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2013 年管理科學與經營決策國際學術研討會

論文集

The 2013 International Conference in Management Sciences
and Decision Making

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May 18, 2013

102 年 5 月 18 日 (星期六)

Tamkang University

地點：淡江大學淡水校園

Opening Ceremony: Room 712, Business and Management Building

開幕地點：商管大樓 B712 室(7F)

Plenary Session:**Session A:** Room 712, Business and Management Building

商管大樓 B712 室(7F)

Session B: Room 713, Business and Management Building

商管大樓 B713 室(7F)

08:30~09:00	<i>Registration: Room 712, Business and Management Building</i>	
09:00~09:15	Opening Ceremony	
09:20~09:50	<p>Keynote Speech: Management Science Modeling of Risk in 21st Century Supply Chains</p> <p>Session Chair: Dr. Chung-Chu Chuang (Tamkang University, Taiwan)</p> <p>Speaker: Dr. David L. Olson (University of Nebraska - Lincoln, U.S.A.)</p>	
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	<p>Fu-Ju Yang (Chinese Culture University, Taiwan)</p> <p>NiLuh Shanthi Sekarini (Chinese Culture University, Taiwan)</p>	<p>Permissible Delay in Payments</p> <p>Jinn-Tsair Teng (The William Paterson University of New Jersey, U.S.A.)</p> <p>Ya-Lan Chan (Asia University, Taiwan)</p>
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Management Science Modeling of Risk in 21st Century

Supply Chains

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ABSTRACT

Supply chain management is a critically important activity, becoming increasingly important with the development of globalization on a large scale. This offers organizations many cost benefits, but also make management of risk more critical. Taking risk is fundamental to doing business. Insurance firms, such as Lloyd's of London, exist to mitigate risk. In finance, where risk management started, activities such as risk exchange swaps, derivatives and options, and catastrophe equity puts have been created for investors to mitigate risk. They also led to the CDOs in home mortgages that nearly brought down the global economy in 2008. This paper reviews economic views of risk, and risks associated with supply chains. Four management science modeling techniques are presented and briefly demonstrated. These models can provide valuable tools for the effective management of risk within supply chains.

Keywords: Supply chains, risk management, management science models

1. INTRODUCTION

Supply chains involve the movement of material from wherever it is obtained from nature, often involving various processing activities, ultimately delivered to consumers. Supply chains provide us consumers with many benefits. Producers of goods and services can take advantage of the many opportunities for efficiency provided by global linkages. Supply chains are attractive because they allow access to the most cost effective sources in a system. However, these opportunities are not free – they involve risks.

All human endeavors involve uncertainty and risk. Mitroff and Alpaslan [1] categorized emergencies and crises into three categories: natural disasters, malicious activities, and systemic failures of human systems. Nature does many things to us, disrupting our best-laid plans and undoing much of what humans have constructed. Events such as earthquakes, floods, fires and hurricanes are manifestations of the majesty of nature. Recent events to include the tsunami in the Indian Ocean and Hurricane Katrina in New Orleans in 2005 demonstrate how powerless humans can be in the face of nature's wrath.

Malicious acts are intentional on the part of fellow humans who are either excessively competitive or who suffer from character flaws. Examples include Tylenol poisonings of 1982, placing syringes in Pepsi cans in 1993, bombing the World Trade Center in 1993, Sarin gas attacks in Tokyo in 1995, terrorist destruction of the World Trade Center in New York in 2001, and corporate scandals within Enron, Andersen, and WorldCom in 2001. More recent malicious acts include terrorist activities in Spain and London, and in the financial realm, the Ponzi scheme of Bernard Madoff uncovered in 2009. Wars fall within this category, although our perceptions of what is sanctioned or malicious are colored by our biases. Criminal activities such as product tampering or

kidnapping and murder blend are clearly not condoned. Acts of terrorism are less easily classified, as what is terrorism to some of us is expression of political behavior to others. Similar gray categories exist in the business world. Marketing is highly competitive, and positive spinning of your product often tips over to malicious slander of competitor products. Malicious activity has even arisen within the area of information technology, in the form of identity theft or tampering with company records.

The third category is probably the most common source of crises: unexpected consequences arising from overly complex systems [2]. Examples of such crises include Three Mile Island in Pennsylvania in 1979 and Chernobyl in 1986 within the nuclear power field, the chemical disaster in Bhopal India in 1984, the Exxon Valdez oil spill in 1989, the Ford-Firestone tire crisis in 2000, and the Columbia space shuttle explosion in 2003. The financial world is not immune to systemic failure, as demonstrated by Barings Bank collapse in 1995, the failure of Long-Term Capital Management in 1998, and the sub-prime mortgage bubble implosion leading to near-failure (hopefully no worse than near-failure) in 2008.

2. GLOBALIZATION

Globalization has played a major role in expanding the opportunities for many manufacturers, retailers, and other business organizations to be more efficient. The tradeoff has always been the cost of transportation, as well as the added risk of globalizing.

In 2010 the Eyjafjallajökull volcano in Iceland shut down transportation across most of Europe. Many Europeans got to spend a full week waiting for some means to travel across Europe. Supply chains were also disrupted, as transportation (logistics) is key to linking production facilities in supply chains. Many in Europe found their supermarkets short of fresh fruit

and flowers [3]. Supply chains often depend on optimized lean manufacturing, requiring just-in-time delivery of components. These systems are optimized, which means elimination of slack to cover contingencies such as volcanic disruption of air flight [4]. Bloomberg Businessweek [5] estimated the economic impact of Eyjafjallajökull to be in the billions of dollars, and cited the need for supply chain flexibility through multiple sourcing, flexible manufacturing strategies, and logistics networks capable of alternative routing.

On March 11, 2011, an earthquake north of Tokyo led to a catastrophic tsunami that destroyed most of a rich area of advanced technology manufacturing. It also severely damaged a nuclear power plant, which at the time of writing still saw damage control efforts. While the worst impact was in terms of Japanese lives, there also was major impact on many of the world's supply chains. Organizations such as Samsung, Ford Motor Company, and Boeing found production disrupted due to lack of key components from Japan [6]. Japanese plants produced about 20 percent of the semiconductors used worldwide, and double that for electronic components. Toshiba produced one-quarter of the nano flash chips used. On March 14, 2011, Toshiba had to halt operations due to power outages.

Modern supply chains need to develop ways to work around any kind of disruption. Wars of course lead to major disruption in supply chains. Tariff regulations can have an impact as well. In 2002, Honda Motors spent \$3,000 per ton to airlift carbon sheet steel to the U.S. after tariff-related supply disruptions. In January 2011, Volkswagen, Porsche and BMW supply chains in Germany were taxed by surging demand [7]. Volkswagen had to halt production due to engine and other part shortages. This was not due to natural disaster or war, or any other negative factor, but rather to booming demand in

China and the United States. Lean manufacturing and modern consumer retailing operations require maintenance of supply.

Supply chains can offer great value to us as consumers. Competition has led to better products at lower cost, enabled by shipping (by land and air as well as sea) over supply chains. Outsourcing allows producers to access the best materials and process them at the lowest cost. Lean manufacturing enables cost efficiency as well. Both of these valuable trends lead to greater supply chain exposure. There is a need to gain flexibility, which can be obtained in a number of ways:

- Use of diversified sources to enable use of alternatives in quick response to disruptions
- Flexible manufacturing strategies allowing options to produce critical products in multiple locations with rapid changeover capability
- Flexible product design to reduce complexity and leverage common platforms and parts, thus reducing exposure to supply disruption
- Global logistics networks to access low cost and low risk through multiple routes and contingency shipping plans.

Economically efficient supply chains push the tradeoff between cost and risk. The lowest cost alternative usually is vulnerable to some kind of disruption. Some of the economic benefit from low cost has to be invested in means to enable flexible coping with disruption.

3. ECONOMIC VIEWS OF RISK

Risk has been a fundamental topic of economic theory for centuries. Von Thünen [8] viewed profit as part payment for assuming risk. Hawley [9] argued that it was essential for entrepreneurs to take on risk. Knight [10] tried to clarify terms, viewing business objective

to be profit, due to assuming risk. Risk was viewed as measurable uncertainty, while the term uncertainty was reserved for non-quantitative aspects. More recently, Markowitz [11] gave us the mean-variance approach, defining risk as variance, and providing a tool to identify the efficient frontier, where risk and return were traded off. Markowitz's model also allows correlations to be included, realizing that investment returns are not independent of the returns of other investments. Sharpe [12] extended Markowitz's work to the capital asset pricing model, where investments are evaluated in terms of risk and return relative to the market as a whole. In this view, the riskier the stock, the greater the expected profit. Thus this leads to the conclusion that risk is opportunity. Fama [13] carried on this strain of thinking with efficient market theory, viewing the market price as incorporating perfect information. Prices then vary randomly around their appropriate equilibrium value.

