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護理人員創新領導理論之建構與實證-關係品質與組織氣候的角色
研究成果報告(精簡版)

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（計畫名稱）護理人員創新領導理論之建構與實證–關係品質與組織氣候的角色

第一章 研究背景及目的

第一節　研究背景與動機

不同領導型態對護理人員創新行為會產生何種差異性的影響？這些問題卻仍甚少有研究者進行深入的探討(Jeong & Keatinge, 2004; Reuvers, van Engen, Vinkenburg, & Wilson-Evered, 2008)。過去轉換型領導(transformational leadership)理論主張促進創新為轉換型領導的核心功能，且相對於交易型領導(transactional leadership)，轉換型領導型態更是促進下屬展現創新行為的有效方式(Basu & Green, 1997)，然有關於直屬主管的轉換型領導與交易型領導對於護理人員創新行為影響的實證研究仍相當稀少。領導者-成員關係(leader-member exchange)、團隊成員間關係(team-member exchange)等兩種組織內部成員間關係為影響員工工作成效的關鍵關係性脈絡因子(Graen & Graen, 2007)，成員間的信任以及滿意往往會影響其知識分享以及對於工作額外投入的程度，因此組織內部成員間若有良好的關係品質，不僅領導者-成員以及團隊成員間會產生良性的互動，更能提升知識分享以及對於工作額外的投入，進而促進員工創意的發想以及創新的實踐，因此 Amabile, Conti, Coon, Lazenby, and Herron (1996)指出領導者-成員以及成員同儕間良好的互動是激發員工創意過程中不可或缺的關鍵要件，Scott and Burce (1994)更具體指出領導者-成員關係以及團隊成員間關係為探討員工創新行為過程中關鍵環境因子。

員工創新行為表現會受到其心理所知覺到的組織氣候所影響，其所知覺到的氣候為支持員工的創新行為表現時，則員工較會願意將其創意轉換成創新產出(S. G. Scott & Burce, 1994)，國內學者蔡啟通 & 高泉豐(2004)亦提出相似的看法並透過國內實證樣本的分析，證實了這樣的主張。對服務業（包含醫療服務業）來說，Jong and Vermeulen (2003)亦具體指出為促進組織能有效且成功的進行新服務開發，組織氣候是不可忽視的影響要素。有鑑於組織氣候對於員工創新發展的重要，本研究乃欲深入探討組織氣候對護理人員創新表現所產生的影響性，然由於組織內部中可能同時存在多種組織氣候，因此在探討組織氣候的影響性時，必須先將本研究所欲探討的組織氣候項目明確化。近來病人安全(patient safety)的改善已成為近年來全球各醫療機構的努力方向，也因此使得病人安全氣候(patient safety climate)亦成為國內外醫療機構最重要的組織氣候項目(Katz-Navon, et al., 2005; 李偉強, 2007)。此外，過去組織管理學者認為，組織內部若有良好的創新氣候(climate for innovation)將給予員工資源上、技術上以及心理上的支持，塑造員工對創新的正向態度，因此在提升員工創新行為的過程，創新氣候亦不是忽略的環境脈絡因素(Jin Nam Choi, 2004; S. G. Scott & Burce, 1994)，而這樣創新氛圍的影響性亦確實存在於對於護理人員創新採用的行為上(van der Weide & Smits, 2004)。

本研究乃採用問卷調查法，收集國內醫院護理人員資料，透過問卷資料的量性分析來驗證本研究從轉換型領導與交易型領導觀點，並考量領導者-成員關係品質、團隊成員間關係品質、病人安全氣候、創新氣候四項重要環境權變因子，對護理人員創新行為表現所帶來的影響

第二章 文獻回顧

第一節　員工創新

West and Anderson (1996)認為創新不僅是在團隊、組織或社會中，提出或是應用新的流程、產品、方法以提昇全體的利益，從更廣義的角度而言，創新還包含員工成長、滿意度增加、團隊向心力凝聚、更佳的內部溝通、生產力與其他經濟性指標的持續提升等等，特別是當組織面臨新的任務和挑戰時，個人可能會藉由角色創新行為重新設定任務目標、達成方法、資源、時程、甚至人際關係等，以期達

成績效 (M. A. West, 1987)。創意的出現往往是構成員工創新行為的關鍵，蔡啟通(2006)於是將員工創新行為定義為：員工在組織中對於新技術、新製程、新技巧或新產品的創意尋找、確立、執行、及成功地將創意付諸實踐已成為有用的產品或服務等整體行為表現歷程。Pieterse et al.(2009) 則認為員工創新行為是一種歷經問題查覺、創意產生、建立對創意的支持、創意實現的過程表現，Kanter (1988) 以及 Scott and Bruce (1994)則有相似的主張，認為員工創新行為是員工意圖、助長與實現的產生新構想的過程，而這樣的過程將有益於個體、群體或組織的績效。由此得知創新行為可以說是員工為了達成其創新性而表現出來的行為，也是經歷過多階段之歷程所展現出來的創新活動(Pieterse, et al., 2009; S. G. Scott & Burce, 1994)。有鑑於過去研究不論是一般組織內的員工創新行為或者護理人員創新行為的主張皆視創新行為的表現是一種多階段的歷程，且機構內部的創新表現乃是經由機構內員工的知識創造力所產生的意見、轉換與擴散所構成。

第二節　領導型態

一.交易型領導

交易型領導建立之基礎源自於領導-成員交易理論(leader-member exchange theory)以及路徑-目標理論(path-goal theory)，交易型領導者設定目標、訂定協議明確地表達領導者所期望的員工作為與成員的努力所能獲得的報酬，並提供建設性的回饋來確保成員會專注於任務中，如此的交易性質可分成兩種，一種為明確的(obvious)或低品質的(low-quality)，如工作時數、薪酬等；另一種為較不明確的(less obvious)或是高品質的(high-quality)，如情感、信任、認同、尊重等。Bass(1985)則主張交易型領導是一種強調交易關係的交換過程，分為(1)權宜獎賞（contingent reward）：員工的努力符合要求後，領導者提供獎賞，屬於一種論功行賞的概念。(2)例外管理（management by exception）：在部屬的表現未能符合要求時，領導者就必須介入，適度予以指導與修正，達到把事情做到對的原則為止。故交易型領導者主動發現部屬之期望，提供獎賞以換取部屬的表現，而這樣的交易是來自於目標與報酬之間的緊密結合，領導者重視獎賞下所產生之激勵，給予部屬明確獎賞，以期望部屬達到某些行為，並透過清楚的角色和任務需求，來指引或激勵部屬朝既定的目標前進的一種常見之領導型態(Brayant, 2003; Goodwin, 2001)。

二.轉換型領導

轉換型領導的構念源自於 Burns(1978)與 Bass(1985)交易-轉換型領導典範，該理論認為每一位領導者皆會表現出特定風格的領導行為，除交易型領導外，而轉換型領導便是另外一項重要的領導型態。轉換型領導是一種相互刺激、相互評估的關係，能使跟隨者轉換為領導者，並使領導者轉換為精神的原動力(moral agent) (Burns, 1978)，轉換型領導強調部屬的發展、智力啟發，並會激勵部屬超越個人利益以追求更高的集體目標、願景與使命，並能明確的傳達給部屬具有吸引力的願景，而部屬亦對領導者感到信任、欽佩、忠誠與尊敬(B.M. Bass, 1985; Howell & Avolio, 1993)。Parryet et al.(2002)指出轉換型領導是高效率的領導，它會轉換部屬的心靈，到達有動機和肯執行的境界，並能引導組織各階層去追求更好，去承擔責任並為達成組織目標而負責；Berson and Avolio (2004)認為轉換型領導對了解及傳播策略願景、任務、目標及部屬的認同方面能創造更好的情境，轉換型領導者能提供部屬願景，對部屬的能力給予高度的期望與信心，增加對於團體的歸屬感，並且透過價值觀的內化來影響部屬。而有關於轉換型領導所包含的內涵，過去有許多學者提出不同的論點，如：Simons(1999)認為轉換型領導應包含鼓舞激勵、正直、創新、印象管理、智力啟發與個別關懷等六項構面，然在眾多的內涵的論述中，又以 Bass and Avolio(1994)的轉換型領導構面較常受到學者所採用(Piccolo & Colquitt, 2006; Reuvers, et al., 2008; Shin & Zhou, 2003)。Bass and Avolio(1994)將轉換型領導分為下列四個構面：(1) 個別關懷；(2) 智力啟發；(3) 動機激勵；(4) 模範影響。

