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Econometric Analysis on Developing Decision to Promote an Investment Object of Small Business

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ABSTRACT

Econometric applications should be used for decision making on economic issues of the day. One of the most important is access to finance sources, a vital field to the country's economic activity. Accessing funding source involves feasibility studies for decision making on opening funding. Therefore, I decided to approach applied econometrics in the feasibility studies: I avoided advanced software applications, limiting to universally accepted methodology of the World Bank and the functions for calculating Excel spreadsheet-success of a feasibility study is correctness and depth of analysis and processing raw data, not in getting and keeping a reputable software.

1. Introduction

The econometric model is a simplified picture of the relationships between economic variables which concerns both anatomical representation of economic processes (definition of variables) as well as physiological description (relations, compliance, operational mechanisms).

The econometric model is presented as a visual schemes or through equations, shows what is essentially in the aggregate economy, limited to description, often global, transformation that causes the effects on the main sectors of the economy.

Financial analysis is a set of concepts, methods, techniques, procedures and tools that provides treatment of internal and external information, the formulation of relevant considerations relating to the financial situation of an undertaking, identify the factors, causes and conditions that have caused it, and internal reserves for its improvement, in terms of efficient use of human, material and financial resources.

Investment processes constitute the most important stimulus of any economic activity. Investment plays in every business momentum economic generator element that makes it to initiate, develop conditions imposed by the competitive environment of the market economy. Making an investment project has the effect of increasing and diversifying supply and therefore, if it is validated by market revenue growth product system. Simultaneously, however, will be influenced directly by operation of the drive, employability of the workforce. But increasing the number of employees and / or earnings ultimately lead to increased demand for goods and services. There will be an increase in household savings and production systems, thus increasing their financial availabilities will opt for larger and more efficient structures in accordance with the investment options.

According to the World Bank methodology, the feasibility of an investment project is determined using cash flow analysis over a period of ten years, ie the period of active life during which an individual is animated to recover their invested savings. A longer period may be allowed only for legal person engaged in economic activities like big companies: they invest in large industrial sites or in networked industrial-commercial complex systems-see event of the automotive industry developed in social depth to automotive maintenance services level, supply them, etc. For a periods with hundred years and more, could be animated only a perennial legal person like states: they invest in public works such as road networks, rail systems, irrigation systems, public utilities, etc.-are necessary in such complex technical cases on investment decision making. In this paper, we addressed the issue of investment for an individual person trying to access a source of funding, a financial institution which operate including EU funds: this involves a duration of ten years of cash flow analysis, it is essential for a feasibility study, which be developed with complementary analyzes such as analysis risks and uncertainties analysis.

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2. Feasibility study

Cash flow analysis

This method consists in determining the internal rate of return of the proposed investment and net updated value over a period of ten years. Investment project is illustrated in the following table:

Table 1. Virtual data for showing cash flow analysis

Year	Investment	Operationg expenses	Income	Annual total	Current value
0	10000	0	0	-10000	10000
1		800	2300	1500	1500
2		900	2400	1500	1500
3		1000	2500	1500	1500
4		1050	2550	1500	1500
5		1000	2550	1550	1550
6		950	2600	1650	1650
7		900	2600	1700	1700
8		850	2600	1750	1750
9		800	2600	1800	1800
10		800	2600	1800	1800
Net current value					**6250**

If 1 RON would be worth 1.05 RON after deposition for one year and 1.1025 RON after deposition for two years at 5% annual interest, then one RON on next year, worth this year 0.9524 RON and one RON over two years, worth lei this year 0.907 RON at an interest rate of 5% annually. Precisely, this consists in the cash flow analysis method: updating the reference year zero future financial flows, reference year is always year of commissioning the investment object.