Empirically, however, markets have behaved much more erratically than economic theory would lead us to believe. Bubbles have been endemic in human practice, beginning with the Dutch tulip mania in the early 17th century, and early real estate investment opportunities such as the South Sea Company (1711-1720) and the Mississippi Company (1719-1720). Isaac Newton was considered one of the smartest people in the world, but lost heavily in such bubbles. He is credited with stating, "I can calculate the motion of heavenly bodies but not the madness of people." You might think that we have learned to control investment bubbles, but the London Market Exchange experienced a spiral in 1983 when excess-of-loss reinsurance became popular, and syndicates ended up paying themselves to insure themselves against ruin. These syndicates viewed risks as independent. They didn't realize they were hedging against themselves. In 1983 Hurricane Alicia

caused heavy claims that brought this system down, and early supply chain related bubble. An example of a model gone mad was use of the Black-Scholes model to price derivatives on the part of Long-Term Capital Management (LTCM) [14]. They ended up viewing risk with return and invested in Russian banks, which tumbled in the 1990s, bringing down LTCM with them. There also was a dot-com bubble in the early year or two of the 21st Century, following madness on the part of venture capitalists seeking anything to do with e-business sites. And we all are far too familiar with the 2008 bubble in CDOs, still impacting Europe.

Alternative economic views have been presented by Nassim Taleb [15], who presented the Black Swan problem. Humans try to be scientific, and learn from their observations and history. But while nobody in Europe had seen a black swan, and had thus assumed they didn't exist, when they settled Australia they found some, disproving their empirical hypothesis. Taleb also points to fallacies on the part of investors, who assume data is normally distributed. In practice, especially during bubble bursts, fat tails with higher extreme probabilities are often observed. Cognitive psychology can explain some of this. Kahneman and Tversky [16] emphasized human biases from framing, with different attitudes toward risk found during winning and losing streaks. Humans also have been found to overestimate the probability of rare events, such as the odds of the next asteroid impacting the earth, or the risk of terrorists on airplanes. Akerlof and Shiller [17] argued that standard economic theory makes too many assumptions. When human decisions are involved, historical data is not a good predictor of future performance.

4. SUPPLY CHAIN RISKS

Supply chains involve many risks, which might be categorized as internal (involving issues such as capacity variations, regulations, information delays, and organizational factors) and external (market prices, actions of competitors, manufacturing yield and costs, supplier quality, and political issues) [18]. Examples of internal failures are not widely publicized, although they certainly exist. Supply chain organizations need to worry about risks from every direction. In any business, opportunities arise from the ability of that organization to deal with risks. Most natural risks are dealt with either through diversification and redundancy, or through insurance, both of which have inherent costs. As with any business decision, the organization needs to make a decision considering tradeoffs. Traditionally, this has involved the factors of costs and benefits. Society is more and more moving toward complex decision-making domains requiring consideration of ecological factors as well as factors of social equity.

Dealing with other external risks involves more opportunities to control risk sources. Some supply chains in the past have had influence on political systems. Arms firms like that of Alfred Nobel come to mind, as well as petroleum businesses. While most supply chain entities are not expected to be able to control political risks to include wars and regulations, they do have the ability to create environments leading to labor unrest. Supply chain organizations have even greater expected influence over economic factors. While they are not expected to be able to control exchange rates, the benefit of monopolies or cartels is their ability to influence price. Business organizations also are responsible to develop technologies providing competitive advantage, and to develop product portfolios in dynamic markets with product life cycles. The risks arise from competitors' abilities in never-ending competition.

Internal risk management is more directly the responsibility of the supply chain organization and its participants. Any business organization is responsible to manage financial, production, and structural capacities. They are responsible for programs to provide adequate workplace safety, which has proven to be cost-beneficial to organizations as well as fulfilling social responsibilities. Within supply chains, there is need to coordinate activities with vendors, and to some degree with customers (through bar-code cash register information providing instantaneous indication of demand). Information systems technology provides a new era of effective tools to keep on top of supply chain information exchange. Another factor of great importance is the responsibility of supply chain core organizations to manage risks inherent in the tradeoff between wider participation made possible through Internet connections (providing a larger set of potential suppliers leading to lower costs) with the reliability provided by long-term relationships with a smaller set of suppliers that have proven to be reliable.

3.1 Supply Chain Risk Management

Supply chain risk management can be described as a systematic, integrated approach to manage all risks facing an organization [19]. The benefit is to develop means to anticipate, measure, and control risk. The concept of enterprise risk management (ERM) developed in the mid-1990s in industry, with a managerial focus. There are over 80 risk management frameworks reported worldwide, to include that of the Committee of Sponsoring Organizations of the Treadway Commission (COSO) 2004. COSO is a leading accounting standards organization in the U.S.

The Internet allows business to be conducted all over the globe. This presents many new opportunities

for organizations to market to new customers, and thus improve their business opportunities.

It is interesting to compare the old way of organizing business by vertical integration, made so successful by John D. Rockefeller and Standard Oil, by U.S. Steel, Alcoa, and others. They took the idea of system logistics developed by the military and applied it to business, taking the approach that if there was any profit to be made in their supply chain, they wanted it. This led to vertical supply chains connecting mines, processing, transportation, and various forms of production to different levels of marketing for massive monopolies. Enforcement of such monopolies was easiest in businesses calling for high capital investment.

The modern way of conducting business is quite different. The formerly adversarial relationships of 19th and early 20th Century business have been replaced by cooperative arrangements of supply chain members. The focus is on being more competitive, and thus emphasizing services related to the products being made. There also is an emphasis on linking together specialists, with a dynamic integration of often reasonably independent entities to work together to deliver goods and services. Goods and services seem ever less distinguishable, making the old dichotomy of operations passé.

Global competition, technological change, and continual search for competitive advantage have motivated risk management in supply chains [20]. Supply chains are often complex systems of networks, reaching hundreds or thousands of participants from around the globe in some cases (Wal-Mart or Dell). The term has been used both at the strategic level (coordination and collaboration) and tactical level (management of logistics across functions and between businesses) [21]. In this sense, risk management can focus on identification of better ways and means of accomplishing organizational objectives

rather than simply preservation of assets or risk avoidance. Supply chain risk management is interested in coordination and collaboration of processes and activities across functions within a network of organizations. Tang provided a framework of risk management perspectives in supply chains [22]. Supply chains enable manufacturing outsourcing to take advantages of global relative advantages, as well as increase product variety. There are many risks inherent in this more open, dynamic system.

5. MANAGEMENT SCIENCE TOOLS IN RISK MANAGEMENT

Management science is the modeling of business decisions for analysis. Many different types of models have been proposed in the literature. Because of the uncertainty involved, statistical analysis and simulation is very appropriate to consider supply chain risk.

There are a variety of methods for different purposes. We will present four of them using a supply chain context:

- Multiple criteria analysis is evaluative, focusing on selecting options best matching decision maker preference
- Simulation is a probabilistic method of numerical analysis to evaluate probabilistic situations
- Chance constrained programming is an optimization method allowing probabilistic constraints
- Data envelopment analysis is an optimization-based method to evaluate relative performance in terms of output relative to input.

5.1 Multiple Criteria Analysis

There are many multiple criteria methods [23]. These methods include Analytic Hierarchy Process (AHP), outranking methods such as Electre and PROMETHEE. A widely used approach (at least in the US) is multiattribute utility theory. A linear manifestation of this approach is the simple multiattribute rating theory, based on the value formulation:

$$\text{Value}_j = \sum_{i=1,n} w_i \times s_{ij} \quad (1)$$

where w_i is the weight of criterion i , and s_{ij} is the score for alternative j on criterion i . SMART is proposed as a useful tool to aid in supply chain selection decisions, which typically involve tradeoffs among criteria.

5.2 Simulation

Simulation, especially Monte Carlo simulation, is a useful tool for supply chain risk evaluation as well. There are two broad types of simulation: waiting line simulation based on discrete events, highly useful for queuing situations, and Monte Carlo simulation which can be applied to models displayed on spreadsheets. Simulation is limited in its ability to identify optimal solutions, but is highly useful to study expected outcomes in probabilistic situations. Simulation was proposed in a number of studies, to include discrete-event simulation to estimate survival over long-range periods given assumed probabilities of supply chain linkage failure [24]. Wu and Olson [25] used Monte Carlo simulation to evaluate risks associated with vendor selection, following up on similar modeling from many sources. System dynamics models have been widely used, especially with respect to the bullwhip-effect [26] and to model environmental, organizational, and network related risk issues [27].

