

中原大學

111 學年度研究傑出教師獲獎人-

■ 企業管理學系 胡宜中教授

第二次獲獎 研究類(人文社會領域)

■ 化學工程學系 費安東教授

第二次獲獎 研究類(自然科學工程領域)

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■ 研究論述

個人的學術專業聚焦於多準則決策分析、模糊理論、資料探勘、灰色系統、啟發式演算法等相關研究領域，以及商業管理實務問題的分析與應用。迄今已發表 120 餘篇 SCI/SSCI 期刊論文以及 10 餘篇 TSSCI 期刊論文。近五年之研究內容簡述如下：

(一) 於分類問題發展以多準則決策分析為基礎之容差約略集合

分類系統之發展係以多準則決策分析的評估面為基礎，使用頗具代表性且廣為應用的優勢關係評估法、妥協排序法、灰色理論，再進一步融合模糊積分的非加法型特性，分別發展獨特的容差約略集合，並結合柔性計算技術由演化學習過程搜尋最佳系統參數（例如準則權重、偏好參數等），建構以高正確識別率為目標之智慧型分類系統。

(二) 灰色預測模型發展及其實務應用

灰色系統理論以小樣本資料為前提，其特點在於對樣本的數量、資料的分布以及變數的統計性質均無特別要求，突顯出灰色理論在預測問題建模以及實務應用的便利性。以人工智慧為基礎，包含模糊理論、神經網路與軟性計算等技術，個人已發展多個創新性且具有高預測精確度的灰色預測模式，強調實務應用，並廣泛應用於包括旅遊需求、能源需求、3C 產業對於鎂金屬材料的需求、企業破產預測等重要預測議題，突顯所提出之預測模式應用於商管實務之潛力。

過去的實證分析顯示沒有任何一個預測模式在所有的分析情境下都能獨佔鰲頭，這也意味著在眾多模式可選擇下，由於預測結果的不確定性，由其中擇一進行預測必然會有選擇錯誤的風險。而組合不同模式進行預測的組合預測模式可以降低此類因選擇錯誤所造成的風險。灰色預測的無母數特性使灰色模式在組合預測模式的發展上有其前瞻性，也成為個人的研究重點。

(三) 多準則決策分析之創新性發展與應用

以管理實務問題之解決為導向，本人與校內外具有相關學術專業之教師共同合作，以人工智慧技術發展新穎的多準則決策分析方法。實務的問題均非加法型，我們針對問題以系統化的思維發展研究架構，對關聯性的問題追求系統性的改善，並依據關鍵因素的因果圖與績效表現的良窳提出相對應的改善策略。研究議題包括企業社會責任、供應鏈管理、企業經營、電子商務等領域。

■ 經驗分享

研究能量的積累與研究成果的呈現並非一蹴可幾，而是長時間的灌溉與耕耘。感謝學校提供優良的學術資源與研究環境，使自己能透過研究過程進行學理的探索，並強化研究在商管實務問題的解決能力。學術研究強調對知識的分享，也是身為學術社群一份子應該擔負的責任，而透過在國內外學術刊物等平台的積極發表，不但能與同儕與學術社群共同分享研究成果，也更能藉此獲得審查者的意見，逐步完善模式發展的思維與架構。個人由此不斷

的累積基礎與經驗，再加上參與國際研討會以及擔任訪問學者等學術交流活動，對後續研究議題的啟發有很大的幫助。

在研究所教學與論文指導上所得到的回饋，對個人在研究與實務結合的經驗累積也有很大的幫助。透過在課堂的學術分享，傳遞個人在研究與實務應用上的成果與經驗心得，協助來自於業界的同學善用方法解決實務問題，對我而言是一個相當有趣的挑戰。博士生也還有發表期刊論文點數的壓力。同學們在課堂與課後的提問，以及在期末專題的實作成果，不僅使自己省思是否有效的表達相關的概念，也能藉由與同學在實務問題的互動，發想可能的研究議題。近幾年甚至有多位設計學院的博士生前來選修我在博士班教授的「定量研究方法」，他們迥異於商管的專業以及思維模式，對我的教學而言是很有趣的體驗，也為研究帶來更多的激盪。

