

## BUSINESS SIMULATION GAME AS A TOOL OF PRACTICE-ORIENTED EDUCATION

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*The use of simulation methods for training personnel in different industries is not new. For many years for example, the aircraft and military industries have been using increasing levels of sophisticated simulation technologies to train pilots and operators. Simulations are now also being used to help the academic students. Computer simulations help individual students to practice the business decision making without making huge losses in a real company. In the Financial Department of Miskolc University we have been using business simulation program for BSC students since 2009. The game focuses the duties of a financial manager, but the students can also test their statistical, marketing and strategy-making skills. The game consists of 5 turns; the players' major goal to achieve the highest cumulated profit by the end. During the game they should make their investment decision, order materials, program the manufacturing, employ workers, and salesmen, develop products and markets. They face limited access to loan, capacity and various lifecycles of products. After each turn there is a feedback, which is prepared a group of students from various topics. So this develops their presentation skills. Preparing for presentations, they can load the actual ledges accounts, income statement and balance sheet. If they become familiar with the game rules, they should create business plan for a future turn and they should evaluate their results compared with their budget. The subject of the business simulation is at the last semester of the Accounting-Finance branch, so this is a good test before the students enter the labour market.*

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The use of simulation methods for training personnel in different industries is not new. For many years for example, the aircraft and military industries have been using increasing levels of sophisticated simulation technologies to train pilots and operators. In the airline industry many of the flight simulators are so realistic that pilots can no qualify to fly a particular aircraft type without having actually flown the aircraft in the air. This generally only applies when pilots are being upgraded to fly a newer version of the same aircraft they have flown in the past.

In industry, sophisticated simulators are used to train operators where a mistake on a complicated process could have very expensive or disastrous consequences. This is particularly true of the nuclear industry. Providing

managers and operators with simulated but realistic environment before they have to make their decisions on expensive and potentially dangerous technical processes has proven to be a very effective training approach.

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In the Financial Department of Miskolc University we have been using business simulation program for BSC students since 2009. The game focuses the duties of a financial manager, but the students can also test their statistical, marketing and strategy-making skills.

This paper classifies our particular game among the various kinds of alternatives, and argues in favour of the chosen options. Then it introduces the main features and rules of the game and the evaluation of training. Finally it summarises the key concept of business simulation and demonstrates how effective the business simulation is in the Accounting-Finance training.

### Classification of Business Simulation Games

*Business simulation games* are games that focus on the management of *economic* processes, usually in the form of a *business* (Lean, Moizer & Towler, 2006:230). There are a wide range of business simulation games that we can classify in different categories.

If you consider or not the environmental changing, there are two kinds of business simulation. *The management simulations* focus the strategy building, implementation in a static environment, while *construction simulation* has got additionally a development phase. In a construction simulation the economic environment and the internal conditions (capacity, work force, client-supplier relationship) can vary over time. The rules of management simulation are more simply, the learning aims can be achieved in shorter way. However the advantage of construction simulation is that it is closer to the reality, and if the learning points focus the management of business in various phase of economic cycles, then you should use construction simulation.

In my case the target audience is the BSC students, who will be operational managers, whose major duty is to run a predetermined business. So their operational environment will be closer to the management simulation game, that's why I decided to make such simulation.

The second aspect is that the rules of the games are *deterministic*, or *stochastic*. In a deterministic environment the rules are static, and the algorithm of decision consequences is unambiguous. So if the decision has been made, the consequence and the result can be calculated. In a stochastic environment the rules are affected by random factors. Malfunction; break down, client solvency, market demand, economic cycle can be simulated in this way. In a deterministic game the reasons of results and their explanations are more transparent and the participants cannot affix their bad performance to bad luck. If you use random factors, the performance of the participants is not clear, but naturally the stochastic simulations are closer to the reality. However if your business is more sensitive to the hardly focused figures mentioned before, you should use stochastic simulations.

In my case the final rank in the simulation game is the part of the participants' course evaluation. Hence I don't want that the students can criticized my ranking that they have got simply for bad luck in probability statistic. So I've made a deterministic game.