5.3 Optimization under Risk

We also look at two optimization techniques. Chance Constrained Programming (CCP – Charnes & Cooper [28]) is a mathematical programming modeling technique allowing constraints expressed in terms of the probability of being satisfied. In effect, constraint bounds are adjusted in terms of their variance – the more variance, the higher the adjustment. Such models were once very difficult to solve, but now spreadsheets make it fairly easy to solve if models are convex. Risk models often are convex. Other optimization models have been applied to supply chain risk. Bogataj and Bogataj used parametric linear programming based on net present value to estimate supply chain vulnerability [29]. Goh et al. [30] applied a stochastic bi-criterion algorithm to analyze a multi-stage global network problem with objectives of profit maximization and risk minimization.

The last model we will discuss is Data Envelopment Analysis (DEA [31]). DEA models consider multiple inputs and outputs, with model objectives to maximize each function subject to constraints on the other attributes. DEA provides a tool to obtain relative efficiency.

6. MODELS APPLIED

6.1 SMART

To demonstrate the SMART method, we draw upon a data set originally presented by Moskowitz et al. [31], and subsequently used by Olson and Wu [32]. We will pare this data set down to 5 vendors, evaluated over 7 criteria:

1. Quality personnel & procedures, concern for quality
2. Company history and experience
3. Cost of delivered product
4. Vendor flexibility
5. Technical performance

6. Exchange rate risk
7. Vendor capital situation

The first step in the SMART method is to determine relative weights of the criteria. This is done by first sorting the criteria in decreasing order of importance, as indicated in Table 1. Anchoring on the most important (in this case quality) give 100 to that criterion, and assess the relative importance of swinging from the worst to the best for each of the other criteria compared to swinging from the worst to the best performance on quality. This adds up to 435 in this example. Dividing each assessed value by 435 yields the weights in the Base 100 column.

Table 1: Weight Development for Criteria

Criteria	Base 100	Weight
Quality	100	0.230
Experience	90	0.207
Cost	85	0.195
Flexibility	60	0.138
Technical	50	0.115
Exchange	30	0.069
Capital	20	0.046
	435	

We assume five alternative vendor sources: Mexico (Mex), Brazil (Bra), Vietnam (Viet), Germany (Ger), and Alabama (Ala). Table 2 gives assessed scores for each alternative on each criterion on a 0-1 scale, where 0 is the worst possible score and 1 the best possible

Table 2: SMART

Criteria	Mex	Bra	Viet	Ger	Ala
Quality	0.2	1	0.4	1	0.7
Experience	0.3	1	0.1	0.7	0.9
Cost	1	0.5	0.95	0	0.3
Flexibility	1	1	0.2	0.2	0.2
Technical	0.6	1	0.2	1	1
Exchange	0	0.5	0.5	0.5	1
Capital	0.2	1	0.2	1	0.5
Value	0.53	0.88	0.39	0.60	0.64

Rank	4	1	5	3	2

Table 2 shows scores for each alternative on each criterion. The “Value” row shows these products for each of the five alternatives. These scores can imply a relative ranking. The “Rank” row indicates that Brazil receives first rank, followed (some distance back) by the Alabama alternative.

6.2 Monte Carlo Simulation

Simulation models are sets of assumptions concerning the relationship among model components. Simulations can be time-oriented (for instance, involving the number of events such as demands in a day) or process-oriented (for instance, involving queuing systems of arrivals and services). Uncertainty can be included by using probabilistic inputs for elements such as demands, inter-arrival times, or service times. These probabilistic inputs need to be described by probability distributions with specified parameters. Probability distributions can include normal distributions (with parameters for mean and variance), exponential distributions (with parameter for a mean), lognormal (parameters mean and variance), or any of a number of other distributions. A simulation run is a sample from an infinite population of possible results for a given model. After a simulation model is built, the number of trials is established. Statistical methods are used to validate simulation models and design simulation experiments.

In supply chain outsourcing decisions, a number of factors can involve uncertainty, and simulation can be useful in gaining better understanding of systems [32]. We begin by looking at expected distributions of prices for the component to be outsourced from each location. Mexico in this case has the lowest estimated price, but it has a wide expected distribution of exchange rate fluctuation. These distributions will affect the actual realized price for the outsourced

component. The Vietnam vendor is rated as having relatively high probabilities of failure in product compliance with contractual standards, in vendor financial survival, and in political stability of host country. The simulation is modeled to generate 1000 samples of actual realized price after exchange rate variance, to include having to rely upon an expensive (\$5 per unit) price in case of outsourcing vendor failure. Table 3 gives hypothetical data for the five alternatives used in the SMART analysis. Each vendor has a quoted price. Exchange rates are all considered normally distributed, with the means and standard deviations given. Three failure probabilities are then given: product failure, organizational failure, and political failure. The final column shows the expected price. However, this calculated expected value doesn't show the details of price given by simulation.

Table 3: Simulation Input

	Mex	Bra	Viet	Ger	Ala
Price	0.82	1.36	0.85	3.20	2.05
Mean	1.3	1.03	1.11	1.05	1
Var	0.2	0.02	0.1	0.02	0
Prod	0.10	0.01	0.15	0.01	0.03
Org	0.15	0.01	0.25	0.02	0.20
Polit	0.15	0.10	0.05	0.01	0.03
Exp	2.13	1.81	2.51	3.43	2.78

Monte Carlo simulation output is exemplified in Figure 1, which shows the distribution of prices for the hypothetical Mexican outsourcing vendor, which was the low price vendor very nearly half of the time.

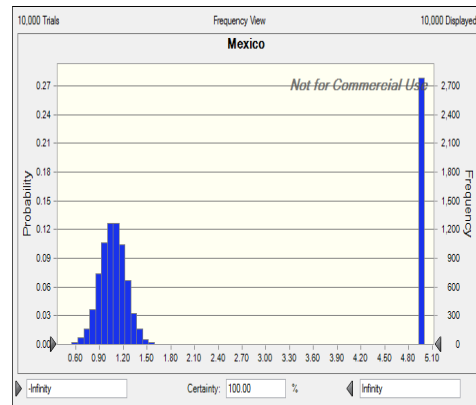


Figure 1: Simulation Output for Nominally Low-Cost Vendor

Figure 2 shows the same display for the Brazilian vendor, which had a relatively high quoted price, but low probabilities of failure.

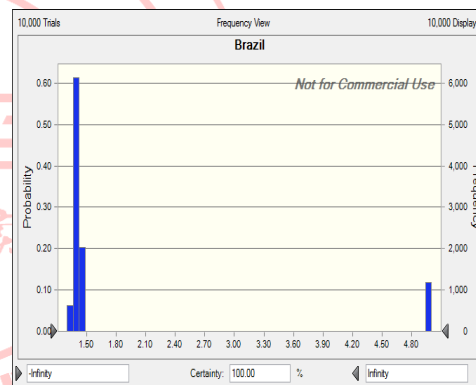


Figure 2: Price Outcome for Hypothetical Brazilian Vendor

Many financial simulation models can be accomplished on spreadsheets, such as Excel. There are a number of commercial add-on products that can be added to Excel, such as @Risk or Crystal Ball, that vastly extend the simulation power of spreadsheet models. These add-ons make it very easy to replicate simulation runs, and include the ability to correlate variables, expeditiously select from standard distributions, aggregate and display output, and other useful functions.

6.3 Chance-Constrained Programming

Chance constrained programming was developed as a means of describing constraints in mathematical programming models in the form of probability levels of attainment [33]. Consideration of chance constraints allows decision makers to consider mathematical programming objectives in terms of the probability of their attainment. If α is a predetermined confidence level desired by a decision maker, the implication is that a constraint will be violated at most $(1-\alpha)$ of all possible cases.

Chance constraints are thus special types of constraints in mathematical programming models, where there is some objective to be optimized subject to constraints. A typical mathematical programming formulation might be:

$$\begin{aligned} & \text{Maximize } f(X) \\ & \text{Subject to: } Ax \leq b \end{aligned} \quad (2)$$

The objective function $f(X)$ can be profit, with the function consisting of n variables X as the quantities of products produced and $f(X)$ including profit contribution rate constants. There can be any number m of constraints in Ax , each limited by some constant b . Chance constraints can be included in Ax , leading to a number of possible chance constraint model forms. Charnes and Cooper presented three formulations [34]:

Maximize the expected value of a probabilistic function

$$\begin{aligned} & \text{Maximize } E[Y] \text{ (where } Y=f(X)) \\ & \text{Subject to: } \Pr\{Ax \leq b\} \geq \alpha \end{aligned} \quad (3)$$

Any coefficient of this model (Y, A, b) may be probabilistic. The intent of this formulation would be to maximize (or minimize) a function while assuring α probability that a constraint is met. While the expected value of a function usually involves a linear functional form, chance constraints will usually be nonlinear. This formulation would be appropriate for many problems seeking maximum profit subject to

staying within resource constraints at some specified probability.

