1st World
Sustainability Forum
1-30 November 2011

Prof. Ph.D. **Aleksandras Vytautas Rutkauskas**
Ph.D. **Viktorija Stasytyte**
Ph.D. student **Indre Lapinskaite**

SUSTAINABILITIES PORTFOLIO AS SYSTEM TO ENVISAGE AND MANAGE UNIVERSAL SUSTAINABILITY

Abstract

- The purpose of this paper is not to analyze the sustainability of universe, but try to conceptualize what the universal sustainability is, when it comes to a single country or region, wherein realistically the religious, political, social, economic, environmental and investment subsystems are revealed as the vitality of spiritual and material existence media or maybe wherein the signs of erosion of the subsystems (as the of self-organized entities) correlation or development.

- Invoking the expert methods and abilities of the portfolio's techniques, the problem of optimal allocation of financial resources among the separate sustainability's subsystems, is trying to be solved, which would let to reach the nourishing standards of universal sustainability.

- The universal sustainability index for the country was chosen the particular composition of that country's sustainability subsystems indexes.

- In the dynamics the index is known as random process and its force for a particular moment is measured by the level of index and level's reliability or guarantee.

- To solve the problem - financial resources allocation in order to reach the maximum power of sustainability index, the idea of Markowitz random field was invoked, and a means for the technical solution the system of simulation models and decisions - "GoldSim" was used.

The Concept of Universal Sustainability

- Speaking about the problems of evaluation and management of sustainability usually set of sustainabilities or a structure of universal (from the Lat. universalis) sustainability is chosen, revealing the possibilities to formulate and solve the specific sustainability problems.

- Mostly the *social*, *economic* and *ecological* sustainability's subsystems are highlighted, often – *investment* and *political* sustainability subsystems and rarely – *religious* sustainability subsystems.

The Concept of Universal Sustainability

- The main objective of each universal sustainability's subsystems in a more simplified way could be understood as a subsystem's ability to maintain with the high level of guarantee the certain foundation parameter's level above the critical threshold, while dropping below the threshold the subsystem starts to lose its ability to rebuild itself as a system.

- Undoubtedly the main question is rising - what kind of ability the universal sustainability should foster?

- Searching for an answer to this question deterministically the idea is coming that this feature conceptually should be understood as preservation of the subsystems' ability to interact.

The Concept of Universal Sustainability

- *The key tasks here are* - to understand the content, methods and consequences of the universal sustainability and be able to simulate adequately those processes in order to create the assumptions for the various specialists of subsystems to discuss on the basis of quantitative information.

- Further calculations are based on Lithuania case.

Sustainability Assessment Problems:

Ought Universal Sustainability's Index to be Adequate Measure for Sustainability Strength Assessment?

Interaction or the ability to interact - is there a difference?

- Humankind meeting the requirements and continuously growing needs, as the result both the population growth and irrational usage of needs, send a signal about possible catastrophic results in the future;
- An area that has come to be called sustainability science has emerged;
- Sustainability is not yet an autonomous field or discipline of its own, and has tended to be problem driven and orientated towards guiding decision- making;
- There is a hope and necessity that knowledge about the interaction of sustainability's subsystems will become the first and most important problem of this science.

Fund Allocation According Sustainability Index Strengthening Directions

- With the help of specific measurements got from lower level of subsystems and based on expert evaluation, we find out how the usage of the marginal financial unit weighty with amount of expenses impact the changes of index.

- This impact is estimated as stochastical variables in the indexes of subsystems.

- The existing state of system characterized by index could be changed (multiplied) by the coefficient:

$$C = N(a_{si}, \sigma_{si})^{w_i}$$

Fund Allocation According Sustainability Index Strengthening Directions

Expert assessed such values of coefficient:

- N (0.9; 0.1) – for religious subsystem;
- N (0.93; 0.11) - for political subsystem;
- N (1.05; 0.05) - for investment subsystem;
- N (1.02; 0.04) - for ecological subsystem;
- N (0.96; 0.12) - for economical subsystem;
- N (0.99; 0.13) - for social subsystem.

