finished products, and their sales in the product market. A part of the source codes is below.

```
#
ipage decision DecisionMaking
                              # ipage: input page
 <P>Enter the selling price</P>
 <P>Enter the production instruction(quantity)</P>
 <P>Enter the parts procurement(quantity)</P>
ivar Selling_Price    range 0 100000 20000
                              # ivar : input variables
ivar Production_Instruction    range 0 1000 100
ivar Parts_Procument    range 0 100000 5000
#
```
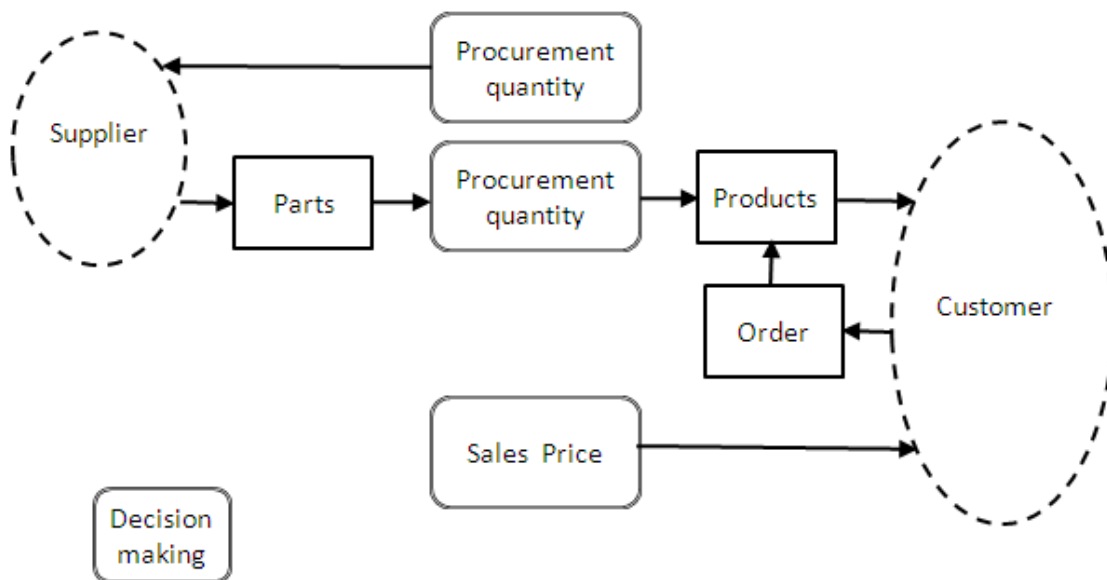

Figure1: Example of the concept model

Enter the selling price

Enter the production instruction(quantity)

Enter the parts procurement(quantity)

Selling_Price	20000
Production_Instruction	100
Parts_Procument	5000

次へ リセット

Figure 2: Computer screen after execution

The language follows simple grammatical rules. Japanese words can be used for the names of the variables. There is no other platform in which Japanese words are available. Figure 2 shows the input screen of the computer after these source codes are automatically translated and executed. After developing their own games, students will play their games each other. Then students will find some defection in their models through discussion and revise their models. In this process, students will learn the business structure in a company and industry profoundly.

APPLICATION OF E-LEARNING

Collaboration between the members of a team through communications is vital to enhance the educational effects of business games that are characterized by the interaction between human players who compete and cooperate. This enables a person to develop his/her thought pattern that considers and incorporates the opinions of others. A game should have a mechanism to facilitate conversations and exchanges of wisdom between members, and all players should simultaneously assemble at a common location. Thus, the maximum number of players was 50, owing to the spatial constraints of the classroom and the limited number of equipment such as computers.

It is the application of IT-driven e-learning that breaks these limits. Because of the development of networks, business games that once required players to assemble in a common area can be conducted, irrespective of their location. In addition, conducting games at different time frames allows learners from various locations to undergo on-site training. The general pattern currently used for research, development, and execution is the single user type for self-study. That is, it is designed to enable learners to study at home at any time. The function that enables the learner to study at home as per his/her schedule is effective for self-study of the business game.

This alone, however, is not adequate for business games that are designed to enable a player to experience competition and cooperation with others. A business game involving multiple players requires the "multiuser type e-learning system" which enables a communication function between the teacher and the students as well as between learners, the automatic progress control of gaming and the self-control study of each learner. This function can considerably improve the efficacy of a business game. This function can considerably improve the efficacy of a business game. Fig. 3 illustrates the execution of a business game through e-learning.

The "remote education type" enables simultaneous execution in different locations. Thus, the teacher and students can play a business game, regardless of their locations. As a result, the teacher is no longer required to visit the actual classroom where the students may be located. This facilitates the participation of people situated in remote areas. Such games also involve supporting systems such as an electronic bulletin board, real-time chat, e-mail and video conference system. In fact, we executed a remote education business game between two universities using the YBG system, and found it to be operable without any problems(Shirai, Hishiyama, 2007).

