

Computer aided venture projection and evaluation using process control paradigm

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The paper is dealing with a new approach and technique to project and evaluate any venture by computer aided technology concept. The groundwork consist in the use of process control paradigm that enables a consistent and rigorous view of the problem. An application to assessment of a business venture is concisely described. The term "venture projection" represents ability to display given venture from entrepreneur's point of view (in constructive, object and process-oriented way) into financial reports and indicators over time. The required reports and indicators are mainly income statement, balance sheet, cash flow statement, financial ratios, funding structure of investors, and investment indicators such as PBP, NPV, IRR, ROR, EPS, B/C, PI and more can be defined. Eventually it enables the user to carry out financial, investment, sensitivity, risk, scenario and what-if analyses according to requirements. It opens possibilities to carry out different changes to optimize given venture in terms of economic results.

Keywords: venture projection, venture evaluation, process control, computer aided technology, investment analysis, financial analysis, sensitive analysis, risk analysis, scenario analysis, what-if analysis

Introduction

The use of traditional methods of venture projection and evaluation by techniques of investment and financial analysis with specifics of business, engineering and project economics are well known, e.g. (Gillespie, 2013), (Newnan et al., 2013), (Mian, 2011). More sophisticated math approach is represented by application of option value paradigm added to classical investment analysis, taking into account managerial aspect of decision flexibility during venture's life. In general, it justifies reason to add to the net present value (NPV) a premium (option value) which can increase project's value and thereby chances for feasibility of venture under study. Real options analysis can explore alternative approach, such as delaying the development, bussines expansion in the future or leverage to the commodity prices. These methods require either use of decision trees (scenarios) approach or application of adequate math real option model, e.g. (Guthrie, 2009), (Kodukula & Papudesu, 2006).

However, we must keep in mind simplifications inherited within the respective formulas of many investment indicators used (e.g. PBP, NPV, IRR, ROA and so on) (Jones, 2012), (Lee et al., 2009) as well as for real options valuation. Additionally, in such applications the used data only hardly reflect the economic reality stemming from often complicated and conditioning natural, technical and economic circumstances. We could think of these indicators as they are of more theoretical nature and that it could be more preferred to get more concrete answers to more practical questions. For examples, what there will be Net Worth on balance sheets in particular time periods, or how much cash there will be at the end of venture on account available, or even how much there will be debt indicated in financial statements and so on.

Taking into considerations complex reality within any venture, there are many aspects that can play crucial role in evaluation of a venture. Typical examples are timely and spatially conditioned courses of activities and their performances due to irregularities. Similarly it is with changing economic conditions during anticipated venture. There are changing values of exogenous and endogenous parameters such as orders, interest and exchange rates, taxes, prices, different costs, inflation trends, not to mention changes in funding, structure of owners and lenders with consequences on capital costs. Owing to discontinuous and fuzzy character of such values, taking a long-term horizon under investigation, math formulas can become deficient. So, what can be done to be close to the entrepreneur's point of view, in order to get better understanding and cooperation between entrepreneur and economists?

The basic idea behind the Computer Aided Venture Projection (CAVP) of any business or project venture is to enable the entrepreneur's view and approach to a venture under study from the start of evaluation process. Entrepreneur can during the venture modelling manipulate particular objects (e.g. orders, construction sites, works, buildings, equipments, facilities, activities, operations, even loans and the like) and their attributes (natural, technical, financial and control ones) in construction style. It enables to bring them together into a consistent dynamic model to be ready for a projection run, resulting standard financial statements in defined time periods. In principal, the ability to reflect states and flows of key item values over time into financial statements,

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gives incomparably greater possibilities for insight and investigation of a venture than the currently used methods. With the CAVP a venture designer can change not only the values of key decision variables, but also structural properties and relations with discontinuities in time and space of venture, better approximating the reality (Birkhofer, 2011). If the real option paradigm is considered, it is always possible to set different scenario during venture model projection, e.g. alternating scenario at certain time point or at a relevant event.

1 Problem formulation

For a rigorous definition of the problem it can be effectively used the concept of theory of control, e.g. (Bequette, 2003), (Smuts, 2011), and its apparatus, for given case as follows. Let's have a dynamic system S as a venture case with state vector $x(a,d,t)$ where $(a,d,t) \in A \times D \times T$ is a product element of activities A , domain D and time T . There is known a beginning state of the system in $t = 0$ and final state of the system in $t = k$. Task is to find such trajectory of states in phase space of the system S defined over $A \times D \times T$

$$\begin{matrix} \{UU x(a,d,t)\}^k \\ A D \\ t=0 \end{matrix} \quad (1)$$

to apply:

1. In natural terms projection:

$$\begin{matrix} W(x(a,d,t)) = UUU u(x(a,d,t)) \\ T A D \end{matrix} \quad (2)$$

$$m(W(x(a,d,t))) - > max$$

where

x is a state vector of identified (by nature) and designed (by design and plan) values of attributes of the elements (a,d,t) ,

u - function, projecting the state vector x into natural values of used resources and produced outputs,

