

## Cybernetic Methodology for the Forecasting of Global Economic Crises

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### Abstract

*There are a lot of scientist economic research which are devoted to the problems of world economic development and the reasons of economic crisis but these problems have no real solution. Actually the existing economic theories can't forecast economic crises. As a result economic crises are happened suddenly and only afterwards the experts tried to explain their reasons. But the "explaining" are too late, economic crisis already had grave consequences, especially for the pure and small countries with transient economy, as it happened recently. From the cybernetic point of view the problem of economic crisis' forecasting is the topic of management in the conditions of not full information. In this case it is possible to conduct the optimal management (i.e. forecast economic crisis) on the basis of the factors' analysis and consideration probability characteristics of "noise". The article considers an opportunity of economic crisis forecasting on the basis of cybernetic methodology that gives a chance both to the countries based on global economy to avoid or weaken results of the global economic crisis and to business companies to craft an optimal strategy of a company's development during the crisis.*

**Keywords:** *Economic crisis, forecasting, "shadow player", environment analysis, winning strategy, cybernetic approach, "noise", feedback, Bayesian methodology.*

*"The one who does not reflect on far difficulties,  
has to wait troubles soon by all means"  
Konfutsy (Kun-Tzu)*

### Introduction

There are a lot of scientist economic researches, which are devoted to the problems of world economic development and the reasons of economic crisis but these problems have no real solution. Actually the existing economic theories can't explain the nature of modern economic relations and forecast economic crisis

As a result economic crises are happened suddenly and only afterwards the experts tried to explain their reasons. But these "explainings" are too late, the economic crisis already had grave consequences, especially for the pure and small countries with transient economy, business companies of these countries are especially vulnerable.

Policy makers, businessmen, managers have to understand or to go through the key areas which can affect a business and/or policy of a country. The key areas of business activity include a lot of various political and economic factors, among them we can detach those which are out of the firm's control (fiscal and monetary policy, population levels, the labor market, etc.) and those under the firm's control (costs, prices, profits, product development). By understanding the issues surrounding these varied subjects any policy maker, businessman, manager should be able to better analyze the existing data and construct practical and

useful forecasts from them. Forecasting is an art as well as a science - successful policy maker or businessman, effective manager must unlock its secrets.

Not all businessmen, managers or decision makers have to make forecasts or conduct market analyses, but since they all will be in situations where they must make decisions using these data, it is important that they understand how those data were derived. In conditions of stable development of the world policy and economy it is possible to decision-makers of a company (provide policy makers of a country) with a reasonable understanding of the tools most widely used for making sales forecasts and analyzing markets. Political analysis and forecasting is not so easy because of in this case we have no relevant information as in case of economic data, but economic development is connected very closely with political situation, so in order to make correct economic forecasting it is necessary to take into account political consideration, and in order to make political forecasting it should be considered economic consideration, including a possibility of political and/or economic crisis. Information from sales forecasts and market analyses usually acts as the focal point for a firm's planning activities. The firm has to use various fiscal and economic data to guide its inventory, decisions for any type of activity as well as its decisions related to the expansion/contraction of its work force. Fiscal and economic data also influence a firm's expansion to new areas, its purchases, capital investment, its promotional and market activities. Because these data play such an important role in a firm's planning process, it is crucial that these forecasts and analyses be accurate and that decision makers understand how they were derived.

As people advance in their business careers, the number of situations requiring decisions and the impact of those decisions increases dramatically. Successful managers or decision makers seem to have two inherent qualities: a willingness to make tough decisions and a high rate of success in those decisions. Their success flows from an ability to combine intuition and general know-how with solid information. This know-how might be a formal technique used to estimate future events, or it could be informal set of procedures the decision maker developed just for this situation. In any case, the more tools a decision maker is familiar with and can use, the greater his/her chances will be for making right decisions.

But in conditions of the world economic crisis, which as usual is unexpected attack to an economy of the world, all normal estimations of a business development became un-useful and, as a result, most of companies, especially the companies with not strong financial background, declare their bankrupt, which is followed by various, very unhappy consequences - arising of unemployment, inflation, etc. (sometimes including – political crisis). Of course we have to admit that not only objective economic processes are the reasons of global crisis, an essential role is belonging to the “shadow players”, which artificially stimulate the crisis situations.

Nevertheless, it is clear that forecasting is very essential for any type of activity. Generally, it is possible to forecast economic development of a country (an industry, a company) only in more and less stable political and economic situation. Unfortunately, as a world economic history shows it was impossible to forecast the world, global economic crisis.