We will not go through a detailed model applying chance-constrained programming, but it is appropriate to consider value-at-risk. This concept has been widely applied in finance in the past decade, in attempts to control risk. Chance-constrained models can be used to specify investment combinations which have a stated probability (like 0.99) of being at least some minimum value. Value-at-risk is a combination of the selected probability and limit. Generating a solution with a chance-constrained model could yield an investment portfolio which in turn could then be simulated to show expected outcome. Value-at-risk output can be obtained through Monte Carlo simulation.

6.4 Data Envelopment Analysis Models

Charnes, Cooper and Rhodes first introduced DEA (CCR) for efficiency analysis of Decision-making Units (DMU) [35]. DEA can be used for modeling operational processes, and its empirical orientation and absence of *a priori* assumptions have resulted in its use in a number of studies involving efficient frontier estimation in both nonprofit and in private sectors. DEA has become a leading approach for efficiency analysis in many fields, such as supply chain management [36]. DEA and multicriteria decision making models have been compared and extended [37].

Moskowitz et al. [38] presented a vendor selection scenario involving nine vendors with stochastic measures given over twelve criteria. This model was used by Wu and Olson [39] in comparing DEA with multiple criteria analysis

7. CONCLUSIONS

The process of risk management can be supported by planning tools to identify what might go wrong, and by methods to monitor organizational performance.

While risk needs to be managed, taking risks is fundamental to doing business. Profit by necessity requires accepting some risk [40]. ERM provides tools to rationally manage these risks. We will demonstrate multiple criteria and DEA models in the enterprise risk management context with a hypothetical nuclear waste repository site location problem.

REFERENCES

- [1] Mitroff, I.I., Alpaslan, M.C. "Preparing for evil", *Harvard Business Review* Vol. 81, No. 4, pp. 109—115, 2003.
- [2] Perrow, C. *Normal Accidents: Living with High-Risk Technologies*. Princeton, NJ: Princeton University Press, 1999.
- [3] Nelson, R. "Flight disruption lacks hard data", *Test & Measurement World* Vol. 30, No. 4, May 7, 2010.
- [4] Uhlmann, U. "Eruption disruption", *Canadian Underwriter* Vol. 77, No. 8, August, pp. 18-20, 2010.
- [5] Pearson, M., Read, B. "A volcano's fallout: Strategies for disruption", *Businessweek*, June 15, 2010.
- [6] Einhorn, B., Culpan, T., Ohnsman, A. "Now, a weak link the global supply chain", *Bloomberg Businessweek* 4221, 3/21/2011, pp. 18-19.
- [7] Reiter, C., Cremer, A. "Volkswagen, BMW feel pinch from struggling suppliers", *Bloomberg Businessweek* Jan 27, 2011.
- [8] Von Thünen, J.H., *The Isolated State*, 1826.
- [9] Hawley, F.B. *The Risk Theory of Profit*, 1907.
- [10] Knight, F.H. *Risk, Uncertainty, and Profit*, 1921.
- [11] Markowitz, H.M. "Portfolio selection:", *The Journal of Finance* Vol. 17, No. 1, pp. 77-91, 1952.
- [12] Sharpe, W.F. "Capital asset prices: A theory of market equilibrium under conditions of risk", *Journal of Finance* Vol. 19, No. 3, pp. 425-442, 1964.
- [13] Fama, E.F. "Portfolio analysis in a stable Paretian market", *Management Science* Vol. 2, No. 3, pp. 404-419, 1965.
- [14] Lowenstein, R. *When Genius Failed: The Rise and Fall of Long-Term Capital Management*, 2000.
- [15] Taleb, N.N. *The Black Swan: The Impact of the Highly Improbable*, 2007. [16]
- [16] Kahneman, D. and Tversky, A. "Prospect theory: An analysis of decision under risk", *Econometrica* Vol. 47, No. 2, pp. 263-292, 1979.
- [17] Akerlof, G.A., Shiller, R.J. *Animal Spirits: How Human Psychology Drives the Economy, and Why it Matters for Global Capitalism*, 2009.
- [18] Cucchiella, F. and Gastaldi, M. "Risk management in supply chain: A real option approach", *Journal of Manufacturing Technology Management* Vol. 17, No. 6, pp. 700-720, 2006.
- [19] Dickinson, G. "Enterprise risk management: Its origins and conceptual foundation", *The Geneva Papers on Risk and Insurance* Vol. 26, No. 3, pp. 360-366, 2001.
- [20] Ritchie, B., Brindly, C. "Supply chain risk management and performance: A guiding framework for future development", *International Journal of Operations & Production Management* Vol. 27, No. 3, pp. 303-322, 2007.
- [21] Mentzer, J.T., Dewitt, W., Keebler, J.S., Min, S., Nix, N.W., Smith, C.D., Zacharia, Z.G. *Supply*

- Chain Management*. Thousand Oaks, CA: Sage, 2001.
- [22] Tang, C.S. “Perspectives in supply chain risk management”, *International Journal of Production Economics* Vol. 103, pp. 451-488, 2006.
- [23] Olson, D.L. *Decision Aids for Selection Problems*. NY: Springer, 1996.
- [24] Klimov, R., Merkurjev, Y. “Simulation model for supply chain reliability evaluation”, *Technological & Economic Development of Economy* Vol. 14, No. 3, pp. 300-311, 2008.
- [25] Wu, D., Olson, D.L. “Supply chain risk, simulation, and vendor selection”, *International Journal of Production Economics* Vol. 114, No. 2, pp. 646-655, 2008.
- [26] Towill, D.R., Disney, S.M. “Managing bullwhip-induced risks in supply chains”, *International Journal of Risk Assessment & Management* Vol. 10, No. 3, pp. 238-262, 2008.
- [27] Kara, S., Kayis, B. “Proactive logistics risk management – A system dynamics modeling approach”, *International Journal of Risk Assessment & Management* Vol. 10, No. 3, pp. 224-237, 2008.
- [28] Charnes, A., Cooper, W.W. “Chance-constrained programming”. *Management Science* Vol. 6, No. 1, pp. 73-79, 1960.
- [29] Bogataj, D., Bogataj, M. “Measuring the supply chain risk and vulnerability in frequency space”, *International Journal of Production Economics* Vol. 108, Nos. 1/2, pp. 291-301, 2007.
- [30] Goh, M., Lim, J.Y.S., Meng, F. “A stochastic model for risk management in global supply chain networks”, *European Journal of Operational Research* Vol. 182, No. 1, pp. 164-173, 2007.
- [31] Charnes, A., Cooper, W.W., Rhodes, E. “Measuring the efficiency of decision-making units”, *European Journal of Operational Research* Vol. 2, pp. 429-444, 1978.
- [32] Olson, D.L. “Risk management models for supply chain outsourcing”, *Conradi Research Review*, Vol. 5, No. 1, pp. 15-28, 2009.
- [33] Charnes, A. and Cooper, W.W. “Chance-constrained programming”, *Management Science* Vol. 6, No. 1, pp. 73-79, 1959.
- [34] Charnes, A., Cooper, W.W. “Deterministic equivalents for optimizing and satisficing under chance-constraints”, *Operations Research* Vol. 11, No. 1, pp. 18-39, 1963.
- [35] Charnes, A., Cooper, W.W., Rhodes, E. “Measuring the efficiency of decision-making units”, *European Journal of Operational Research* Vol. 2, pp. 429-444, 1978.
- [36] Ross, A., Droge, C. “An integrated benchmarking approach to distribution center performance using DEA modeling”, *Journal of Operations Management* Vol. 20, pp. 19-32, 2002.
- [37] Lahdelma, R., Salminen, P. “Stochastic multicriteria acceptability analysis using the data envelopment model”, *European Journal of Operational Research* Vol. 170, pp. 241-252, 2006.
- [38] Moskowitz, H., Tang, J., Lam, P. “Distribution of aggregate utility using stochastic elements of additive multiattribute utility models”, *Decision Sciences* 31, 327-360, 2000.
- [39] Wu D., Olson, D.L. “A comparison of stochastic dominance and stochastic DEA for vendor evaluation”, *International Journal of Production Research* Vol. 46, No., 8, pp. 2313-2327, 2008.
- [40] Alquier, A.M.B., Tignol, M.H.L. “Risk management in small- and medium-sized enterprises”, *Production Planning & Control*, Vol. 17, pp. 273 – 282, 2006.

The Effect of Agency Problem, Donation Amount, and Donor- Recipient Relationships on Corporate Philanthropic Donations Intention: Evidence from Taiwan

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ABSTRACT

By using a questionnaire experimental approach, this study derives an improved model aims to investigate the effects of agency problem (present or absent), donation amount (small or large), and donor- recipient relationships (familiar or unfamiliar) on manager donation intention under firm's limited resource condition. This research hypothesizes that a manager has difference behavior on charitable donation when agency problem are present or absent. Also, this study predicts that a manager with small-dollar donation or with familiar donor-recipient relationships has a stronger tendency to make a donation than one with large-dollar donation or with unfamiliar donor- recipient relationships. This study finds that agency problem, donation amount are significant factors on the intention regarding philanthropic donations. More specifically, the empirical evidence supports the hypothesis that a manager under no agency problem is more likely to give donation than one under the circumstances of agency problem. Next, manager is more likely to give small-dollar donation rather than large-dollar donation. However, there is no significant difference between the taxonomic groups of donor- recipient relationships. Finally, there is also no interaction effect among agency problem, donation amount, and donor- recipient relationships on donations intention.