W - functional, defined over the set of possible trajectories of system S , representing reports of proposals in natural terms,

m - evaluation operator, conveying optimality of the values of functional W , i.e. the reports of proposals,

subject to

$$\text{for each } (a_p t) \in A \times T: \begin{matrix} U p(x(a,d,t)) = PLP_t \\ D \end{matrix} \quad (3)$$

where

p is a function, projecting vector x into values of watched indicators of a production plan given for the system S as PLP_t for $t = 1, 2, \dots, k$,

a_p - production activity within activities A , generating planned products,

$$\begin{matrix} \text{for each } x(a,d,t): \quad r_t(x(a,d,t_i), x(a,d,t_{i+1})) \in PZST \\ r_d(x(a,d_i,t), x(a,d_{i+1},t)) \in PZSD \\ r_a(x(a_i,d,t), x(a_{i+1},d,t)) \in PZSA \end{matrix} \quad (4)$$

where

r_t, r_d, r_a convey state changes, qualified for advance in time, domain and activities,

$PZST, PZSD, PZSA$ represent set of values limiting admissible changes of states within the advance in time, domain and cooperating activities.

Requirements for a design and a plan of a venture case are formulated by these constraints. Particularly, keeping it with right progress in terms of time, domain and activities. All that means to meet requirements for technologically rational and obligatory advancement of activities, requirements for state changes according to intensities possible in given time and space, also for state changes admissible from viewpoint of technological

cooperation and safety, as well as admissible from viewpoint of consecutiveness and required distances of activities mutually. Such a correct development of modeled venture is assumed to follow from the basic pace and expansion of the core production activity defined already by the constraint (3).

2. In economic terms projection:

$$\begin{aligned} FSR_t(x(a,d,t)) &= UU v(u(x(a,d,t))) \\ AP \\ n(U FSR_t(x(a,d,t))) &\rightarrow \max_T \end{aligned} \quad (5)$$

where

- x is a state vector of identified and designed values of attributes of the elements (a,d,t) ,
- u - function, projecting the state vector x into natural values of used resources and produced outputs,
- v - function, projecting function u into monetary values of used resources and produced outputs, i.e. in monetary units,
- FSR_t - functional, defined over set of possible trajectories of system S as venture case, representing financial standard reports (income statement, balance sheet, cashflow statement and investors structure changes), arranged over time t ,
- n - evaluation operator, conveying optimality of values of functional FSR_t over time, e.g. by means of investment and financial indicators and analyses, or a team expertise.

The formulated problems (2),(5) become unsolvable by methods of contemporary theory of control, i.e. by methods stemming from the mathematical disciplines of standard sets and operators as are differential calculus, calculus of variations and so on.

There was a need to come up with more prospective, experimental methods in the given field, stemming from computer oriented method of projection, which is presented here by the CAVP (Computer Aided Venture Projection) technique. The principle rests in creating entrepreneur's model of venture under study in form of its progress in time and space, i.e. as a dynamic prototype of venture case in computer with aim to optimize it. As the evaluating operators, apart from predominately expert team appraisals, there are different qualitative methods of assessment using multi-criteria approach, e.g. weighting and scoring, AHP, group decision making techniques and others (Ishizaka & Nemery, 2013), (Voronin, 2014).

2 Computer realization

2.1 Model building

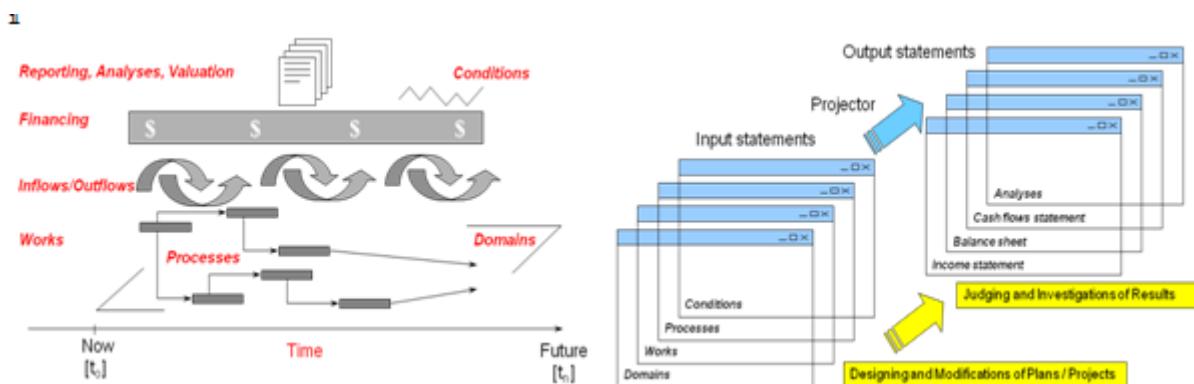


Fig. 1. Scheme of venture model and its statements.