What is possible to do? What is possible to do? It is necessary to develop methods of economic crisis forecasting, even if the accuracy of forecasting is not satisfactory from the point of determination of the exact dates and places of crisis beginning. Only to give notice about economic stability changing (worsening) should be enough in order to craft a new strategy, which will help a company (a country) to save a company (country's economy) without great losses.

The article considers an opportunity of the world (global) economic crisis forecasting on the basis of cybernetic methodology that gives a chance both to the countries based on global economy to avoid or weaken results of the global economic crisis and to business companies to craft an optimal strategy of a company's development during the crisis. In this case the role of forecasting is possible to introduce as it shown at Fig. 1 (Bagaturia, 2011, p. 21), which presents the external-internal framework of strategic situation analysis and

forecasting for a single-business company. It indicates both the analytical steps and the connection between business forecasting and winning business strategy.

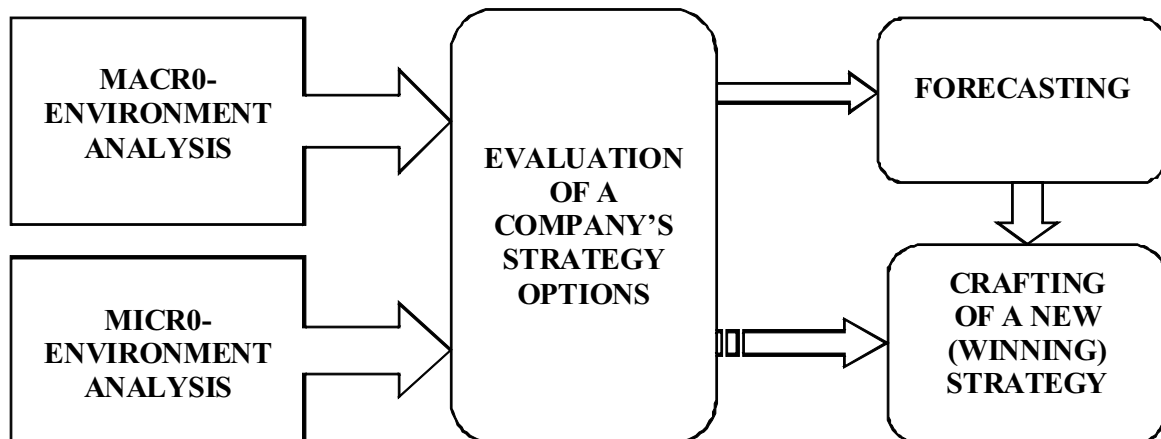


Figure 1. The Role of Forecasting - From Analysis & Forecasting to Winning Strategy Choice.

Generally forecasting is needed in order to choose a winning strategy for a company's (a country's) successful development on the basis of three fundamental analyses. The fundamental directions of the analysis includes

1. Macro-environment analysis i.e. analysis of national & global economy, industry and competitive conditions, political situation, etc.,
2. Micro-environment analysis i.e. the company's (country's) own internal situation, political-economic stability, competitive position (particularly for a business company), etc., and
3. Evaluation of existing strategy of a company (a country)

In this case we can note the logical flow from analysis of the company's external and internal situation to evaluation of alternatives, forecasting of each alternatives and to choice or to craft of a new (winning) strategy that includes establishing a mission, setting objectives, goals, aims, tasks, criteria, etc., generally - the ways of a company's development.

The necessity of such analysis is shown more clearly if we use the cybernetic approach

### Cybernetic approach

Forecasting is the process of estimation of various events in unknown situations. From another – *cybernetic* - point of the problem of economic crisis' forecasting is the topic of management in the conditions of not full information. In this case it is possible to conduct the optimal management (i.e. forecast economic crisis) on the basis of the factors' analysis, consideration probability characteristics of “noise” and feedback.

Cybernetic approach considers an economic system from the position of the theory of management (Bagaturia G., Bagaturia O. 2005). Such approach must be used for management and analyzing of economic processes, among them for the tasks of business management. The fig. 2 shows general structure of an economic system from the point of cybernetic view. The processes taking place inside are unknown or little known for us. At our disposal there're outside processes acting on the economic system (denoted as X) and the reaction of the object on this influence, its response (denoted as Y).

