



InterSymp-2006

18th International Conference on Systems Research, Informatics and Cybernetics
(August 7 - August 12, 2006, Baden-Baden, Germany)

PRE-CONFERENCE PROCEEDINGS

of the Special Focus Symposium on

4th CATALLECTICS:

Quantitative-Behavioural Modelling Of Human Actions and Interactions on Markets

Monday - Tuesday, August 7th – 8th, 2006

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(AND JOINT SYMPOSIUM CHAIRS)

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Zagreb, 2006





Preface:

Focus of the Symposium

The paradigms in finance are on the brink to change (cf. Ross 2005): the major assumptions of neoclassical finance are obviously not consistent with the facts and figures characterising reality grasped by the data and methods available today. Two aspects need to be addressed: the one is the decision-making based on the *rational man* assumption and the other is the *no arbitrage* assumption.

The first ignores the circumstances caused by the decision-making by individuals; the necessity to regard these behavioural aspects led to behavioural finance. The importance of behavioural/psychological aspects was already underlined by scholars like von Hayek a long time ago. Von Hayek's arguments, however, suffered from the absence of a formal treatment. The eschewal of formal tools also endangered the behavioural finance approach. Discrete choice models do offer a methodology to treat psychological aspects formally. (cf., esp., McFadden 1999).

The *no arbitrage* assumption ignores the existence of and the effects generated by markets: the major deficiencies might be characterised by the neoclassical procedure to search for arbitrage opportunities by methods that are grounded on the assumption that there do not exist arbitrage opportunities. The importance of markets has been known long before the predominance of the neoclassical paradigm. The appropriate term has been *catallactics* – quite in use since the 1920s – and has been rediscovered by those dissatisfied with the shortcomings of the neoclassical theory. Buchanan (2001) has raised the postulate of observing *catallactics* again and has called for *mathematics of economic interactions* instead of *mathematics of optimisation*.

We apply the term *catallactics* announcing the 4th Special Focus Symposium, even if our call is meant to encourage particularly, but is not limited to, the submission of papers addressing both aspects with a combined methodology.

Cited Literature

Buchanan, J.M. (2001): Game theory, mathematics, and economics, *Journal of Economic Methodology* 8, pp. 27-32.

McFadden, D. (1999): Rationality for Economists?, *Journal of Risk and Uncertainty* 19, pp. 73-105.

Ross, S. (2004): A Neoclassical Look at Behavioural Finance, IMA Public Lecture Series, Institute for Mathematics and its Application, University of Minnesota, March 30, 2004.

Topics may include, but are not limited to:

- Interactive agent-based modelling of dynamic market processes



- Human learning and decision-making on markets
- Emergent impact of market microstructure on market outcomes
- Non-equilibrium asset pricing
- Evaluation of discrete activities

Call for Papers

Papers that address any of the above listed issues are invited. An abstract of approximately 200 words should be submitted for evaluation. All proposals will be judged on the basis of their scholarly quality, originality and potential for further discourse. Abstracts may be submitted electronically (Microsoft Word preferred) or by mail

March 19, 2006 to:

Prof. Dr. Vladimir Šimović, Joint Symposium Chair

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Department of Informatics, Croatia, & College of Business and
Business Administration "Baltazar Adam Krčelić", Zaprešić,
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with a copy to: **Prof. Dr. George E. Lasker**, Conference Chair

President of The International Institute for Advanced Studies
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Review Process and Conference Proceedings

All submitted abstracts will be peer-reviewed. Final papers should not exceed 5 single-spaced typed pages prepared according to the Instruction to Authors given at the website <http://www.iias.edu> and <http://www.ecnsi.hr>. All selected papers will be published in Conference Proceedings.