Keywords: agency problem, philanthropic donation intention, donor- recipient relationship, donation amount

The Influence of Expected or Unexpected Events on Word of Mouth

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ABSTRACT

In our lives, we are closely associated with services and engage in any activities that are relative with service. Based on simultaneous production and the consumption of service characteristics, avoiding service failures is difficult for service industries (Zeithaml, Parasuraman, & Berry, 1985; Choi & Mattila, 2008). Therefore, with the rise of consumer awareness, examining how consumers reflect on their perceptions has become increasingly important.

Previous research has focused on service types by examining service failures, but there is little research focused on the relationship between consumers and restaurants. According to previous research, when service industries experience service failures, this letdown could diminish customer satisfaction and loyalty and even generate negative word-of-mouth. Furthermore, much of the previous research has examined the influence of service recovery on perceived fairness and focused on the outcomes of service recovery.

In addition, we are often confronted with the problem of unfair charges in restaurants. Consumers have always generated a series of complaints toward expected and unexpected charges; therefore, in this research, we will examine how expected and unexpected charges influence consumers' attitudes. This study will also focus on how different factors influence consumers to spread negative word-of-mouth. Therefore, relationship type is another important factor when the service sector experiences service failures.

This research employed an experimental methodology and adopts an experiment to examine word of mouth when service failures occur. In this experiment, we adopt a 2 (customer punishment: expected vs. unexpected) \times 3 (relationship types: encounter relationship, pseudo relationship vs. intimate relationship) mixed-design experiment to examine negative word of mouth. We also proposed practical implications and suggestions for service industries according to the achieved results.

Keywords: service failures, customer punishment, word-of-mouth, relationship types

The impact of service quality for Taiwanese firms to enter the Chinese market

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ABSTRACT

China is a huge potential market both in terms of population and region. Therefore, China is the country of battlegrounds for almost every major manufacturer in the world. However, China's domestic market is big enough to feed local manufacturers who would easily develop and strengthen their brand names. Consequently, the demand for foreign brands in China's market is relatively insignificant. The gap of living conditions between urban and rural areas is phenomenal in China. That would create differences in information perceptions and living styles between urban and rural residents. As a result, Chinese market is a relatively closed market compared to other Asian countries. Foreign firms want to enter the Chinese market would normally encounter much difficulties. Based on previous studies (e.g., Birkner, 2012; Lorelle, 2003), issues of staff recruitment and cultural awareness are important reasons for the difficulties encountered by foreign firms entering into the Chinese market. In addition, behavioral norms and expectations from different cultural backgrounds is also an important challenge for foreign firms.

For business operations that require service contacts, the issue of cultural difference becomes even more complicated. First of all, the perception of how service should be delivered may be different in different cultures. Differences in service expectations may cause misunderstandings during service interactions. In other words, cultural differences would add to the difficulties for foreign firms entering into the Chinese market. Few studies explored the impact of cross-cultural service contacts on the perceptions of local Chinese customers. Also, not too many studies discussed the acceptance of foreign services offered in the Chinese market that would be affected by how local customers perceive the concept of service satisfaction. Under such circumstances, some important research agenda emerged regarding the issue of service firms entering into the Chinese market. Topics such as the perceptual difference of service satisfaction due to cultural differences and how foreign firms fundamentally re-define, re-strategize, and improve cross-cultural services are worth of exploring.

Unlike Western or European countries, Taiwan enjoys the same heritage with China and speaks the same language. There are not much differences in behavioral patterns, moral thoughts, and cultural differences between Taiwanese and Chinese. Therefore, the impact of service perceptions and cultural differences for Taiwanese manufacturers who enter the Chinese market should be less than those from Western or European countries. In other words, problems encountered by manufacturers from Western or European countries due to cultural differences might not be problems for Taiwanese manufacturers. The current study tries to look at some Taiwanese service firms who had set foot in the Chinese market. How they define, perceive, and execute service contacts would be explored. Furthermore, would Chinese customers be more willing to accept and accent to the service quality defined by Taiwanese manufactures than it is defined by Western or European countries?

Keywords: cross-cultural difference, service quality, Chinese market, service contact

Empirical Study of the Influential Factors of Groupon-shoppers' Satisfaction

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ABSTRACT

Based on the expectation disconfirmation theory and measuring theory of Customer Perceived Value(CPV), this study proposed a theoretical model which reflects the relations among customer perceived value, customer expectation and Groupon-shoppers' satisfaction. CPV has three dimensions: Perceived Benefits (PB), Perceived Cost (PC) and Perceived Risk (PR). The model is tested with the sample of the college students. The empirical results support the theoretical model and all of the hypothesis. The conclusion shows that Groupon shoppers' satisfaction is determined by the customer perceived value and customer expectation , and customer perceived value is the main factor. The much value is perceived by the customer, the more satisfaction they will get. Customers always want to buy goods with the minimum cost through Groupon. Accordingly, product value is not the main focus, but the cost is. We also find that the perception of risk would be marked with a great discount of perceived value.

Keywords: Groupon, satisfaction, perceived value, influential factor

Compulsive Buying Behavior and the Effect of Intention to Use Credit Card and Possibility of Overuse Credit Card

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ABSTRACT

Compulsive buying behavior is increasingly recognized as a growing problem among consumers in general. Considered as a side effect of materialism and the dark side of consumer behavior, compulsive buying has been under scrutiny by numerous customer researchers as well as marketers because of its serious impact on the individual and the public. The key determinant of compulsive buying behavior is credit card. This study regards the intention to use credit card and possibility of overuse credit card as a crucial factors for compulsive buying behavior. Percieved value of credit card, fashion oriented, self esteem, power prestige, risk taking, and elemental personality traits are important factors that determines the intention to use credit card and possibility of overuse credit card. This study aims to fill this research gap by firstly developing a comprehensive research framework for compulsive buying behavior. The research model will be evaluated through questionnaire survey by targeting the samples from the bank credit card customers in Indonesia. Multivariate data analyses will be adopted to empirically test the developed research hypotheses. The expected results of this study are that the intention to use credit card and possibility of overuse credit card tend to have a positive relationship to compulsive buying behavior.

Keywords: compulsive buying behavior, perceived value, fashion oriented, self esteem, power prestige, risk taking, personality traits

Applying the Automatic Message Broadcasting Computer System in Schedule Management – the first-case-of-the-day

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ABSTRACT

There are lots of precise and expensive instruments in the operation rooms, where are many professional staff gathering in and the core units completing patients' medical treatment. Whether the first surgical start time begins on time or not will influence the operating performance of surgery rooms. The aim of this study is to investigate if the delayed start time of first surgery and waiting time for surgical patients can be effectively reduced after improving the interventional methods in the operating rooms of a medical center. The study was conducted in the operating rooms of a medical center in Taipei, Taiwan. The before-intervention period was July 7-19, 2009, and the after-intervention period was January 5-17, 2010. Daily collecting the first surgical start time of the operating rooms. There were 120 patients in before-intervention period and 116 patients in after-intervention period enrolled. The valuation impact indicator was the delay time in starting surgery. The interventional method was automatically sending a text message to the attending physician's cell phone by the surgical scheduling computer system as soon as the surgical patient arriving the operating room, and the doctor immediately arriving the operating room for surgery after receiving the message. The results showed the maximum delay time in starting first surgery was 60 minutes, the minimum time was 0 minutes, the average time was 17.9 minutes, and the standard deviation was 10.596 minutes in before-intervention group. The maximum time was 40 minutes, the minimum time was 5 minutes, the average time was 15.69 minutes, and the standard deviation was 8.385 minutes in after-intervention group. The P-value between the 2 groups was 0.001 and t - value was 3.595. The findings suggested that ahead of the start time for daily first surgery was more cost-effective, and the daily first surgery should be started on time for patient safety requirements.

Keywords: Operating Room (OR) 、 OR efficiency 、 The first-case-of-the-day.