第三節　組織氣候

一、創新氣候

過去在提升員工創新行為表現的過程中，創新氣候的角色至為重要(Jin Nam Choi, 2004; S. G. Scott & Burce, 1994)，組織創新氣候觀念發展已久，過去組織創新理論學者大多對創新氣候內涵已有較具體的共識，其認為組織內部若有良好的創新氣候將給予員工資源上、技術上以及心理上的支持，塑造員工對創新的正向態度，並將創新氣候定義為「指員工在其所處之工作環境中，對於組織透過領導者的鼓勵、高度的差異性容忍、高度的風險承受、正式管理機制與工具的建立、資源的提供以及團隊的支持，以鼓勵員工從事創意產生、評估與實現的情況知覺」(N. R. Anderson & West, 1998; S. G. Scott & Burce, 1994; M. A. West, 1990; M. A. West & Wallace, 1991; P.-K. Wong & He, 2003; 蔡啟通 & 高泉豐, 2004)。因此在提升員工創新行為的過程，創新氣候亦不能忽略的環境脈絡因素。

二、病人安全氣候

在醫療照護組織中，除了員工之外，病人安全的內涵更是醫務管理研究者在進行安全氣候探討時的重點(Naveh, et al., 2005)，Burke and Sarpy (2003)亦指出安全氣候的概念化與測量應著重於其主要關係人，而在醫療照護組織中，其主要的利害關係人便是病人，因此病人安全內涵為應在探討醫療照護組織安全氣候時的核心，而所謂病人安全，乃是指醫院以及內部員工，為保護病患在接受醫療照護時免於受到傷害所採取的相關行動。Naveh et al.(2005)認為病人安全氣候乃與員工對於組織所實施之降低病人意外傷害發生的程序或作業的認知程度有關，其認知程度越高，則其所知覺到的病人安全氣候越高；Colla et al.(2005)指出病人安全氣候是一種多構面的構念，此構念包含個體對於醫療照護環境病人安全觀念的的廣泛性認知，而其在回顧多種病人安全氣候與文化量表後發現，領導、政策與程序、人力配置、溝通、通報系統為五個常見的病人安全氣候構面。Blegen et al.(2005)則將病人安全氣候定義為一種醫院內部工作團隊成員對於保護病患免於醫療疏失與傷害主要源自於醫療照護的介入與醫療環境的疏失或傷害）的共同知覺，並認為病人安全氣候的內涵應包含單位管理者、社會化/訓練、對安全的強調、責罰系統而非個人、安全資料的通報與使用、藥學專業、工作者安全等七個構面。而Naveh et al(2005)與 Katz-Navon et al (2005)在回顧過去有關安全氣候的文獻後，認為以病人安全分成四個構面：(1).安全程序；(2).對於管理者安全性作業的認知；(3).安全資訊流（safety information flow）：；(4).安全的優先考量：本研究認為過去學者雖然提出許多不同的構面內涵，然 Naveh et al(2005)與 Katz-Navon et al (2005)所提出的四構面不僅已包含病人安全的基本與核心內涵，且其亦具有良好的理論與實證基礎，因此，本研究將採用 Naveh et al(2005)與 Katz-Navon et al (2005)的主張。

第四節　關係品質

關係品質是一種高層次的構念(construct)，其中包含數個不同但卻彼此相關的構面(dimension)(Dorsch, Swanson, & Kelley, 1998)；關係品質是一種描述關係整體深度(depth)與氣候(climate)的一般性概念(Johnson, 1999)；Smith (1998)也認為關係品質包含多個正向關係結果的高階建構，且能夠反映出關係的總體強度，以及關係人在符合需求與期望的滿足程度。就個人認知的角度而言，關係品質是指個人對於整個關係所能夠滿足期望、預測、目標與欲望的認知程度(A. Wong & Sohal, 2002)，而Hennig-Thurau and Klee(1997)認為服務業的顧客關係品質是一種顧客基於過去與服務提供者接觸的經驗與印象所形成的一種整體概念。另一方面，Keating et al. (2003)則認為關係品質不同於服務品質，它是溝通、合作、信任與價值等因素的表現。而翁瑞宏 et al (2008)再進行過3位醫管學者(其中一位曾擔任醫學中心護理部主任)以及6位中高階護理主管(包含區域醫院級以上醫院之護理部主任3位以及護理部副主任、督導、護理長各一位)的專家效度檢驗後，認為在新進護理人員職場導師關係中，對新進護理人員而言，其與職場導師間關係品質乃指新進護理人員對於職場導師關係的整體印象與評價，是新進護理人員基於過去與職場導師互動的經驗、印象以及預期未來互動成效所形成的多構面概念，其

中包括滿意與信任兩構面。由上述文獻來看，關係品質應是一種包含多個構面且多個層次的整體概念，而這樣的概念是個人基於過去經驗、印象以及對於未來的預期所形成的，其中信任與滿意是最重要的兩個構面。若護理人員對領導者或團隊成員的信任程度越高，將會降低成員對於彼此互動過程的焦慮，於是成員會產生較高的滿意度，再者，若從角色扮演的角度分析，信任亦包含了滿足所扮演的角色義務(Dwyer, 1987)，因此，當護理人員認知到領導者或團隊成員間之義務滿足程度愈高，護理人員會有較高的滿意度，也會因此有更高的信任程度，故得知，滿意與信任並非是彼此獨立的構面(Henning Thurau et al., 2002)。然除上述構面外，衝突亦是與信任、滿意高度相關聯的關係品質特質。

第五節　研究假設

依據本研究推論邏輯與過去研究成果，本研究提出下列研究假設：

H1 轉換型領導會正向影響護理人員創新行為的表現。
H2 交易型領導會正向影響護理人員創新行為的表現。
H3 轉換型領導會透過創新氣候的中介來影響護理人員創新行為的表現。
H4 交易型領導會透過創新氣候的中介來影響護理人員創新行為的表現。
H5 轉換型領導會透過病人安全氣候的中介來影響護理人員創新行為的表現。
H6 交易型領導會透過病人安全氣候的中介來影響護理人員創新行為的表現。
H7 轉換型領導會透過領導者-成員關係品質的中介來影響護理人員創新行為的表現。
H8 交易型領導會透過領導者-成員關係品質的中介來影響護理人員創新行為的表現。
H9 轉換型領導會透過團隊成員間關係品質的中介來影響護理人員創新行為的表現。
H10 交易型領導會透過團隊成員間關係品質的中介來影響護理人員創新行為的表現。

第三章 研究方法

第一節　研究資料來源

有鑑於區域級以上醫院之護理單位對於護理創新的推動較為積極，本研究抽取台灣地區三家區域級以上醫院為樣本醫院，與三家醫院護理部主管協商並取得同意，經人體試驗委員會(Institutional Review Board ; IRB)核准後，採用訪員問卷調查的方式，問卷於 100 年 4 月 11 日發放，回收期間皆在三星期內，對三家醫院之非管理階級護理人員進行立意抽樣後各發出 150 份問卷，共計發放 450 份問卷，回收 450 份問卷，扣除填答不完全問卷 11 份後，共得有效問卷 439 份，有效回收率達 97.6%。

此外，本研究為避免受訪者的主觀意見填答所可能產生的共同方法變異（common method variance）問題，本研究分別採用事前與事後數種不同方式處理，以期盡可能降低所發生的共同方法變異問題(Peng et al.2006)，事前的預防方法包括受訪資訊隱匿法、反向題設計法、題項文字組織法；事後的處理則採用Harman單一因素檢測法，來評估共同方法變異問題的嚴重性(Podsakoff & Organ, 1986)。本研究為強化研究構念測量的嚴謹性，在進行問卷調查後，進一步採用Harman單一因素檢測法，來評估共同方法變異問題的嚴重性(Podsakoff & Organ, 1986)，以Harman單一因素檢測法，將所有變項進行因素分析後，會從因素分析中抽取出單一因素或同一因素可解釋大部分變異的情形，經因素分析後發現，第一主成分僅能解釋32.66%的變異，必須於第51個主成分才能解釋90.17%的變異，由此可見本研究量表之CMV的問題並不嚴重(Podsakoff & Organ, 1986)。