The model building (see Fig. 1) requires a set of instruments available to user to define as truthfully as possible any real venture and its economic situation and to get and to display its results in a convenient form, (Guimaraes et al., 1992), (Power & Shardea, 2007), (Walkenbach, 2010). For this purpose there are defined such facilities, so-called abstracts or elements, as follows:

- domains and their articles, modeling blocks of orders or construction and other sites with premises as certain frameworks, to approximate layout of venture, which can be purposely structured. Domains comprise then some articles with potential volumes creating revenue. They are result of transformation by

- different processes carried over up to the final articles to sell. Generally, domains with their articles represent mainly set of frames with stock of tasks or targets as revenue potential to be processed and realized in economic sense. Some domains can serve just to denote places for defined works and processes.
- works and their inflows and outflows, modeling different procurements and operations according to their specific purpose, which are designed and planned in certain structure and sequence. Operation, including procurement, in general, can be an elementary activity resulting into a visible work, or transforming something into new forms or state, or it can represent accruing physical capital like building and equipment, or is just consumption operation. During their development in natural units as processes, the works are consuming some resources as inflows and makes some waste as outflows. E.g. it can include different material supply, energy, fuel and workforces on the input side, and waste, scraps, exhaust fumes and others on the output side. Every work has defined specific consumption rate of resources and specific waste rate for individual items of inflows and outflows. Such works can then be perceived as certain construction, equipment or activity elements with flexible parametric setting. They can be differently dimensioned and deployed into defined domains with a concrete technical and economic purpose by venture designer intentions.
 - processes and their programming, setting and modeling dynamics of defined works as running operations in domains and time as a growing tree structure to enable to define different conditional relationships among the progressing and cooperating operations. Every complex activity can be coded and modeled by such a tree of works. The tool enables to design and to plan technologically correct course of activities. An elementary process, as a branch of such tree, is programmed firstly by assignment of work to a domain and then setting its performance and conditions for material and time handling during its projected growth.
 - economic items and their values, modeling effects in material and economic values as consequences of designed and planned processes in domains and time, at given outside economic conditions. In such a way an economics of venture under study is always represented by values of exogenous items (changes of outside economic conditions) as are dispatching capacity, prices, taxes, interest and exchange rates, inflation, funding, as well as endogenous ones (changes of inside economic conditions) as are material flows of resources and products, and value flows of costs, benefits, revenues and others. The economic value flows are arranged into integrated income statements, balance sheets, cash flow statements and statement of changes in shareholders' equity, all that in defined time periods. Consequently, it provides a number of indicators usually required within investment and financial analyses for evaluation and decision support analysis. Setting some input items as random or fuzzy allows for sensitivity and risk analyses. Similarly, setting certain special conditions enables to carry out what-if analyses and defining the most pessimistic, or the most likely, or the most optimistic conditions for the venture under study, enables to carry out scenario analyses. Possibilities to other analytical studies are open.

2.2 Model programming

Within the programming of processes which are modeled as a growing tree structure of works there must be firstly decision on their placing in domains as well as decision on advance and pace. All these aspects are then up to the model programming. The programming during a computer session can consist of two following phases. The first one is planning solely production or other revenue generating core process within framework of venture, taking into account different restrictions, demand for the final articles and possible capacities. The second one is planning all the cooperating processes together, respecting already the approved plan of core activity. The core plan works out an optimal advance and pace with possible selection of articles for revenue. In such way it determines also overall expansion of the other conditional processes by linking them to the core ones, thus implying also a certain life expectation of whole venture. The model programming consists then in setting planned values of control parameters for particular processes of the defined tree structure by a team expertise or by support of math subroutine results. Thereby is ensured a correct development of overall venture process on the base of foregoing approved core activity plan.

2.3 Model projection

The projection of a variant of venture can be performed by computer immediately after the user's model programming is completed. The projection itself consists in simulated growth of particular works as branches of the defined tree structure in domains in defined time scale. The driven growth of the works as certain processes consequently invokes sequence of changes in states and flows of the economically and environmentally relevant resources and products, recording it into the defined economic items. Such a projection is possible to perceive as series of economically significant events within the proposed venture, which are displayed and reported by measured development of the defined works in their specific units and by computed course of natural and economic values of the defined economic items over time. Overall development of venture, in the individual work progresses and in the individual input and output flows, all that in natural and monetary units over defined time horizon, is thus recorded, displayed and available.