In this table are present:

- This year, being the year "zero" when operational investments, followed by ten years, numbered sequentially from 1 to 10, of the period for which the cash flow analysis is performed.
- The investment, in this case € 10,000 representing the total amount on:
  - work on developing technical and economic documentation of design and construction documents for obtaining necessary approvals from state institutions and the financial institution became the source of funding,
  - construction and installation work,
  - purchase technological equipment,
  - assemble technological equipment
  - technological tests and commissioning of the investment objectives.
- Operating expenses include all costs for labor, maintenance of technological equipment, raw and auxiliary materials on current year, excluding costs for:
  - financial remuneration on the source of funding, which is included in investment value
  - reduction in value, they are recorded in the financial accounting and financial costs as being intrinsic income but cash flow analysis in terms of return on investment.
- Total annual means the difference between annual income and annual costs, including investment costs.
- Update value according to the formula

$$VA = Total\_anual : (1+a)^{an},$$

where:

VA—updated annual value,

Total_anual— algebric sum of annual income and annual costs,

an— present year counted from zero reference year of commissioning of the investment object

and

a— update rate, in this case 5% as interest decent rational value.

For this table result the net updated value as sum of annual updated values over ten years: VNA = **6250** €, ie the total net gain of the investor, which will decrease the financial costs and / or benefits related to shares or shareholders. In the calculation spreadsheet that I made I used the function NPV≡*Net Present Value* in *Excel*.

In this situation, independent of the update rate, Internal Rate of Return for string outdated annual totals values is: RIR = **10** %.

Internal Rate of Return allows variation of the update rate in the range $a \in [0, RIR]$,variation which allows developing of risks analysis, the second major chapter of any feasibility study of an investment object. In the calculation spreadsheet that I made I used the function IRR≡*Internal Rate of Return* in *Excel*.

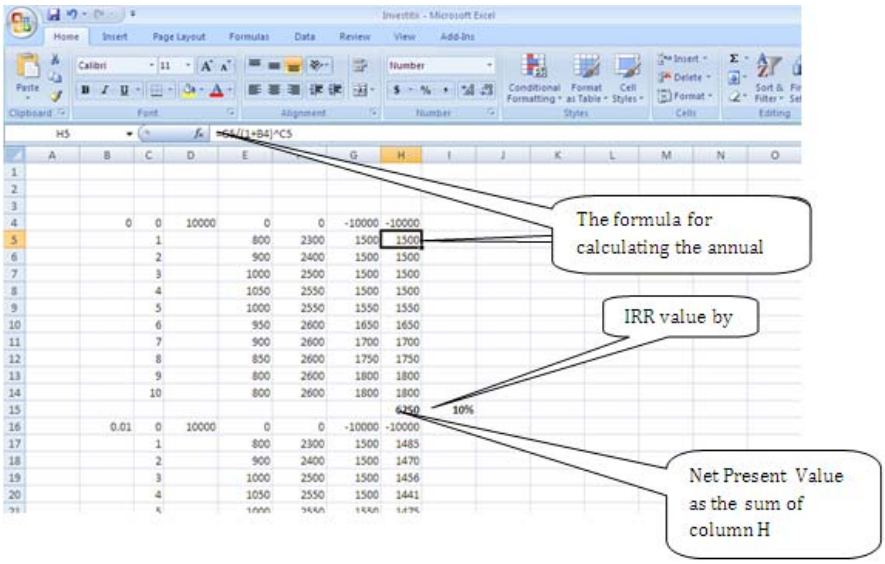


Figure 1. Internal Rate of Return calculation usind Excel

The values listed in this spreadsheet are:
Column **B**: update rate [%],
C: current year,
D: value of the investment [€],
E: annual operating costs [€],
F: annual revenues [€],
G: total financial flows in each year [€]
H: present value of each year [€],total of this column is net present value.

Risks analysis

It should be noted that the risks are intrinsic to their own initiative, having thus endogenous character and uncertainties incumbent initiatives of others, having thus exogenous character: the entrepreneur has an investment initiative, thus assuming some risk, and it does it in a particular environment who knows more or less, being exposed uncertainties.

What's the risk? The probability (or misfortune (!?!)) to not achieve expected net update value year. There are many techniques for calculating risk, the most advanced being the Monte Carlo method. We applied a simpler method determining risk as

$$Rata\_risc = 100 \times \frac{VNA_0 - VNA_a}{VNA_0} = 100 \times (1 - \frac{VNA_a}{VNA_0}),$$

where:

VNA_0— net update value at zero discount rate, $a = 0$, $VNA_0 = 6250$ €

VNA_a— net update value ranging between $a \in [0, RIR]$, $RIR = 0$, for $a \succ RIR$ resulting in a negative net update value and, therefore, it is unnecessary to calculate the risk in this case is clear that it will not get any gain.