第二節　問卷效、信度與分析方法

一、問卷效度與信度

本研究量表亦經三位醫務管理或護理管理學者：蔡文正教授(中國醫藥大學醫管所所長)；龔佩珍副教授(亞洲大學健康產業管理學系)；陳筱瑀副教授(台中護專護理科主任)以及六位醫院高階管理者：

黃金安主任(台中榮民總醫院急診醫學科)；彭麗蓉副院長(台南市立醫院)；陳麗梅主任(台南市立醫院護理部)；林慈恩主任(聖馬爾定醫院護理部)；彭安娜主任(南投醫院護理部)；張麗玉主任(仁愛綜合醫院護理部)，針對本研究所設計的題項進行專家效度檢測與修正，因此應具有相當水準之內容效度。(二)建構效度(construct validity)：由於本研究各量表亦根據過去理論基礎建構而成，因此採用驗證性因素分析(comfirmatory factor analysis；CFA)來檢驗二者量表之建構效度。檢驗結果皆具有良好的鑑別效度與聚合效度。除了以Cronbach’s α 來檢測量表之信度是否達到可接受水準外，還另外計算量表之組成信度(composite reliability；CR)與平均萃取變異(average variance extracted；AVE)，來進一步檢驗量表之內部一致性。檢驗結果顯示，量表亦具有高度的信度。在進行完驗證性因素分析後，本研究則階層迴歸(Hierarchical Multiple Regression)，以驗證假設是否成立。

第四章 研究結果

第一節　樣本特性描述性分析

表 1 樣本特性描述性分析(n=439)

變項名稱	次數	%	變項名稱	次數	%
職級			**醫院年資**		
N1	161	36.7	1 年以下	47	10.7
N2	147	33.5	1-2 年	52	11.8
N3	53	12.1	2-3 年	60	13.7
N4	17	3.9	3-4 年	43	9.8
其他(N0)	61	13.9	4-5 年	29	6.6
單位名稱			5 年以上	208	47.4
內科	120	27.3	**護理年資**		
外科	80	18.2	1 年以下	21	4.8
婦產科	28	6.4	1-2 年	32	7.3
兒科	22	5.0	2-3 年	34	7.7
急診	32	7.3	3-4 年	36	8.2
ICU	92	21.0	4-5 年	30	6.8
其他	65	14.8	5-6 年	34	7.7
單位年資			6-7 年	31	7.1
6 個月以下	24	5.5	7 年以上	221	50.3
6-12 個月	35	8.0	**教育程度**		
1-2 年	56	12.8	專科(含二專)以下	176	40.1
2-3 年	65	14.8	大學(含二技)以上	263	59.9
3-4 年	45	10.3	**婚姻狀況**		
4-5 年	37	8.4	未婚或離婚	282	64.2
5 年以上	177	40.3	已婚	157	35.8

第二節　階層迴歸分析結果

領導型態、病人安全氣候與創新氣候對護理人員創新行為的模型中，結果顯示在 Model 1-1~ Model 1-4 中，在各研究變數的部份，轉換型領導、交易型領導、病人安全氣候與創新氣候皆達統計上顯著水準($P < 0.001$)，其 β 值分別為 0.23, 0.27, 0.29, 0.35；而這樣的結果亦證實護理人員領導型態的不同、及對病人安全氣候與創新氣候的認知程度愈高，則護理人員將愈容易表現出創新行為，因此假設 H1 和 H2 成立。領導型態對病人安全氣候的模型中，結果顯示在 Model 2-1~ Model 2-2 中，研究變數的部份，由 Mode 2-1~ Model 2-2 看出，轉換型領導與交易型領導皆達統計上顯著水準($P < 0.001$)，其 β 值分別為 0.51, 0.53。而在領導型態對創新氣候的模型中，由 Model 3-1~ Model 3-2 可看出轉換型領導與交易型領導皆達統計上顯著水準($P < 0.001$)，其 β 值分別為 0.38, 0.46。在轉換型領導之中介效果驗證方面，在轉換型領導對護理人員創新行為的 Model 4-1 結果顯示，轉換型領導的標準化迴歸係數達

統計上顯著水準(β=0.23)，然在加入病人安全氣候變項後(Model 4-2)，病人安全氣候呈現統計上顯著水準(β=0.24)，而轉換型領導係數雖然仍達統計上顯著意義，但其標準化迴歸係數值已明顯降低(從 0.23 降低至 0.11)，根據 Baron&Kenny (1986)指出，因中介變數的導入，使自變數對依變數的作用下降，但仍達顯著水準時，表示其中有多重中介因子之運作，僅具有「部分」中介效果。而本研究結果代表病人安全氣候乃具有部分中介效果，因此假設 H5 獲得部分支持。然於 Model 4-3 中顯示，轉換型領導的標準化迴歸係數達統計上顯著水準(β=0.12)，在加入創新氣候變項後，創新氣候呈現統計上顯著水準(β=0.30)，而轉換型領導係數雖然仍達統計上顯著意義，但其標準化迴歸係數值已明顯降低(從 0.23 降低至 0.12)，代表創新氣候乃具有部分中介效果，因此假設 H3 獲得部分支持。另於 Model 4-4 中顯示，轉換型領導的標準化迴歸係數達統計上顯著水準(β=0.25)，轉換型領導構念在加入領導者-成員關係品質變項後，領導者-成員關係品質未達統計上顯著水準(β=-0.03)，代表領導者-成員關係品質不具有中介效果，因此假設 H7 不成立。而於 Model 4-5 中顯示，轉換型領導的標準化迴歸係數達統計上顯著水準(β=0.20)，轉換型領導構念在加入團隊成員間關係品質變項後，團隊成員間關係品質未達統計上顯著水準(β=0.10)，代表團隊成員間關係品質不具有中介效果，因此假設 H9 不成立。於 Model 4-6 結果顯示，然在加入病人安全氣候與創新氣候變項後，病人安全氣候呈現統計上顯著水準(β=0.13)，創新氣候呈現統計上顯著水準(β=0.25)，但轉換型領導的標準化迴歸係數未達統計上顯著水準(β=0.07)。

在交易型領導之中介效果驗證方面，在交易型領導對護理人員創新行為的 Model 5-1 結果顯示，交易型領導的標準化迴歸係數達統計上顯著水準(β=0.27)，然在加入病人安全氣候變項後(Model 5-2)，病人安全氣候呈現統計上顯著水準(β=0.21)，而轉換型領導係數雖然仍達統計上顯著意義，但其標準化迴歸係數值已明顯降低(從 0.27 降低至 0.16)，根據 Baron&Kenny (1986)建議，本研究結果代表病人安全氣候乃具有部分中介效果，因此假設 H6 獲得部分支持。然於 Model 5-3 中顯示，交易型領導的標準化迴歸係數達統計上顯著水準(β=0.14)，在加入創新氣候變項後，創新氣候呈現統計上顯著水準(β=0.28)，而交易型領導係數雖然仍達統計上顯著意義，但其標準化迴歸係數值已明顯降低(從 0.27 降低至 0.14)，代表創新氣候乃具有部分中介效果，因此假設 H4 獲得部分支持。另於 Model 5-4 中顯示，交易型領導的標準化迴歸係數達統計上顯著水準(β=0.31)，交易型領導構念在加入領導者-成員關係品質變項後，領導者-成員關係品質未達統計上顯著水準(β=-0.05)，代表領導者-成員關係品質不具有中介效果，因此假設 H8 不成立。而於 Model 5-5 中顯示，交易型領導的標準化迴歸係數達統計上顯著水準(β=0.24)，交易型領導構念在加入團隊成員間關係品質變項後，團隊成員間關係品質未達統計上顯著水準(β=0.07)，代表團隊成員間關係品質不具有中介效果，因此假設 H10 不成立。於 Model 5-6 結果顯示，然在加入病人安全氣候與創新氣候變項後，病人安全氣候呈現統計上顯著水準(β=0.13)，創新氣候呈現統計上顯著水準(β=0.23)，但交易型領導的標準化迴歸係數未達統計上顯著水準(β=0.10)。

第五章 結論

一、轉換型領導量表方面，護理人員對於護理主管之轉換型領導風格的認知構面排名以智力啟發得分最高，排名最末者為動機激勵。交易型領導量表方面，發現護理人員對於護理主管之交易型領導風格的認知構面排名以主動式例外管理構面得分較高，權宜獎賞構面的得分較低，。