2.4 Model evaluation

A complete projection as a model of proposed venture can then be evaluated by more realistic analysis and assessment regarding many entrepreneur's aspects. The economic items in natural form represent spent resources and generated products, including wastes, in defined units, whereas the economic items in monetary form are different calculated costs, revenues and other economic/financial items, all due to the development by works in time. The economic evaluation is then represented mainly by appraisal of, finally from the economic item values arranged, financial standard statements/reports (the FSR in math model above) in particular time periods and in a summary after end of modeled venture. On the base of balance sheet, income statement, cash flow statement and statement of changing shares of owners, investors or lenders, many investment and financial indicators and ratios can be defined, reflecting viability and efficiency of proposed venture under study (e.g. NPV, IRR, ROR, PI, B/C, NetWorth, ROE, EPS and others). The possibility of many analyses, as already mentioned above (financial, investment, sensitivity, risk, scenario and what-if), is enabled as well. Additionally, the financial diagnostics available in individual time periods allows for real option valuation and analysis of the proposed venture.

2.5 Model optimization

To optimize a venture model means experimenting with its parameters (the operator m and n in the math formulation of problem above) to search for the best results in the financial statements, indicators and appended analyses as standard outcomes (the functional W and FSR in the math formulation of problem above). Such aim is possible to reach by improvement of engineering, investment, operation and financial decisions on the venture model under optimization, i.e. during making up a design and plan of venture under study. They have the crucial impact on the venture cash flow, that is generally considered to be the "king" for any successful project or business. In terms of the computer realization, the experiments are in essence proposed changes of values in attributes of the defined elements, i.e. in Domains, Works, Processes and Economic Items, when getting better results within the outcomes are expected.

3 Example of application

A case study was done by the CAVP technique, having dealt with a feasibility assessment of business venture. Three shareholders have considered to start up an interesting business with production of a special wooden toy for a foreign customer. He has obliged to buy 8 ths pcs a year for the nearest 5 years at price of 10 USD a piece. The participants have considered to invest 200 ths each in domestic currency, to hire convenient rooms, to take a lease of a car, through a loan to buy a recommended programmable machine to secure manufacturing, to get ready operation and successfully to start up the business. The main intention of study has been to investigate viability of such a project, case of not using the loan, sensitivity on selected economic parameters, and to investigate its riskness at changed conditions, especially as for the estimated costs, inflation and volatile dollar movement. Finally, there have been investigated a possible of negotiated change of the loan terms and impact of order falling-out.

3.1 Domains and their Articles

In business venture they are represented by blocks of tasks for realization with values of their key properties or by sites to designate relevant places with different activities, premises or equipment. In our case, as depicted in the Fig. 2, entrepreneur defined within the Domain statement a very simple case of business domain consisted of one infinite order objedn and two fictive blocks (mesto, vyrabn)representing business sites, city and workshop respectively. None special articles or properties for them is needed, just the infinite volume of order indicated by 999999 there.

Blocks	art1	art2	art3	art4	art5	art6	art7	art8	art9
objedn	999999.0000								
mesto									
vyrabn									

Fig. 2. Statement of Domain.

3.2 Works and their Inflows and Outflows

The works within a business venture are comprehended as a system of works, equipment, operations and others up to management and administration, structured into particular subsystems deployed into business according to their specific purpose. Each of elementary works is described within the Works statement by its key attributes and parameters. First it is its unique name, encoding relevant information about, such as belonging to a subsystem, link to an defined article in the domains, technical and economical type and others. Next, its type of

modeling, maximum performance rate and type of financing are defined. Finally, there are given consumption rates for inflows of individual resources being used by given work, and analogically rates for outflows of individual waste items. As read in Fig. 3, there was only 2 subsystems defined, prefixed by 1 and by 9 as manufacture and management respectively. E.g. the 9zariadN0 represents a procurement of equipment for 200 ths in cash, 9autolizop an operational leasing of car for 100 ths yearly, 1strojN0 procurement of programmable machine for 500 ths by loan UI with 4 years accelerated depreciation, 1vyr1hracS1 manufacturing of the toys with maximum possible performance of 10 ths a year at material and special material costs for 0.1 ths a piece. Finally, the 9uverUI as a loan is defined with 555 principal (one year deferral) at 4 years maturity and 11% interest rate, marked in the statement to be experimented with.

Works	Cut	Mod	Perf	Inv	FinCov	Labr	CLabr	Mat	C Mat	Enr	CEnr	Fuel	CFuel	WrtOff	Other	Watr	CWatr	Spec	CSpec	Fum	Sivg
9vybavP0		0.d	1												10						
9najomP0		0.d	1												50						
9zariadN0		0.ks	1	200										0.25							
9autolizopP0		0.d	1												100						
1strojN0		0.ks	1	500	UI									4							
1pripravV0		0.d	1												50						
1vyr1hracS1	100	% kt	10000							0.1								0.1			
1vyr1hracS2	100	% kt	8000							0.1								0.1			
1vyr1hracS3	100	% kt	6000							0.1								0.1			
1prevyvrP0		0.d	1												100						
9uverUI		0.sk	1	555										4.11							

Fig. 3. Statement of Works.