在論文指導上，找我指導論文的研究生多半是具有業界經驗的博士生或碩專班學生，因此能具體解決管理實務問題的應用型研究便成為研究主軸，而多準則決策分析在其中扮演著重要的角色。研究生剛開始對定量方法都存在不小的恐懼感，這也讓我一直思索如何降低多準則決策分析方法的進入門檻，包括研究架構的建立、問卷的設計與發放，以及數據的分析與呈現等等。頭過身就過，一旦研究生能有清楚的處理邏輯，能順利地使用研究方法，就有可能發展創新的研究框架，對問題進行後續的績效評估與策略發展，讓多準則決策分析能成為解決管理實務問題的利器。所產生的研究成果就有機會成為發表期刊或研討會論文的基礎。團隊的努力與付出也陸續開花結果，包括在 SSCI 與 TSSCI 期刊陸續發表多篇具理論與實務意涵的論文，以及博碩士論文在國內重要的管理博碩士論文獎屢獲佳績，包括富邦人壽管理博碩士論文獎、崇越論文大賞、中華民國科技管理學會 EMBA 論文獎，以及中華民國灰色系統學會博碩士論文獎等等。教學相長以及對學術分享的使命感，正是推進自己在教學與研究的原動力。

Research focus

My research interest focuses on multiple criteria decision making (MCDM), fuzzy set, data mining, grey systems, and metaheuristic, and apply the hybrid techniques to the management practice. Thus far about 120 SCI/SSCI and 10 more TSSCI journal articles have been accepted for publication. The following briefly introduces my research work for recent five years.

1. Development of tolerance rough sets using MCDM for pattern classification

On the basis of the evaluation aspect of MCDM, the study uses the representative and widely-used methods for evaluating alternatives, including the outranking

method, the compromise ranking, the grey theory and the fuzzy integral, to develop tolerance relations for tolerance rough sets. We use soft computing techniques to automatically determine parameter specification (e.g., criteria weights, preferential parameter) of the proposed model with high classification accuracy through the process of evolution.

2. Development of novel grey prediction models with applications to real-world decision problems

In contrast with time series and econometric models, grey prediction models have gained popularity in the past decade because of their ability to characterize an unknown system using a limited number of samples and without requiring conformance with statistical assumptions. We have applied the artificial intelligence methods to develop novel grey prediction models with high forecasting accuracy. To highlight the applicability of these new models, they have been widely used in many forecasting problems in the field of business management such as tourism demand, energy demand, magnesium material demand in the 3C industry, and bankruptcy prediction.

Indeed, there is a high risk in model selection because no single model consistently outperforms all others on all occasions, and one may have no knowledge about the performance of individual models. As such, the combination of individual forecasts into a composite forecast has emerged as an important research area. Consequently, combination forecasting with grey models becomes the focus of our work, since nonparametric grey models do not require that the available data have specific statistical properties.

3. Innovative development of MCDM methods with applications to real-world decision problems

We cooperate with several professional scholars to develop novel MCDM methods based on the artificial intelligence method. All real problems are non-additive, we not only construct a conceptual framework for a decision problem by systemic and systematic thinking, but solve a problem with interdependent criteria through systematic improvement. According to the causal diagram and the importance-performance analysis of key factors, the strategies can be provided to improve the performance of individual key factors. The research interests include corporate social responsibility, supply chain management, business operation, and electronic commerce.

Experience sharing

The accumulation of research momentum and the presentation of research results cannot be accomplished in one step; instead, they require long-term cultivation and hard

work. It is appreciated that the school provides the excellent academic resources and research environment, which facilitate theoretical exploration during the research process and enhance the research ability to resolve problems in business administration practices. Academic research emphasizes knowledge sharing, which is also one of the responsibilities a member of the academic circle should take. The active publication of academic works in platforms such as local and international journals can promote research results sharing with peers and academic communities and draw opinions from examiners. In this way, the concept and structure of model development have been perfected step by step. Through the steady accumulation of essential knowledge and experience, along with international conference attendance, and the role of a scholar interviewer in academic exchange activities, one can gain massive inspiration for future research issues.

The feedback from teaching at graduate school and instructing theses is incredibly beneficial to one's accumulation of research and practical integration. Sharing academic knowledge in class, including expressing the results and opinions of one's research and practical applications, as well as helping students from all walks of life to solve practical problems with proper methodology, has been a rather exciting challenge for me. In addition, Ph.D. students are also under the pressure of impact factors. The questions raised by students in class and after class, as well as the practical results of final projects, prompt me to reflect on the efficient expression of related concepts. Besides, the interaction with students regarding practical issues can also enliven the creation of potential research topics. In recent years, many Ph.D. students from the design college have selected Quantitative Research Methodology I teach in the doctor program. Their profession and mindset, showing a stark contrast to the ones in business administration, have been an exciting experience and brought more stimulation to research.