Using Monte Carlo method for previous data resulted the following table:

Table 2. Risk analysis using Monte Carlo method

a [%]	VNA_a [€]	Risk rate [%]	Cause	
			Equip.	Personnel
1	5359	14	4,20	9,80
2	4537	27	8,10	18,90
3	3777	40	12,00	28,00
4	3074	51	15,30	35,30

a [%]	VNA_a [€]	Risk rate [%]	Cause	
			Equip.	Personnel
5	2423	61	18,30	42,30
6	1818	71	21,30	49,30
7	1257	80	24,00	56,00
8	1389	78	23,40	54,60
9	248	96	28,80	67,20
10	17	100	30,00	70,00

Based on this table can construct the diagram shown below. With it determines the update rate permissible: considering that the risk is acceptable for up to 50%, that's allowable update rate of 4%: this means that small enterprise manager will avoid bank loans with higher interest rate of 4% - can accept only after a rigorous calculation was developed econometric on "leverage effect" in this case the possible loan of more than 4% interest to ensure economic efficiency by mobilizing funds made available by the holders of shares. This is important in terms of making decisions concerning the action of re-investing the profits animated it needed a loan from a financial institution with an interest rate higher than 4%.

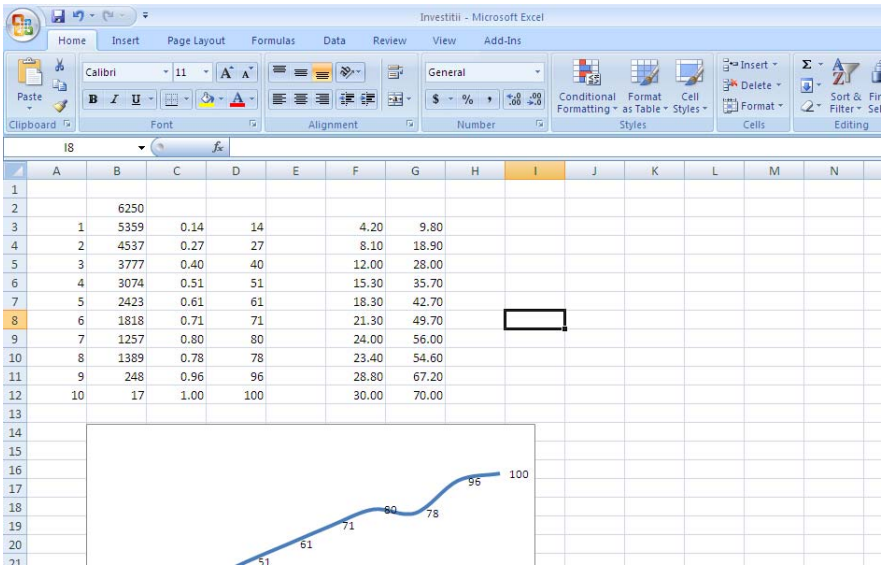


Figure 2. Risk analysis in Excel

The values listed in this spreadsheet are:

Column **A**: update rate [%],

B: Net Present Value at update rate $a \in [0, RIR]$, cell B2 comprising Net Present Value for *a = 0*,

C: risk rate [u.r.],

D: risk rate [%],

F: risk rate caused by technological equipment [%],

G: risk rate caused by personnel [%].

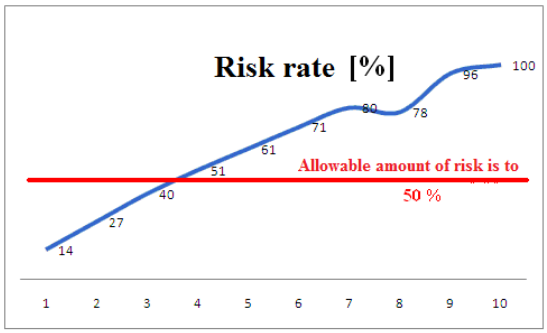


Figure 3. Diagram of variance risk based on update rate

Risk analysis should be completed detailing the risks using a method such as ELECTRE, how it is used by insurance companies and to determine the occupational risks on safety.