Important Dates

Abstract due: March 19, 2006
Notification of acceptance: April 8, 2006
Final paper due: May 7, 2006

Further details on InterSymp-2006 are available at <http://www.iias.edu> and <http://www.ecnsi.hr>



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Monday, August 7, 2006

8:45–17:30

Hall C

4th Special Focus Symposium on Catalactics: Quantitative-Behavioural Modelling Of Human Actions and Interactions on Markets

Joint Chairs: Prof. Dr. Otto Loistl^a, Prof. Dr. Vladimir Šimović^b and Mr. Michael Hüetl^a

^aVienna University of Economics and Business Administration, Vienna,
Austria

^bUniversity of Zagreb, and Zaprešić College, Croatia

8:45 - 9:00

Welcome Address

Session I “Financial Decision Making“ chaired by Efim Bronshtein

9:00 - 9:30 **Modelling of Multi Criteria Decision**

Mária Hromníková

9:30-10:00 **Global and Local Minimums of Maintenance Costs**

Dominika Crnjac and Ivana Barković

10:00-10:30 **Some optimization problems of investment theory**

Efim Bronshtein, Tatyana Oleynik, and Gulnara Latypova

10:30-11:00 **Linear Models of Insolvency Forecasting**

Efim Bronshtein and Gulnaz Rakhimkulova

11:00-11:30

Coffee Break

Session II “Market Microstructure” chaired by Otto Loistl

11:30-12:00 **A Quantitative-Behavioural Approach to Limit Order Book**

Analysis-Theoretical Foundation and Empirical Simulation

Michael Hüetl, OttoLoistl, and Johannes Prix

12:00-12:30 **Empirical Evaluation of Open Limit Order Book Models**

Johannes Prix, OttoLoistl, and Michael Hüetl

12:30-13:00 **Building Software Agents for Market Segmentation**

Brano Markić and Dražena Tomić

13:00-13:30 **Specialized Day Trading - A New View on an Old Game**

Vladimir Šimović and Vladimir Šimović

13:30-15:30

Lunch Break

Session III “Projects and Risks“ chaired by Ljubica Bakić-Tomić

15:30-16:00 **Risks in Project Management**

Vesna Markovac, Ljubica Bakić-Tomić, and Vilim (William) Vranović

16:00-16:30 **Quality Assurance in Project Management**

Vilim (William) Vranović, and Vesna Markovac

16:30-17:00 **Computer Crime and Business Information**

Slavko Šimundić, Zlatko Golubić, and Dean Golubić

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**17:00-17:30 Methods and Technology of Operational Analytics in Combating
Computer Crime**

Slavko Šimundić, Zlatko Golubić, and Mario Dumančić





Tuesday, August 8, 2006

8:45–14:00

Hall C

4th Special Focus Symposium on Catalactics: Quantitative-Behavioural Modelling Of Human Actions and Interactions on Markets

Joint Chairs: Prof. Dr. Otto Loistl^a, Prof. Dr. Vladimir Šimović^b and Mr. Michael Hüetl^a

^aVienna University of Economics and Business Administration, Vienna,
Austria

^bUniversity of Zagreb, and Zaprešić College, Croatia

8:45 - 9:00

Arrival at Conference Venue

Session IV “System Dynamics Simulation“ chaired by Vladimir Šimović

9:00 - 9:30 **Simulation of Investor Behaviour on Stock Markets Using Lattice Model**

Ladislav Lukáš

9:30-10:00 **Finance Problem Modelling With Vensim® System Dynamics Example**

Vatroslav Zovko, Vladimir Šimović, and Duje Ančić

10:00-10:30 **Applications of Threshold and Smooth Transition Models to Economic Phenomena**

Alexandr Kuchynka

10:30-11:00 **Financing Co-Payments as a Health Care Consumption Control Mechanism - A System Dynamics Model**

Vatroslav Zovko, Vladimir Šimović, and Duje Ančić

11:00-11:30

Coffee Break

Session V “Corporate and Global Economic Performance“ chaired by Li Xiaomin

11:30-12:00 **Corporate Ventures - A Source of Investment Opportunities in Global Economic Environment**

Lidija Romić, Gojko Ostojić, and Vladimir Šimović

12:00-12:30 **GDP of the European Union**

Ludmila Bokrošová

12:30-13:00 **On the Discrepancy between Venture Capital Investment’s Culture and Traditional Chinese Culture**

