

RISK MODELLING OF PRELIMINARY SMALL AND MEDIUM ENTERPRISE BUSINESS PLAN

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Abstract

The article focuses on business plans for small and medium enterprises (SME). Small companies are sensitive to even slight changes in the environment. Many little businesses failed due to too low demand, payment delays, high interest rates or changes in cost structure. Standard business plan duly defines the profits and costs; on this basis the income is derived. The problem is that all values are considered deterministic and the profit is calculated as a single value. To enhance this method the common practice is to define three scenarios: the most pessimistic, the most optimistic and the most probable and on this basis derive the baseline assumptions, however even with this approach it is problematic to consider all the possibilities. The main goal of the article is to present and discuss the impact of risk modelling and simulation methods at the first stages of business plan preparation. A case study presents two business plans: deterministic and probabilistic. The probabilistic model encompasses probabilistic assumptions regarding decision variables. The two presented models are compared; pros and cons of both models are presented. The result of the conducted research shows that using probabilistic model for first, simple calculations can help businesses to succeed.

Key words: risk modelling, business plan, Crystal Ball

JEL Code: G32, D81

Introduction

The business plan is a document which systematises and structurises a new project and it encompasses all features of the proposal. According to Timmons it should cover:

- executive summary,
- description of the industry, company and product,
- market analysis,
- profitability of the venture,

- marketing plan,
- technical analysis,
- production plan,
- human resources plan,
- schedule,
- risk analysis,
- financial plan,
- proposed company offering (Timmons, 1999).

Business plan is a tool for communicating with internal and external stakeholders; it should include the most important things and neither of them should be neglected. At the initial planning stage the profitability of the project should be assessed. Small and medium enterprises (SME) carry out limited number of projects, therefore failure in just one project has a big impact on the entire company. Most entrepreneurs prepare projects based on deterministic data. In best case three scenarios are prepared: pessimistic, the most probable and optimistic; the most often the most likely scenario is considered. Schoemaker (Schoemaker, 1991) emphasises that „scenario planning presents an especially viable alternative to single line forecasting.“; when the environment is unstable, scenario analysis recognises better information about the problem. All positive elements of the plan are put into optimistic scenario, all negative elements into pessimistic one, while most likely scenario is somewhere in between. Nothing is ever black or white. Variables range from positive to negative values according to defined distributions. Nowadays, when popular spreadsheets allowing statistical analysis are widely available, more sophisticated analyses can be considered.

This article presents only one aspect of the business plan – the financial profitability of the project, as it is the most important factor for SMEs; using a case study concerning creation of a new store using two approaches: deterministic and probabilistic.

Project description, the assumptions of the analysis, calculation results for deterministic and probabilistic examples, advantages and disadvantages of both cases are presented in the following sections.

1 Project description

Little stores are prone to instability. It is very important to prepare initial financial analysis before preparing detailed business plan. The objective of the proposed project is to open a new clothing store. The owner, as a professional tailor and fashion designer, will also perform fittings and will produce small clothing lines for their own store and for selected contractors; which is considered a competitive advantage. The company is scheduled to open in January. The analysis concerns both a profit and loss account and a statement of cash flows. The profit and loss account includes the main revenues and expenses recorded in accordance with the accounting law. The statement of cash flows collects all inflows and outflows even if they are mistakenly recorded (Rai, 2003; Bertoneche, Knight, 2001).

The owner possesses 120 000 zł. The bank agreed to grant 20 000 zł loan, and the installments are due on the 10th of each month starting from February. The principal of the loan will be repaid over the course of one year in equal installments with interest in decreasing installments; the interest rate of the loan is 30 %.

It is necessary to buy professional sewing machines for 30 000 zł and shop equipment for 50 000 zł. The machines' amortisation starts in February. The depreciation rate is 10%. The rent for the premises is 5 000 zł per month payable on 1st of each month. It is necessary to employ two people whose gross salary (including all costs) will amount to 3 000 zł paid in accordance with the labour law on 10th of each month after each worked month. Monthly expenditures for electricity, advertising, accounting etc. amount to 5 000 zł. The franchise fee in the first month of operation is 10 000 zł and afterwards 5 000 zł per month. The shop's supplies are purchased using a trade credit on 50/50 terms (which means that 50% of the invoice must be paid immediately and the remaining 50% after one month from receiving the invoice); the values of the purchases are presented in table 1. The sales will also be realised using the trade credit. The values of the sales and trade credit terms are presented table 2.

