Learning Decision Making through Management Games

Timo Leino

Turku School of Economics and Business Administration
P.O. Box 110, 20510 Turku, Finland

This paper deals with the use and development of management games. A management game is a session where the groups of players form fictive companies to operate at fictive markets. The market operations are carried out by using a special computer software. The objective is to enhance the players' decision making skills and the insight of the industry. Management games are used mainly in teaching purposes, but they may also be appropriate planning tools when used as simulation or what-if models.

In a management game a number of competitive (long-time) strategies may be pursued alongside with various tactical and operative short-time decisions regarding for instance personnel, equipment investments, financial operations or marketing campaigns. Therefore, the development team of a management game software must integrate the theoretical knowledge of market economies with the practical know-how of the chosen market environment. The development process is somewhat similar to those of expert systems, combining the knowledge of human experts and text books with system engineering skills.

A successful game session is a harmonised combination of motivated players, a suitable and carefully planned setting, an experienced game instructor and, finally, advanced software. The Shipping Game® is a state-of-the-art computer-aided management game for the shipping industry. It incorporates the latest advances in software development for personal computers with theoretical knowledge in maritime economics and practical know-how in shipping into a thrilling dynamic liner shipping environment.

The goal in designing and conducting a game session must be clear. There are several alternatives one may regard as important objectives, such as pedagogic objectives, increased team work abilities and increased knowledge. The Shipping Game® may be used as a vehicle in teaching decision-making in different competitive settings, liner shipping operations management and the use of economical indicators supporting decision making.

Management gameS

A management game is a session where the groups of players form fictive companies to operate at fictive markets. The market operations are carried out by using a

special computer software. The objective is to enhance the players' decision making skills and the insight of the industry. Management games are used mainly in teaching purposes, but they may also be appropriate planning tools when used as simulation or what-if models.

There is a wide spectrum of management games according to the objectives that are set to the game. Figure 1 illustrates the typology. First, there are general purpose games simulating the whole operative environment of a firm and functional games focusing on a special type of decisions, e.g. marketing or finance. Second, some real life industry may be used as the market environment, or the markets are defined in more general terms. The third dimension concerns the competitive situation: the firms are playing against each other or against anonymous competitors, i.e. the computer. In the former case the decisions are compared to those of the competitors while in the latter case they are compared to predefined optimal decisions.

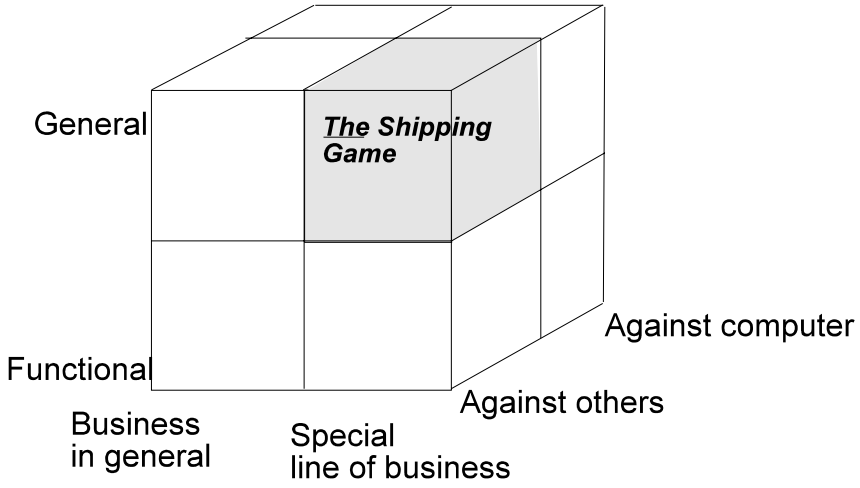

Figure 1. The typology of management games.

An elegant example: The Shipping Game®

The Shipping Game® is a state-of-the-art computer-aided management game for the shipping industry. It incorporates the latest advances in software development for personal computers with theoretical knowledge in maritime economics and practical know-how in shipping into a thrilling dynamic liner shipping environment.

The purpose of The Shipping Game®is to enhance the management skills of the players in operating a liner shipping company in a close-to-real market environment. In the dynamic markets a number of competitive strategies may be pursued

alongside with various tactical and operative decisions regarding, among other things, fleet employment, route planning and personnel management.