Li Xiaomin, and Chen Demian

13:00-13:30 **Improvement the Productivity and Costs in Graphic Production System**

Klaudio Pap, Mario Barišić, and Ivica Pogarčić

13:30-13:55

Closing Remarks

14:00-

Lunch



MODELLING OF MULTI CRITERIA DECISION

Mária Hromníková

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Abstract

Intent of this paper is motivated by fact, that decision making is principle of entrepreneurial management, primary discharge of managers' competence and sign of enterprising subject autonomy in market economics. Reliability of managerial decision affects on marketer preferences, competitive advantage and prosperity of enterprise. The article shows a supporting efficiency of multi criteria decision modelling on the building enterprise management. An asset for to hike of decision process quality are strategic applications of multi criteria programming by production program creation or entrepreneurial plan submission. Here's mathematical formulation and applied illustration of multi criteria decided problems solution by: a extremal programming of compromise decision by the unconfined purposes level, a target programming of undominant decision by the given or extreme goals level, a parametric programming of the vectorial multi criteria function.

Keywords: multi criteria function, parameterization of criteria, compromise decision.





GLOBAL AND LOCAL MINIMUMS OF MAINTENANCE COSTS

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Abstract

The paper presents the preventive maintenance of spare part supplies. The model for the minimizing average joint costs for maintaining the system $T_m(s,t)$ is given. The practical researches have shown that there are more local minimums, therefore the way for obtaining the global minimum has been found whereby total costs of maintenance per unit of time are minimal.

Keywords: maintenance costs, local minimum, global minimum, optimization





SOME OPTIMIZATION PROBLEMS OF INVESTMENT THEORY

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Abstract

The following optimization problems of the investment theory are considered.

1. A scheduling problem. It is required to finance the portfolio of given investment projects during the shortest time. The investor sets initial time $(0,1,2,\dots)$ of each project. Initial investor funds are limited. Every project is corrected in compliance with the inflation rate; the investor keeps free assets in a bank.

We show that the First Fit Algorithm (with any initial ordering) doesn't provide an optimal schedule. Two algorithms are developed to solve the problem.

2. A payment management problem. The moments of payments are fixed and an investor sets the sizes of payments in compliance with some restrictions. In particular, the sum of returns to arbitrary moment is limited by the function of the previous investments sums. The *NPV* maximization problem is considered under these conditions. The problem is linear for the some considered cases; the linear complexity algorithm is developed for the special ones.

Keywords: investment project, optimization, schedule, *NPV*.





LINEAR MODELS OF INSOLVENCY FORECASTING

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Abstract

Well known Altman, Springate and Fulmer models are adapted to the Russian economics by applying linear optimization problems.

We determine the system of indicators which can be calculated by the balance book of a company. Then we use linear function of indicators as companies' financial stability integral estimate.

Keywords: disability of companies, linear models, optimization.





A QUANTITATIVE-BEHAVIOURAL APPROACH TO LIMIT ORDER BOOK ANALYSIS - THEORETICAL FOUNDATION AND EMPIRICAL SIMULATION

Michael Hütl¹, Otto Loistl¹ and Johannes Prix¹

1 Real Market Performance

The current market microstructure discussion deals with issues that are at the core of practical regulation in the EU and the US addressing the real performance of capital markets (see [10] and [13]), i.e. how orders are transformed into prices. The academic community is narrowing the gap between these real tasks and the abstract models investigating the behaviour of prices only. Among the issues treated now are:

(a) The differentiation between prices and orders. Prices are only the tip of the iceberg of the entire capital market performance: orders drive the market; prices are generated by matching orders according to exchanges rules and regs. Therefore, neglecting the entire order book means disregarding the fact that prices are generated by order matching, thus ignoring important information contained in the order activities. Furthermore, at Xetra a large part of the orders for DAX 30-stocks are cancelled (see [2, p. 31]). This high rate of cancellations might be part of screen fighting² which might not only comprise noise effects but be a rational tactical game of market participants.