Next, we define the "e-learning type" as the execution of a game with a relaxed time limit between the teacher and the students staying apart. The game progresses by one round per unit of time (for example, a day), and the students input their decisions by the deadline. This enables multiple students residing in various locations to play the business game. The e-learning type basically has the same supporting systems as those offered by the remote-education type business game, such as an electronic bulletin board, real-time chat and e-mail. We executed three business games of this type between four universities for two months and did not encounter any problems.

The trial runs that were conducted for this paper confirmed the feasibility of multiuser e-learning through the YBG system. Future tasks include the comparison between the efficacy of e-learning and face-to-face education, and
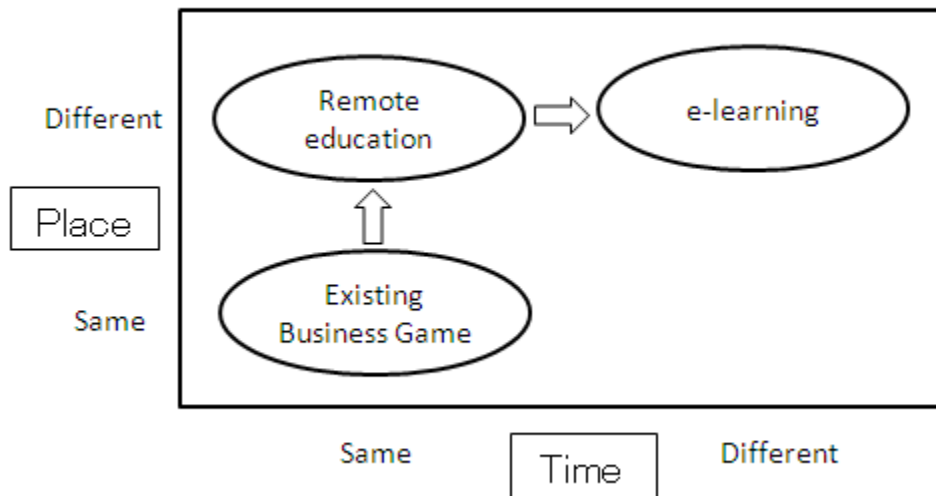
Figure 3: Execution of a business game by e-learning

the improvement of the business game education system as blended learning that integrates e-learning and face-to-face education.

GAME PLAYED BY MULTIPLE PLAYERS WITH DIFFERENT ROLES

The traditional model structure of a business game mostly has players sharing the same role. For example, in a business game modeled on the manufacturing industry, all players are manufacturers who share size-related and decision-making factors. As shown in Fig. 4, all players are retailers in the retailing industry. Given the fact that business games are designed to provide students with on-site training on good management and the improvement of management efficiency, these games basically share the same structure.

However, the field of supply chain management (SCM) that has recently attracted attention requires a different model structure wherein players have different roles. That is, the supply chain that covers the point where a product is supplied to customers can be outlined as follows: the producers of raw materials are located in the uppermost part of the stream; manufacturers are in the middle part; wholesalers, in the lower part; retailers, in the lowest part; and customers are located at the end. In the business game based on this model structure, each player is in competition or cooperation with other players.

The existing special-purpose language for the YBG was formed to facilitate the development of business games for competition between players sharing the same role. Since the necessity to develop business games modeled on subjects such as SCM is expected to grow, there is a strong need for enhancing the expandability of the language such

that it satisfies the requirements and strengthens the function of creating model structures. Then, we created a business game involving multiple players with different roles on trial using the existing YBG language to explore additional required factors(Shirai, 2009). As shown in Fig. 5, we established an industry with a small supply chain comprising two manufacturers that produce a product, and three retailers that purchase it from them and sell it to consumers.

Twelve students in five groups played the trial business game. Initially, negotiations were conducted between manufacturers 1 and 2, and retailers 1, 2 and 3 on the selling price and the quantity of products. The results were inputted to a computer on the decision-making screen, and the computer performed the operations. The sales and profits of each round were displayed, and the next round began subsequently. While the game progressed without any major problems, the following issues were detected:

1) Increase in the execution time owing to negotiations between teams
   YBG's business games have never involved negotiations between teams. In the trial, we allowed students to conduct negotiations using the e-mail function, and many of them regarded the game as interesting because it conveyed a sense of reality. This is an aspect that should be considered in today's growing population that is interested in e-learning. However, we cannot dispel the perception that communication through e-mail is slower than face-to-face communication. The teams were allowed to conduct negotiations freely in the first round of the trial, and it took them 30 minutes to reach an agreement. Allowing for negotiations between teams in a business game is effective at enhancing the sense of reality.
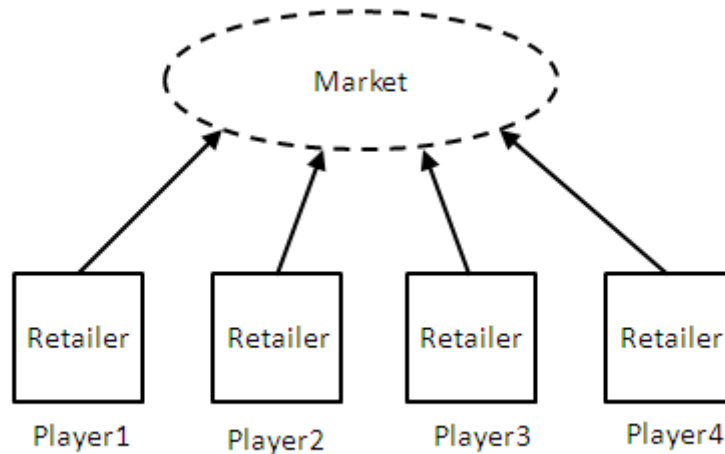
Figure 4: Structure of a business game for players sharing the same role
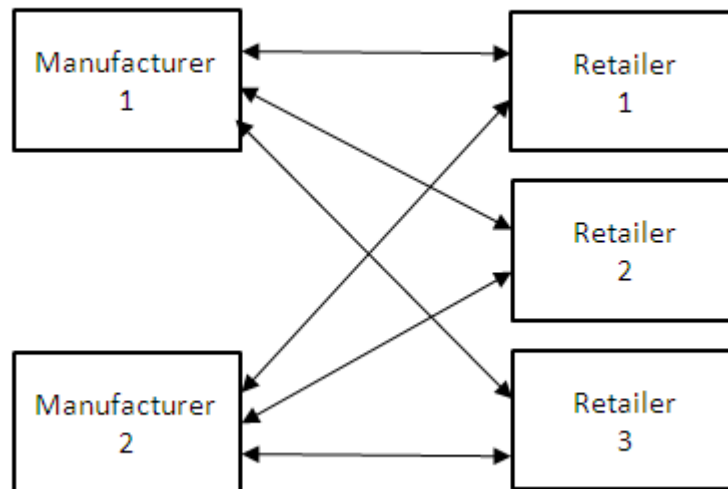

Figure 5: Business game structure of a small supply chain

However, there is room for further consideration on how to conduct negotiations.

2) Strengthening the checking function of input data
Teams on both the manufacturer and retailer sides input price and quantity in the decision-making screen on the computer after reaching an agreement using the mailing function. However, a different value from that decided during negotiations may be entered by mistake. That is, the selling price proposed by the manufacturer may not agree with the buying price of the retailer. In this case, the checking function of input data is essential for reentry to execute response. In the existing YBG language, the checking function between multiple variables needs to be expanded because it only checks the upper and lower limits of an

independent variable. We decided to add the expanded checking function to the YBG language.

As described above, we successfully confirmed that the YBG realized the model structure of a business game played by multiple players with different roles. This led us to believe that the YBG will have a wider range of applications, including SCM.

POSSIBILITY OF APPLICATION TO BUSINESS ANALYSIS

In corporate management, it is necessary to avoid the risk of failure by performing simulations in advance. Further, it is important to consider the human factors involved in business apart from computer simulation. A

business game can be applied at this point. Although business games are mainly designed to impart training related to decision making in corporate management, they can be characterized by the ability to enable players to learn corporate management through experience in settling conflicts and fighting competition from other teams. However, the problem with traditional business games is that their business models focus only on a specific industry and market.

While players can gain management know-how by playing games, they cannot directly adapt it to their specific companies because of the differences in business models. If a game can be developed using the business model of a player, it can validate the business model of his/her company. If the players are asked to compete in the same business model, some players may make profits, but some may incur losses. By analyzing the behavior of each player, it is possible to detect the differences that arise in the business results, the operation that creates the highest throughput, or the operation that results in failure. That is, the characteristics, strengths, and weaknesses of a business model can be evaluated.

It is also useful to locate the points of improvement in the process to develop a business model into a business game because players can discuss and analyze the current process. From this perspective, the research and implementation of "business game as a new approach of experimental management" is desired in areas such as analysis and improvement of various problems in corporate management and development of new business models(Iwai,2009)(Tanaka, Tanabu and Shirai,2009).

By developing a business game, we realized that teachers are extremely concerned about using a business game without any advanced knowledge about it. In fact, various factors of anxiety exist, for example, whether the game operates as originally expected, whether it exhibits the expected behaviors, and whether the parameters are perfectly correct. The agent-based approach can be useful to verify the operation of the model (Tanabu,2008). The agent-based approach was not originally intended for this purpose, but it is useful to reduce the burden of operational and validation inspection of the modeling in the initial stage. In the stage wherein a model is built to a certain degree, designing a learning agent with some relevance and examining the model from various angles provide a deeper insight into the operation of the model. Nonetheless, in order to build a model following the agent-based approach, the simultaneous use of the test using human agents is advisable. This is because the YBG packages a function that allows for agent-based modeling.

OPENING TO THE GENERAL PUBLIC

Although business game is widely used as an educational approach, business game has a considerable scope for improvement. Presently, 70 universities use the YBG for their classes of business game. We are planning to facilitate more effective utilization of the business game by sharing the games of each university. Furthermore, we will offer the YBG as a platform of business games to on-campus education such as Master of Business Administration (MBA) and Management of Technology (MOT) programs, in addition to that offered at the Faculty of Business Administration of Yokohama National University, and to off-campus organizations, including other universities, private companies, government agencies, and municipalities. (http://ybg.ac.jp)

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