二、護理主管之轉換型領導及交易型領導對護理人員創新行為有直接性的正向影響。護理主管之轉換型領導與交易型領導則會透過創新氣候的中介效果來對護理人員創新行為產生顯著的間接影響。護理主管之轉換型領導與交易型領導亦會透過病人安全氣候的中介效果來對護理人員創新行為產生顯著的間接性影響。護理主管之在關係品質的中介效果之結果顯示，轉換型領導與交易型領導無法透過領導者-成員關係品質的中介效果來對護理人員創新行為產生顯著的間接性影響，亦無法透過團隊成員間關係品質之中介效果來對護理人員創新行為產生顯著的影響性。顯示其領導者的工作是營造良好環境，護理主管的領導風格不同，護理人員會以領導者為典範，轉換型領導之主管會藉著提出美好願景，鼓勵員工以新方法解決問題，交易型領導之主管會透過獎酬分明、適時督導以達到創意的落實，透過營造良好創新氣候與病人安全氣候這兩項環境權變因子，使每位護

理人員感受到其領導者願意支持創新，並提供有效的教育訓練，藉以刺激護理人員多元思考，將越能有助於員工創意及創新行為的產生並有效落實其創新服務。

表 2 各變項間相關係數矩陣

變項名稱	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
年齡(A)	1.00																				
自我效能(B)	0.09	1.00																			
創新氣候(C)	0.06	0.42**	1.00																		
創新行為(D)	0.12**	0.64**	0.41**	1.00																	
院方的支持(E)	0.08	0.26**	0.47**	0.26**	1.00																
個別關懷(F)	-0.02	0.21**	0.41**	0.24**	0.24**	1.00															
智力啟發(G)	-0.02	0.18**	0.44**	0.25**	0.33**	0.80**	1.00														
動機激勵(H)	-0.05	0.19**	0.40**	0.25**	0.28**	0.67**	0.70**	1.00													
模範影響(I)	-0.01	0.21**	0.45**	0.28**	0.27**	0.69**	0.74**	0.72**	1.00												
權宜獎賞(J)	-0.05	0.23**	0.53**	0.31**	0.34**	0.70**	0.69**	0.68**	0.73**	1.00											
主動式例外管理(K)	-0.08	0.23**	0.52**	0.30**	0.28**	0.59**	0.57**	0.58**	0.73**	0.71**	1.00										
領導者-成員**「信任」**(L)	-0.05	0.18**	0.42**	0.23**	0.32**	0.58**	0.61**	0.59**	0.65**	0.64**	0.64**	1.00									
領導者-成員**「滿意」**(M)	-0.04	0.19**	0.44**	0.25**	0.32**	0.66**	0.66**	0.61**	0.67**	0.65**	0.61**	0.85**	1.00								
領導者-成員**「衝突」**(N)	0.01	0.10*	0.36**	0.10*	0.17**	0.48**	0.48**	0.41**	0.49**	0.47**	0.42**	0.48**	0.54**	1.00							
團隊成員間**「信任」**(O)	-0.11*	0.30**	0.45**	0.27**	0.18**	0.30**	0.34**	0.32**	0.40**	0.41**	0.43**	0.44**	0.40**	0.26**	1.00						
團隊成員間**「滿意」**(P)	-0.08	0.32**	0.44**	0.27**	0.24**	0.34**	0.35**	0.33**	0.37**	0.43**	0.39**	0.42**	0.41**	0.26**	0.83**	1.00					
團隊成員間**「衝突」**(Q)	-0.07	0.06	0.24**	0.01	0.14**	0.22**	0.25**	0.21**	0.26**	0.22**	0.24**	0.31**	0.31**	0.52**	0.40**	0.45**	1.00				
安全程序氣候(R)	-0.00	0.26**	0.50**	0.26**	0.22**	0.34**	0.37**	0.38**	0.48**	0.43**	0.48**	0.45**	0.42**	0.40**	0.47**	0.46**	0.35**	1.00			
管理者安全性作業氣候(S)	-0.06	0.29**	0.52**	0.31**	0.30**	0.46**	0.49**	0.51**	0.55**	0.53**	0.58**	0.57**	0.55**	0.40**	0.49**	0.47**	0.35**	0.69**	1.00		
安全資訊流氣候(T)	-0.01	0.28**	0.56**	0.34**	0.30**	0.40**	0.41**	0.41**	0.47**	0.47**	0.53**	0.43**	0.43**	0.32**	0.44**	0.43**	0.29**	0.67**	0.75**	1.00	
安全優先氣候(U)	0.02	0.18**	0.34**	0.18**	0.08	0.28**	0.31**	0.34**	0.30**	0.26**	0.25**	0.26**	0.25**	0.36**	0.29**	0.26**	0.39**	0.39**	0.37**	0.32**	1.00

註：1. *P<0.05; **P<0.01。

國科會補助專題研究計畫項下出席國際學術會議心得報告

日期：100 年 7 月 31 日

計畫編號	NSC 99-2410-H-041 -004 -		
計畫名稱	護理人員創新領導理論之建構與實證-關係品質與組織氣候的角色		
出國人員姓名	翁瑞宏	服務機構及職稱	嘉南藥理科技大學
會議時間	100 年 7 月 26 日至 100 年 7 月 30 日	會議地點	Universiti Kebangsaan Malaysia, 吉隆坡, 馬來西亞
會議名稱	(中文) 2011 組織創新國際研討會 (英文)2011 The International Conference on Organizational Innovation		
發表論文題目	(中文)醫院技術創新之前因與後果 (英文)The Antecedents and Consequences of Technological Innovation: The Case of Hospital Industry		

一、參加會議經過

我於吉隆坡當地時間 2011/07/26 下午 2 點左右抵達吉隆坡國際機場，於 2011/07/27 上午坐車抵達國立馬來西亞國民大學(Universiti Kebangsaan Malaysia，研討會舉辦地)。早上參加大會開會開幕典禮並聆聽三場來自美國、紐西蘭以及葡萄牙學者的 keynote speak 演講，而我所報告的論文場次安排 session 6.2 (發表會議室為 Bilik Seminar 7.215)，由國立馬來西亞國民大學 Zaimah Darawir 教授擔任該場次 session chair，該場次安排五篇文章進行發表，每人有 15 分鐘報告時間以及 5-10 分鐘 Q＆A 時間。第一篇報告者為來自國立馬來西亞大學的 Puvanasvaran，其報告主題為 Principles and Business Improvement Initiatives of Lean Relates to Environmental Management System；我是第二位報告人，報告主題 The Antecedents and Consequences of Technological Innovation: The Case of Hospital Industry；第三位報告人為 Suechin Yang,，報告主題為 Decomposition NPD Process Impact on New Product Success；第四位報告人為 Ming Tang Wang,，報告主題為 The Viewpoints of Healing Toy Products from Different Ageing Group，中國大陸學者 Cong Yan 為最後一位報告人。

我報告的主題，主要以中華民國全部醫院為研究對象，探討台灣醫院技術創新發展的前因，以及醫院技術創新對於醫院績效的影響性，整個報告的時間共進行 20 分鐘，報告完畢後，共有主持人以及多位與會專家學者提出問題與建議，整個 Q＆A 的過程約歷時 10 分鐘，對於與會學者的提問，皆能給予立即且正確的回應，其中由於台灣醫療產業環境與其他國家並不相同，因此在回答過程中介紹許多台灣目前醫院發展現況。除自己報告的場次外，在會議期間乃分別前往參與其他場次的報告，並對於部分報告主題提供問題與建議，所參與的場次包含：Session 5.1、7.3,、6.4、2.3、5.4 等場次，涵括 Service

Management、Technological Innovation、New Product Development、Service Innovation and Organizational Innovation 等主題。所有的研討會場次於當地時間 2011/07/28 下午 1 點左右結束。

二、與會心得

2011 The International Conference on Organizational Innovation 為美國 International Association of Organizational Innovation 的年會，這次的年會共有來自美國、英國、韓國、中華民國、葡萄牙、中國大陸、俄羅斯、澳洲、馬來西亞、印度、伊朗、巴基斯坦、土耳其、烏干達、菲律賓、泰國等多個國家的管理學者與會，共約有 150 篇經過審查通過的研究論文在此次研討會發表，透過此國際研討會的參與，讓我有下列幾項重大的收穫：

