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## Society systems science: a brand new discipline

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**Biographical notes:** John Wang is a full Professor at MSU. Having received a scholarship award, he came to the USA and completed his PhD in Operations Research from Temple University. He has published more than 100 refereed papers and six books. He has also developed several computer software programs based on his research findings. He is the Editor-in-Chief of *Int. J. of Sustainable Society (IJSSoc)*. Also, he is the Editor of *Encyclopedia of Data Warehousing and Mining* (4 Volumes)-2nd ed., *Data Warehousing and Mining: Concepts, Methodologies, Tools, and Applications* (6 Volumes). His long-term research goal is on the synergy of operations research, data mining and social sciences.

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Society faces many significant challenges nowadays: pollution, poverty, pain, terrorism, crime, greenhouse effect, war, disease, starvation, road accidents, inflation/deflation, unemployment, pornography, great suffering, ignorance, pesticide poisoning and falsehood, to just name a few. It could be argued that scientists have spent too much time on many not-so-urgent issues and put too little effort into these challenges at the present time. Some researchers have veered from the main stream of our society. 'Society Systems Science' (SSS), as we have termed it, is the interface of natural science and social science, where both natural scientists and social scientists confront the real-world problems and challenges that exist in our society and work towards formulating effective solutions.

*IJSSS* eliminates the following 'six barriers':

- the barrier between social and natural sciences
- the barrier between theory and applications
- the barrier between hard decision models and soft ones
- the barrier between different disciplines in the business world
- the barrier between government and industry
- the barrier between the ivory tower and real society.

When barriers exist, it is less likely that the various areas involved will serve one another properly. There is an urgent need to integrate all segments of society into one single productive system.

The objectives of *IJSSS* are to call for attention to the interdisciplinary principles, architectures, techniques, methodologies, models, as well as the appropriate strategies,

which can solve the various society-related dilemmas. Social scientists and natural scientists might work together to promote synergy. Theory and application can be integrated. Hard and soft decision models could be interchanged. Different disciplines in the business world should be integrated. Government and industry should be incorporated. Scientists in the ivory tower must face the real challenges in the whole society. When one part of the society offers its service to the other, most likely both parties will benefit. Only in this way can the talents and the resources from different areas be fully utilised for the benefits of the entire society.

There are six interdisciplinary articles in this issue. After September 11th, government officials have begun questioning the appropriateness of the current federal allocation formula to counter terrorism, demanding the development of more rigorous risk based mechanisms. Quadrioglio develops a resource allocation optimisation model based on the current largely accepted rigorous definition of risk and suggest a practical implementation of a decomposition methodology to solve it. This paper is among the first works addressing this request. The proposed procedure can be carried out within the current geographical hierarchical partitioning of the nation in a 'bottom up' fashion: 'child' subsets provide their 'parents' with piecewise linear relationships indicating the cost effectiveness of the allocated budget in reducing the overall risk. A successful implementation of the methodology would reduce the 'barrier' between theory and application to make the Nation safer.

Development in northern British Columbia (BC) has focused on resource-based exports, frustrating efforts to promote self-sustaining development. Jackson, Illsley, Curry and Rapaport report on a pilot study testing the applicability of the 2006 Vancouver Declaration on a 'new governance paradigm for managing human settlements' to northern BC. Fieldwork focused on two small northern BC settlements. Semi-structured interviews with key stakeholders offered insights into the composition of a 'new regionalism' pathway which exploits the appeal of place to amenity migration, allowing a shift from resource-based dependency towards high added-value professional skills-based employment. The paper explores the evidence for such a shift. Findings indicate that good social capital networks stimulated by pleasant surroundings have promoted more sustainable patterns of local development. Effective territorially-based community governance is seen as important in enabling these settlements to acquire greater ownership of their built and natural environments.

Nanotechnology is predicted to create the 6th Kondratieff period following the 'age of information'. It represents a new revolutionary approach in fundamental research moving from a macrocentric to nanocentric system. Nanotechnology is expected to stimulate 1 trillion dollars of production involving about 2 million workers in the next 10–15 years. More than 40 countries now have specific nanotechnology research funding programs with the common goal of finding greater uses for the emerging technologies and enacting measures to encourage commercialisation. Martin and Daim use text mining to uncover trends in nanotechnology and changes in nanotechnology programs and applications since the first distribution of the National Nanotechnology Initiative (NNI) funds in 2001. Top keywords in current nanotechnology research will be analysed to provide insight into the translation of government funding invested in applied research programs to resulting publications and patents.

Anecdotal evidence and theoretical research highlight the role of flexible benefit systems (FBS) in enhancing employee satisfaction. While this is supported by some empirical evidence, most findings mainly pertain to the 1990s and North America and the

private sector. Fewer studies have used other national settings or the public sector. Therefore, Yu, Waldeck and Rowley used a large sample of employees in central government departments in South Korea to examine the impact of FBS on levels of employee (benefit and job) satisfaction at two points in time. This was pre- and post-FBS in the same departments and the control departments continuing without FBS. Their findings suggest that the benefit satisfaction of employees increases with FBS and although job satisfaction was also positive, it was not statistically significant. The wider implications and relevance of their findings are also elucidated.

Freshwater sources are very limited in the Gulf Cooperation Council (GCC) countries. Their capital abundance and coastal locations enabled them to produce freshwater through desalination and supply water to customers at highly subsidised price. However, due to the sharp increase in population and misuse of freshwater, there are shortages in water supply. The GCC countries need to take appropriate measures to tackle this problem. Hajeesh uses the analytical hierarchy process (AHP) as a decision tool for finding the best course of actions to bring about water conservation by soliciting water experts' opinion. In this work, four factors are considered along with ten policies. The study found that the five most important policy instruments for promoting water conservations in the GCC countries are: participation of the private sector; incentive customer pricing; reducing subsidies; accelerating wastewater treatment and reuse; and water audit and water loss.

Applying a multiple regression model, Tang and Shum re-examine the monthly and weekly risk-return relationships of 13 international stock markets during up and down markets. Their model corrects the effects of heteroskedasticity and autocorrelation of the residuals using the method of Newey and West (1987). Their results provide reliable evidence that not only beta, but also unsystematic risk and skewness are useful and relevant risk measures in international stock markets. One of important implications is that international investors should not only consider the impact of higher statistical moments but also their trade-off in making investment decisions in international stock markets.

*IJSSS* presents a forum to help policy makers, researchers and professionals to exchange their innovative ideas and thought-provoking opinions. It also creates a communication channel between practitioners and academics to discuss problems, challenges and opportunities in all aspects of our society.

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