A study of inventory problem with appreciation period and trade credit under advance sales

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ABSTRACT

Today, competition is not only rife but growing more intense every year. Due to the effects of globalization, advances in technology and information, successful companies have to keep growing. In order to sustain competitive advantage and increase market share, retailers provide better and better service. In the marketplace, offering appreciation period has become a commonly adopted method to retailers. During the appreciation period, customers can make a request to return products for any kind of reason. Packaging errors and product defects are some of the common reasons that customers make a request to return products. To attract more customers, it is a common practice for retailers to provide advance sales. Advance sales provide numerous benefits for companies, including gaining additional discriminative customers and increased profit due to interest earned from payments received from committed customers prior to the start of the regular selling period. In addition, trade credit is a common payment behavior in business to business (B2B) and business to customer (B2C) transactions. The supplier usually provides the retailer a trade credit to attract more customers who consider it to be a type of price reduction. Therefore, in this article, we establish an inventory model for a retailer who simultaneously receives trade credit from its supplier, and offers advance sales and appreciation period to its customers. Finally, numerical examples are given to illustrate the solution procedure and a sensitivity analysis is performed to investigate the effect of changes of some main parameter values on the optimal solution.

Keywords: Inventory; Trade credit; Advance sales; Appreciation period; Finance

Cost/ benefit model development of quality management with profit design

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ABSTRACT

In this research, the cost/ benefit model will be developed to integrate quality management with profit design on relevant processes. The profit should be properly allocated on quality conformance, quality improvement, and quality attraction by the investment in quality management and using the approach of profit design. The model can be used for the decision makers to predict the cost/ benefit of quality management with profit design before the investment.

Keywords: Quality management, cost, investment, profit design

Supplier's optimal replenishment time and trade credit period using the concept of up-stream and down-stream trade credits

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ABSTRACT

In practice, to attract new buyers and increase sales, a supplier frequently offers its retailers a credit period to settle the amount owed to him/her. There is no interest charge to a buyer if the purchasing amount is paid within the credit period, and vice versa. a retailer in turn offers another trade credit period N to its customers.

The benefits of trade credit are not only to attract new buyers who consider it a type of price reduction, but also to provide a competitive strategy other than introduce permanent price reductions. On the other hand, the policy of granting credit terms adds an additional cost to the seller as well as an additional dimension of default risk. In this paper, we first incorporate the fact that trade credit has a positive impact on demand but negative impacts on costs and default risks to establish an EOQ model for the seller in a supply chain with up-stream and down-stream trade credits. Then we derive the necessary and sufficient conditions to obtain the optimal replenishment time and credit period for the seller. Finally, we use some numerical examples to illustrate the theoretical results.

Keywords: inventory; permissible delay; trade credits; seller; finance.

Nash equilibrium solution in a seller-buyer supply chain model with permissible delay in payments

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ABSTRACT

In practice, sellers often offer their buyers a fixed credit period (i.e. trade credit) to settle the account. The benefits of trade credit are not only to attract new buyers but also to avoid lasting price competition. On the other hand, the policy of granting a permissible delay adds not only an additional cost but also an additional dimension of default risk to vendors. In this paper, we will incorporate the fact that granting a permissible delay has a positive impact on demand but negative impacts on both costs and default risks to establish vendor-buyer supply chain models. Then we will derive the necessary and sufficient conditions to obtain the optimal solution for both the vendor and the buyer under non-cooperative Nash equilibrium. Finally, we will use two numerical examples to show that (1) granting a permissible delay may significantly improve profits for both the vendor and the buyer, and (2) the sensitivity analysis on the optimal solution with respect to each parameter.

Keywords: inventory; supply chain management; permissible delay; Nash equilibrium.

The Effect of the Financial Crisis on the SME's Capital Structure in Taiwan

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ABSTRACT

The subprime mortgage crisis that broke out in the U.S. in 2007 resulted in a large scale of financial chaos not only in the U.S., but also in many other countries in the world. The crisis spread over to Taiwan rapidly, causing downturn of sales, layoffs, and financial stresses. It dampened the Taiwan stock market about 5,000 points, decreasing from 9,000 points in September 2007 to about 4,000 points in December 2008. The capital structure choice is one of the most important decisions faced by corporate management (Degryse, 2010). Usually, the small and medium-sized firms (SMEs) encounter higher difficulty in obtaining funds, and also have more limited alternatives in choices than the large firms when funds are needed. Since the SMEs have made a great contribution to Taiwan's economy (30% of total sales in 2006) and employment (77% of total jobs in 2006), this research is intended to investigate the capital structure of the SMEs in Taiwan, and also develop an understanding how the SME adjusted both their financial policies and leverages to overcome the distress during the era of financial crisis since 2007.

Extended and modified from the models of Sogorb-Mira (2005) and Degryse et al. (2010), a regression model is formulated to test hypotheses. The sample data of Taiwan firms are retrieved from the data bank of Taiwan Economic Journal (2011) for the period of 2003-2010. The major findings of this research are: a) The variables of firm size, tangible assets, ROA, and working capital have significant effects on short-term debts for the SMEs in Taiwan prior (2004-2006) and during (2008-2010) the financial crisis, while depreciation and R& D have no significant impacts on short-term debts prior and during the financial crisis. Taxes reveal no significant effect on short-debt prior the financial crisis, but it becomes a significant effect during the financial crisis. b) The aforementioned variables aggregately do not reveal as strong factors affecting the SME's long-term debts prior and during the financial crisis. A couple of other findings and all findings' implications are also discussed.

Keywords: financial crisis, capital structure, small and medium-sized firms, SMEs.

Multiple large shareholders and the cost of equity capital

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ABSTRACT

Concentrated ownership is very common in East Asia, especially in China, resulting in the agency problem between the controlling shareholder and minority shareholders. Previous research emphasizes the role multiple large shareholders (MLS) play in corporate governance mechanisms to alleviate the agency problem. This study extends the strand of literature by investigating the impacts of MLS on firms' implied cost of equity capital. On the one hand, MLS might mitigate the agency problem by monitoring the controlling shareholder, which helps reduce the firms' cost of equity capital. On the other hand, MLS can deteriorate firm value by colluding with the controlling shareholder. By examining the presence, contestability, and identity of MLS, this study provides another perspective to better understand how MLS may affect the firm value.

The sample in this study consists of 1,517 observations. The Ordinary Least Squares method was used to analyze the relationship between MLS and firms' cost of equity capital. The empirical results reveal that the presence and contestability of MLS could harm the firm value by increasing firms' cost of equity capital. However, when the second-largest shareholder is the state or domestic legal person, the firm value can be enhanced by decreasing the required rate of return from investors.

In China, MLS might not serve as an effective corporate governance mechanism. Instead, MLS may choose to collude with the controlling shareholder and extract private benefits at the expense of minority shareholders, which impairs the firm value by increasing the required rate of return from investors. However, the identity of the second-largest shareholder matters in determining whether the firm value would be enhanced or destroyed. Our findings have implications for investors that they should understand the identity of the second-largest shareholder before they invest in the company.

Keywords: Multiple large shareholders, cost of equity capital, corporate governance.

An Empirical Analysis of Adverse selection factor : Group Accident Insurance in Taiwan's Property and Liability Company

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ABSTRACT

Property and Liability Industry joined the accident insurance market in 2001. The past decade has witnessed growing in premium income. At the same time, the loss ratio has raised gradually. From 2005 to 2011, average loss ratio is 45.24% in Property and Liability insurance industry and 34.31% in Life insurance Industry. Property and Liability insurer's underwriter must face the getting worsen loss ratio and look for something to do. The purpose of this paper is to examine execute underwriting guideline can reduce the adverse selection or not and personal features can influence group insurance's decision-making factors or not.

We complied data on group accident insurance from a Property and Liability Company in Taiwan from 2009 to 2010. There are 151,037 samples in personal features and 4,504 samples in group features, the 2009 data as contrast group and the 2010 data as a experiment group. We use ordered logistic regression to analysis the phenomenon of adverse selection. The estimation results show that adverse selection exists in group accident insurance and execute underwriting guideline can improve the effect of adverse selection. The result of the analysis not only help underwriter to establish a sound underwriting system but also increase more underwriting profit.

Keywords: adverse selection, group insurance, orded logistic regression

Using Higher Moments to Estimate the Value at Risk under the Minimum Variance Hedging Portfolio: Evidence from Hang Seng Stock Index Futures

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ABSTRACT

Portfolio returns usually demonstrate a heavy tail or skewness. If portfolio value at risk (VaR) is not considered to incorporate the distributions of third and fourth moments, bias results in the estimation of VaR. Considering to incorporate the distributions of the third and fourth moments, this study evaluates the Hang Seng stock index using the VaR of minimum variance hedging portfolio of future hedging and compares the performance of different models using back-testing. Empirical results indicate accuracy is improved when considering the distributions of third and fourth moments compared to without considering the distributions of third and fourth moments. Additionally, models that incorporate the leveling effect are more accurate than those without. This study thus recommends that investors consider incorporating the distributions of third and fourth moments, while simultaneously including the effects of leveling on the dynamic volatility model when constructing hedging portfolio. Furthermore, investors can also use the study results as a reference for risk management.