As for thesis instruction, the students who follow my guidance are mostly Ph.D. students or graduate students with working experience. As a result, applied research that can substantially resolve practical management issues has been the majority of research, and multi-criteria decision analysis has played an essential role. In the beginning, these graduate and Ph.D. students found quantitative methods quite overwhelming, which motivated me to reflect on ways to lower the entry barriers to the multi-criteria decision analysis method, including the creation of research structure, design and distribution of questionnaires, and analysis and presentation of data. A

decent start guarantees an excellent completion; once these students develop a clear and logical procedure, they can employ the research methodology smoothly. Then it is possible to develop an innovative research framework and conduct the subsequent evaluation of the performance and strategy development, which makes multi-criteria decision analysis a helpful tool for solving practical managerial issues. The subsequent research results will likely become the basis for periodical publications or conference papers. The efforts and contribution of teamwork have also brought about successful results; papers with theoretical and practical meanings have been published consecutively in SSCI and TSSCI journals. Furthermore, theses and dissertations have reached outstanding achievements in major national thesis awards, including Fubon Life Management Doctor and Master Thesis Award, the TSC Thesis Award, the CSMOT EMBA Thesis Award, and the Chinese Grey System Association Thesis Award. What is learned from teaching and the vocation of academic knowledge sharing are the drive that impels me to teach and undertake research.

■ 化學工程學系 費安東教授

Dr. Antoine Venault, Professor

Department of Chemical Engineering



Research focus

Our team forming the Membrane Engineering Lab is trying to contribute to the overall effort to engineer better membranes for more efficient/sustainable processes. More particularly, we lay the emphasis on the following aspects, all concerning polymeric or composite membranes:

- Membrane formation mechanisms: we care for these mechanisms because they permit to control the morphology of membranes (cellular, bicontinuous, nodular, with/without "fingers", etc.) upon which depend directly their span of applications.
- The VIPS process, VIPS membranes and their applications: VIPS stands for Vapor-Induced Phase Separation. This process permits slow mass transfers. As such, it enables to achieve control of membrane structures. We look into the wide yet poorly explored range of applications of these membranes.
- The fabrication of antifouling membranes: as fouling, that is, the attachment of particles, proteins, cells, etc. is inevitable as a direct result of the membrane separation, we are designing materials and membranes that can resist irreversible fouling, in order to extend membrane lifetime and decrease overall process costs.
- The development of green membranes: membrane separation is considered a green

technology, but their formation is not green. We are now involved in the development of alternatives to currently existing strategies.

- Membranes for advanced applications: We impart specific functional properties to some of our membranes. For instance, we are developing "killer membranes" that can kill bacteria during separation, catalytic membranes able to degrade solutes (such as antibiotics) during the separation, or smart membranes that can catch particular cells during blood filtration.

The reference journal in my field remains the Journal of Membrane Science (IF 10.53, Q1). Therefore, I have continuously tried to publish several articles/year in this journal. Besides, as I am a chemical engineer and working on materials, I also target the Chemical Engineering Journal (IF 16.74), ACS Applied Materials & Interfaces (if 10.38) or the Journal of Materials Chemistry B (IF 7.57). I am running two MOST projects as a PI including an Outstanding Young Researcher project (專題研究計畫 (優秀年輕學者研究計畫)). Besides, our team just completed an industrial project (with a German company) and has been involved in several international collaborations with French and Japanese groups.

Experience sharing

I received most of my education (BSc, MSc, PhD) in the University of Montpellier, France. Then I came to Taiwan and joined a team at the R&D Center for Membrane Technology of CYCU. That was at the end of November 2010, so almost 12 years ago. I found here a very good environment to conduct my research, met great students, postdoctoral scientists, research assistants, researchers and professors who all contributed to make me grow as a professor. I am still learning but can probably share a few tips with young researchers about my work. I shared something a bit similar a few years ago, and one may see that I have not changed much my philosophy, maybe "edited" it a bit from experience. What follows is just my opinion, you are free to disagree.