In a typical game situation you need one PC for the Game instructor and one PC for every team participating the game. You can run software in any personal computer using Windows 3.1 preferably with a 486+ processor and 8 MB of RAM. The Shipping Game® is designed to be used in stand-alone workstations without benefiting from LAN systems, and, on the other hand, avoiding the possible problems caused by exotic network configurations. Therefore, all data transfer in The Shipping Game® is meant to be managed by using diskettes. To run the software you need Microsoft Excel 4.0 and the Run-only version of Level 5 Object 2.5, the latter only in instructor's PC and the former both in instructor's and players' PC's.

Building Management games

Naturally, the structure and functions of a management game software depend on the aimed use of the game. However, some core functions are needed in every game. These include (see Figure 2):

- A program with which the players plan and enter their decisions. It must be user-friendly and assist the players in routine tasks (calculations) but may not give straight guidelines to decisions. Decision making is the task that the players should learn and therefore it must be left totally to them. In The Shipping Game® this program is designed in Excel 4, which is a tool with features needed to create a modern, Windows-based application that is easy to use and nice to watch.
- A program with which the players may browse the market data and the reports of their own activities, such as statement of income, balance sheet and sales reports. This may be apart from the decision making module or one function of that module. Use of graphics is preferable to show trends, variation or comparisons. Using graphs is one thing the players may learn through a management game. In The Shipping Game® this program is also designed in Excel 4; spreadsheet is with no doubt the best tool in producing reports.
- The "game" itself, that is, a program that simulates the markets. This is the soul of a game software. In a competitive setting (a game against others) the game instructor operates and adjusts this program. Therefore, the requirements for user-friendliness are not so high, more important attributes are efficiency, robustness and reliability. In The Shipping Game® this program is designed by

using Level 5 Object v2.5, which is a Windows-based, object-oriented expert systems generator. It showed not to be a very efficient tool in this project, because of low efficiency and some problems in combining rules, procedural code and external batch files. If we could start again from scratch, we would probably choose Visual Basic instead.

- Programs to transfer the data between teams and the game module. These programs are important because the actions in data transfer are the most error-proning. On the other hand, the task is only to move or copy files, which makes the programs quite easy to construct. In The Shipping Game® the data transfer is taken care of by simple batch files, which are very easily and quickly modified in the case of some unusual technical configurations in a new game environment.

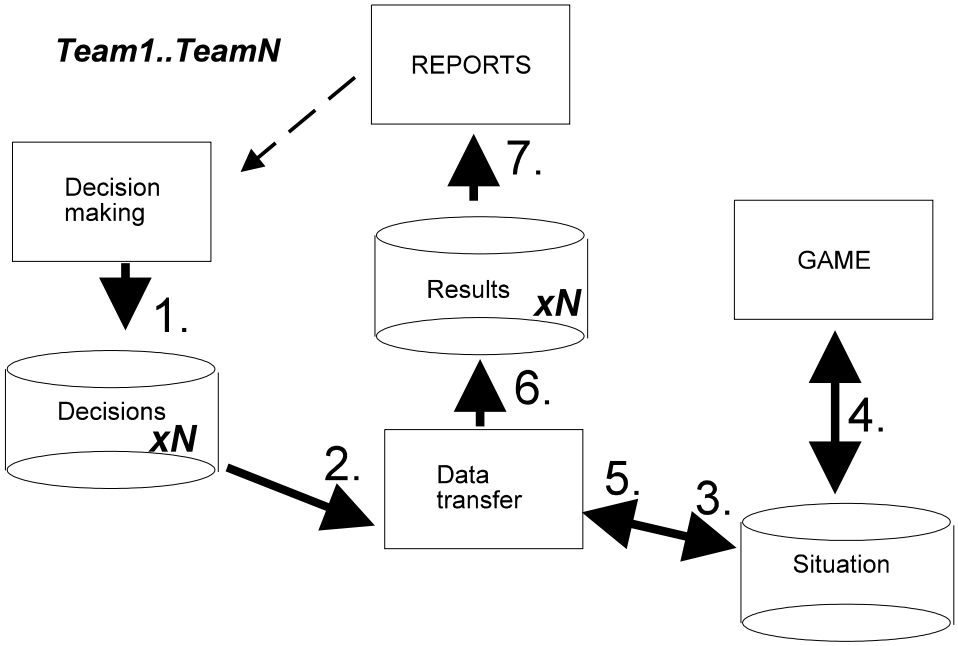

Figure 2. A general structure of a management game software.

There are lot of alternatives in modelling the markets, but the following questions have to be answered:

- How the demand is created? The most simple way is to predefine it as a line of numbers indicating the demand in each period and

market area. In more advanced solutions the demand is reactive, depending on the actions at the markets. In The Shipping Game® the demand is defined for each period and route using an algorithm that uses as input the changes in service level and price level of the actors at the markets, the competitive situation (monopoly / oligopoly / competition) and the type of the customers (big / small).