Tab. 1: Purchases of goods for supplying the clothing store

Month	January	February	March	April	May	June
Value of purchases, zł	30 000	20 000	10 000	20 000	6 000	4 000

Source: Autor's own research

Tab. 2: Sales of goods on the basis of trade credit

Month	January	February	March	April	May	June
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Value of sales, zł	40 000	30 000	30 000	30 000	30 000	30 000
Percentage paid in the next month		50%	30%	20%	50%	20%

Source: Autor's own research

2 Assumptions of the business plan financial model

The aim of the analysis is to prepare the initial profit and loss account and a statement of cash flows. The results will show possible gains and the possibility of loss of financial liquidity. The case study covers only six months of operation. At the outset, the deterministic calculations are performed. In table 3 the most probable values of revenues and expenses are presented. All cash flows of the project are collected in table 4. It should be noted that the expenses and revenues are different from the cash flows. Three scenarios are prepared, for both income and for cash flows. The total contribution cannot exceed 140 000 zł. In the pessimistic scenario, it is assumed to be 90 000 zł, in optimistic scenario the full amount of 140 000 zł. All most probable values are presented in table 3 and 4. The loan is calculated as a difference between 140 000 zł and the amount which the owner possesses. The equipment can be bought for between 40 000 zł and 55 000 zł. Depending on the market offer, the cost of the machines ranges from 25 000 zł up to 50 000 zł. Rental and franchise fees are taken as constant values. It is assumed that the salaries depend on the sales value and the relation is linear; the values of purchased and sold goods are also linearly correlated. In the pessimistic scenario the sales value is assumed 20% lower, and in the optimistic one 20% higher than the value in the most probable scenario.

Tab. 3: The most probable revenues and expenses of the new clothing store project

	Monthly expenses, PLN					
	January	February	March	April	May	June
Revenues						
Own contribution	120 000.00					
Sales revenues		40 000.00	30 000.00	30 000.00	30 000.00	30 000.00
Costs						
Purchase of equipment	50 000.00					
Amortisation		250.00	250.00	250.00	250.00	250.00
Interest payment		500.00	458.33	416.67	375.00	333.33
Rental fee	5 000.00	5 000.00	5 000.00	5 000.00	5 000.00	5 000.00
Salaries	3 000.00	3 000.00	3 000.00	3 000.00	3 000.00	3 000.00
Expenditures	5 000.00	5 000.00	5 000.00	5 000.00	5 000.00	5 000.00
Franchise fee	10 000.00	5 000.00	5 000.00	5 000.00	5 000.00	5 000.00

Purchase of goods	30 000.00	20 000.00	10 000.00	20 000.00	6 000.00	4 000.00
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Source: Autor's own research