(b) The fact that market events (prices or orders) occur asynchronously. The distribution of waiting times between two events gains increasing interest (see, for instance, [5] and [12]). However, not only waiting times vary, but also volatility is not constant over time. A prominent way of considering these facts is the generalized variance gamma model proposed by [4].

(c) Increased availability of detailed high-frequency market data advances the investigation of these issues on a causal level. In order to avoid measurement without theory an appropriate theoretical foundation for order book market analysis is required (see also [6, p.3]). We present an approach which is based on real activities occurring at the market's microstructure level. Our model integrates the stochastic elements into a causal structure: Statistical figures like volatility are not the true causal driving forces. There are several layers of cause and effect structure .

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² The term 'fighting-screen' has been used by [15, p. 47].



EMPIRICAL EVALUATION OF OPEN LIMIT ORDER BOOK MODELS

Johannes Pritz³, Otto Loistl¹, and Michael Hütl¹

Abstract

A stock market's entire order book has gained increasing interest in the last years. A major reason has been the availability of relevant data bases. A reliable investigation has to be based on a theoretical model. We will apply in our presentation such a model implementing cadlag structures.

A major issue in comparing real order book data with simulated data is the fact, that the data exhibit a cadlag feature. In this paper we propose firstly a notion of distance describing the complete status of the real order book and we apply it secondly to evaluate the similarity of real order book data with the simulated data to check the model for forecasting capabilities.

Keywords: forecasting, capital markets, market microstructure, open order book.

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BUILDING SOFTWARE AGENTS FOR MARKET SEGEMENTATION

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Abstract

Software agents for market segmentation are computers programs that perform useful tasks for marketing researches. They will make marketing researchers more productive allowing doing more work in less time and creating interesting information for marketing decision making. Agents comprise enough knowledge to react quickly and the sequence events-conditions-actions define the workings of agents. In the paper is analyzing and building software agent for market segmentation based on crisp and fuzzy set clustering. Fuzzy logic is a well proven and well established logic of degrees and provides a framework for dealing quantitatively and logically with vague concepts. In fuzzy logic a data point's membership in a set is not crisp (crisp means either in or out of the set) but can be specified as a degree of membership. Fuzzy logic has a wide range of applicability (in clustering, machine learning, expert system, neural networks and decision trees). Software agent built in the paper is using fuzzy clustering algorithm and assigns a set of to multiple clusters with varying degrees of membership, unlike conventional cluster analysis that assigns a value to a single cluster. These agents are reactive and reflexive and respond in new *data- data change - new clustering set* mode. Software agents are special kind of computers programs, the program with an attitude. It is possible to build collaborative agents that will on automatic cluster detection and quantification find patterns in data and then produce the if-then-else rules that turn the analysis into prediction and classification models. In marketing research they exist to facilitate and help get the work done.

Keywords: software agents, fuzzy c-means clustering, market segmentation.

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SPECIALIZED DAY TRADING - A NEW VIEW ON AN OLD GAME

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Abstract

After the U.S market earned strong returns in 2003, day trading made a comeback and once again became a „popular“ trading method among traders. Although there is no comprehensive empirical evidence available to answer the question do individual day traders make money, there is a number of studies that point out that only few are able to consistently earn profits sufficient to cover transaction costs and thus make money. The day trading concept of buying and selling stocks on margin alone suggests that it is more risky than the usual “going long” way of making profit. This paper offers a new approach to day trading, an approach that eliminates some of the risks of day trading through specialization. The concept is that the trader should specialize himself in just one (blue chip) stock and use existing day trading techniques (trend following, playing news, range trading, scalping, technical analysis, covering spreads...) to make money.

