# THE SMALL BUSINESS MANAGEMENT FLIGHT SIMULATOR IN AN ENVIRONMENT OF FINANCIAL INDISCIPLINE

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## KEYWORDS

## ABSTRACT

The article describes the features of a system-dynamics based game for financial strategies of small business in an environment characterised by severe financial indiscipline and with the restricted access to financial resources. The problem of small firm striving to succeed in such conditions is discussed in the framework of a system dynamics model that is converted into a simulation game. Player makes the decisions on bank credit, accounts receivable policy, profit payout, and time to pay the suppliers.

## INTRODUCTION

One of the typical problems for the transition countries of Central and Eastern Europe is financial indiscipline, when firms delay payments to suppliers, banks, employees and the government (Begg and Portes, 1993). It is very hard for a small business to survive in such an environment. If its buyers do not pay on time, the firm will initially face liquidity crises and will eventually go bankrupt. Restricted access to financial markets is the additional problem that small businesses face (OECD, 1996).

System dynamics is a powerful tool that enhances learning about company, market and competitors, portrays the cognitive limitations on the information gathering and processing power of human mind, facilitates the practice of considering opinions, and supports building of "What if" scenarios (Sterman, 2000).

Over the past twenty years, the growth of computer technology has facilitated the wide application of system dynamics modelling as sophisticated tools for simulating business environments and situations. The basic goal of management simulation games is to apply experiential learning to the commercial world. They are designed in order to allow the player to experiment with the model on a compressed time basis while reducing costs and personal risk. The participant is able to see the consequences of his/her actions in few minutes or hours. In real world such consequences are visible only after much longer time (months or years).

The purpose of this article is to describe and demonstrate applicability of system dynamics models as decision and learning support tools for small businesses in an environment of financial indiscipline that permit controlled experimentation and enhance understanding of reality.

## MODEL OVERVIEW

Several system dynamics studies have examined the impact of financial policy on business success. Lyneis (1980) proposes the use of system dynamics models in deciding which action (e.g. capital rationing, increasing prices, reducing the collection period) would be best in the case where a firm faces a shortage of financial resources. Indeed, this is a common problem for all growing companies. Thompson (1986) examines the impact of cash flow on the success of a small business, and suggests that system dynamics can provide an overview of the complex relationships between inventory, receivables, payables and cash. Kolay (1991) recommends a system dynamics approach in managing working capital crises, and demonstrates the influence of debt collection efforts, restricted credit policy, and deferred payment to creditors on working capital. Bianchi and Mollona (1997) show how the coupling of the dynamics of growth with that of net working capital management creates recurring problems, especially in the context of small entrepreneurial firms. An interactive learning environment has also been created, whose focus is on understanding the dynamics generated by commercial and financial policies on sales revenue and profitability on one hand, and net working capital and liquidity on the other hand (Bianchi and Bivona, 1999).

The system dynamics model of a small firm in the transitional Croatian economy striving to succeed in an environment characterised by severe financial indiscipline and with restricted access to financial resources. The goals of the study were to help the owners of the firm to decide which financial policy would be best in the situation of financial indiscipline and to demonstrate an application of system dynamics methodology in a small business environment. The model is discussed at length by Pejic-Bach (2003), and is converted into a simulation game that consists on six major sectors: sales force, accounts receivable policy, finance, demand, inventory, and financial sources. Model sectors shall be described shortly.

## Sales force sector

Sales force sector describes sales force size and hiring effort (Figure 1). The owner compares the current and required number of workers and employs new staff in order to reduce the difference. The number of workers required depends on the expected demand.
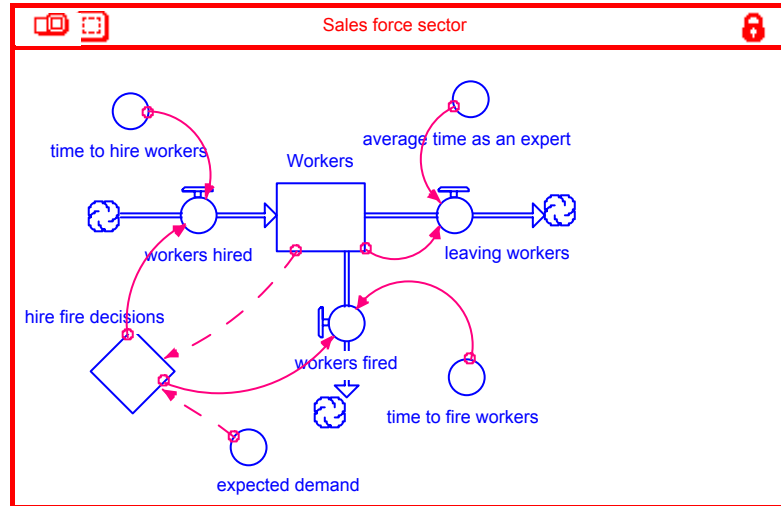