1. 充分並切身了解到不同國家或區域文化的脈絡對於各種營利或非營利組織管理活動的影響，尤其這次接觸到許多回教世界、非洲、俄羅斯等過去未曾接觸的學者與議題，透過與各國家學者在研討會中的互動與交流，不僅跨大我的國際視野，更讓我建立起未來進行國際間研究合作時的人脈。
2. 口頭簡報完後，國立馬來西亞國民大學 Zaimah Darawir 教授除了讚賞本研究具有高度的發表價值外，另針對本研究提出許多問題與建議，透過 Darawir 教授與在場與會學者的建議與提問，讓我對於此次發表的論文有更深入且多元觀點的認識，此外，亦讓我對於未來繼續將此篇論文投稿至國際學術期刊時有了具體的修正方向。
3. 與會的專家學者皆認為此篇論文相當嚴謹，且研究主題對醫療產業管理以及組織創新管理來說具有實務上的貢獻，亦是極具創新性的研究，透過與會學者得肯定，讓我更深信台灣學術研究成果絕對是能夠站上國際舞台。
4. 在參與研討會的過程中，對於許多論文的發表，我亦提供了一些問題與建議(例如：對於來印度大學公共衛生學院的 Shammy.Shiri，我便提到在該研究中，轉換型領導應有可深入進行區分，以進一步了解其細部構面的效應，進而強化研究的嚴謹度)，所提供的一些建議亦多能獲得在場許多與會人士的認同與肯定，因此，讓我深覺得其實台灣管理學者在國際學術舞台上具有”給”的能力。

三、考察參觀活動(無是項活動者略)

無

四、建議

建議國科會可優先獎助國內大學博士畢業之學者出席國際會議，亦有效提升國內大學畢業之學者的國際觀。

五、攜回資料名稱及內容

名牌、大會議程、論文集光碟、註冊費收據、其他研討會宣傳資料、發表證書。

六、其他

無

Malaysia ICOI 2011 International Conference of Organizational Innovation

Dear Rhay-Hung Weng

Congratulation!!! **According to our record your manuscript Rec. No. 11R-038 entitled is "The Antecedents and Consequences of Technological Innovation: The Case of Hospital Industry", and coauthor are Ching-Yuan Huang, Jin-An Huang Jung-Chien Chen, it has been accepted for publication in 2011 The International Conference on Organizational Innovation proceeding. The registration fee of the 2011-ICOI conference is US$300 for each paper registered before May 23, 2011 or US$350 after May 23, 2011. Notably, the student registration fee is US$280 .Each paper should be registered at least by one author; otherwise it will be regarded as withdrawn automatically.**

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The Antecedents and Consequences of Technological Innovation: The Case of Hospital Industry

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Abstract

Innovation has become the key element to improve competitive advantage for hospitals. We investigated the determinants of technological innovation and its influence on hospital performance through samples in Taiwan. Research data were obtained from four secondary databases: "Taiwan Hospital Annual", "Statistical Yearbook of the Interior" of the Taiwan Hospital Association, and "registry for contracted medical facilities" and "registry for contracted beds" of National Health Insurance Research Database in 2005. We adopted structural equation modelling to analyze our research model. We found that hospital scale affects technological innovation positively, the level of technological innovation of private hospitals is higher than that of public hospitals, and the technological innovation of non-teaching hospitals is also significantly higher than that of teaching hospitals. Results also showed that technological innovation influences ambulatory performance, emergency performance, and inpatient performance positively. This research confirmed that market factors failed to have a direct impact on the technological innovation of hospitals; hospital scale, hospital ownership and teaching status are the critical factors affecting technological innovation. Finally, we confirmed that technological innovation indeed affects hospital performance.

BACKGROUND

For most successful organizations, consistent growth is the critical factor for success and innovation is the main driving force. Companies require sustained innovation of products, systems and services, which in every sector must become more responsive to customer demand, in order to compete successfully in the long-term (Schepers, Schnell, & Vroom, 1999). Afuah(1998) states that innovation is an important resource for implementing novel knowledge to enhance organization's abilities, and develop new products as well as new services to create value in an organization. Hospitals are a knowledge-intensive and professional organization, therefore innovation is the key element in improving their environmental adaptability and competitive advantage (McDonald & Srinivasan, 2004). Accordingly, many hospitals have focused more on their development of innovation and have even invested more resources into enhancing their innovative performance.

Researchers usually categorize organizational innovation into administrative innovation and technological innovation and it has been widely adopted by scholars of either organizational innovation or hospital innovation (Francesco, 2007; Goes & Park, 1997; Kimberly & Evanisko, 1981; Liao, Fei, & Liu, 2008; Young, Charns, & Shortell, 2001). These two fundamental kinds of organizational innovation have different influences on organizational performance, therefore these two innovations must be considered independently when conducting research(Damanpour, 1991; Wolfe, 1994). Technological innovation enhances hospitals competitive advantages through the improvement of work efficiency and value (McDonald & Srinivasan, 2004). Moreover, it supports hospitals achieve core activities and enhance their reputations. Technological innovation is more directly related to the improvement of health care quality and for hospital managers it has become a key developmental component (McDonald & Srinivasan, 2004; Tsai & Li, 2002).

Based on the Structure-Conduct-Performance (SCP) perspective of industrial organization theory, the characteristics of market structure affect the behavior of organizations and subsequently cause different organizational performances (Hawawini, Subramanian, & Verdin, 2003). However, with regard to technological innovation, both market factors and organization factors are all main constructs that affect hospital technological innovation (Damanpour, 1991, 1996; Wang, Wan, Burke, Bazzoli, & Lin, 2005). In addition, some researchers have claimed technological innovation can help to improve organizational performance (Damanpour & Evan, 1984; Torsten Oliver & Antonio, 2009). Nonetheless, little research has been done within hospital context based on a large-scale sample of hospitals. In order to fill the gap, our study collected large-scale secondary data from Taiwanese hospitals and aimed to investigate the determinants of hospital technological innovation from market and organizational aspects and examined the relationship between technological innovation and hospital performance.

LITERATURE REVIEW

Hospital technological innovation

Kimberly and Evanisko (1981) have defined hospital technological innovation as being directly related to diagnoses and treatment of disease, which can help hospitals to achieve the basic work activity or mission. They used twelve technological innovations items to measure technological innovation, including one surgical procedure, two new drugs, two new techniques and seven new kinds of equipment. Goes and Park (1997) define hospital technological innovation as the adoption of new medical technology and used six new medical innovations (laser surgery, ultrasound

imaging, magnetic resonance imaging, fiberoptic endoscopy, cardiac catbeterization and computer axial tomograpby) to measure technological innovation. Wang et al (2005) explored factors that affect the adoption of health information system in American hospitals, and measured hospital innovation by the adoption of three information systems, namely, clinical information system, administrative information systems and strategic information system. McDonald and Srinivasan (2004) stated that hospital technological innovation is a useful indicator of a hospital's product, service and production process, and they propose twenty items to evaluate hospital technological innovation. Mas and Seinfeld (2008) used thirteen medical technologies to explore how managed care restrains the development of technological innovation in hospitals. Chou et al. (2004) used the adoption of six expensive or dangerous medical devices to explored the effect of Taiwan's 1995 implementation of National Health Insurance on technological innovation. Weng et al. (2006) used the adoption of seventeen medical equipments to explore the diversity of technological innovation of hospitals. Since the adoption of high-tech medical equipment has been demonstrated to provide hospitals with a critical competitive advantage, many scholars have used high-tech medical equipment to define hospital technological innovation. Therefore, we adopted the same criterion to define hospital technological innovation.

The determinants of technological innovation

Whether there are sufficient profit incentives and customer demands in the market is a major factor which affects hospital technological innovation (Hawawini et al., 2003). It increases an organization's willingness to develop technological innovation when profit incentives and customer demands are adequate in the market. Hospital industry is a highly capital-intensive industry(McDonald & Srinivasan, 2004). Therefore, when there are high profit incentives in the market, hospitals are more highly motivated to invest substantial capital to improve technological innovation. Dranove et al. (1992) state that if an area has a high population, there will be more complex medical problems, so hospitals will be more likely to adopt and extend new medical technology. In addition, market uncertainty is positively linked to the volatility of market size. Organizations residing in relatively uncertain environments may be expected to adopt a greater number of innovations than those residing in relatively certain environments. Naranjo-Gil(2009) indicates hospitals are more likely to adopt innovations when there are more opportunities or uncertainties in the market. Wang et al.(2005) also found market size had a positive association with hospitals' adopting new technologies.

Hypothesis 1: Market scale has a positive influence on technological innovation.