3.3 Processes and their Programming

Processes are defined as a complex of mutually conditional operations modeled as a growing tree structure of the defined works being localized on or passing through the defined domains. In the Processes statement is firstly defined timescale for such growth, i.e. development of modeled venture. In the next step, assigning of the works to the blocks are made according to proposed business venture. The total quantity to be carried out in particular processes, percentage volume of produced waste and regulation of their output are given either straightly by the user or by using respective subroutines, e.g. in case of setting their output in a time in intentions of some plan. The conditional starts and stops for individual processes in the next columns are referring either to a point on the timescale or to some preceding process to link them conditionally. This input statement is essentially a static representation of programmed dynamic process, ready to run in the next phase. As read in the Fig. 4, there was defined 11 processes each with specific meaning and purpose. E.g. in order the 1st process is arrangement of some matters 9vybavP0 in town mesto starting in the beginning of time scale with one year step there. The 2nd process represents the rent payments 9najomP0 for workshop, all the five years of business venture. The processes 7th, 8th, 9th represent realization of the order objedn for the toy manufacturing according to capacity schedulling available with the conditional starts: parallel with preceding processes (7th) or after preceding process has finished (8th, 9th). Finally, process 11th is anuity repayments of the loan starting at beginning 2nd year with one year deferral as mentioned above.

Act	Op	Block	Work	Quant	Waste	RegOut	Start	Stop	1	2	3	4	5
1	mesto	9vybavP0		1					1	1	1	1	1
2	vyrobn	9najomP0		5			1.0000		1	1	1	1	1
3	vyrobn	9zariadN0		1			1.0000		1	0	0	0	0
4	mesto	9autolizopP0		5			1.0000		1	1	1	1	1
5	vyrobn	1strojN0		1			1.0000		1	0	0	0	0
6	vyrobn	1pripravV0		1			1.0000		1	0	0	0	0
7	objedn	1vyr1hracS1	10000				1.0000		10000	0	0	0	0
8	objedn	1vyr1hracS2	24000				7.0100		0	8000	8000	8000	0
9	objedn	1vyr1hracS3	6000				8.0100		0	0	0	0	6000
10	vyrobn	1prevyvrP0	5				1.0000		1	1	1	1	1
11	U	9uverUI		1			0.0001		0	1	0	0	0

Fig. 4. Statement of Processes.

3.4 Economic Items and their Values

Many economic items are defined to determine external conditions of the venture under study and to record natural and monetary value flows and states, due to the processes and their linking to the different resources and products pools. External economic conditions are represented by values of exogenous variables with important impact on the venture under study. In this application, the following terms were taken into considerations: shipping schedule, regarding buyer requirements and capacity available (uniformly 8 ths pieces of the toy every year); exchange rate for USD (0.030 ths domestic currency) regarding export to a foreign buyer; flat corporate tax rate (19%); zero inflation yearly for the base case; 10 USD price of a toy according to agreement, including transport costs and insurance terms; interest rates on credit (0%) and debit (0%) not to include such factors; keeping working capital at level of 250 ths and outstanding receivables at level of 400 ths and payables at 250 ths yearly. The three investors put in equity 200 ths in cash each in the beginning of venture. Some of the variables (costs, USD, inflation) were defined in dynamic random fashion over timescale of 5 years to enable

sensitivity and risk analysis. Regarding to long-term trends, the expected values are justified. Duties to the government and self-government and next investments in form of private equity and obligations with dividend and interest payments were also possible to include. They would bring changes in shares of investors or owners as well as in capital costs during the venture. All these values of items represent input data of the Economic items statement in the given business venture.

On output side of the Economic items statement are then recorded values of items in natural and monetary units following from the evolution of modeled works as processes. These are already mentioned: produced toy article, different spent economic resources, accrued costs, received revenues and others, all by defined time periods, in the given case - years. In principle, it stems from modeled natural development, flows and states, and consequently from them derived economic value flows and states. The latter are finally arranged into integrated dynamic income statement, balance sheet and cash flow statement and so on, as a projection of the financial standard reports for evaluation of modeled venture under study.

3.5 Projection of Processes

As indicated within the Processes statement in shadow cells (Fig. 4), development of individual processes is projected over the timescale by their realized quantity in respective works' units defined in the Works statement. For instance, the process 1, representing some arrangements by the work 9vybabP0 in town mesto, is done all within the first year. The process 4, as the operational lease of a car 9autlizopP0 in town mesto is for 5 years. The processes 7, 8, 9 represent realization of order objedn scheduled through the 5 years according to the planned starts, catching product costs. Unlike the process 10 is operation of workshop vyrobn for 5 years, catching periodical costs linked with manufacturing the toys. As for the financial process 11 as the last one, it represents repayment of the investment loan 9UverUI to cover procurement of the machine 1strojN0 with the start in 2nd year, when the annuity installments start running up to the maturity date defined in the Works statement, i.e. to the end of 5th years.