Figure 1: Stock and flow diagram of sales-force sector

## Accounts receivable policy

Accounts receivable policy sector explains effect of financial discipline on level of accounts receivable, and how financial discipline could be controlled with accounts receivable policy.

Increase in accounts receivable inflows into the level of accounts receivable, and it depends on the number of products sold and the selling price (Figure 2). Three outflows reduce the level of accounts receivable: (1) payment in advance, (2) the accounts receivable that are collected, and (3) bad debts. Payment in advance depends on the selling and payment in advance fraction that is influenced by financial discipline. The amount of accounts receivable collected depends on the current level of accounts receivable and the usual time to collect accounts receivable, which is influenced by financial discipline. The current level of the accounts receivable and bad debt fraction determines the amount of bad debt. However, bad debt does not reduce the accounts receivable immediately. The owner of the firm will put pressure on bad customers after the usual collection time has passed. For example, bad debts reduce the level of accounts receivable after 9 months if the time to collect accounts receivable is 6 months and the owner puts pressure on bad customers for an additional 3 months.

Financial discipline influences level of accounts receivable by the following means: time to collect accounts receivable, percentage of bad debt and percentage of early payment. Normal financial discipline was defined as a situation where customers pay on time, where 30% of sales are collected in advance, and where 3% of accounts receivable are bad debts that cannot be collected despite additional efforts. When financial discipline is lower than normal, the time needed to collect accounts receivable is longer than agreed, fewer than 30% of customers pay in advance, and more than 3% of accounts receivable are considered as bad debts.
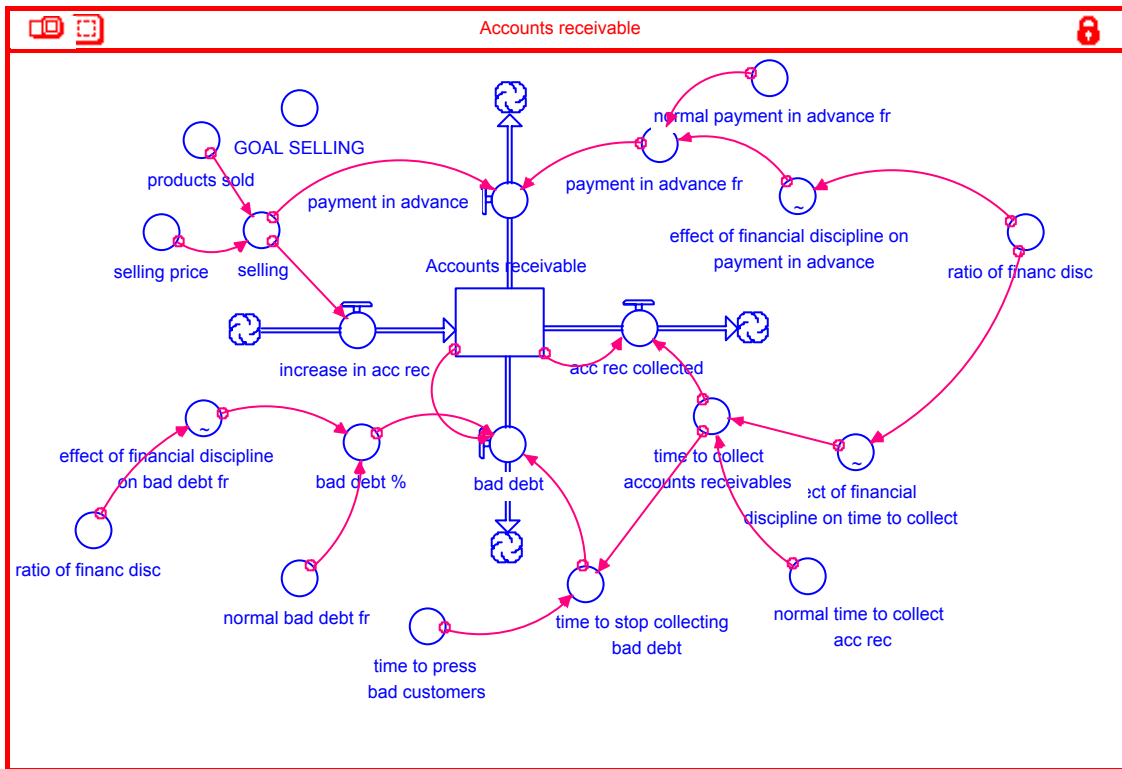
Figure 2: Stock and flow diagram of accounts receivable