The computer simulations can be *real-time* and *turn-based* simulations. The real-time simulations implement the decisions promptly when they are made. So the real-time simulations are able to measure the players' reaction time, and situation recognition ability. This could be very important for a broker or a security trader. In a turn-based simulation the decisions are processed and implemented at the end of a predetermined period (turn), so the participants have got time to think through the potential effect of their choices to the performance of their companies. My students' graduation is finance-accounting specialist, which requires more analytical knowledge, but only rarely requires quick decisions. So I choose turn-based simulation.

The technical realization of business simulations can be *computer based* or *board based*. The advantage of board based simulation that the operation of the game is very transparent, the participants see the whole picture of the game, and the consequences of the decision can be easily traced to the final result. But a board based simulation cannot be too complex, because the manual operation can take too much time, which can distract the attention from the analysis and interpretation of the results. The board based simulation requires much more resources (staff and equipment) than a computerized simulation game. The computer based simulation can use more complex rules; the rules can be stochastic and fairly close to the reality. If the computer program has been implemented, it doesn't require too much maintenance and resource. The main problem of the computer programs is that it operates as a black box, so the final results can be interpreted hardly, the linkage between the decisions and the consequences are less visible.

In my case I developed a computer based Internet application. To avoid the copyright problems, I developed my application in the Debian Linux-Apache-MySQL-Php framework, which has got a freeware licence for non-profit application. At first the number of students in a semester is about 50, so I cannot run effectively a board based simulation. In the course we focus to evaluate the result, not to run the game. With Internet access, the running phase doesn't require time in the seminar, so we have more time to analyse and interpret the results.

## Business simulation games in the world

There are many games in this type which have been designed around various kind of enterprises. For example Theme Park World can be called a business simulation because the aim of the game is to gain customers and achieve profits, but the game also has a building aspect that makes it a construction and management simulation. Construction game also includes many of the "Tycoon" games such as Railroad Tycoon, Business Tycoon Online and Big Biz Tycoon. Capitalism has been developed in 1995 which has been described as the best business simulation game at that time.

Active development of Internet technologies and the growth of the Internet audience in recent years gave a powerful incentive to the development of the online games, and in particular, online business simulations. There are many varieties of online business simulations - browser-based and downloadable, single-player and multiplayer, real-time and turn-based.

Because economic simulations simulate real-world systems, they are often used for economics education. These games give more active and collaborative learning methodologies (Greenlaw, 1999:35) for the economics education. Simpkins (Simpkins, 1999:279) stated that "...*teaching practices, which rely heavily on the lecture format, are not doing enough to develop*

students' cognitive learning skills, attract good students to economics, and motivate them to continue coursework in the discipline". This statement is consistent with the results of a survey published in the American Economic Review by Allgood (2004:262) that shows that students "rarely take economics as a free elective – especially beyond principles". More is needed to be done in the classroom to excite students about economics education.

Simulation supplements the standard lecture. Both computerized and non-computer based simulation and games show significant levels of growth in education (see Lean, Moizer, Towler & Abbey, 2006; Dobbins, Boehlje, Erickson & Taylor, 1995; Gentry, 1990).

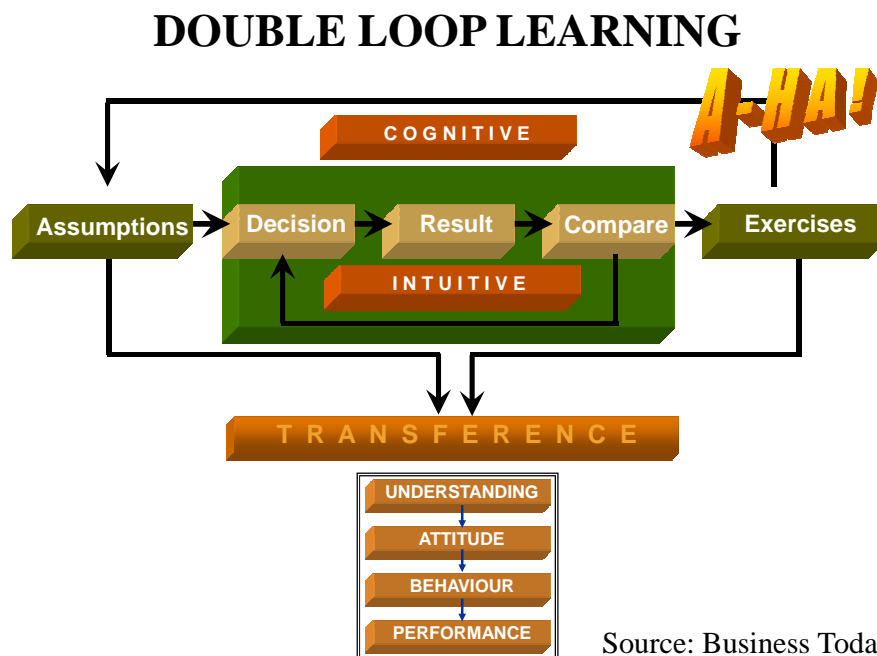
### The double loop learning cycle of business simulation