Hospitals will constantly evaluate their technological advantages and adopt newer technology to maintain their advantage in a highly competitive environment (McDonald & Srinivasan, 2004). Health care prices will be restricted by third-parties if hospitals apply a third-party payer system, and as a result, hospitals will dedicate more resources to improving healthcare quality rather than engaging in price competition. In a more competitive market, hospitals will be more willing to invest in high cost healthcare quality to attract patients and to increase market share (Bokhari, 2009; Tsai & Li, 2002). Based on the "Medical Arms Race" theory, a hospital's motivation to purchase expensive high-tech medical equipment is positively associated with the degree of market competitiveness. Strategic contingency theory suggests that organizations can respond to hostility. Organizations in a competitive industry would constantly evaluate technologic advantages and adopt them in order to gain a competitive advantage. Thus, market competitiveness is significantly related to

the adoption of new technologies(Wang et al., 2005). Goes and Park (1997) empirically showed that hospitals will adopt new medical technology to achieve a better reputation and to compete with other hospitals, and confirmed that market competition has a positive influence on hospitals' willingness to adopt innovation.

Hypothesis 2: Market competition will have positive influence on technological innovation.

Research into organizational learning has revealed that an organization's innovative capacity is built on its background knowledge base. The lack of sufficient background knowledge would impede organizational ability to develop and adopt innovations. Older companies tend to have a richer functional and productive knowledge base which can enhance the organization's ability to exploit innovation and improve the diverse developments of technological innovation (Cohen & Levinthal, 1990). Older organizations will have perfected the routines, structures, incentive programs, and other infrastructure that are needed to develop or adopt new technologies and bring them to market(Sorensen & Stuart, 2000). Thus, organizations which have survived a long period of time are likely to develop the capability to innovate. Moreover, studies on organization ecology researchers showed that due to the shortage of formal structure and institutional legitimacy in new organizations, firms are inefficient in developing innovation, resulting in so-called Liability of Newness (Freeman, 1990; Weng et al., 2006). Kimberly and Evanisko (1981) investigated technological innovation and found hospital age was significantly associated with the level of hospital technological innovation.

Hypothesis 3: Technological innovation will be positively influenced by hospital age.

From the perspective of resource shortage, larger organizations have more complex resources and ability, better technical know-how and can adopt diverse innovations (Weng et al., 2006; Young et al., 2001). Damanpour (1987) indicated that large organizations have more diverse and more complex facilities that presumably foster the adoption of a larger number of innovations. On the other hand, according to Diffusion of Innovation Theory, hospitals need sufficient resource to support, accomplish and maintain the adoption of new technology(Wang et al., 2005). Some researchers have also reported that larger hospitals may have greater access to the resources and critical mass needed to develop technological innovation(Goes & Park, 1997; Kimberly & Evanisko, 1981). Larger hospital scale is directly related to medical demands and number of patients and larger hospitals can enjoy the benefits of economy of scale. Thus, larger hospitals are more likely to adopt or extend new medical technology (Kimberly & Evanisko, 1981). Lo (2005) indicated that bigger hospitals have more resources, higher ability and higher internal demand, and therefore they are better able to adopt new medical technology. In addition, larger organizations have more complex structures and face more uncertainties that would necessitate their adoption of innovations(Jaana et al., 2006). Chou et al. (2004) also found hospitals with more beds are more likely to adopt technologies. Naranjo-Gil (2009) confirmed that the adoption of technological innovation was positively significantly related to hospital size.

Hypothesis 4: Hospital scale will have positive influence on technological innovation.

Unlike public hospitals, private hospitals do not have financial support from the government, hence they have higher residual claimants to provide incentives for profit and further development, which spurs technological innovations and activities (Kimberly & Evanisko, 1981; Young et al., 2001). However, public hospitals have the

financial support of the government and have to take numerous policy-related responsibilities into consideration. Consequently, public hospital managers generally adopt a conservative and stable policy (Milgrom & Roberts, 1992). Price (1992) noted that a high level of bureaucracy and lack of rapid reaction to market conditions lowers hospitals' innovation in healthcare. Compared with public hospitals, private hospitals have greater strategic flexibility, higher environmental sensitivity and higher demand for promoting market status (Goes & Park, 1997). Hisashige (1994) found the amount of high-tech medical equipment in private hospitals was more than in public hospitals. Barros (2003) compared two hospitals and found the private hospital performed better than the public hospital because of the differences in technology. Private hospitals are wholly responsible for organizational performance in a competitive environment, hence they adopt or extend new medical technology proactively (Rajshkha, Rao, & Thomas, 1991). Chou et al. (2004) confirmed that private hospitals have more probability to adopt new technology. In addition, Wang et al. (2005) reported that the adoption of an innovative information system in public and private hospitals was significantly different. For nursing homes , Davis (2009) indicated that for-profit ones were more efficient than were nonprofits and for-profits will use more new technologies than nonprofits.

Hypothesis 5: Technological innovation of private hospitals is significantly higher than one of public hospitals.

Hospitals in Taiwan can be categorized into teaching hospitals and non-teaching hospitals. Hult (2004) found learning orientation is positively related to organizational innovativeness. Teaching hospitals would pay much importance to employee learning and organizational learning to improve the level of learning orientation. Furthermore, teaching hospitals offer their facilities to doctors and health care personnel or to medical school students for medical education and training (Weng et al., 2006). Therefore, teaching hospitals which have a higher level of teaching and research will dedicate more resources to research. Mitchell (2002) found that the utilization rate of high-tech equipment, i.e. CT and MRI, was higher in teaching hospitals than in non-teaching hospitals. According to absorptive capacity theory described by Cohen and Levinthal (1990), if an organization invests more resources in R&D it will increase its own absorptive capacity. The improvement of the absorptive capacity is the essential factor affecting the adoption of innovation technology in organizations (Keller, 1996). In addition, with the improvement of the absorptive capacity, the technological knowledge resources in the organization would also be enriched(Chen, 2004). Damanpour (1991) indicated that the greater the technological knowledge resources, the more easily can new technical ideas be understood and procedures for their development and implementation be attained.

Hypothesis 6: Technological innovation of teaching hospitals is significantly higher than one of non-teaching hospitals.

Service complexity is the number of clinical specialties in a hospital: when a hospital has more specialties it means that its medical sectors have higher functional differentiation, which will increase the hospital's structure complexity and medical service complexity (Damanpour, 1991; Eiriz, Natália, & José, 2010; Young et al., 2001). Damanpour (1996) showed that in an organization with a high structure complexity, different specialists can offer more diverse knowledge bases to improve the exchange and diffusion of creative ideas, and induce more diverse creative innovations. If hospitals' functional differentiation is higher, it will have diverse interest groups and demands of core technology, which will serve to further advance hospital technological innovation (Kimberly & Evanisko, 1981). Damanpour (1991)

used the meta-analysis method to found that functional differentiation would highly influence the adoption of innovations and is also positively related to technological innovation . Therefore, medical service complexity is a vital factor in the adoption of hospital technological innovation (Young et al., 2001). Lo (2005) found that if the hospital has more specialties it will have more resources, capability and higher internal demand, and will be better able to adopt or extend new medical technology.

Hypothesis 7: Service complexity has a positive influence on technological innovation.

Hospital administrators often have more interests on any kind of innovations that could improve organizational efficiency or effectiveness(Kimberly & Evanisko, 1981). Therefore, administrative intensity of a hospital may be the factors affecting the adoption of innovations. If an organization has higher administrative intensity (the percentage of management employees), it can execute the related management functions efficiently while developing innovation (Damanpour, 1996). Salavou et al. (2004) indicated administrative intensity is an important determinant of organizational innovation and use the ratio of administrative worker to total employees. Damanpour (1991) and Damanpour (1987) pointed out that a higher administrative intensity would facilitate innovation because the successful innovation depends largely on the leadership, support, and coordination managers provide. In hospitals, high administrative intensity will increase hospital adaptation of new technology and new techniques from the external environment (Weng et al., 2006).

Hypothesis 8: Administrative intensity has a positive influence on technological innovation.