Keywords: Day Trading, Blue Chip





RISKS IN PROJECT MANAGEMENT

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Abstract

This study is about risks and risk management in Project management. Risk is an integral component of numerous human activities related to project management. In introduction, the concept and structure of risk is described. The focal part of this study discusses methods and strategies in order to reduce and eliminate risk consequences in project management segments. The key point in risk management is how to control risk exposure during the project. It is important to control risk by conducting actions in order to reduce consequences. Each member of the project team must be informed on possibility of risk, and must be an owner of certain risk factor, which may impact project progress. The project manager and each project team member must take their part of responsibilities. Risk analysis is then made. The project should be realized through stages within project management cycle. Risk management must analyse interdependencies of different risks at different levels in project management environment. The financial and marketing aspects of risk management are highlighted. Risk management requires resources that must be planned and budgeted. Project manager must evaluate risks and perform a cost benefit analysis.

Keywords: Project management, Risk management, Risk evaluating, Risk Analysis, Principles of risk





QUALITY ASSURANCE IN PROJECT MANAGEMENT

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Abstract

The *Quality Assurance* process involves performing quality audits to determine how the project is proceeding. Quality Assurance is concerned with making certain the project will meet and satisfy the quality standards of the project defined during the Quality Planning process.

Quality assurance has moved into the strategic realm and is concerned with integrating quality into the strategic – planning process so that quality becomes a company or an institution wide theme. Your customers and/or clients- whether internal or external, are the ones who should define quality. Quality assurance is how you will know and guarantee the quality requirements of your project specifications will be met. Quality Assurance will also improve the quality of future projects, because the information gained from one project in the form of lessons learned can be applied to the quality process during the next project.

The Quality Assurance process integrates project scope, project costs, and project time. All three of these elements are brought together and measured during this process and throughout the life of the project.

Project team members, the project manager, and the stakeholders are responsible for the Quality Assurance of the project.

Keywords: Quality Assurance, Project management, Project costs

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COMPUTER CRIME AND BUSINESS INFORMATION

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Abstract

The computing era is here and present. Computer science has become a very important means. Those who acknowledge changes, adapt well to them, will benefit the most. However, with this come dangerous risks, especially for those managers who fail to take appropriate precautions, as is shown in this paper. In this paper, a detailed study researches computer which is linked to computers and business information means.





METHODS AND TECHNOLOGY OF OPERATIONAL ANALYTICS IN COMBATING COMPUTER CRIME

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Abstract

What has triggered the analysis and the approach to researching modern computer crime in the world and also in the Republic of Croatia is certainly the already developed computer crime no longer as manifestation but as a whole set of criminal acts which through a range of activities are committed by the people who are anyway in the domain of high technological development. In this paper, a detailed study of the research methods and technology of operational analytics in combating computer crime are presented.





SIMULATION OF INVESTOR BEHAVIOUR ON STOCK MARKETS USING LATTICE MODEL

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Abstract

The paper presents a simple lattice model for simulation speculative behaviour of investors on stock markets. The traders are modelled by set of computer based agents performing discrete time decision making process to find their market 'buy/sell' position in the next trading period. Since not being isolated each other, they use for making price prediction not only all previous price information but also known recent information obtained from selected subsets of 'neighbour-traders'. Such information can produce herding effects among traders. The numerical procedure realizing the adopted stochastic discrete time dynamic model is described in detail.

Keywords: computer agents' model, market behaviour simulation, stochastic discrete time dynamic model





FINANCE PROBLEM MODELLING WITH VENSIM® SYSTEM DYNAMICS EXAMPLE

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Abstract

System dynamics modelling is very useful tool for enhancement of decision making process. Although the models are simplification of reality, they can become very complex to manage. To make model operational it is necessary to use one of the software packages on the market. This paper is a step by step guide for system dynamic modelling with Vensim® software. It shows basic concepts applied to casual loop diagrams as a foundation for model development and process of definition of mathematical equations that determine relationships between system's components. As an example it is presented construction of very simple model with only four components. Finally, the system's behaviour is tested with software simulation run.