How can financial discipline be controlled? Is it possible at all? What are the consequences of such actions? Accounts receivable policy is one of the means to influence financial discipline of firm's customers. It comprises credit standard, the collection policy, and cash discount. It would be too complicated to model all the aspects of the management of accounts policy. Therefore, we modelled the accounts receivable policy as one variable that could vary between two extremes – a liberal and a restrictive accounts receivable policy (Figure 3).
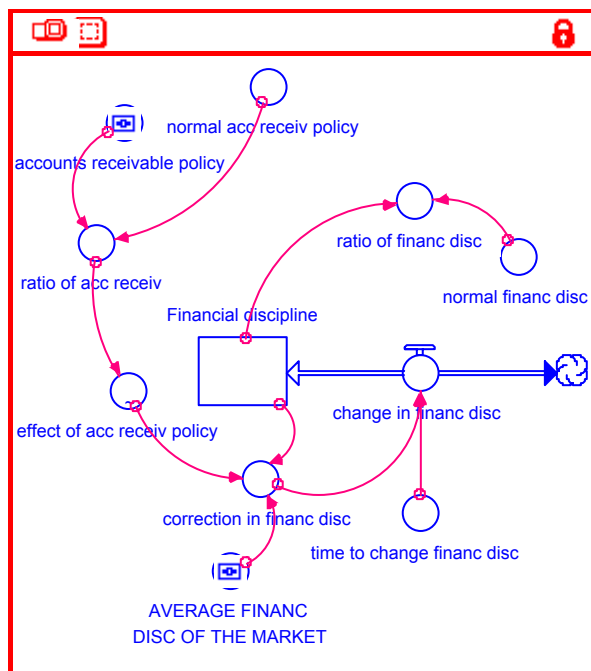


Figure 3: Stock and flow diagram of accounts receivable policy

An accounts receivable policy is liberal if the credit period is long, credit standards are low and if the collection policy is loose. Easing the credit policy stimulates sales, but carrying costs and bad debt and/or cash discount expenses may also rise. An accounts receivable policy is restrictive in the opposite case where the credit period is short, credit standards are high and the collection policy is tightened. Tightening accounts receivable policy increases financial discipline of customers, but the firm risks to lose its customers.

Players make the decisions on accounts receivable policy that is expressed in pressure units. If financial discipline is normal, than the player retains accounts receivable policy also at the normal level (50 pressure units). The accounts receivable policy is expressed in pressure units. If the accounts receivable policy is completely liberal, (the firm sells goods to everybody, does not put pressure on

customers, and the credit period is long), its value is 0 pressure units. More than 50 pressure units represent a restrictive accounts receivable policy.