3.6 Projection of Economic Items

3.6.1 Natural value flows

This output part of Economic items statement provides projection of natural value courses of economic items over defined time periods, as are resources consumed by processes as well as produced commodities and wastes generated by processes in their natural units as are defined in the Works statement. In this case, natural value flows are modelled just for final production of toys in pieces, so it is simply the 10, 8, 8, 8, 6 ths by years respectively, but with goods despatch of 8 ths pieces yearly uniformly as mentioned.

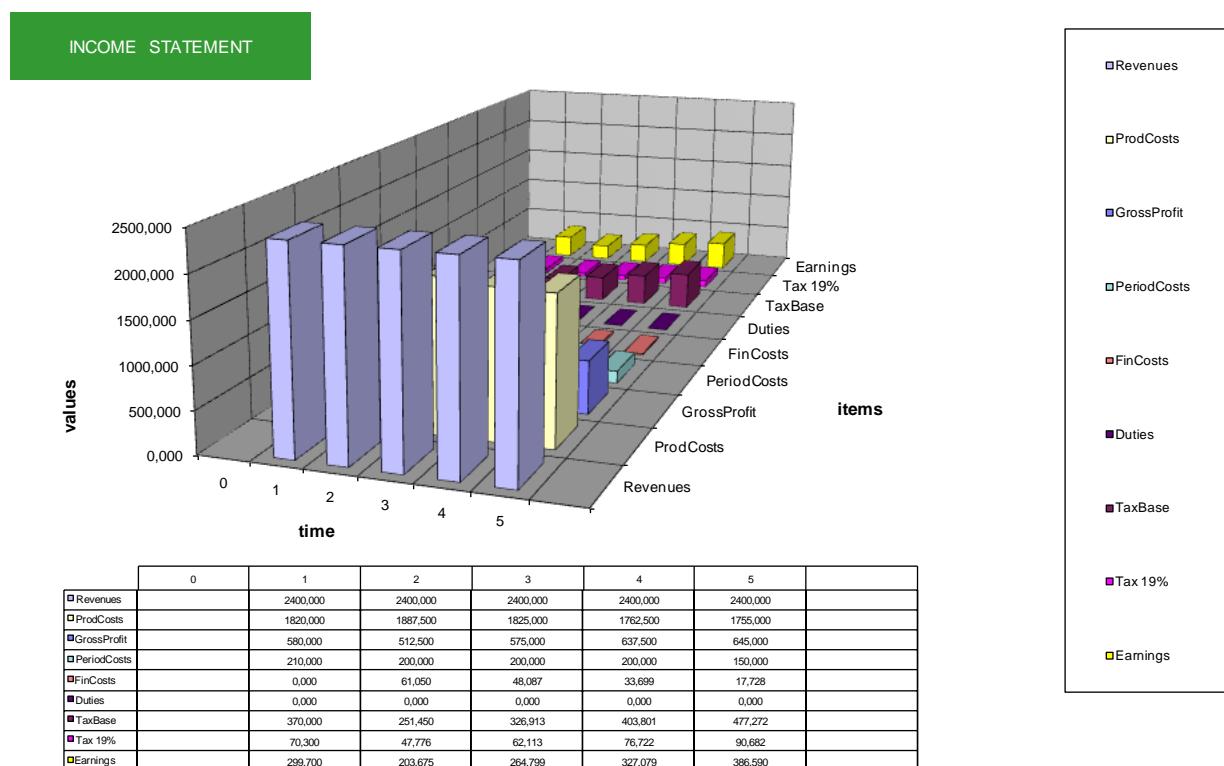


Fig. 5. Income statement within projection of economic items.

3.6.2 Economic value flows

This large output part of Economic items statement provides projection of monetary values courses of economic items over defined time periods as are different costs and revenues, profit and cash flow, but also financial ratios and some indicators for evaluation of the venture under study.

For a comfortable ideal assessment of the venture it is preferred to arrange elementary value flows and states of the items into standard financial statements in table and graphical form. The most sought after are Balance sheet (reflecting states of property and capital available), Income statement (reflecting profit performance) and Cash flow statement (resulting free cash flow available), all that for particular defined time periods. Additionally, statements about shares of investors and lenders funding venture (if varying over time) and about different analyses being performed are available.