The impact of technological innovation on hospital performance

The purpose of organizational innovation is to advance organizational performance by maintaining organizational competitiveness: organizations can develop innovation through the systems of input, output, transformation and feedback (Didier & Guerreror, 2002). First-mover advantage research shows that industry innovators can usually achieve first-mover advantage, including technology, resource preemption, switching cost, decision uncertainty and create higher economic profit (Lieberman & Mentgomery, 1988). From resource-based view, innovation is a means for changing an organization, whether as a response to changes those occur in its environment or as a pre-emptive move taken to influence an environment. Because environments evolve, organizations must adopt innovations over time and the most important innovations are those that allow the firm to achieve some sort of competitive advantage, thereby contributing to its performance (Hult et al., 2004).The development of technological innovation is benefits organizations by creating valuable, rare, imperfectly imitable and non-substitutable resources, thus improving organizational advantage and performance (Barney & Burnham, 1991).

Yamin and Gunasekaran (1999) hold that innovation can be improved through technology to reduce production cost. Furthermore, organizational productivity as well as overall performance will benefit from innovation. Their empirical investigation of Australian manufacturing companies showed that the organizations with a higher degree of technological innovation had a higher performance in marketing, asset management, production effectiveness and financial performance. Hagedoorm and Cloodt (2003) found that technological innovation has a positive impact on organizational performance in 1200 international organizations. In the health care industry, Irwin et al. (1998) used a sample of 189 hospitals in Florida and discovered a positive relationship between medical technological innovations and hospital financial performance. Salge and Vera (2009) investigated 173 English public

hospital organizations and found hospitals investing in innovation-generating activities can enhance clinical performance. Eric et al. (2007) studied 111 hospices in California and found that innovative practices were positively related to quality of care. The residents who were most able to afford palliative care cost were more accepting of innovative practices and could help to improve hospices' performance. Naranjo-Gil (2009) proved that the adoption of technological innovation was positively related to organizational performance in Spain's public hospital sector. A study on English public acute care organizations suggests that technological innovation helps knowledge diffusion and clinical treatment innovation. In addition, patients had more confidence in treatment, therefore, technological innovation had a significant positive influence on both clinical performance and administrative performance (Torsten Oliver & Antonio, 2009). Thus, we propose the following hypotheses:

Hypothesis 9： Technological innovation has a positive influence on ambulatory performance.

Hypothesis 10: Technological innovation has a positive influence on emergency performance.

Hypothesis 11: Technological innovation has positive influence on inpatient performance.

METHODS

Data source and collection

The major data source of the study was the "2005 Taiwan Hospital Annual" published by the Taiwan Hospital Association, which contains data on 299 Taiwanese hospitals. Our analysis included data from 217 hospitals of these hospitals. The remaining 82 hospitals were excluded due to incomplete data. As for hospital locations, Goodness of Fit test showed no significant difference between populations and samples ($p > 0.05$). In addition, we also obtained data from the "2005 Statistical Yearbook of the Interior", "registry for contracted medical facilities" and "registry for contracted beds" of the National Health Insurance Research Database in 2005.

The operational definition of research variables

According to the measurement items proposed by Weng et al. (2006) , Goes and Park (1997) and Kimberly and Evanisko (1981), we adopted 16 high-tech medical equipment items to evaluate technological innovation.

Equipment items and the weight of their innovativeness are shown in appendix. The operational definitions of other variables are as below: 1. Market scale: the logarithmic value of populations in every city at the end of 2005; 2. Market competitiveness: measuring by Herfindahl-Hirschman Index (HHI) (Scherer, 1980), HHI is given by the formula, where α_i is the market share of each hospital in the same city, calculate in terms of the number of hospital beds in 2004; 3. Hospital age: (2005) －(The year of establishment); 4. Hospital scale: the logarithmic value of employees in the hospital at the end of 2005; 5. Hospital ownership: including public and private hospitals in 2005; 6. Teaching status: Teaching hospitals and non-teaching hospitals in 2005; 7. Service complexity: the number of specialists, twenty-eight specialists in total by the end of 2005; 8. Administrative intensity: the percentage of administrative personnel in all employees in 2005.

We classified hospital services into three categories, namely, outpatient service, emergency service and inpatient service. Subsequently, we used ambulatory

performance, emergency performance and inpatient performance to evaluate hospital performance. Due to limited secondary data, we used daily outpatient visits (the total number of outpatient visits in 2005/270 days) to represent ambulatory performance, daily emergency visits (the total number of emergency visits in 2005/365 days) to represent emergency performance, and occupancy rate of acute beds ([(the sum of inpatient days in 2005/365 days) /current beds in 2005 * 100)]) to represent inpatient performance.

Analysis method

Besides using prescriptive analysis to delineate sample characteristics, we also used a correlation matrix to test correlations among the various constructs. We found that all distributions of daily outpatient visits, daily emergency visits and occupancy rate of acute beds were skewed to the left.

The research framework was evaluated by Partial Least Squares (PLS), which is one kind of approaches to structural equation modelling (SEM). PLS is a second generation technique for the estimation of path models which allows to identify multiple dependent variables simultaneously (Chin, Marcolin, & Newsted, 2003; Naranjo-Gil, 2009; Smith & Bristor, 1994). King & Lekse (2006) indicated that PLS possesses certain advantageous characteristics which include allowing smaller sample size, allowing samples without normal distributions, explaining dependent constructs efficiently, and being able to deal with complex causal relationships. However, PLS does not provide on the fit of the whole model, we applied R^2 to stand for the fitness, where higher R^2 means better fit (Chin et al., 2003). The estimated path coefficients between constructs are standardized regression coefficients which indicate whether hypotheses match or not (Smith & Bristor, 1994). The program SmartPLS 2.0 was used to analyze research data.

RESULTS

The valid sample included 217 hospitals, of which 77.88% were private hospitals and 59.45% were non-teaching hospitals. In addition, the mean of hospital market scale was 13.93 (SD = 0.83), market competitiveness was 964.45 beds (SD = 664.78), average year was 26.52 year (SD = 22.35), hospital scale was 5.38 (SD = 1.35), service complexity was 12.1 (SD = 8.48), administrative intensity was 21.87% (SD = 23.42), daily outpatient visits were 1015.66 persons (SD = 1454.80), daily emergency visits were 61.65 patients (SD = 22.72), occupancy rate of acute beds was 60.56 beds (SD = 22.72), number of inpatient days of acute beds was 18.81 days (SD = 61.90), technological innovation was 129.53 (SD = 276.62). The correlation analysis result is shown in Table 1 Table 2 shows technological innovation, ambulatory, emergency and inpatient performance of teaching hospitals were significantly higher than in non-teaching hospitals.

Before we performed PLS analysis, the re-sampling times was set as 500 which suggested by Chin (Chin 1998) to test whether each path was significant or not. PLS analysis result revealed that technological innovation (R^2 = 0.45) is positively influenced by hospital scale (β = 0.95；t = 7.50) and the level of technological innovation in private hospitals was higher than in public hospitals (β = 0.15；t = 3.01). On the other hand, market scale, market competitiveness, hospital age, teaching status, service complexity and administrative intensity had no significant influence on technological innovation. Surprisingly, our empirical result showed teaching status was negatively related to technological innovation (non-teaching hospital > teaching hospital). As for the impact of technological innovation on hospital performance, PLS result showed ambulatory performance (R^2 = 0.66), emergency performance (R^2 = 0.52), and inpatient performance (R^2 = 0.10) were all positively related to

technological innovation, with β and t values of 0.81, 19.39; 0.72, 15.18 and 0.31, 9.31, respectively (Figure 1). In conclusion, our hypotheses H4, H5, H9, H10 and H11 were all supported by these findings; however, H1, H2, H3, H6, H7 and H8 were not supported.

DISCUSSION

The determinants of hospital technological innovation

Regarding market factors, we expected that the larger the market scale was, the higher the demand of medical technology, and hospitals would therefore have a higher profit incentive to enhance its technological innovation. We used a logarithmic value of population in each city to represent the market scale and determined that there was no significant association. Lo (2005) found that population in each city did not significantly influence the adoption and expansion of new medical technology. Weng et al. (2006) also found that market scale had no significant influence on the diversity of technological innovation in Taiwanese hospitals.

Concerning market competitiveness, we estimated when the market was more competitive, hospitals would adopt newer technology to maintain their technological advantages. However, we used Herfindahl-Hirschman Index to measure hospitals' market competitiveness and found no significant associations. Tsai and Li (2002) found market competitiveness was positively related to the adoption of high-tech medical equipment, although Lo (2005) and Weng et al. (2006) reported that market competitiveness was not significantly related to the adoption of high-tech medical equipment or the diversity of technological innovation. Wang et al. (2005) also found the increase of market competitiveness had no influence on the adoption of an innovative information system.