Typically, risks are caused by technological equipment and the personnel working in the small business. Risk caused by technological equipment usually has two causes, on the one hand operation as parameters guaranteed by the supplier of technological equipment and other improper maintenance of technological equipment. The first case is more of a legal matter and resolve all the damages, etc., which is outside of the subject. The other case concerns how the administrator manages the small business risk rate, showing the importance that should give technological equipment maintenance, in relation to the extent which forces operation. In this case study follows a risk rate up to 15.3% caused exploitation by technological equipment at update rate of 4%, which implies attention to "reasonable" maintenance of technological equipment. Regarding personal risks caused by exploitation, will be use the method ELECTRE. Usually they take a formula like:

$$Risc\_personal = \sum_{i=1}^{n} c_i \times r_i ,$$

where:

i— number of considered criteria,

c_i— weight criterion i, expressed either as a percentage or in relative units

r_i—risk rate i, expressed exclusively commercial.

For example, be in this case three criteria:

$i = 1$, average age of personnel, where $c_1 = 0,3$ and $r_1 = 28\ \%$,

$i = 2$, average training level of personnel, where $c_2 = 0,5$ and $r_2 = 9\ \%$

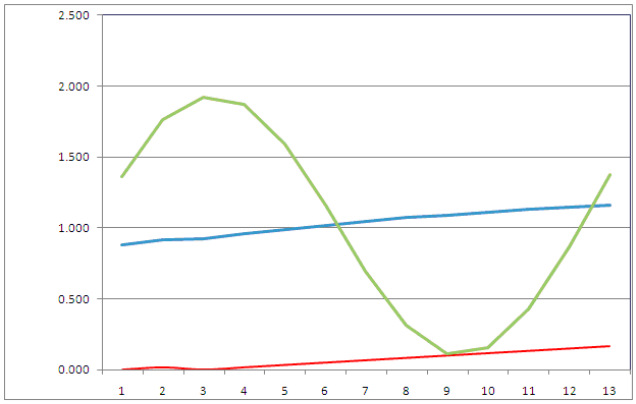
$i = 3$, motivating personnel, where $c_3 = 0,2$ and $r_3 = 12\ \%$,

in which case the exploitation rate risk caused by personnel is 0,3 x 28 + 0,5 x 9 + 0,2 x 12 = 15,3 % < 35,3 % permissible value for the update rate a = 4%, otherwise the need to improve risk rate proceeding in order of weight coefficient of each risk factor, recruit personnel of a certain age, improving training personnel with appropriate training courses and need motivating it by rewarding discriminatory according to results.

All this illustrates that econometrics is a management tool for small businesses, raise the standard allowing them relevant decisions of its manager.

Uncertainties analysis

This analysis of the economic environment refers the exogenous factors on the dynamics of the market and therefore the uncertainty on sales and thus revenue. There are many techniques and, given that it is rather a matter of macro-economy than econometrics, we used a simpler technique as "spectral analysis" illustrated in the following figure:



Green: annual cycle Blue: Kondratriev cycle Red: Wallerstein cycle

Spectral Analysis of uncertainties

Figure 4. Spectral Analysis of uncertainties

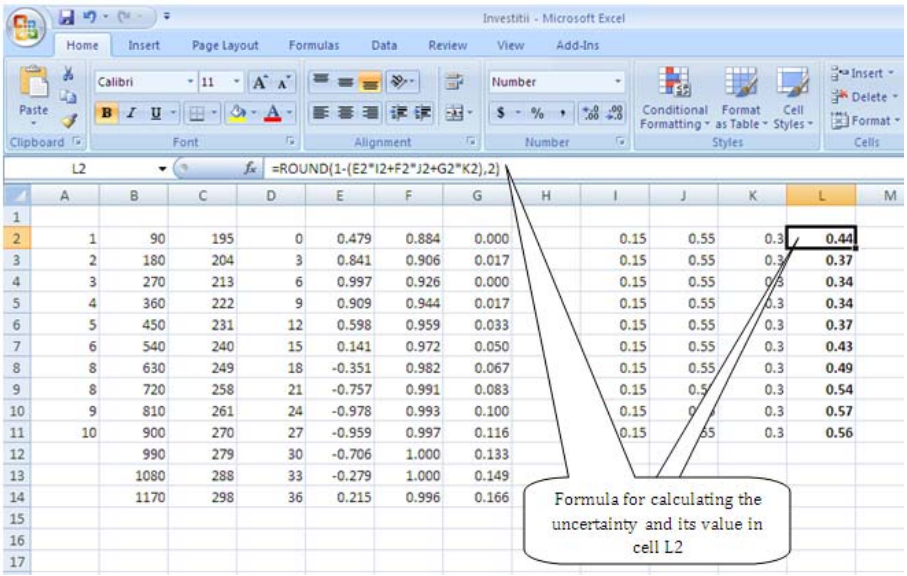
The annual change in sales is illustrated by green sinusoid, the upward phas Kondratiev cycle by blue sinosoid and secular Wallerstein with red. The amplitude of each sinusoid and therefore the weights of each variation were determined based on the following equation system:

1 = x + y + z, expressing maximum relative value when positive peaks coincide with sinusoids,

0,7 = -x + y + z, expressing the average relative value when the negative annual sinusoid is in phase with the positive peaks of the other two

0,4 = x + y – z, expressing minimum relative value when negative Wallerstein's cycle sinusoid is in phase with the positive peaks of the other two.

Solve this system of equations, resulting weights annual cycles, x = 0.15, Kondratiev, y = 0.55, and Wallerstein, z = 0.3, which allowed determination of uncertainty from one year to another as illustrated in figure 6.



	A	B	C	D	E	F	G	H	I	J	K	L
1												
2	1	90	195	0	0.479	0.884	0.000		0.15	0.55	0.3	**0.44**
3	2	180	204	3	0.841	0.906	0.017		0.15	0.55	0.3	**0.37**
4	3	270	213	6	0.997	0.926	0.000		0.15	0.55	0.3	**0.34**
5	4	360	222	9	0.909	0.944	0.017		0.15	0.55	0.3	**0.34**
6	5	450	231	12	0.598	0.959	0.033		0.15	0.55	0.3	**0.37**
7	6	540	240	15	0.141	0.972	0.050		0.15	0.55	0.3	**0.43**
8	8	630	249	18	-0.351	0.982	0.067		0.15	0.55	0.3	**0.49**
9	8	720	258	21	-0.757	0.991	0.083		0.15	0.5	0.3	**0.54**
10	9	810	261	24	-0.978	0.993	0.100		0.15	0	0.3	**0.57**
11	10	900	270	27	-0.959	0.997	0.116		0.15	55	0.3	**0.56**
12		990	279	30	-0.706	1.000	0.133					
13		1080	288	33	-0.279	1.000	0.149					
14		1170	298	36	0.215	0.996	0.166					
15												
16												
17												

Figure 5. Uncertainties analysis using Excel

The values listed in this spreadsheet are:
Column **A**: current year,
B: angle variation of the annual cycle [°],
C: variation of phase angle upward in Kondratiev cycle [°],
D: variation of phase angle upward in Wallerstein cycle [°],
E: function value SIN(Bi/180),
F: function value SIN(Ci/180),
G: function value SIN(Di/180),
I: proportion of variance of the annual cycle,
J: proportion of variance of the Kondratiev cycle,
K proportion of variance of the Wallerstein cycle
I.: uncertainty value.

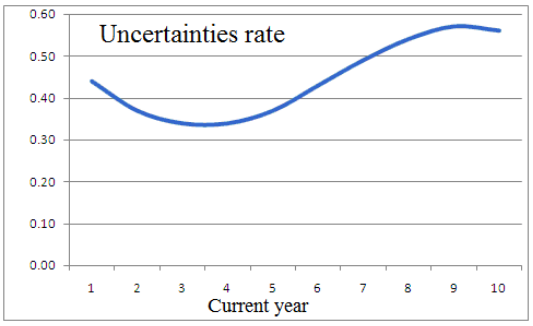


Figure 6. Uncertainties diagram

The result is influenced by the phase difference between sinusoidals, when object operationalization of investment, which raises the question of determining the timing of investment promotion, but the problem beyond the scope of this case study. It can be seen reducing uncertainty during the first years of operation and its growth in recent years of operation of the analyzed period, which is natural for investment for an object that was passed at the appropriate time.