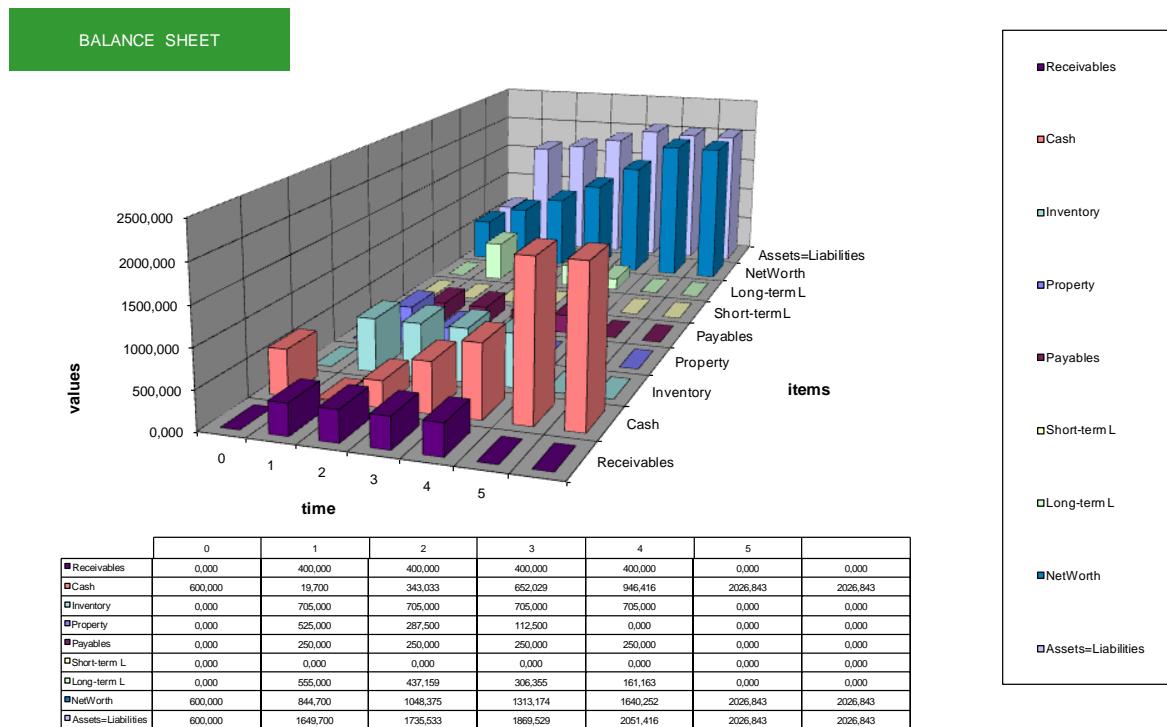


Fig. 6. Balance sheet within projection of economic items.

The Income statement and the Balance sheet for the base case are displayed in Fig. 5 and Fig. 6. The cash flow statement is omitted, but in principle it is always possible to derive and to have available from those two basic statements. As read there, the decisive items within the Income statement, earnings, and within the Balance sheet, free cash flow, both indicate a positive course of the modeled venture. In such a way, the proposed venture under study indicates a successful business with ending level of assets consisting in retained earnings in form of cash amounting to 2026,843 ths without remaining value of property after the 5 years.

3.7 Indicators

The key investment indicators are considered as generally accepted PBP (pay back period), NPV (net present value), IRR (internal rate of return), ROR (rate of return), B/C (rate of benefit and cost), EPS (earnings per share) and Net Worth in balance sheet. The definition of others is open, because many items and values potentially required are available. They can be displayed in table and graph form by time, particularly if real option analysis is wanted, or just in final values, for an overall appraisal. In the base case there are of relevance: NPV of 1426,843 ths, IRR of 57,56 %, ROR of 160.20 % and PBP of 3 years. All the indicators show a positive outlook at the venture under study at given conditions.

3.8 Analyses

There are many types of analyses available, thanks to the rich base of data and results. The financial analysis in the given research consist in assessment of financial ratios and in investigating different possibilities of financing, i.e. by equity, loans or obligations with different capital costs accruing. The investment analysis is dealing with overall viability of venture and with different alternatives of capital allocation into assets.

The sensitivity and the risk analysis focus on investigating impacts of random values of the key drivers, such as prices, costs, inflation and others, on values of the key results, mostly NPV or Net Worth, and in case of risk analysis, displaying them as random variables with their frequency distribution. Analyses, such as scenario and what-if, generally provide a view of venture under study in pessimistic, most likely expected and optimistic conditions, and also special cases being set in the modeled venture, that are interesting from viewpoint of researcher or financial analyst.

Profitability	Net profit / Net sales	0.12	0.08	0.11	0.14	0.16
	Net profit / Total assets	0.18	0.12	0.14	0.16	0.19
	Net profit / Owner's equity	0.35	0.19	0.20	0.20	0.19
Activity	Net sales / Total assets	1.45	1.38	1.28	1.17	1.18
	Receivables collection	0.17	0.17	0.17	0.17	0.00
	Payables collection	0.11	0.14	0.14	0.14	0.00
	Inventory turnover	3.40	3.40	3.40	3.40	0.00
Leverage	Total debt / Total assets	0.49	0.40	0.30	0.20	0.00
	Long-term debt/ Owner's equity	0.66	0.42	0.23	0.10	0.00
Liquidity	Current assets / lab.	4.50	5.79	7.03	8.21	0.00
	Quick ratio (acid test)	1.68	2.97	4.21	5.39	0.00

Inv	EQT	DBT	NetWSt	NetWFin	Ratio
500.000	600.000		600.000	2711.900	4.520
500.000	600.000	loan555	600.000	2026.843	3.378

Fig. 7. Results of financial analysis of venture under study.