How can business simulation game games be used to make the training more effective? I use computer based simulation which focus the key financial success elements of business. The simulation demonstrates to the participants in a very visible way, how their business decisions affect the company overall performance.

If I tell the students something, this is true for me, but means only a learning material for the majority of the students not more. But if the students can discover something, this is true for them.

The fundamental theory behind these simulation programs is the double loop learning cycle. The concept of learning cycles are developed by the Managing Business Today which is the leading board based simulation training company of the world. The structure of double loop learning is demonstrated by figure 1.

Figure 1. Concept of double-loop learning



Source: Business Today

There are three pieces of double-loop learning. A single learning loop begins with a person *taking action*. An example of this could be learning to serve in tennis or trying to hit a golf ball straight down the fairway. The action generates a *result* which is *compared* with the anticipated result and

establishes a feedback loop. The feedback loop is the first piece of understanding.

On the basis of the comparison, the person takes *corrective action* to attempt to achieve the desired result. Much of this type of learning occurs at an intuitive or gut-level. It is important from a learning perspective that a number of cycles (loops) of activity are pursued. This repetitive process facilitates the learning. In my simulation there are 5 turns, which offers 4 repeated processes to improve the company's performance.

The recognition process is supported by the exercises. The theoretical background of these exercises occurred in the syllabus of former subjects, so the students only should apply their existed knowledge. The simulation is designed to create this first learning loop by providing the basis on which to take actions. At the end of each simulation cycle, performance results are prepared and teams compare these to budgeted or anticipated results and to those of other teams. Based on this comparison, each team will make decisions to improve performance through the next cycle of activities. The fact that the programme cycles through 5 repetitions of the same set of activities allows delegates to begin to master the concepts. This action-exercises loop is the second piece of learning loop.

The introduction of relevant exercises allows the students to focus on the fundamental (and often unconscious) assumptions on which they have been basing their decisions.

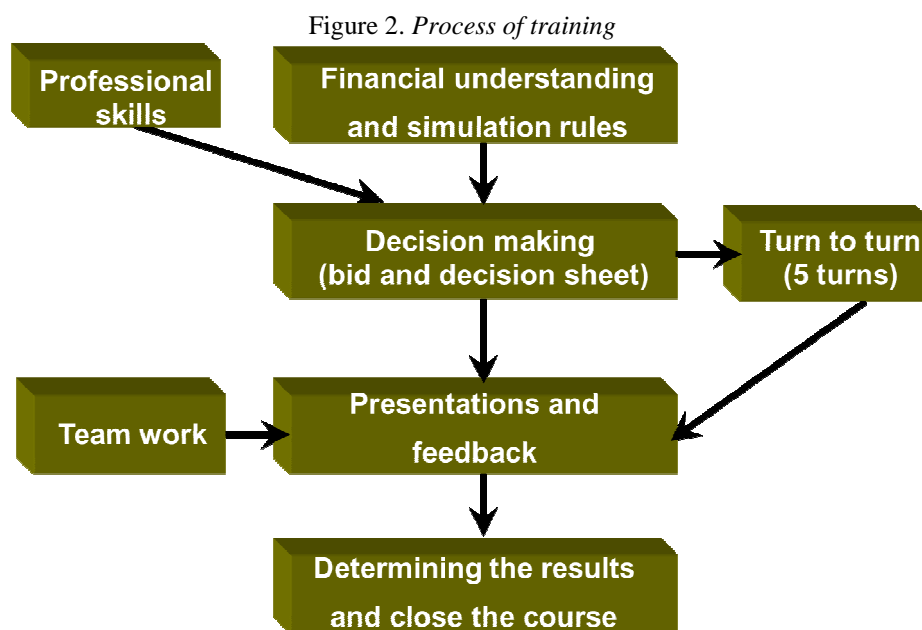
For example, a company may be continuously losing money, despite successful attempts to increase sales volume with every cycle. When faced with an exercise dealing with the analysis of margins, they realise that it is their pricing and not level of sales that is causing the problem. They can thus attend to the real cause of their problem.