Fund Allocation According Sustainability Index Strengthening Directions

- The force of index is calculated with analog of utility function:

$$U = u(e, p, r) = \frac{ep_e}{r_e}$$

Where:
e- The value of index possibility
p- The guarantee of the possibility (p {ξ≥e} =pe)
r- Riskiness of possibilities

Fund Allocation According Sustainability Index Strengthening Directions

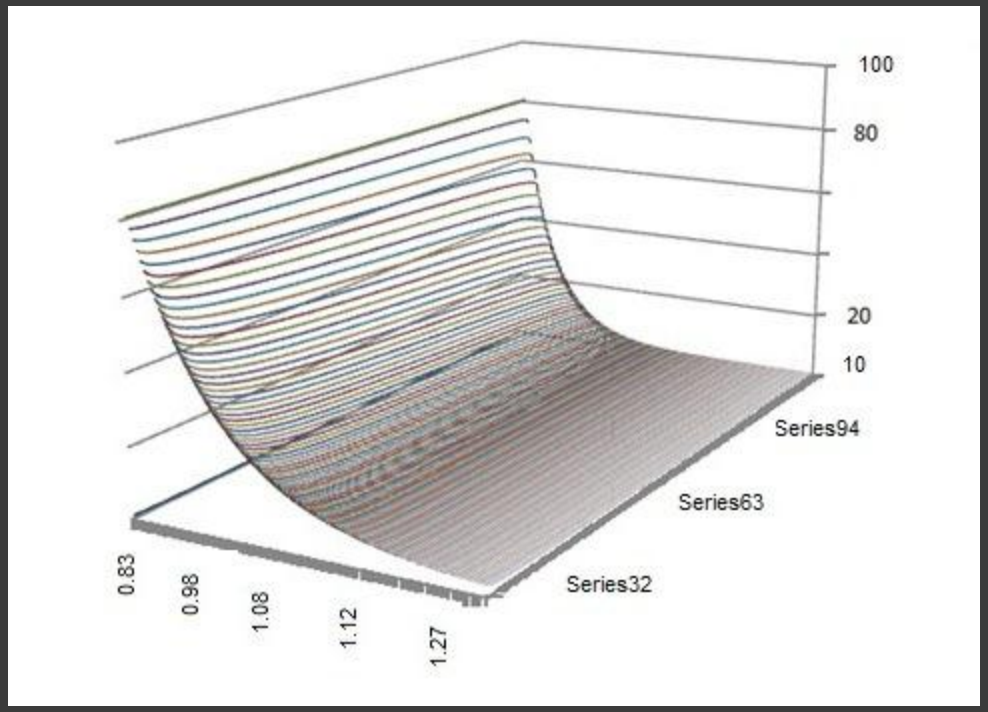

Figure 1. The set of index changes possibilities

Fund Allocation According Sustainability Index Strengthening Directions

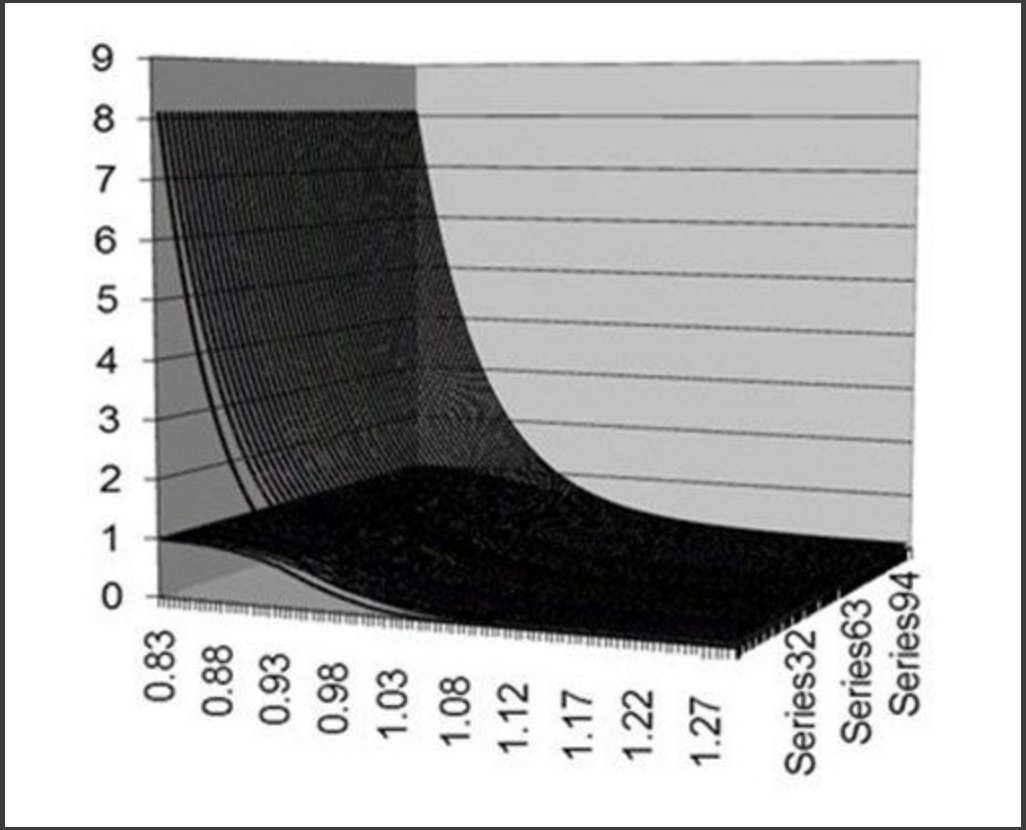