Key words: System dynamics, modelling, software





APPLICATIONS OF THRESHOLD AND SMOOTH TRANSITION MODELS TO ECONOMIC PHENOMENA

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Abstract

The paper shows how threshold or smooth transition models can be successfully applied to several economic phenomena, even those considered challenging for a long time. In this paper, a special attention is devoted to the relationship between stock-index futures price and spot price (based on the cost-of-carry model). The shift from univariate to multivariate approach, i.e. from threshold or smooth transition autoregressive models to nonlinear co-integration and error-correction models is also reflected.

Keywords: threshold autoregressive models; smooth transition models; nonlinear cointegration; cost of carry model





FINANCING CO-PAYMENTS AS A HEALTH CARE CONSUMPTION CONTROL MECHANISM - A SYSTEM DYNAMICS MODEL

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Abstract

Croatian health care authorities try to control consumption of health care resources by imposing financing co-payments for users of health services. The mid and long term effects were not fully explored so it is uncertain if co-payments will produce desired results. This study uses system dynamics approach to explore the possible consequences of co-payments as a mechanism to control health care consumption. According to the simulation results, co-payments do not have significant effect to the level of health care consumption and are not appropriate mechanism for the health care cost control. This paper gives more detailed insight into interactions of different variables influencing health care consumption, and evaluates effects of different co-payment levels to the consumption of health care services.

Key words: System dynamics, co-payments, health care costs, model





CORPORATE VENTURES - A SOURCE OF INVESTMENT OPPORTUNITIES IN GLOBAL ECONOMIC ENVIRONMENT

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Abstract:

Private Equity investors are continuing to be optimistic about business prospects in Central Europe – and they are planning to continue to focus on new investments. Market activity and transaction sizes are also expected to increase, according to the latest Deloitte Central European Private Equity Confidence Survey. Working with corporate ventures can provide venture capital and private equity firms with a rich source of investment opportunities. But they should be wary of corporate objectives and ensure they are well protected if circumstances change

Key words: Corporate ventures, investment opportunities, global economic environment





GDP OF THE EUROPEAN UNION

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Abstract

This article aims to analyse and evaluate a trend of EU GDP by means of time series of GDP indicators figures since 1995 till 2004. The GDP trend is monitored both at current and constant prices. With regard to time comparability the indicator of real GDP at constant prices is suitable because misrepresentation caused by price level movement can be avoided.

There it is used aggregation method based on fixed basic year on the following calculation. This method uses prices from the fixed basic year for valuation of production in each economy sector and following aggregation of the results for the amount of real GDP. There is a long-term trend of GDP measured in this article, but it brings a lot of problems, e.g. changes of prices, production structure, innovations etc. Because of this there are only bare figures compared in this article without taking aspect to the above-mentioned changes.

Keywords: GDP at constant prices, GDP at current prices, method of a fixed basic year





ON THE DISCREPANCY BETWEEN VENTURE CAPITAL INVESTMENT'S CULTURE AND TRADITIONAL CHINESE CULTURE

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Abstract

Venture capital investment is concerned with projects of high risks, high profits, high increase potentials and high technologies. Originated from America, this industry requires a tolerant social environment, with its distinctive culture based on trust and knowledge. China, with her rich and solid civilization, exerts great influences on every member in the society. Therefore Venture capital investment is quite discrepant from traditional Chinese culture. Studying this discrepancy will surely play a positive role in Venture Capital Investment's healthy development in China.





IMPROVEMENT THE PRODUCTIVITY AND COSTS IN GRAPHIC PRODUCTION SYSTEM

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Abstract

Publishing of results following many simulation experiments based on the created digital workflows base, correlated research work, research in respect to machine utilization, sub-chain, chain and the complete workflow productivity. Improvement of the existing operations and workflows on all levels of graphic reproduction. Detection of bottlenecks in production. Results of measuring the productivity and costs and defining the areas where investment returns will be the greatest. Defined methods in searching for the best work path, i.e. work flow with possible use and hypothetic workflows or sub-chains for the best investment results.

Keywords: graphic reproduction, modelling and simulation, digital workflows, XML, relation database