The task of optimal management is to form and implement such decisions (managing influence - denoted as U) that will give opportunities to achieve the aims with consideration of social-economic, political processes taking place outside and inside of the object i.e. existing value of entrance factors and influence of

„noise“. Particularly for the economic system inside and outside processes are estimated by GDP, Export-Import Balance, Income, Costs, Unemployment level, FDI, Currency rate, Inflation rate, etc.

For checking up how well we achieve planned goals, the criterion of estimation must be selected rightly. According to the criterion we have to ascertain how effective is our decision, how we're approaching to our goal. After decision making and its testing realization it's important to analyze the feedback information. Decision should be corrected, changed or finally realized according to feedback results. May be it is necessary to reconsider the criterion of optimality and demands to entrance factors too. The criterion is strategic if its can change in compliance with changing circumstance.

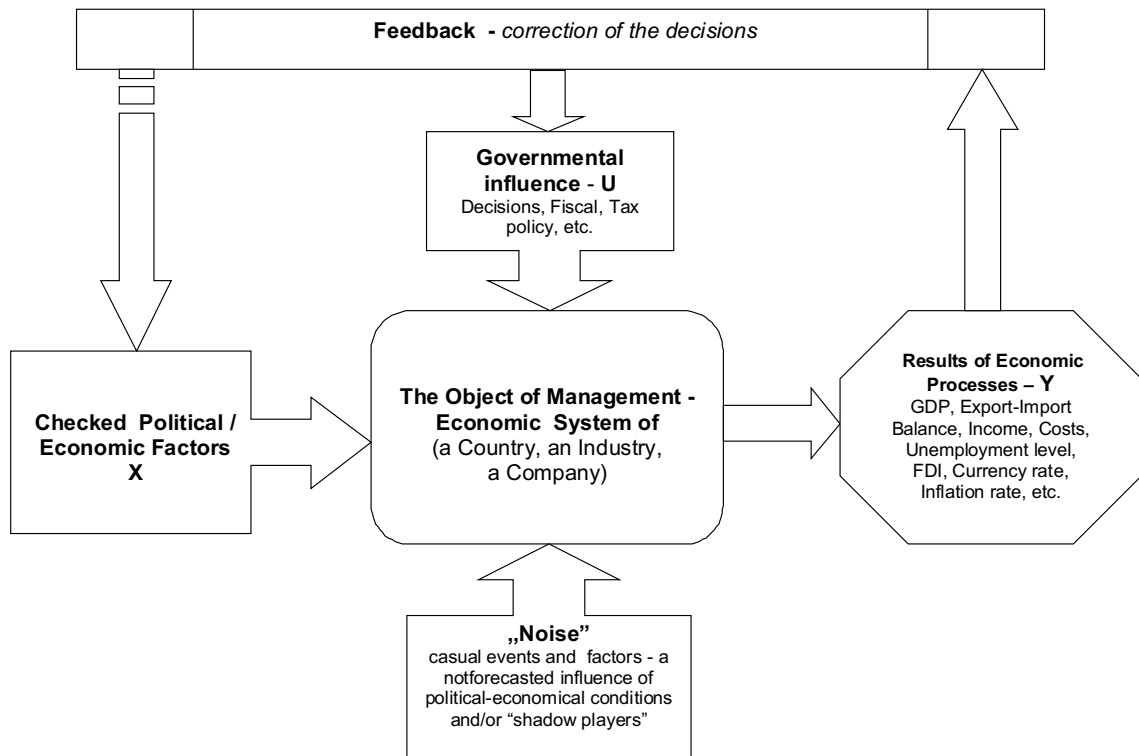


Figure 2. Cybernetic model of economic system management

Economic process, functioning of a country's (a company's) economy is influenced by the inside and foreign political-economic circumstances as well. The character and intensively of influence, time and place of its appearance aren't define in advance, particularly in the conditions of unstable political and economic circumstances. Generally, such situation is in the developing countries of transitive economics. Nonprogrammable and unpredictable action of political-economic circumstance as a rule makes negative influence of the functioning of the existed political system, so, political-economic environment should be belonged to „noise“ in accordance with point of management view. By the using of the feedback link theoretically is possible the prognostication of influence of political-economic „noise“ (including influence of the “shadow players“) and the choice of relevant strategy. In the conditions of effective and viable public management the feedback influences on economic system and forms various demands that finally will stimulate the achievement of ultimate aims.

In case of correct definition of X, U, Y, „noise“ it is possible to estimate (i.e. to forecast) the probability of changing of any factors of the economic system. For this reason we use Bayes Methodology

### Bayes methodology

Consider event X (crisis), which is happened by

$$Y_i, i=1,2,\dots,n$$

ways.