Tab. 4: The most probable cash flows of the the new clothing store project

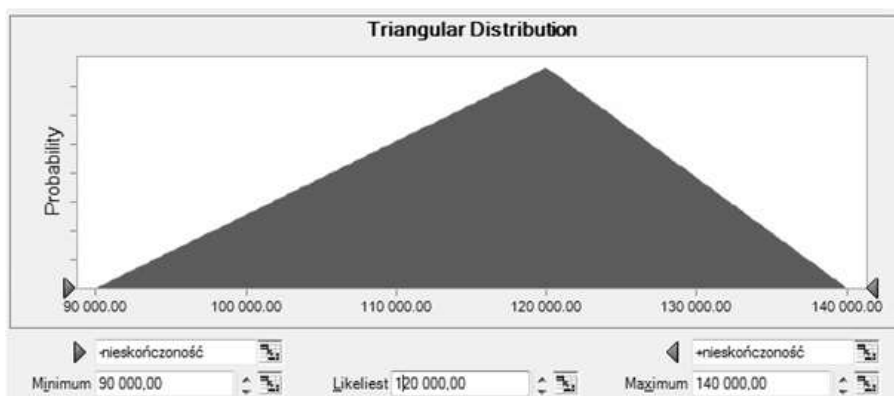
	Monthly expenses, PLN					
	January	February	March	April	May	June
Inflows						
Own contribution	120 000.00					
Loan	20 000.00					
Current month income		20 000.00	21 000.00	24 000.00	15 000.00	24 000.00
Previous month income			20 000.00	9 000.00	6 000.00	15 000.00
Percentage of the deferred payment		50%	30%	20%	50%	20%
Outflows						
Purchase of machinery	30 000.00					
Purchase of equipment	50 000.00					
Loan payment	0.00	1 666.67	1 666.67	1 666.67	1 666.67	1 666.67
Interests payment	0.00	500.00	458.33	416.67	375.00	333.33
Rental fee	5 000.00	5 000.00	5 000.00	5 000.00	5 000.00	5 000.00
Salaries		3 000.00	3 000.00	3 000.00	3 000.00	3 000.00
Month expenditures	5 000.00	5 000.00	5 000.00	5 000.00	5 000.00	5 000.00
Franchise fee	10 000.00	5 000.00	5 000.00	5 000.00	5 000.00	5 000.00
Current payments	15 000.00	10 000.00	5 000.00	10 000.00	3 000.00	2 000.00
Delayed payments		15 000.00	10 000.00	5 000.00	10 000.00	3 000.00

Source: Autor's own research

Besides deterministic calculations, the Monte Carlo method (Jim'Enez, 2005, Willis, Minden, and Snyder, 1969) was used in order to calculate the probable total revenue and the possibility of losing the financial liquidity. A triangular probability distribution, with boundaries equal to the pessimistic and optimistic values of the variables used in the deterministic method above, was used as an input for the Monte Carlo method. The mode

values were also taken from the most probable scenario in the deterministic method. The assumption of the probability distribution of the owner's contribution is presented in figure 1.

Fig. 1: The assumption of the probability distribution of the owner's contribution



Source: Author's own research

3 Standard model and Monte Carlo simulation results

The deterministic calculations of the model were performed for three scenarios. In figure 2 the chart of most probable cumulative incomes and cash flows is presented, and figure 3 contains the corresponding values for pessimistic and optimistic scenarios.

In the pessimistic case, the project is not profitable - in February both the income and cash flow have negative values. The optimistic scenario shows that starting from March the project will not suffer from the lack of financial liquidity. The most probable scenario shows, that careful financial management is required - in May despite the positive financial result the cumulative cash flow is negative; to combat this the executives should consider taking a loan or negotiating payment delays.

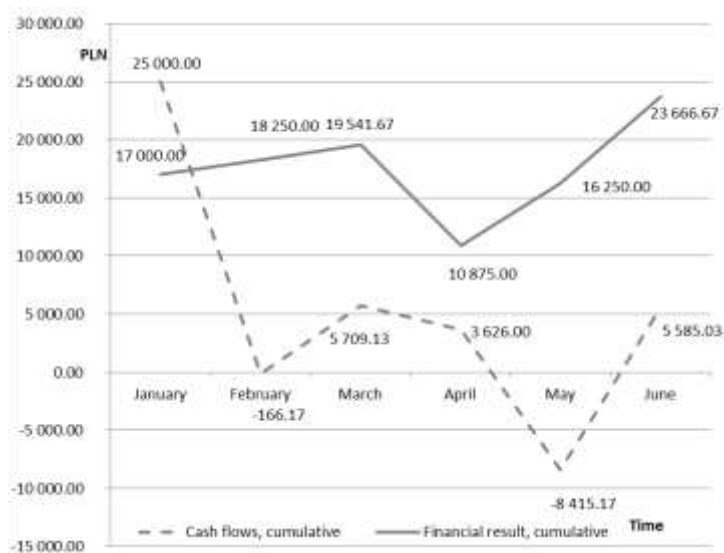
The chance of achieving the most probable results from the deterministic calculations (base case) is almost 70%, while for the positive result the chance is only 30% (ref. figure 4). The lowest monthly profit calculated using Monte Carlo simulation is -12 000 zł while deterministic value is -8 500 zł. The calculated average income is 13 000 zł while according to the deterministic calculations it was 23 000 zł. Distribution of cash flows based on the Monte Carlo simulation is presented in figure 5. The probability of achieving a positive cash flow is 50% which is a slightly smaller value than the one for the deterministic calculations