- How the competitors are evaluated? The offers of the competitors must be evaluated by using several criteria, resulting in one or several image indicators for each supplier, indicating the motivation of the customers to buy from that particular supplier. The choice, number and weights of the criteria is a complex problem and solving it requires expertise. Text books give general guidelines, but if the game is tailored for a special line of business the general knowledge is not enough. In The Shipping Game® the firms are offering sea transport services. The criteria are the price (freight), the service level (quality) and the transport ability. These are calculated through a quite complex process.
- How the concrete sales volumes are defined? There are two main solutions. One possibility is to rank the suppliers according to their image indicators and share the demand according to some predefined rule, for instance 70% to the best one (if they can deliver that much), 20 % to the second, etc. This solution is probably the best one if the game simulates business-to-business markets where the number of customers is very low. Another possibility is to calculate the market shares directly from the image indicators. This fits better to a situation where the number of customers is larger and the transactions are not based on long-term partnerships. In any case, the inflexibility of markets has to be taken into account to avoid too dramatic changes in competitive positions.

A Management game session

A successful game session is a harmonised combination of motivated players, a suitable and carefully planned setting, an experienced instructor and, finally, advanced software like The Shipping Game®.

From the game instructor's viewpoint a game session has four phases as follows:

1. Preliminary operations. Before the game the instructor has to plan the game setting, adjust the parameters of the software, and prepare the teaching environment, e.g. install the software.

2. Introduction. The game starts with a short lesson, where the instructor leads the players into the game environment and decisions of the game objectives are made.
3. Playing the game. The game itself takes usually several hours and may be conducted in a number of ways, depending on the objectives. In most games the time is managed by using periods, the length of which is for instance one year or one month. The teams make the operative decisions always for one time period, preferably basing them on some long term plan.
4. Summary. A discussion at the end is important, the game should be analysed and the key points summarised from the learning perspective.

In the following, some guidelines for planning and conducting a game session are given.

- The time available for the game. Generally, with first-time players, ten hours of effective playtime or more is needed. Hence, a two-day session is recommended.
- Skills of the players. Prior knowledge in business decision making may reduce the time needed. Alternatively, it may give more possibilities to vary the game setting. The skills must be analysed in advance.
- The set-up situation at the beginning. Various starting points may be used according to the level of the players and the objectives of the game. The more experienced players, the more complex set-up may be chosen.
- Equipment at hand. It's very critical to check in advance the technical details, i.e. smooth functioning of all the modules of the management game software with the computers and printers reserved for the game session.

A careful planning of the game is necessary. Usually the software allows several alternatives to start and lead the game. As an example, in The Shipping Game® there are 7 market areas (e.g. Germany Baltic Ports) available between which the vessels may be routed. Thus, if all 7 areas are available, there are 7 x 6 = 42 different routes (markets) the firms may choose. In the beginning of a game that is too much, the players are not able to manage so many markets effectively. Usually we begin with only 2 areas, which gives only 2 routes, and then increase the number of markets when the game proceeds.

The key issue in achieving the game goals is an analysis of the players' skills and a suitable game setting based on that analysis. The prior skills and knowledge of the players must match the game's level of difficulty. Too many features or too many details may be confusing and limit the learning of essential matters. On the other hand, too simple setting may hamper the game being challenging or close-to-real and lower the motivation.

The effects to decision making skills

Designing and conducting a game depends on what you want to achieve through the game. Clear objectives are necessary to plan the game setting in a sound way. Instructor's behaviour and actions during the game must also follow from these objectives. There are several alternatives one may regard as important objectives, such as pedagogic objectives, increased team work abilities and increased knowledge. The Shipping Game® may be used as a vehicle in teaching

- liner shipping operations management,
- decision-making in different competitive settings,
- use of information to support decision-making, and
- business knowledge, e.g. general accounting principles.

Depending on the objectives the game instructor should during the session take up various topics to be analysed and discussed. The session surely goes to a wrong direction without strong leading: it becomes nothing but a game without any learning effects. The players must be guided in using the information available, otherwise they will make bad decisions which result in losses. So, the game instructor plays a very important role.

In a management game there usually are lot of data available - as in real business. The essential thing to learn is how to analyse the mass of numbers and find the critical ones. Also, the most needed figures are not ready but must be produced by the players themselves. In good case, through a management game the players really learn how to use the numbers to make better decisions. Very often the "trial and error method" is used, the firms face problems and their task is to solve them and make the firm succeed. In a competitive situation (a game against others) every group does not succeed, but that belongs to the game.