Real behavior of small business and increase performance

In real life, the small entrepreneur plays intuitively role, his acts being (in) validated the current reality, being "lucky" or "unlucky" according to the extent that its decisions are consistent with the actual situation. Econometrics is not an scope in itself, but tool that would (in) validate decisions before spending their money elsewhere. Making abstraction of unfortunate perception "by ear" feasibility studies prepared by impostors that are vectors of corruption through access to various sources of financing, the small entrepreneur should try to move from stage (in) validation of its decisions *post factum* by real situation after consumption his effort, often resulting in bankruptcy at the intermediate stage which should characterize today on (in) validation *ante factum* its decision before you spend money and then to the final stage tomorrow on optimizing and maximizing profit minimizing risks and / or uncertainties. It's therefore the

classical problem of "point in the saddle". In our case should be minimized both the risks and uncertainties. The figure can be seen three mutually perpendicular planes, one horizontal (c) which intersects the vertical planes (a) the uncertainty and (b) the risks: the plan (c) intersects the plan (b) axis x - x and (a) y- y axis after plans (a) and (b) the intersection them in turn axis z - z-plan (a) contains curve whose minimum uncertainty is the point O intersection of the three plans, the plan (b) contains risk curve whose minimum is the same point O of intersection of the three plans for optimization technique is to identify the point a defining an objective function, which must be determined based solution restrictions. Such a problem is difficult to be defined and the more difficult to be resolved. It's still just econometric case study presented above. For the small entrepreneur is still difficult to do. How does he? Intuitively! Basically, it only propose to minimize uncertainties or risks only, that is precisely the area that for certain reasons it best ruler. In this case, the problem "in the saddle point" for the small entrepreneur becomes a problem linear programming, as is illustrated in the figure below. In this case disappears the uncertainty plan (a): in fact, small businesses usually relies on a more or less "occult" command and decide to move to practical action, uncertainties are for this a certainty that he won in a subcontracted work now the problem is to minimize risks. How? Anyway he knows that's the point minimum risk through risk curve in the risk vertical plan (b) is tangent to the plan (c) expressing the business environment in which it operates. He must act so small enterprise to operate from the point of tangency O. How? We build "leisure polygon" about the point O: he identifies various restrictions on business and try to respect each restriction is expressed linearly, because the small entrepreneur does scholarly calculations each restriction is therefore a linear function represented by red lines in the figure below, the resulting polygon intersection of these straight as "polygon leisure" of small business! Obviously, if point A, the minimum risk, within in the "polygon leisure", then small business is feasible and small business is non-feasible since the point A, the minimum risk is outside the polygon leisure. Basically, the small entrepreneur takes absurd risks causing bankruptcy. How much are more several restrictions defining the business, so it's safer to assess the situation: "polygon leisure" is defined more rigorous - is enough to define as many restrictions as to "close" polygon leisure and to ascertain the presence of point A inside the "polygon leisure".

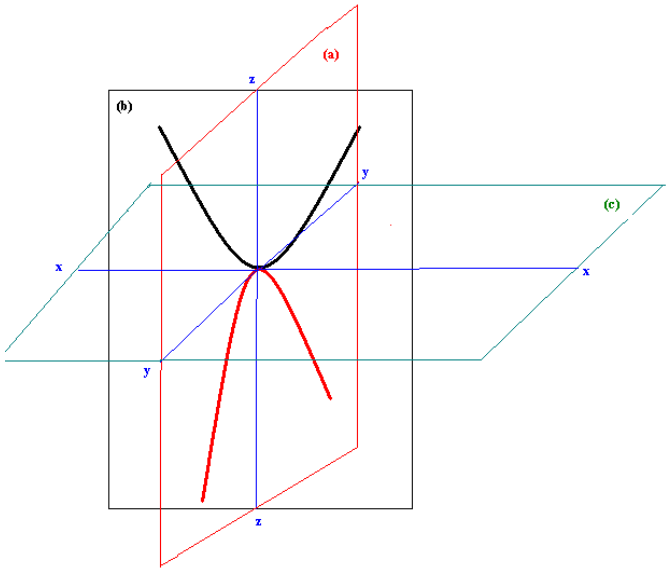


Figure 7. "Point in the saddle" problem

All the above in this paragraph actually shape small business behavior. Similarly can be modeled behavior if it controls risk through professional ability in the business of his undertaking, the problem you have to solve is that of uncertainty: in this case he has to check that the minimum uncertainty within the polygon leisure. You only need to identify restrictions on uncertainties. For example, to draw a line dividing plane (c) the party who can sell and therefore can not sell because of the cost price. Another line will show that dividing plan (c) the party who can sell and therefore can not sell because of the deadline. It can be seen therefore that "leisure polygon" can be "open" when it is enough to identify that existing within its sides point O.