(base case). The lowest probable cash flow is -12 000 zł while calculated in deterministic case is -8 500 zł.

The sensitivity analysis was also performed. The owners' contribution has the biggest impact for the final income (80% responsibility for the income changes). The variability of the revenue has the biggest influence in the changes of the cumulative cash flow. The sensitivity analysis results are presented in figures 6 and 7.

The Monte Carlo simulation was performed using the Oracle® Crystal Ball software¹.

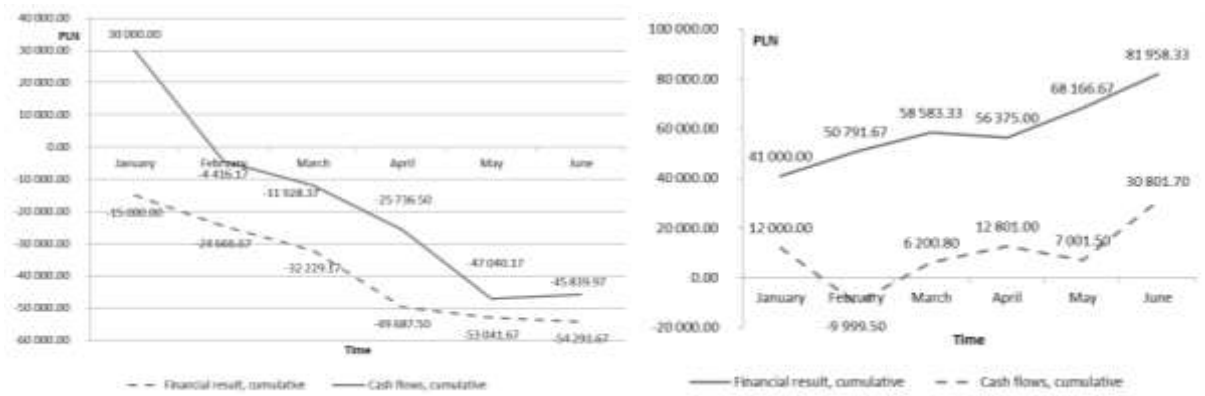
Fig. 2: Cumulative most probable income and cash flows calculated as deterministic values



Source: Author's own research

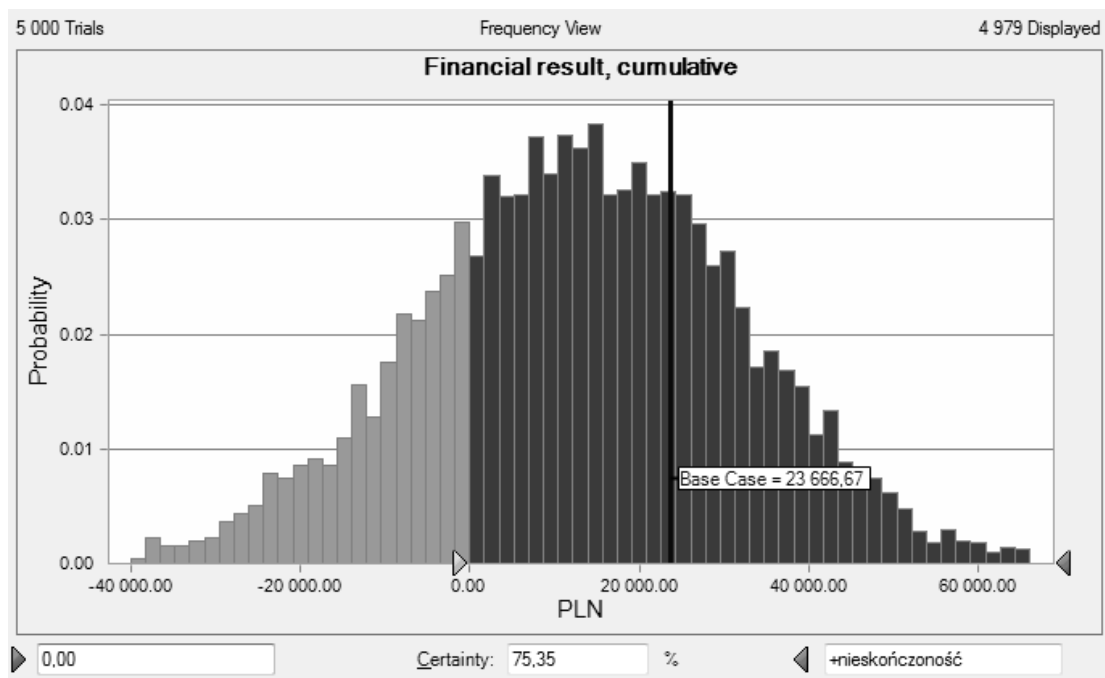
¹ Information about the Oracle® Cristal Ball software could be find in the following site <http://www.oracle.com/us/products/applications/crystalball/overview/index.html>