This process helps to make the learning cognitive and builds a platform for the facilitator to transfer the learning to real business by applying the same exercises to a real company's results.

This second learning loop completes the process of double-loop learning and helps to create true understanding of the real business.

## The Course Objective and Evaluation

The business simulation called "Kisokos" is used in the seminar course *Corporate Financial Decisions*. The seminar course is held at the final semester of the bachelor students in branch Accounting and Finance. The goal of the subject is to deepen the financial understandings by forcing the students to make financial decisions and analyse the results. The course process is shown by the following figure.



### Features of the simulation

According to the scenario of the simulation the students should manage a bike manufacturing company. Their goal is to achieve the highest capital base in 5 turns which represent 5 month. There are 4 different products and 4 different markets in the simulation. In basics only the home market and the product Sparrow is available, if the students should like to sell other products in other markets, they should develop the markets and products, but these developments require cost and money. If they should like to manufacture quality product they should make quality development. They can extend their production capacity by investing in small, medium or large machine. Naturally every product has a unique life cycle pattern in each market and the players can receive information of the future demand by ordering market research which also costs money.

Each turn consists of one bid making and one decision making. In the bid making phase the students load an order list which contains the market order of various kind of bicycles. The order list consists of the quantity, the market and the product type of the order, and tells some information about the customer's attitude. The customer can be quality sensitive, can be market leader sensitive and can be price sensitive. Each attitude modifies the perceived prices of the customer. The effects of modifying factors to the perceived price are set by the game rules. The company offering the lowest perceived price wins the order. The evaluation is made by the administrator and the deduction of perceived price and the winner of orders are sent to the players by e-mail.

After receiving the bids won by their company, the player should complete the decision form. In the decision form they order the raw materials required by the manufacturing, plan their production, raise loans and make their investment decision on products, markets, equipment.

The decisions are run by the game administrator. The running report is sent to the players who can trace the effect of their decision by loading the turn business report from the website of the game. This offers a feedback facility of the player to draw the conclusions about their decision for later improvement.

Parallel with running the game, the students make presentations about the occurred financial and managerial accounting problems. The tasks are shared in the beginning of course and the deadlines of presentations are fixed.

At the end of turn 5, the game is closed and the final rank of each players is determined by the game administrator. The following table shows the content of seminars and the presentation topics:

Table 1. *Content of seminars and presentation topics*

<b>Date</b>	<b>Topic</b>	<b>Lecturer</b>	<b>Game process</b>
Week 1	Game rules 1, sharing the presentations	Tutor	Registration
Week 2	Game rules 2	Tutor	Market research, bid for turn 1
Week 3	Break even analysis	Team	Decision sheet 1
Week 4	Ratio analysis	Team	Bid for turn 2
Week 5	Product profitability	Team	Decision sheet 2
Week 6	Market profitability	Team	Bid for turn 3
Week 7	Cash flow	Team	Decision sheet 3
Week 8	Investments in equipments and markets	Team	Nincs
Week 9	Investments in products and quality	Team	Bid for turn 4
Week 10	Cost allocation	Team	Decision sheet 4
Week 11	Management report	Team	Bid for turn 5
Week 12	General feedback	Team	Decision sheet 5
Week 13	Evaluation of students	Tutor	

## Evaluation of students

The students can receive 100 points during the course in the following distribution:

1. Maximum 20 points are given for performing the requiring steps in simulation
2. Maximum 20 points for the rank in simulation. The simulation organises the students into competition. Each competition consists of 5 companies managed by students. The final goal is to achieve the highest accumulated profit in a 5 turn based game. The student with highest equity base receives 20 points, the last one gets nothing.
3. Maximum 20 points come from the evaluation of verbal presentation about a dedicated controlling problem occurring in the simulation. Typical presentation topics are direct and indirect cash flow statement, ratio analysis of financial report, cost allocation for markets and products, investment appraisal, break-even analysis.
4. Maximum 20 points can be received for making a financial budget for turn 4. The budget should be made before the turn 4 and it consists of every meaningful elements of a financial budget. Sales forecast, variable and fixed cost budget, investment and financing budget, pro forma balance sheet and income statement.
5. Maximum 20 points can be achieved for finishing the controlling loop to evaluate the reliability of the former mentioned budget, and to

formulate a relevant action plan for turn 5 by using the traditional SWOT analysis.

## How can Business Simulation help to deepen the Financial Understandings?

In the following I collect the arguments and my personal experiences which support the usage of simulation in the accounting-finance training.

The model of simulation mirrors the core meaning of economics

The economics is the science of decision making on limited resources to achieve the highest potential return. The model of my simulation supports directly this goal. The return in the simulation is determined by the accumulated corporate profit. The limited resources are the following:

1. Market – there are 4 markets and the market demand is restricted by the number and the quantity of bids, both are changing turn to turn but follow a determined shape.
2. Credit line – Two rules restrict the access to bank loan. The total borrowing/equity ratio cannot be higher than 1 (which means that the total amount of loan cannot exceed the company's equity base) and the cash balance cannot be negative. If the company doesn't meet this two criteria, it goes to bankrupt. The bankruptcy has got severe consequence. The cash balance should turn to positive, so the company should sell their asset at half price – causes a loss of equity in a same extent as the deficit in cash balance. If there is no saleable asset, the company is liquidated.
3. Manufacturing capacity – The size of plant is limited. The company can operate only a limited number of machines. The larger is the machine, the more effective is the manufacturing. But to invest in a larger machine requires money and the company may face liquidity problem.
4. Number of salesman – Each market requires operating salesmen. Each salesman can complete two order forms.
5. To achieve better market position the company should invest. There are four investment opportunity. The company can extend the manufacturing capacity, can develop markets, products and can implement quality products. Every investments cost money and time.

### Skills developed by the business simulation game

In my experience the following skills can be developed by using the simulation game.

1. *Strategic Thinking* – Due to the lack of available resources the students should formulate a winning strategy. The game supports the cost leadership strategy (by offering large market of a dedicated product and giving bonus for the market leader), the market segmentation (by using different customer types in different markets), and brand strength building (by allowing to produce quality product). Every strategy requires different way of implementation, and one of the learning point is to point to the



- failure of strategy building. The warehousing cost is fairly high in this game, so the simulation supports the Lean Management as well.
2. *Business Improvement* – The management of the company in a limited resources environment requires cute and careful planning, and force the students to think through every potential effect of their decision. The continuous decline of demand in the home market for the basic product ensures that a pure adaptive strategy cannot be effective. If the students want to be successful, they should focus the market and invest in market research.
  3. *Financial Understanding* – The study of turns' financial report, the making of financial exercises and budget require a deep understanding in finance. Turn after turn the students can trace the financial consequences of their business decisions. The goal of the game is the highest equity base, so the simulation supports the Shareholder Value concept. The ratio analysis and Key Performance Indicators offer an opportunity to implement a Balanced Scorecard for the particular company. Furthermore the students are forced to use financial and accounting terms, so they will be more familiar with them.

## Conclusion

The business simulation offers an extraordinary opportunity to deepen the professional expertise of the students. The business simulation offers the following advantages in accounting and finance training:

1. The students are forced to use financial and accounting terms.
2. They can recognise the main financial relationships by analysing their own actions, so the recognition is intuitive rather than deductive.
3. The intuitive recognition can destroy the failed beliefs and improve the understanding of business.
4. The simulation uses the competing behaviour of students who simply like to be winner, to encourage the learning attitude. The game offers an enjoyable way to learn rather than a formal lecture.
5. The students can learn from their own failure before they make costly errors in the real life.
6. By making presentations and budget, they can improve their verbal presentation skills, and they become more familiar with the usage of Excel program.

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