**Finance sector**

Finance sector contains selling price calculation, cash flow, income statement and ratio analysis. We shall explain only the cash level, that is increased by the inflow and depleted by the outflow (Figure 4). Inflows to the cash level are: payment in advance, accounts receivable collected, and pre-tax return. In addition, if the firm borrows money from the bank, the cash level is increased by the amount borrowed. Outflows from the cash level are: paying profit, paying administrative and selling costs, paying suppliers, and paying taxes. If the firm has borrowed money from the bank, the cash level is decreased by the amount repaid and by interest payments.
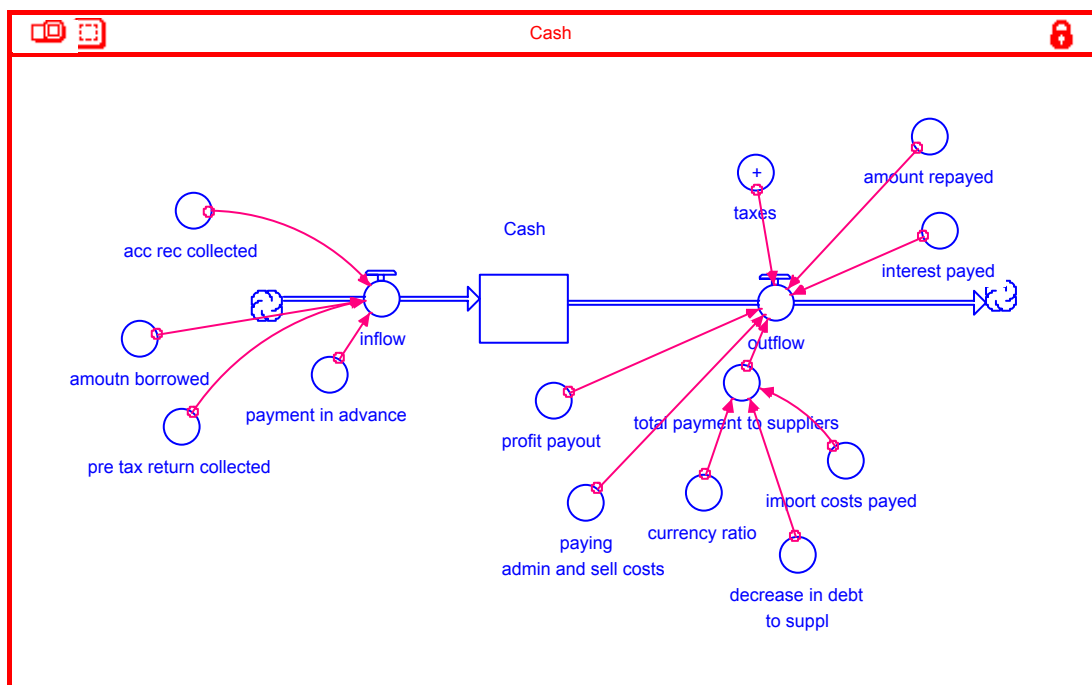


Figure 4: Stock and flow diagram of the cash level

**Demand sector**

Demand sector explains customer creation and retention, and main factors that influence demand are: (1) word of mouth, (2) accounts receivable policy, and (3) marketing expenses (Figure 5). In the context of financial discipline the accounts receivable policy and marketing expenses influences the demand to the biggest extent. When accounts receivable policies are liberal, sales increase, but

more customers with poor financial discipline are attracted. If the accounts management policy is restrictive, sales decrease, but customers of greater financial discipline are more likely to be encouraged. The main way to influence demand is through marketing expenses. If marketing expenses are higher than the similar expenses of competitors, demand increases very quickly. The goal of the model is not unrestricted growth, but growth only to the target level.
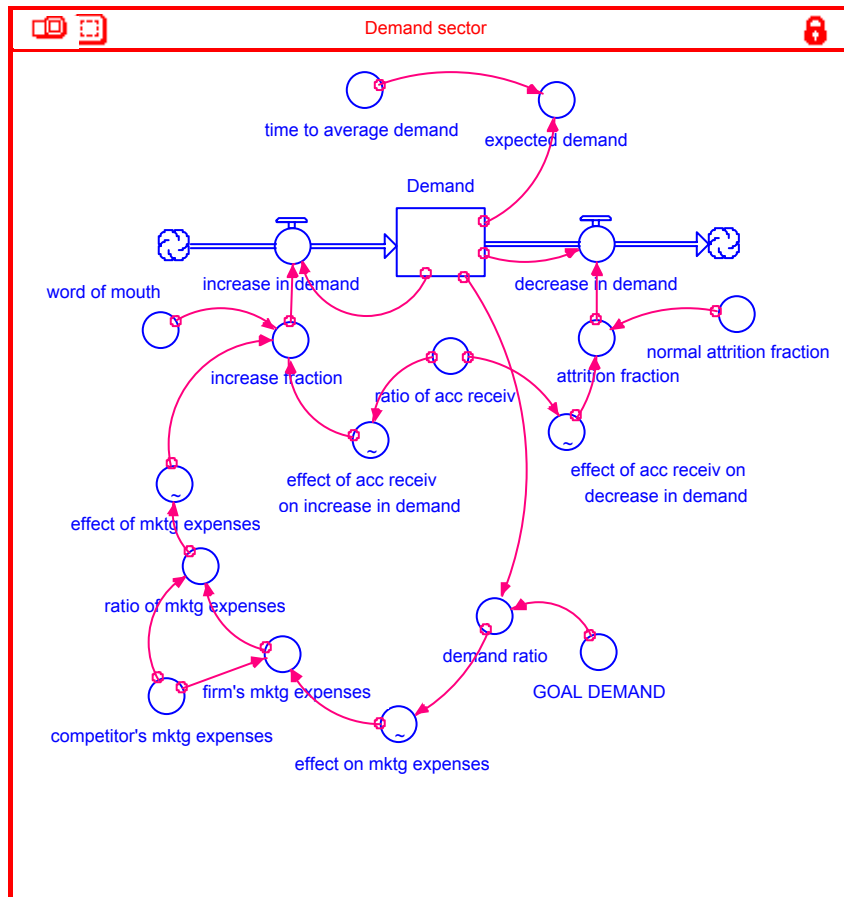
Figure 5: Stock and flow diagram for demand sector