Small business behavior modeling can be used to illustrate how it behaves and, therefore, to what extent its decisions are timely. Show him however, the small entrepreneur opens his eyes on econometrics and became interested, so passing the cognitive phase of empiricism based on experience and intuitive decision, at the cognitive phase analysis based on market research and analytical adoption of the decision. The last phase of evolution is that cognitive modeling economic process of small business / enterprise and econometric adoption decisions.

Three spreadsheet file in annexes of this paper illustrates what the illustrious economist Maynard said that is enough just the four arithmetic operations to develop relevant decisions for the operation of an

enterprise: I wanted to say this because terms such as "objective-based "" polygon leisure "," linear programming "may scare who could be successful in terms of strategic decision making - econometrics must be presented in a" friendly "mode so that student understand and accept the idea that this is the only possibility which may invalidate or, on the contrary, confirm the feasibility of an initiative.

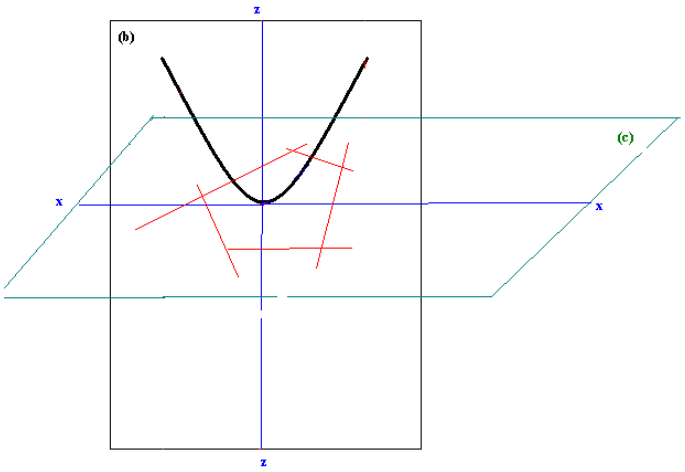


Figure 8. Problem of linear programming

3. Conclusions

The object of the proposed investment is feasible within "reasonable" limits as it is natural to want financing small business to create jobs in a sustainable way, avoiding risks and uncertainties, betting on a technical or technological innovation and/or a commercial or financial speculation.

It was illustrated small business behavior and increase its performance management to illustrate a reality: as ontogenesis repeats phylogenies, there is a recurrent economic phylogenies repeats economic ontogenesis - who ignores it is done to failure, Romania's experience today illustrating an unequivocal regardless of the magnitude of the small enterprise, industry, etc., the small entrepreneur will become manager only when will be finally adopted econometrics. Now there is a danger in Romania, to confuse economics and accountancy: without denying its role should be noted that the ability of managerial is not accountancy: if this is the expert for small business relationships with governments, then is also the basis for econometrics to found in this area database and support necessary for economic and financial analysis. Econometrics must be working tool for developing small business decisions which must ultimately take in small enterprise management.

The case study presented above is an example illustrating what to do small entrepreneurs to develop and adopt a strategic decision: current management decisions are gradually tactical decisions that must leave it to contractors / employees having the necessary professional ability - strategic decisions on resource allocation, how resources are used small enterprises, including especially the funds at its disposal these strategic decisions on resource allocation are the manager prerogative and the small entrepreneur should gain the ability to do otherwise was sentenced bankruptcy.

Conditio sine qua non on managerial skills development and adoption of strategic decisions is the rule of econometrics: it's enough to read and comprehend and understand econometric report without having the very small entrepreneur to prepare.

We present this case study eminently pragmatic considerations: in contrast with the preconceived idea that economists are accountants in business or in state institutions and officials in banks, the economist is a person proactive, generating the management decisions, animating national economy through small and medium business - econometrics not limited to strict record transactions or market segmentation analysis through passive but acts by developing and adopting a proactive decisions through to fruition main resource, labor!

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