Fig. 3: Cumulative pessimistic (left chart) and optimistic (right chart) income and cash flows calculated as deterministic values



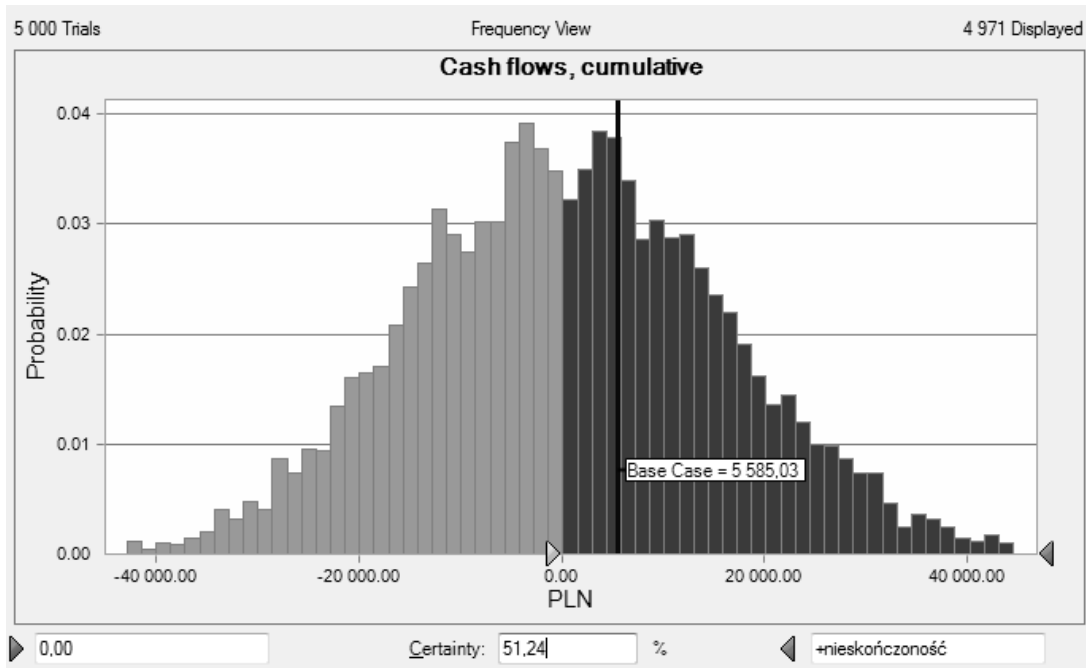
Source: Author's own research

Fig. 4: Probability distribution of cumulative income



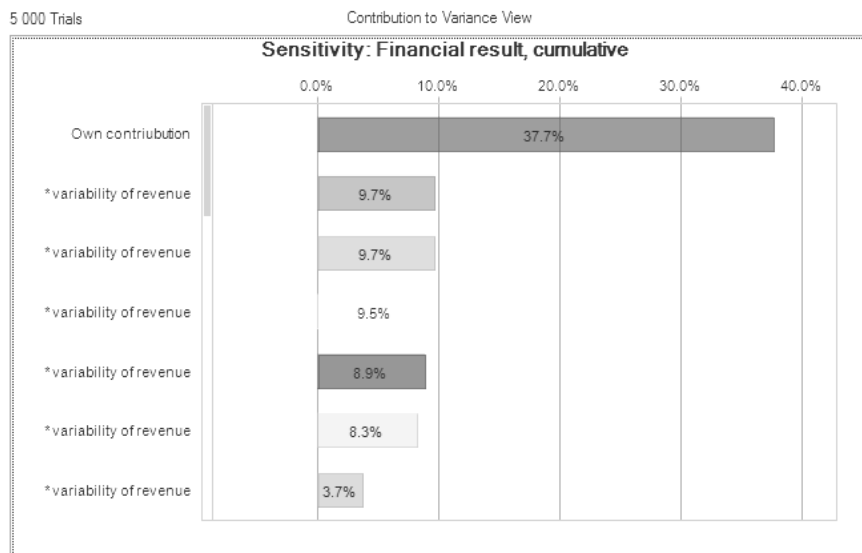
Source: Author's own research

Fig. 5: Probability distribution of cumulative cash flow



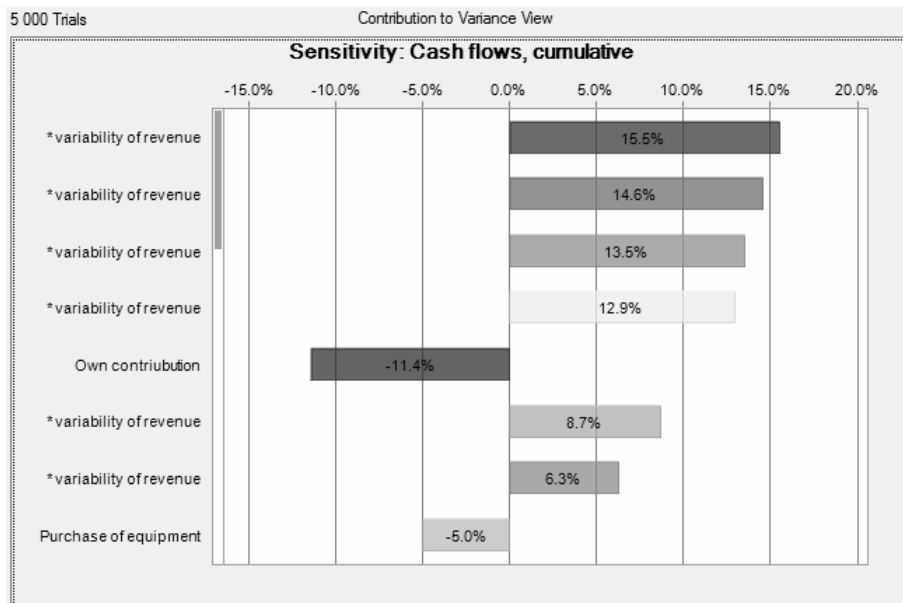
Source: Author's own research

Fig. 6: Sensitivity chart for the financial results



Source: Author's own research

Fig. 7: Sensitivity chart for the cumulative cash flow



Source: Author's own research

Conclusion

In most cases entrepreneurs prepare deterministic business plans based on the most probable calculations. Preparation of two additional scenarios for the worst and best business cases can provide better accuracy. However the Monte Carlo simulation takes into account a wider range of values along with their probabilities and therefore can yield the most accurate results. Furthermore it shows which variables have the greatest impact on the businesses' outcome. With that information the companies' authorities are able to take better, more informed and measured decisions and more reliably plan for success in short and long term.

The markets have already noticed the value of Monte Carlo simulation and it is now used in preparing business plans more and more often (Males, Melby, 2011).

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