**Inventory sector**

The inventory level is increased by the products received and is depleted by the products sold (Figure 6). The owner takes the expected demand into account when she orders new products. She compares the current and target inventory and orders sufficient products to reduce the difference.
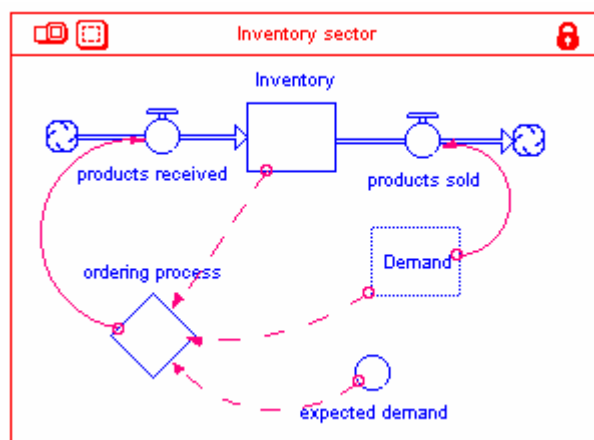


Figure 6: Stock and flow diagram for inventory sector

**Financial sources sector**

Three financial sources are available to the small businesses: suppliers (Figure 7), bank credit (Figure 8) and profit retained (Figure 9). Players make decisions on time to pay suppliers, bank credit and profit payment policy.