First of all, I would like to say that I do not know what to think about numbers. Numbers can be turned around to either highlight one's achievement, or on the contrary criticize them. For example, if I publish 1 paper/year, then one could easily say it is too little. But somehow, 1 paper published in a high-quality journal is worse the efforts needed to publish many papers in lower ranked journals, from my experience. Also, there are fields (typically mine) in which it is easier to get published than in other fields. On the contrary, there are other fields where publishing 1 SCI paper/year is extremely challenging. I also doubt that any indicator is valid to assess the quality of a researcher. Number of papers? Not according to me. Citations? I am not sure anymore. They may be important, but as I am often asked by reviewers to cite their paper(s) in order for my

own paper to pass the review process, I am not sure if that number matters anymore. Contribution and ethic matter but cannot or hardly be quantified.

Instead of focusing too much on numbers, I tell myself that I am a professor. As such, I should at least teach and conduct research. The outcome of this research should be visible to the public, to the people who pay my salary, to the taxpayers who fund my research, to my University providing space and facilities and to my colleagues who trusted me when they hired me. This is why I should write Academic papers. I see it is as my duty as a professor, along with teaching. My salary has two major lines corresponding to teaching and research. So, I have to show that I deserve both. But it so happens that I like writing or editing papers, I enjoy plotting figures, analyzing data and reading related literature. I really enjoy my work, so writing Academic papers is not just a duty to me.

Other than these considerations on numbers, I would like to share a few other things with young faculty members.

(1) Be grateful

I still believe that I have one of the best jobs in the world. We have flexibility, freedom of time management, the choice of research directions but also of work place, and the chance to team up with students (which I think keeps us young and helps us to stay up-to-date).

(2) Manage your time well and be hungry

We don't really have a boss, and the teaching load is not that heavy once the first year has passed (during which it is challenging to get all courses ready). In my opinion, our job as teacher is then to keep our courses up-to-date, and to modify our ways to introduce some concepts based on the questions/concerns of previous generations of students. This does not take that much time. Besides, we get better and better at teaching with experience. So, we then have plenty of time. We can decide what to do with that time when we don't have to teach or serve. I am still often asked at the beginning of January or at end of June by people who are not in Academia what I am going to do when students are on vacation. I actually wish days were longer than 24 hours. There are so many papers and proposal grants to write or papers/books to read that I have no problem keeping myself busy with research work. It is my responsibility to decide to make good use of the time I have when I don't have to teach.

(3) Realize that consistency and work ethic matter

In many situations, I realize I am an average person and I do not like this feeling. Whenever I think it is worth it, I am trying to work harder and longer in order to reach

my goals and move away from average. I often take sports as an example because I am a sports enthusiast. What we see from top athletes is excellence, perfection of movement and technique, speed, etc. But what we see is the result of what we do not see, the outcome of thousands of hours they spend working in the dark, from early morning to late night, and for years. Their hard work, focus and consistency brought them there shining in front of everybody. Surely, I believe in talent, but I believe in work ethic and consistency much more. I do not have any particular talent. Had I seen talent as the number one requirement, I would not have become a professor. So, I have been trying to make up for it by putting the work and by being consistent. It means that I do something work-related every day.

(4) Study people around you

I have had the chance to meet numerous professors in my department or other departments, or in other universities, from the very first moment I stepped in Taiwan. Many of them have something which I think is exceptional and which I wish I had. Leadership, work-ethic, responsibility, kindness, humility, etc. Many professors here gather several of the key elements to become a great professor. Although I still do not fully understand the language, I think that I can quickly identify what is great in these people. So, I try to study them to figure how they became that successful.

(5) Take care of your students

There is no research outcome without students in a university lab. They are our main asset. Each of them is important and can provide something extremely valuable to the group. Some students are excellent at performing experiments or at helping with the lab management, while others stand out in data analysis, figure plotting, teaching to their juniors, computation, or even paper writing. One of my objectives is to encourage students to become even stronger at what they are already good at and to acquire other skills. I may be giving them a hard time every now and then, but it is because I believe that they can do so much better and are below their own standard. As a professor, I need their skills in the lab. I am nothing without them. If I get to know my students well, if I take enough time to speak and listen to my students and ask them what they like to do, what kind of topic they would like to be involved in, then I guess we can reach some very good outcome together as a team.