Within a financial analysis on Fig. 7 is firstly presented standard of financial ratios over time (collections are in fractal of year) for the base case and secondly there is investigated impact of not taking the loan of 555 ths (DBT) to cover investment (Inv) of 500 ths at the equity of 600 ths (EQT) available, on the final Net Worth (NetWFin). As read, computed and projected values of financial ratios do not indicate some extreme cases and the use of loan has expected worsen the financial result in NetWFin, since such funding has no positive effect at given conditions, just profit for lender for keeping the equity more in reserve.

Variable	infl	Costs	\$
Deviation %	6.00		-6.00
Impact on NPV %	-42.91		-54.68

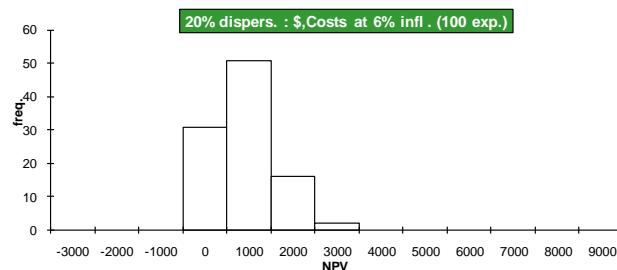


Fig. 8. Results of sensitivity and risk analysis of venture under study.

On Fig. 8, the sensitivity analysis presents impact of 6% inflation and decrease of 6% in exchange rate for USD on the final value of NPV in %. The both variables indicate a relevant impact on financial result of the business under study. The risk analysis has considered random behavior of the USD exchange rate and costs with 20% dispersion at 6% inflation and 100 experiments being carried out, with means of NPV given by the base initial case mentioned above, i.e. 1426,843 ths. Such setting of the values corresponds with possible averse external economic conditions relevant for risk study. The frequency distribution of the NPV values shows a small risk undertaken, since the range of possible NPV values at set conditions is mostly falling into the positive part of x axis.

Experiment	1	2
Variable	loanUI	Sales
Value	4.11 > 3.10	8ths>6ths from 3rd year
Impact		
Variable	dNPV	dNPV
Value	< 2.61%	< 1.84%
		RetEarnings
		NetWFin
		311.987
		1663.8615

Fig. 9. Results of two what-if analyses of venture under study.

For a final example of two what-if analyses on Fig. 9, some impacts of the loan parameter and possible blackout of orders are investigated. In the first, the maturity term and interest rate are decreased to 3 years and 10% respectively. The NPV has increased plus 2.61% compared to the base case and final Net Worth has increased plus 1.84%, that is expected positive effect. In the second, there is supposed decreasing the volume of

sold pieces of toys from currently 8 ths to 6 ths starting from 3rd year. The impact shows particularly the decrease in values of retain earnings to the value of 311.987 ths (cash portion of Net Worth) and for final Net Worth to the value of 1663.8615 ths (1351.875 ths kept in inventory) that means a survival at such averse situation at stable production and with an outlook to sell the inventory in the future.

4 Results and discussion

After some projections with consideration of all the relevant aspects and scenarios, the results indicated that the given business venture project with a life expectation of 5 years, is economically viable. The presented analyses investigated mainly the impact of the USD exchange rate, as a relevant factor in export business, including inflation trend and unpredictable behaviour of business partner. The results indicated minimum risk undertaken at given conditions. The discussion recommended to search for more profitable solutions and further reduction of risk.

5 Conclusion

The paper provided an small excursion via a new technique for projection and evaluation of venture stemming from process control paradigm and realized by computer aided technology concept. An application of the technique to simple business venture was presented. The introduction contains some critical views of contemporary state in given field, i.e. in evaluation, feasibility assessment and optimizing of ventures taking into consideration existence of their different forms. In the next, it is dealing with mathematical formulation of the problem underlying new method and its computer realization. Finally, it presents practical application of the technique. The task was to make viability assessment of the proposed business venture, regarding typical entrepreneur's approach and suggestions. The study provided overall evaluation of the venture including investment and financial analysis, sensitivity and risk analysis, and finally what-if analysis for defined cases.

Many next investigations of venture, but out of usual paper limitation, can be provided by the technique, regarding different entrepreneur's concerns. All that is following mainly from the possibility of excellent approximation real venture processes and situations enabled by the presented conception.

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