Keywords: value at risk; back-testing; level effect; stock index futures

Incentives of banking mergers and market response: evidence in Vietnam

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ABSTRACT

In the recent years, mergers have been an increasing phenomenon in Vietnam market, in particular banking industry. This study examined the main benefits of specific banking mergers in Vietnam. In line with the literature, the study also addresses the issue of whether or not we can infer the effects of banking mergers to the market by looking at market's response. To solve these questions, the research investigated the reactions of market to announcements of the two official banking mergers in Vietnam. The study used seemingly unrelated regression (SUR) method as applied to event studies. The data set includes daily share price of the nine banks, which are listed in Vietnam stock market and the market index for a period of 182 trading days surrounding each event day.

Keywords: banking mergers, market's reactions, seemingly unrelated regression (SUR), incentives of mergers

To enhance the training performance of enterprise human resources by Taiwan TrainQuali System

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ABSTRACT

Bureau of Employment and Vocational Training (BEVT) established Taiwan TrainQuali System, TTQS, which is a management tool suitable for Taiwan's corporations' training processes and human training, with reference to the Swiss ISO 10015 Standards for training quality management and frameworks of the British Investors in People, IIP. With the system, BEVT developed the "Union project of assisting enterprises in human resources elevation" to help and encourage the professional groups, incorporations and businesses in all trades to plan and provide union advanced trainings for their employees. The purpose was to disseminate and share the experience in and resources of education and training, also to elevate the human resources in the enterprises to upgrade and development.

The database of BEVT union training project is divided into three groups -Talent training, Quality training and Innovation. Association analysis by the major variables in association rules, which are training courses and the scores by TTQS to identify the important courses that were evaluated to be above Silver-medal level. It is hoped to draw up the reference to the training courses for future participant firms which firm intends to invest in human resources can implement appropriate trainings for the employees to reinforce its competitiveness.

Keywords: Association Rule, IIP, ISO10015, Performance Matrix, TTQS

Factors Influencing State Registered Nurses' Motivation and Intention to Leave the Health Sector in the Gambia

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ABSTRACT

State registered nurses are the highest cadre of nursing in The Gambia. In addition to their nursing function, they are in charge of all major health centers in the country as well as unit heads in all hospitals. Many nurses abandon the public sector due de-motivation, a situation having serious negative impacts on the health status of the population and the socioeconomic development of the nation. However, limited research has been done concerning the factors that influence nurses' motivation or intention to leave in The Gambia.

Using a qualitative approach, two-factor theory of Herzberg has been used to find out the factors that influence the motivation and leaving intentions of State Registered Nurses (SRNs) in The Gambia. 8 SRNs were interviewed and the results were coded and analyzed. The results show that work characteristics, resource availability, facilities, rewards, management style, job security and availability of training opportunities seem to have the highest impact on motivation and intention to leave. The interviewees were more positive about job security and training opportunities but more negative about resource availability, rewards and work characteristics. A suggestion for further research including other cadres of nurses is made.

Keywords: motivation, two-factor theory, intention to leave

Decision-Making Critical Incidents of Online Auctioning

3C Second-Hand Products

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ABSTRACT

For the increasing numbers of shopping websites, consumers have reformed themselves to shop online and then to make purchasing decision online. More and more online auction websites are also available to the consumers for purchasing and selling second-hand products (SHPs). The decision-making process to purchase or to sell SHPs is usually difficult to the consumers since varied factors have to be taken into account on the auction websites. In the present literature, however, the critical incidents encouraging the consumers to make decision on participating in auctioning SHPs, especially 3C-type, are not explored. Thus, it is worth to carefully explore the consumers' perceived value of purchasing and/or selling SHPs when they are in the process of making auctioning decision. This study explores the consumers' purchasing intention (buyers) and selling intention (sellers) before making decision on purchasing and/or selling 3C-type SHPs on auction websites. This study also explores the consumers' usage of 3C-type SHPs. As a result, this study invites 38 buyers and 33 sellers from varied auction websites by taking a snowball sampling to collect rich verbal descriptions from the consumers whom have owned SHP purchasing and/or selling experiences. After analyzing the SHP buyers and sellers' descriptions about purchasing and/or selling SHPs, this study finds a close relationship between the attributes of the SHPs and the personality of the consumers. Finally, this study finds that the SHP buyers and sellers' personality are influential to produce critical incidents when making auctioning decision. Other issues regarding online auction are discussed at the end.

Keywords: Auctioning decision, Second-hand product, Product lifecycle

The Value of Bundling Strategy with Strategic Consumers

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ABSTRACT

Strategic consumer tradeoffs current purchase with discount purchase in order to obtain higher expected surplus, which aggravates the mismatching risk between capacity and demand. This paper evaluates the value of the explicit and the implicit bundling discount strategies to induce strategic consumer to purchase early. In the explicit bundling discount strategy, a seller offers a bundling price discount when a strategic consumer simultaneously purchases two products early; whereas in the implicit bundling discount strategy, the seller provides a cross market discount via a cross market alliance. We show that in the explicit bundling discount strategy, the seller's profit is independent of the level of the bundling discount; in the implicit bundling discount strategy, both the seller and the partner's profits are independent of the cross market discount level. Finally, we also find that strategic consumers behave more strategic (i.e., higher strategic waiting degree), explicit and implicit bundling discount strategies are more valuable when seller bundles more complementary products.

The Role of Rationality in Self-sustenance of Workers’ Co-operative in India

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ABSTRACT

In this paper we have reviewed a case of closed mine where we have looked at the problems, challenges and ultimate failure of the attempt by a group of separated Indian mine workers to reopen the closed mine by establishing a co-operative, in response to their company’s decision to close down the mine. The case looks at an example of a failed attempt to set up a co-operative in contrast to much other literature that looks at (initially) successful attempts. The paper focuses on the contradictions and issues involved in the process of employee participation in their work as well in their organizational issues, in forming and starting a workers’ co-operative. Regardless of the extraordinarily encouraging beginning the co-operative has failed to start off till date. By referring to the available data on a particular workers’ co-operative in India, which has hitherto not started off, we tried to analyze the case, identify causative factors that led to the fiasco and accordingly categorize the causes to identify overriding factor(s) that emerge(s) out of our analysis. We alluded to the tensions in such situations between the craving and imaginings of workers for something better and more human than capitalism can provide in terms of management, employment conditions and work organization, and between their pragmatic concerns to provide continuing employment when faced with mine closure. From our analysis of the case we concluded that it would be disastrous to the working class movement if advocates of co-operatives fall into the trap of sentiment and utopian socialist dogma that encourages radical transformation without having basic understanding of legal ownership and liability involved in it. The issue of the potential and the obstacles for members of co-operatives is of interest both in the contexts of India and other developing economies, as well as in rather different contexts of developed economies.

Keywords: Workers’ co-operative, closure, mine, separated workers.

The factor analysis of performance on family business-The cases of Chinese Medicines Manufacturing

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ABSTRACT

The manufacturing of Traditional Chinese Medicine (TCM) has been promoted good manufacturing practice (GMP) in Taiwan since 1982, and has included about 116 pharmaceutical factories with the GMP certificated, in addition, most of TCM have been small business with family business so far. According to National Health Insurance (NHI) database, there are 30 herbal concentrates plants which have gained the medical payment from NHI. The top five factories accounted for more than 70% of the overall Chinese medicine health insurance market. The characteristics of top Chinese Medicines Manufacturing are different from Western medicine industry, such as the ages of establishment, the difficulty of copy bulk raw materials, cost structure of raw materials, consumer habits, thus, they have developed the different features from the Western medicine industry.

However, there are still many similarities and dissimilarities between those Chinese Medicine Manufacturing industries. The similarities have included the family business based, product specifications, the sources of raw materials, and the pricing. The dissimilarities have focused on the decision-making model, marketing activities and service value. The value chain was proposed by scholar Porter (1980), including five primary activities. Three items among five activities are ruled by strict laws, rules and regulations, including inbound logistics, operations (production), outbound logistics, and there are few differences between businesses. In the marketing & sales and service sections, they could generate different performance levels due to different decision-making models. The decision-making model is related to corporate culture, education levels of decision makers, different personalities of second-generation successor. Therefore, it could generate differences on distribution channels, service, research and innovation when they make decisions.

In this study, we will employ the method of in-depth interview and interview the major responsible persons about five major enterprises. In this research, we will attempt to analyze the decision-making model and the education level of decision-makers as the main independent variables, and investigate how they influence the performance of the family business. The decision-making model will downwardly divide into two subgroups: group decision and non-group decision. Furthermore, the education level of decision-makers will also separate into three subgroups: PhD degree, Master degree and under-Master degree. The results will indicate that the two main factors could significantly positive influence on performances. According to specific results, we will address further practice implications and suggestions.