Say we know the *priori* probabilities  $P(Y_i)$  (*hypothesis about X occurs*). The question is: How will change  $P(Y_i)$  after X happen? So we have to estimate a Posterior probability

$$P(Y_i/X) = ?$$

In accordance with Bayes formula we have (Aczel, 1996, p. 703)

$$P(Y_i/X) = \frac{P(Y_i) \times P(X/Y_i)}{P(X)},$$

Where

$$P(X) = \sum_{i=1}^n P(Y_i) \times P(X/Y_i).$$

So, it is possible to forecast probability of crisis occurs

$$P(Y_i/X)$$

on the basis of priori probability

$$P(Y_i)$$

For the practical using of above mentioned methodology it is necessary to be listed and estimated:

- The ways of crisis happening –  $Y_i$ ;
- To evaluate Priori probabilities  $P(Y_i)$ ; and
- To evaluate Conditional probabilities  $P(X/Y_i)$ .

For this reason it is necessary to utilize environmental scanning techniques. *Environmental Scanning* involves studying and interpreting social, political, economic, ecological, and technological events in the effort to spot budding trends and conditions that could eventually affect the industry. It attempts to look broadly at “first of its kind” happenings, what kinds of new ideas and approaches are catching on, Environmental scanning raises managers' awareness of potential developments that could have an important impact on industry conditions and pose new opportunities and threats. Environmental Scanning can be accomplished by systematically monitoring and studying current events, constructing scenarios, and employing the judgemental (Delphi) methods (a technique for finding consensus among a group of “knowledgeable experts”). Although highly qualitative and subjective, environmental scanning helps managers lengthen their planning horizon, translate vague inklings into clearer strategic issues (for which they can begin to develop a strategic answer), and think strategically about future developments in surrounding environment. The scope of monitoring must be both financial and strategic objectives (e.g. Revenue growth; Dividends; Profit margins; Higher returns on invested capital; Stronger bond and credit ratings; Bigger cash flows; A rising stock price; A more diversified revenue base; Stable earnings during recessionary periods; Market share changing; Industry rank; Higher product quality; Lower costs relative to key competitors; Broader or more attractive product line; A stronger reputation with customers; Superior customer service; A leader in technology / product innovation; Increased ability to compete in international; Expanded growth opportunities; etc.), tendencies of the global and national economy, chief characteristics of the national economy and the industry; relations between national and global economy, driving and competitive forces, companies competitive positions, future competitors, key success factors, etc.

At the same time a forecaster has to take into account a threat of mistakes. These mistakes, basically, are connected with consideration only one variant of succession of events, with errors of extrapolation, with putting on high hopes on use of mathematical methods or, on the contrary, with ignoring of mathematical methods, with insufficient attention of an estimation various factors, with failure to take possible changes into

account and, at last, with self-deception when in the real phenomena businessmen or managers do not notice dangerous tendencies and remain in a captivity of illusions.

### **Conclusion**

Who does need forecasting? Almost every organization uses forecasting either explicitly or implicitly, they must plan to meet the conditions of the future for which it has imperfect knowledge. Forecasts are needed in finance, marketing, personnel, and production areas, in government and profit-seeking organizations, in small social clubs, etc. Is it possible to forecast the global economic crisis? Exactly forecasting is not possible but the article considers the opportunity of global economic crisis forecasting on the basis of using the cybernetic methodology and methods of stochastic processes analyzing (Bayesian methodology). The above discussed methodology gives an opportunity to forecast the Probability of crisis and make the relevant recommendations for the countries and companies in order to design the optimal strategy.

E.g. building crisis in Georgia and CIS countries was possible to forecast 2-3 years before, when in USA hypothecary (mortgage) problems began. Georgian companies which in that time have sold the property by low (but not panic) price have survived. Otherwise, the companies which didn't pay attention to USA real estate problems now declare bankrupt.

The successful business executive is a forecast first. So, on the basis of correct implementation of above discussed methodology it is possible to forecast the crisis and develop company's (country's) strategy accordingly.

### **References**

Aczel A.D. Complete Business Statistics. The 3rd edition. Bentley College. Irwin, McGraw-Hill, Boston, 1996.

Bagaturia G. Business Forecasting, International Black Sea University, Tbilisi, 2011

Bagaturia G., Bagaturia O. Cybernetic Conception of Public Management Bulletin of the Georgian Academy of Sciences, 171, # 2, Tbilisi, 2005