When cash flow is lower than acceptable, the player can: (1) increase time to pay suppliers, but never above the highest limit that suppliers will tolerate, (2) retain profit to finance day-to-day business, and (3) take credit from the bank, but only the maximum amount approved by the bank.
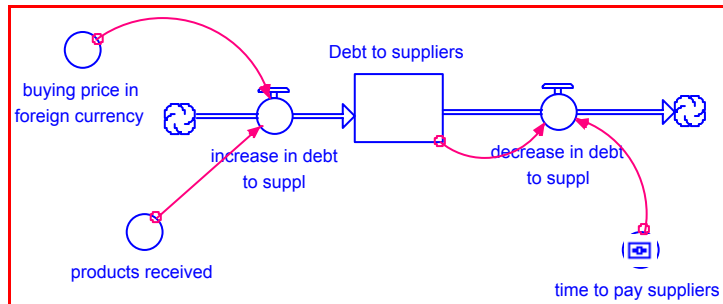
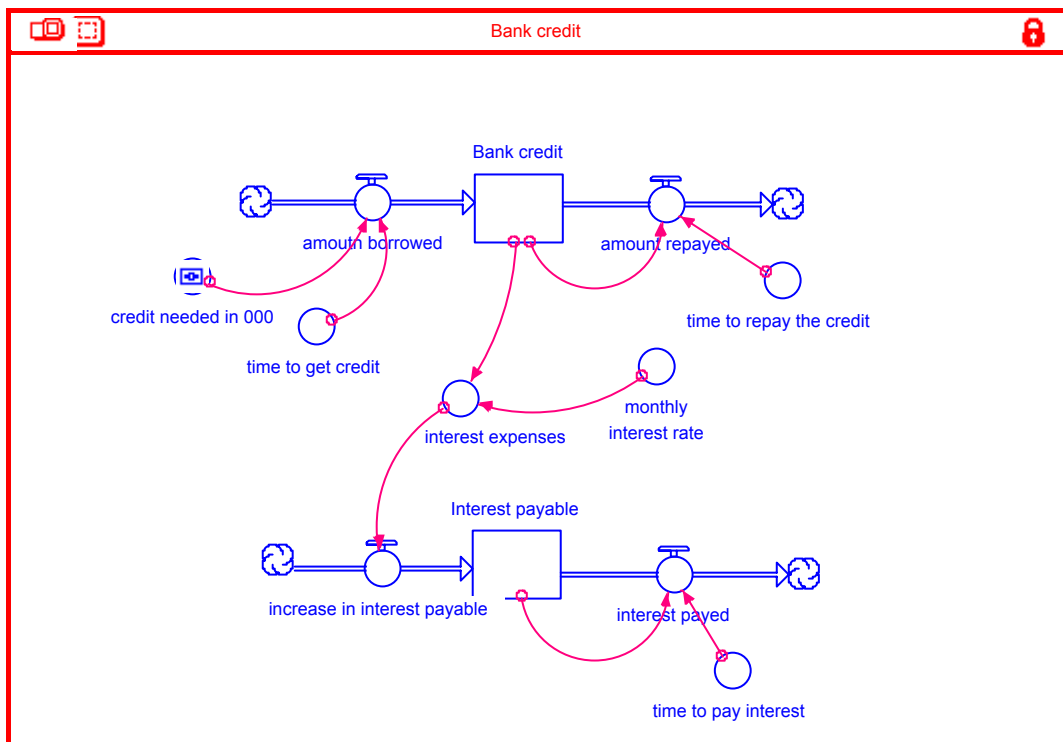Figure 7: Stock and flow diagram for debt to suppliers

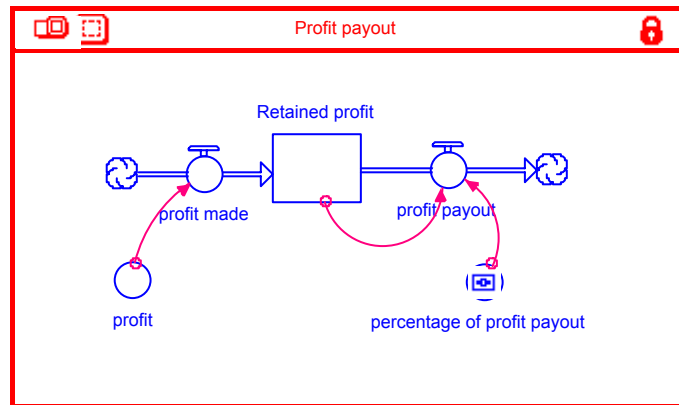Figure 8: Stock and flow diagram for bank credit

Figure 9: Stock and flow diagram for profit payout

## THE SMALL BUSINESS MANAGEMENT FLIGHT SIMULATOR

Basic assumption of the model is that the financial discipline is sensitive on accounts receivable policy. There are four controllable variables in the model: (1) % profit payout, (2) bank credit, (3) time to pay suppliers, and (4) accounts receivable policy.

The simulation game has been designed and played with the objective to sensate management students and practitioners to the problems of financial indiscipline. Team of players or one player makes decisions about four control variables. The players are encouraged to increase turnover, maximise profit while maintaining positive cash flow. Every six months they make decisions.

Game begins with discussion about the financial indiscipline, and how it influences firms profitability and liquidity. Then, system dynamics model of small business is presented. Players gather around a machine for one or two hours. Goal of the game is to make as large profit and demand as possible, and in the same time remain the firm in the liquid position in the conditions of financial indiscipline. After the game the players are asked to explain what they have observed.