Concerning organizational factors, unexpectedly, the empirical result showed no significant relationship between organization age and technological innovation. Although previous research demonstrated that hospital age was positively related to technological innovation (Kimberly & Evanisko, 1981), Weng et al. (2006) showed no significant relationship between hospital age and the diversity of technological innovation. Accordingly, the impact of organization age on the technological innovation of a hospital appears to be very limited. As for hospital scale, based on a study by Weng et al. (2006), we used the logarithmic value of the number of employees in a hospital to represent hospital size and found that size was positively associated with hospital technological innovation. Goes and Park (1997), Chou et al. (2004) and Weng et al. (2006) also proved that hospital scale was positively related to technological innovation.

As for ownership, we assumed that private hospitals were more strategically flexible, had high environmental sensitivity, and higher residual claimants to gains, and that these characteristics were beneficial for seeking and fulfilling innovative opportunities.The result supports the hypothesis that technological innovation of private hospitals was higher than that of public hospitals. Goes and Park (1997) and Hisashige (1994) found that the development of innovation was more favorable in private hospitals. In Taiwan, Lo (2005), Chou et al. (2004), and Weng et al. (2006) also found private hospitals have higher incentives to adopt innovative medical technology. Thus, in Taiwan and overseas, technological innovation of private hospitals is significantly higher than that of public hospitals, and the strategic flexibility, environmental sensitivity and residual claimants to gains in private hospitals are positively related to technological innovation.

For teaching status, we supposed that organizations investing more resources in R&D would have a higher level of technological innovation. Surprisingly, the results

showed a negative relationship between teaching status and technological innovation. However, Weng et al. (2006) found that the diversity of technological innovation of teaching hospitals was better than that of non-teaching hospitals. Thus, early adopters of each technological innovation item should be rated more innovative. The negative relationship may have been the cause of we were not able to evaluate the adoption time of technological innovation items. Chou et al. (2004) found public teaching hospitals has longer managerial decision process and slower technology diffusion rate after Taiwan's implementation of National Health Insurance because these hospitals' technology decisions are affected by their teaching mission and financial factors simultaneously, If researchers can obtain the adoption time of technological innovation items or overcome the limitation of data collection, the data will more accurately demonstrate whether non-teaching hospitals have a higher level of tec

The impact of technological innovation

The results of PLS analysis showed that technological innovation influenced ambulatory performance, emergency performance and inpatient performance positively. Yamin and Gunasekaran (1999) indicated that innovation can be improved through technology and may further enhance productivity and performance. Hurley and Hult (1998) pointed out a higher level of innovativeness in a company will help to develop competitive advantages and achieve better performance. Thus, When hospitals strive to improve their performance, medical technological innovations could be seen as strategic assets (valuable, rare, imperfectly imitable and non-substitutable resources) from resource-based view(Irwin et al., 1998). Eric et al. (2007) and Torsten and Antonio (2009) found that technological innovation was positively associated with performance of healthcare organizations. Our results also support prior studies that technological innovation indeed has a positive influence on ambulatory, emergency and inpatient performance. This shows that technological innovation not only have positive influences on one kind of clinical service performance, but also is beneficial for overall hospital performance. Thus, hospital innovation would lead to improvement in clinical and service quality, and sequentially result in better operational efficiency and effectiveness (Torsten Oliver & Antonio, 2009). It also can be seen from this that the strategy of medical arms race is still very important for hospitals. Improving their technological innovation should be considered as a critical strategic goal when they want to establish the competitive advantage and further enhance overall hospital performance. In addition, PLS analysis showed that the impact of technological innovation on ambulatory performance is higher than that on other service performance. Therefore, improving technological innovation should be more important for hospitals which see ambulatory services as core services.

CONCLUSION

Prior studies have claimed that the characteristics of market structure affect organizational behaviour; however, our study yielded different findings. We found only organizational factors, including hospital size, ownership, and teaching status had a direct influence on technological innovation. The critical factors that affect technological innovation were an organization's own abilities or characteristics, rather than market factors. Our results indicated the larger the hospital was, the higher the level of technological innovation, and the better performance the hospital was. This finding might explain why small hospitals in Taiwan have faced business difficulties in recent years.

In Taiwan, the development of technological innovation of private hospitals fares better than in public hospitals. Our results revealed that technological innovation had

a positive relationship with performance; hence managers at public hospitals can dedicate more resources to improving technological innovation in order to raise hospital performance. We found technological innovation of non-teaching hospitals was better than that of teaching hospitals and this result differed from results reported by Weng et al. (2006). This finding is worth studying further, through long-term observation and data collection to explore whether a hospital's investment of resources in teaching can result in a crowding-out effect and even cause an unfavorable impact on the improvement of performance. Hospital technological innovation can indeed affect ambulatory performance, emergency performance and inpatient performance. Therefore, the promotion of technological innovation is an important strategy that managers can apply to improve a hospital's competitive advantages.

Our study confirmed that organizational factors were the critical factors affecting technological innovation and this supports the contingency model of organizational innovation proposed by Damanpour (1996) . Industrial organization theory states that market factors affect organizational behaviour and further affect organizational performance; however, our results showed market factors had no significant influence on technological innovation, and failed to support the SCP model. This finding warrants further research. First-mover advantage theory and resource-based theory all point out that organization can generate first-mover advantage, competitive advantage and achieve better performance by improving innovation. As a result, our findings support first-mover advantage theory and resource-based theory in that technological innovation indeed has a positive impact on hospital performance.

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國科會補助計畫衍生研發成果推廣資料表

日期:2011/09/09

國科會補助計畫	計畫名稱: 護理人員創新領導理論之建構與實證-關係品質與組織氣候的角色
	計畫主持人: 翁瑞宏
	計畫編號: 99-2410-H-041-004- 學門領域: 醫務管理

無研發成果推廣資料

99 年度專題研究計畫研究成果彙整表

計畫主持人：翁瑞宏	**計畫編號：**99-2410-H-041-004-
計畫名稱：護理人員創新領導理論之建構與實證-關係品質與組織氣候的角色	

成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	1	100%		目前正在整理研究結果準備投稿
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	4	4	100%	人次	聘任嘉南藥理科技大學醫管系碩士班三位研究生擔任兼任研究助理工作，以及1位應屆畢業生擔任臨時工作人員。
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	0	1	100%	篇	目前正在整理研究結果準備投稿
		研究報告/技術報告	0	0	100%		
		研討會論文	0	1	100%		目前正在整理研究結果準備投稿
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		

		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)		本研究計劃成果預計至少可以發表 1 篇文章至國際性一般管理、醫管或護理類國際研討會，此外，在透過國際研討會與在場與會學者的進行學術交流後，再將研究成果發表至國內外一般管理、醫管或護理類之 TSSCI、SCI 或 SSCI 期刊。					

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

■達成目標

□未達成目標（請說明，以 100 字為限）

□實驗失敗

□因故實驗中斷

□其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形：

論文：□已發表 □未發表之文稿 ■撰寫中 □無

專利：□已獲得 □申請中 ■無

技轉：□已技轉 □洽談中 ■無

其他：(以 100 字為限)

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）(以 500 字為限)

(1)透過理論模式實證的過程，更能讓醫院管理者或護理管理者釐清與相信不同領導型態、組織氣候以及關係品質在員工創新發展過程中的影響性。

(2)作為醫療或護理實務機構欲促進護理人員創新行為時具體依據與發展方向，尤其是對領導者來說，更可以了解在提升護理創新過程中，不同領導型態與組織氣候與關係品質間的配適關係，進而提升護理創新之效能與效率。

(3)護理人員創新領導理論的實證結果，不僅可以提供未來促進護理人員創新行為的方向，也由於有進行較大規模樣本的問卷調查與實證，將使得醫療或護理實務機構之管理者對於護理人員創新領導理論內容產生較高的信任感與接受度，而隨著護理人員創新領導理論的實踐，將能提高各醫療或護理實務機構之護理照護品質，最終產生國家整體護理照護品質提升的效果。

(4)讓醫務管理者與研究者更能清楚了解何種領導方式才是真正有利於護理人員創新行為發展，以及領導型態如何與組織氣候、關係品質等環境因子達到一個最佳配適關係，以有效提升護理人員創新表現。

(5)可做為管理者與研究者在促進醫院內部其他醫療專業人員創新發展時的主要實證依據以及與發展方向，以及深化國內外醫療或護理實務機構對於創新管理議題的重視與投入。