Figure 2. The interaction of index changes possibilities surface with the utility function

Fund Allocation According Sustainability Index Strengthening Directions

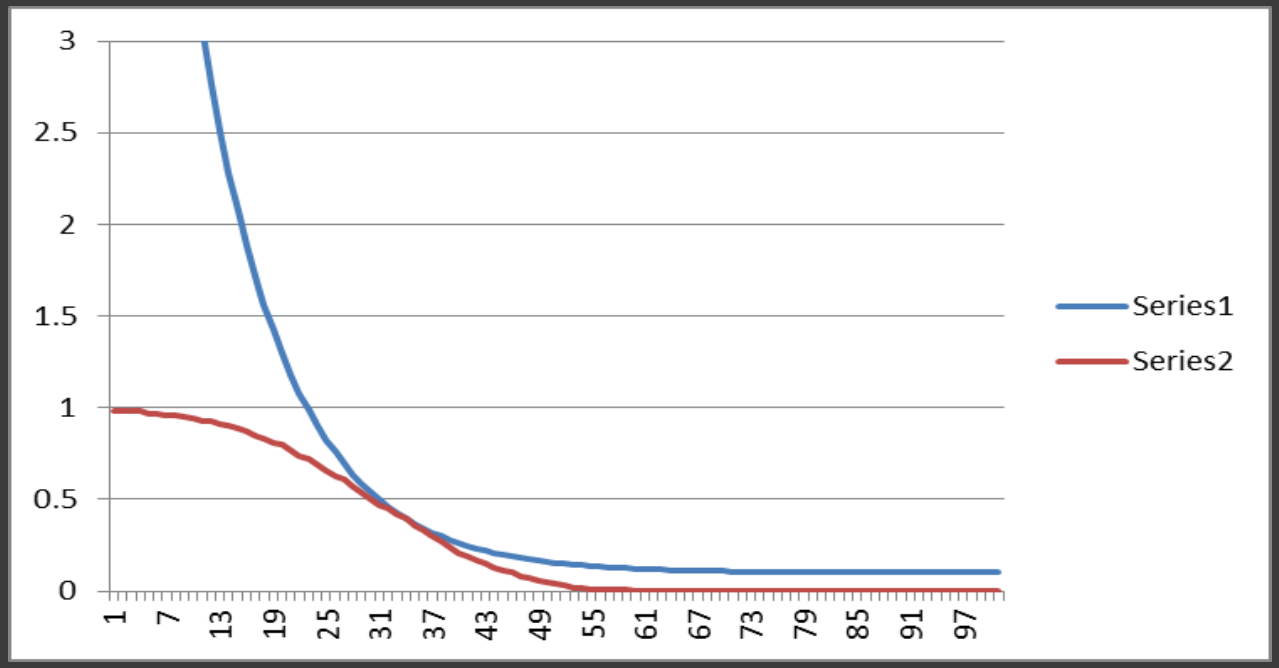

Figure 3. The best possibility choice

CONCLUSIONS

- The definition of universal and general sustainability could become a stand where the indexes of separate subsystems are commensurate.
- Expert systems and simulation technologies are capable means for solving the tasks of optimal allocation of resources.
- The idea of Markowitz random field is effective means of stochastic optimization.

THANK YOU!