Ithink is the system dynamics software that is simple to operate and has interface that encourages exploration. It offers user-friendly input and output devices that empowers the player to make decisions about controllable variables. Control Panel for decision-making is presented (Figure 10.) Input devices are Slider Inputs, which allow the player to make decisions. Every six months players make the decisions on credit needed, percentage of profit payout, time to pay suppliers, and accounts receivable policy. Output devices show the consequences of player's decisions on Numeric Display or graph. Players monitor time to collect accounts receivable, bad debt percentage, cash, and profit or loss on Numeric Displays. Demand, profit and cash are monitored on graphs.
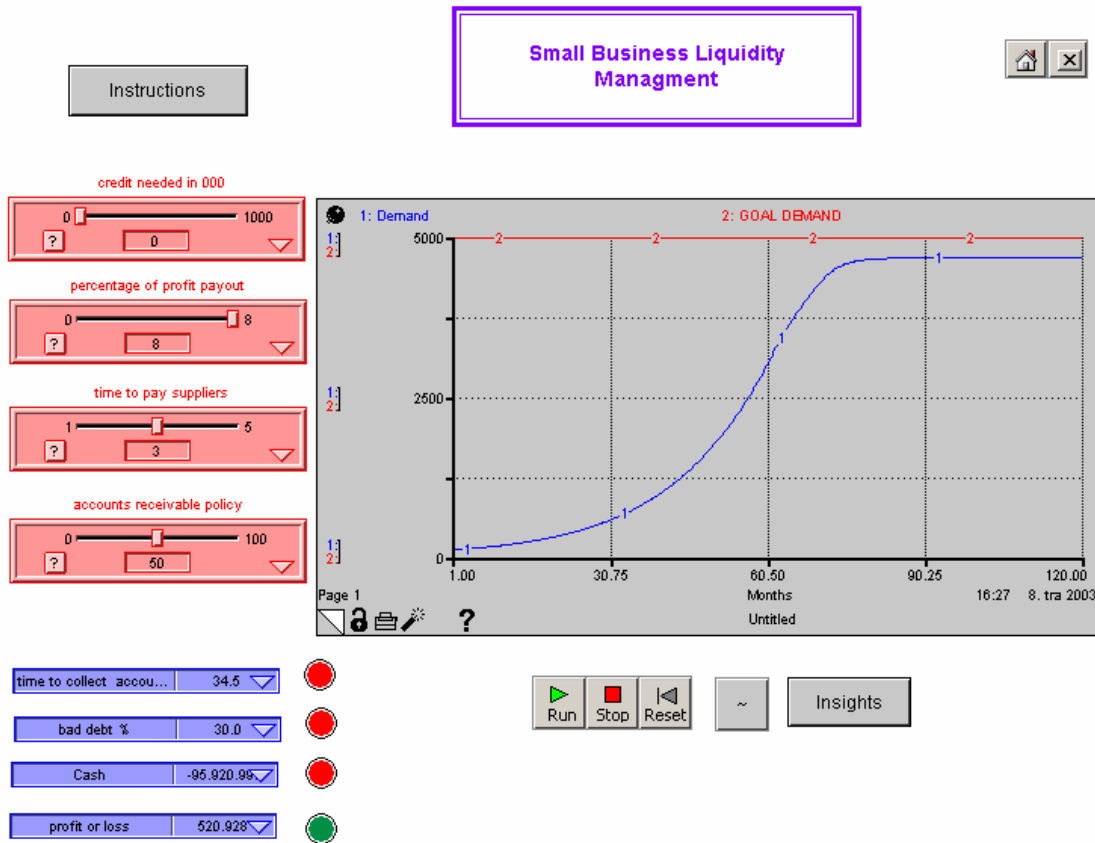
Figure 10: Control panel of the game

## LESSONS OF THE GAME

In an ideal situation every customer would pay on time, there would be no bad debt, and the fraction of early payments would be fairly high. It is pressumed that a sudden and strong decay of financial discipline was introduced.