Keywords: Traditional Chinese Medicine, good manufacturing practice, National Health Insurance, decision-making model

A Framework of Valuation for a Supply Contract under Uncertainty with Long-range Dependence

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ABSTRACT

In a supply chain, a retailer could transfer demand uncertainty to its supplier by signing a supply contract, requiring the supplier to prepare more inventories to meet the retailer's needs. When the retailer has a right to lock in the wholesale price via the supply contract, it owns a real option in the supply contract. In most cases, the predetermined price in the supply contract only comprises the supplier's unit cost and unit margin profit. Real option value is often neglected. As a result, wholesale price is undervalued. This paper aims to address the pricing problem by using a correlated stochastic model. We assume that the market demands are correlated in time horizons. There exist two echelons in the supply chain: the business market and the consumer market. The demands in the consumer market are assumed to follow a fractional Brownian motion. By using the fractional Ito formula, we could derive the analytical solution for the real option value, which is embedded in the supply contract. The result demonstrates that the higher the degree of autocorrelation in demand, the larger the real option value. As a consequence, the wholesale price determined in the supply contract without considering demand's long-range dependence is significantly undervalued. In conclusion, the supplier should charge more for the wholesale price when the degree of autocorrelation in demand is higher.

Keywords: Supply Contract, Long-range Dependence, Fractional Brownian Motion, Real Option

Fuzzy Set Theory, Grey System and ARIMA for the BDI Forecasting

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ABSTRACT

Baltic Exchange Dry Index (BDI) is an independent response of maritime market information for the trading and settlement of physical and derivative contracts. In the paper, we propose fuzzy set theory and grey system model for the prediction of BDI, and employ ARIMA model for the calibration of data structure to depict the trend. The empirical results indicate that for both short-term and long-term BDI data, fuzzy time series model has lowest prediction error; Structural change ARIMA model fits better for the prediction in the long term, while the GM (1,1) model compared to proposed models has the greatest prediction error. Moreover, the relationship that the change between in current BDI and in previous is highly positive significance; the external interference for the current BDI index is negatively related. The conclusion of the paper would provide the bulky shipping with a beneficial reference for the market and risk assessment.

Keywords: Baltic Dry Index, Bulky Shipping, Fuzzy Set Theory, GM (1,1), Grey-Bernoulli model, Grey-Markov model, ARIMA.

Study of Collective User Behaviour in Twitter: A Fuzzy Approach

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ABSTRACT

Compared to traditional blogging sites (e.g. Blogspot) and social sites (e.g. Facebook), Twitter has become a richer source of intelligence that can be used to study online user behavior, due to its efficient and meaningful user-to-user interactions. It is well recognised that human analysts tend to use linguistic terms to analyse data and express their knowledge/expertise. The classical statistical methods have some drawbacks in bridging the gap between data and human analysts. To address this, the paper proposes a new mass assignment theory based fuzzy association rules algorithm (MASS-FARM) to extract useful interaction knowledge of Twitter users. The applicability and usefulness of the proposed method is demonstrated via an empirical study on a collected Twitter dataset, some interesting and meaningful results are obtained and analysed.

Keywords: Twitter data analysis, Fuzzy association rule mining, Mass assignment, Online user behaviour

Efficiency of the Healthcare System in Taiwan: An Illustration with Multidimensional Scaling and Data Envelopment Analysis

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ABSTRACT

The allocative efficiency of medical resources in 23 counties and cities of Taiwan was explored in this paper. The data envelopment analysis (DEA) method was used to assess the relative technical efficiency between counties and cities during the period from 2000 to 2009. In addition, the multidimensional scaling (MDS) method was applied to examine the allocation of healthcare resources system in Taiwan. We first assess the relative technical efficiency of the inputs against the output variables, using data from 23 Taiwanese counties and cities from 2000 to 2009. Next, the multivariable techniques were utilized to examine the data matrix from the DEA analysis.

The results of the MDS analysis show that when the stress coefficient was 0.061 and the value of the RSQ was 0.988; the coordinates for these 23 counties and cities present a much higher stability and conformability on the perspective map. The results of this study also showed that the efficiency of some counties and cities was on the production level shown by production frontier in those ten years. On the contrary, the efficiency of other counties and cities never reached the production level. With regards to the counties and cities with lower efficiency, local government should propose higher budgets on improving the health service system, such as medical facilities, medical personnel and hospital beds.

Keywords: efficiency, data envelopment analysis, multidimensional scaling, healthcare

Optimal Allocation of Resources for Competitive Advantage Based on Value Curve and Quality Function Deployment

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ABSTRACT

Once the customer demand is successfully identified, the potential market, which is full of interests and incentives, will attract more rivals to compete. The demand is much greater than the supply at the initial stage; however, after competition for a while, the supply will be much greater than the demand. In addition, the globalization brings enterprises more competitive pressures. In accordance with more rivals entering into the market, the business has been changed from “product oriented” to “customer oriented” with more related services.

Quality function deployment (QFD) is one of the customer-oriented approaches with a specific focus on the demand definition and transfer. It begins with the customer satisfaction and goes through a series of deploying processes to products or services in which the resource distribution is defined. However, OFD lacks strategic direction. On the other hand, blue ocean strategy provides principles to overall business aspects, and uses value curve to set the patterns, but it is weak in resources allocation. Thus, this research proposes to take advantages of both methods for developing a strategic mathematical model which could allocate resources effectively and efficiently. Two solution approaches, linear programming and genetic algorithm, are used in this study. The linear programming method may not obtain any solution under the conditional requirements unless we widen the conditions. Instead, the genetic algorithm approach can find more acceptable solutions and proves the result is consistent with the form of expected value curve.

Keywords : Value Curve, Quality Function Deployment (QFD), Genetic Algorithm (GA), Linear Programming (LP)

A Novel Choquet Integral Regression Model Based on Extended Multivalent Lambda-Measure

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ABSTRACT

In this paper, some important partial ordering properties of Sugeno's Lambda-measure are discussed. We prove that the Lambda-measure is always larger than the smallest fuzzy measure, Zadeh's P-measure, and less than the largest fuzzy measure, Liu's B-measure, and we point out that the Lambda value of Lambda-measure must less than a given finite number, and a modified Lambda-measure is proposed.

Based on the modified Lambda-measure, a novel fuzzy measure, called extended multivalent Lambda-measure, is proposed. It is proved that this new measure is an extension of not only Lambda-measure, but also P-measure and B-measure, in other words, this new measure is a strictly completed fuzzy measure, since all of the P-measure, B-measure and Lambda-measure are special cases of this new measure. Simultaneously, a novel Choquet integral regression model based on this new measure is also proposed.

For evaluating the improved Choquet integral regression model, an experiment with a real data by using the 5 fold cross validation mean square error is conducted. The performances of Choquet integral regression model with the extended multivalent Lambda-measure, Lambda-measure and P-measure, respectively, a ridge regression model and a multiple linear regression model were compared. The experimental results showed that the Choquet integral composition forecasting model with respect to the proposed new measure outperforms others.

Keywords: Fuzzy measure, Choquet integral, Lambda-measure, multivalent fuzzy measure.

Improving Item Relational Structure Theory Based on a Novel D-Matrix Theory

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ABSTRACT

In this paper, we point out that all of the parametric item response theories can not be used for analyzing the item relational structure, since no partial order parameter is considered, and the items always are set to satisfy the local independent condition without partial order relational for simplifying the estimating and computing.

Two kinds of nonparametric item response theory without item local independent condition, called item ordering theory and item relational structure theory, can be used for estimating the true item relational structure. However, what is the true item relational structure, it is an open problem.

In this paper, a novel D-matrix theory for establishing experts' item relational structure is proposed, the established experts' item relational structure can be viewed as the true item relational structure, some important properties of the transitive and intransitive partial order relation of this new theory are discussed, a novel validation index for evaluating the performance of estimated item relational structure is also proposed, and then an improving item relational structure theory based on this novel D-matrix theory is proposed, an application real data is given as well.

Keywords: Item response theory, item ordering theory, item relational structure theory, experts' item relational structure, D-matrix theory

An Improved Strategy for Mining Partial Periodic Patterns from a Sequence of Event Sets

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ABSTRACT

Finding partial periodic patterns from a sequence of event sets is an important data mining problem with broad applications. A partial periodic pattern considers most but not all points in the period contributes to the approximate cyclic behavior of the sequence. However, the major problem of mining partial periodic patterns is that many candidate patterns are generated and thus results the efficiency problem in decision making. In this study, a strategy is designed to encode the events into an event tuple that contains position information and to segment the event sequence into a set of properly processed period sequences. Besides, to speed up the execution efficiency, a pruning strategy combined with a projection-based method that considers the frequencies of events is also proposed to efficiently reduce unpromising candidates in the recursive process. Finally, the experimental results show the superior performance of the proposed approach.

Keywords: sequential pattern, time series, partial periodic pattern, projection-based technique.



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