Following strategies in case of financial discipline problems are considered:
- Strategy 1 - Retaining profit
- Strategy 2- Retaining profit and borrowing money from the bank
- Strategy 3 - Retaining profit, borrowing money from the bank and tightening the accounts receivable policy (75 pressure units)

- Strategy 4 - Retaining profit, tightening the accounts receivable policy (65 pressure units) and delaying payments to suppliers (5 months)

Game is played with employing above strategies, and the results are following (Table 1). Equilibrium values at the end of the simulation for demand, time to collect accounts receivable, bad debt %, cash and profit are presented in the table. As far as demand is concerned, Strategies 1 and 2 are better than Strategies 3 and 4. But, in terms of the time to collect accounts receivable, bad debt, and profit Strategies 3 and 4 are better. However, the firm faces serious liquidity problems in Strategies 1 and 2.

Table 1. Business performance in different Strategies

| | Demand (number of products sold per month) | Time to collect accounts receivable (months) | Bad debt % | Negative cash position (local currency in millions) | Profit (local currency) |
|---|---|---|---|---|---|
| Strategy 1 | 4687 | 26.2 | 22.5 | Yes (-52.07) | 698,986 |
| Strategy 2 | 4687 | 26.2 | 22.5 | Yes (-49.57) | 658,176 |
| Strategy 3 | 3980 | 5.6 | 5.2 | No | 1,078,253 |
| Strategy 4 | 4149 | 6.7 | 5.7 | No | 1,110,523 |

The players would make the best results if they tighten the accounts receivable policy and, at the same time, delay payments to suppliers (Strategy 4). However, such a strategy is good for the firm only in the short term, because suppliers will not tolerate delayed payments indefinitely. As a result of such actions, the firm would survive, but it would lose its market share and would build up debts to its suppliers. All of the profit would be retained and used to finance the day-to-day running costs of the business. Most of the firms in transition countries that suffer from financial indiscipline operate in the same way. Firms delay payments to suppliers and they themselves turn into bad customers. Therefore, the circle is closed. In the end everybody delays in making payments, and financial indiscipline spreads even more widely. The conclusion of the game is that in conditions of financial indiscipline, there is no win-win solution for everybody.

Players are encouraged to think about available strategy options in the conditions of financial indiscipline, instead of sudden changes of the strategy. Main goal of the simulation experiments is to demonstrate the following conclusions for small business firms (Pejic-Bach, 2003):

- When a firm's customers start to delay with their payments, the worst solution would be to do nothing. In that case, every firm would very quickly become illiquid and would not be able to pay its taxes, suppliers, employees, and creditors.

- Credit from the bank would not be sufficient to cover the negative cash position because of the restricted access felt by most transition countries to the financial market.

- A good solution would be to tighten the accounts receivable policy, which would yield the following results: an increase in the fraction of early payments, a decrease in the fraction of bad debt and time to collect payments. Still, because of a restrictive accounts receivable policy the firm would eventually lose its market share.

- The other solution for the firm would be to use informal sources of credit and to delay payments to suppliers, which is the most likely reaction. Because of the inefficiency of the legal system, most firms decide to pay debts late simply because the cost associated with late payment is smaller than the cost of alternative sources of finance. Underpaid suppliers usually do not terminate further shipments for fear of losing their clients, and, as a result, mutual arrears become a universal practice.

**CONCLUSIONS**

Traditional methods of teaching tend to equip the students with knowledge that could eventually help them in solving their future business problems. On the other hand, simulations are designed in order to initiate active, student-oriented learning. Students seek information that is useful in achieving a goal of the game, and during that process their understanding of the system increases.

Simulation games hold out the promise of new and advantageous ways of learning, and could be useful in education of credit managers. System dynamics model of small business firm has been designed in order to allow players to make decisions in conditions of financial indiscipline in non-risk environment on a compressed time basis. Players are encouraged to decide on credit needed, percentage of profit payout, time to pay suppliers, and accounts receivable policy in order to maximise profit and demand while maintaining positive cash flow. Proposed simulation game could be useful in developing decision-making skills, and could increase understanding of possible strategy options available for small business firm in the conditions of the financial indiscipline.

Finally, players are encouraged to reach the following conclusions. In an environment of financial indiscipline and restricted external sources of finance, most small firms facing liquidity problems will probably restrict their customer base and delay payments to suppliers, so decreasing their market share. If the legal system is inefficient, such a reaction will lead to an illiquid economy in which the small business sector is weak. This would be a severe problem because small business firms usually play an important role in every economy. Furthermore, everybody would eventually become a bad debtor.

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## BIOGRAPHY

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