

行政院及所屬各機關出國報告
(出國類別：會議)

參加大規模系統技術研討會
出國報告

服務機關：行政院飛航安全委員會
出國人職稱：飛航安全官
姓名：王興中
出國地區：墨西哥
出國期間：民國九十三年三月八日至三月十五日
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關鍵詞：大規模系統，文化，人為因素，出國報告。

內容摘要：

美國 Wayne 州立大學和墨西哥 Iberoamericana 大學共同舉辦首次大規模、緊密結合系統之科技邊陲研討會 (Technological Peripheries of Large-Scale, Tightly Coupled Systems)。本次研討會邀集了 8 個國家的 20 位專家學者參與討論在大規模系統中，當某些區域的科技發展和其他區域不平衡時，整個系統所可能遭遇到的挑戰。

當大規模系統橫跨已開發及開發中區域或國家時，區域中的不同之處即可能造成安全上的問題，從過去許多航空失事事件調查中顯示，失事可能肇因可因不同區域之航空科技發展的差異所造成的。

此次三天的會議中，共有墨西哥、美國、法國、奈及利亞、喀麥隆、烏克蘭、摩洛哥及中華民國等八國的學者及專家應邀參加，共同討論在目前航空環境中，科技邊陲所帶來的挑戰、可能解決的方法、及日後應從事研究的方向。

本文電子檔已上傳至出國報告資訊網

行政院及所屬各機關出國報告審核表

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前言

美國 Wayne 州立大學和墨西哥 Iberoamericana 大學共同舉辦首次大規模、緊密結合系統之科技邊陲研討會 (Technological Peripheries of Large-Scale, Tightly Coupled Systems)。本次研討會邀集了 8 個國家的 20 位專家學者參與討論在大規模系統中，當某些區域的科技發展和其他區域不平衡時，整個系統所可能遭遇到的挑戰。

當大規模系統橫跨已開發及開發中區域或國家時，區域中的不同之處即可能造成安全上的問題，從過去許多航空失事事件調查中顯示，失事可能肇因可因不同區域之航空科技發展的差異所造成的。

此次三天的會議中，共有墨西哥、美國、法國、奈及利亞、喀麥隆、烏克蘭、摩洛哥及中華民國等八國的學者及專家應邀參加，共同討論在目前航空環境中，科技邊陲所帶來的挑戰、可能解決的方法、及日後應從事研究的方向。

會議流程

本次研討會先由與會各國報告其國內民航目前發展現況及所遭遇的挑戰，接著開始討論民航發展先進的核心國家及邊陲國家之間的關係。

當各國學者專家經溝通後達到基本共識後，開始針對大規模系統中應注意或可能發生問題的區域加以定義，並規劃日後的研究目標，以提供學界及業界做為參考。

三天的會議結束時，各國學者專家共同草擬一份研究報告草案，待日後資料蒐集更齊全後將由國際飛安基金會贊助發表，在該份未來將發表的報告中將包括與會各國現況報告，工作小組的觀察與研究，日後研究的方向以及可能對相關業界所提出的建議事項。會議流程如下：

Wednesday, March 10, 2004

- 0830 Arrive at Universidad Iberoamericana
Angel Palerm Auditorium
- 0900 Welcome
Rector Mtro. Enrique Gonzalez Torres, S.J.
Universidad Iberoamericana
- 0915 Introduction
Dra, Carmen Bueno
Universidad Iberoamericana
- 0930 Agenda and Conceptual Briefing
Dr. Allen W. Batteau
Wayne State University
Institute for Information Technology and Culture
- 1000 Break
- 1030 Country Presentations, 20 minutes each
Angel Palerm Auditorium
 - Mexico

- Taiwan
 - Ukraine
 - Morocco
- 1200 Break
- 1230 Continue with Country Presentations, 20 minutes each
Angel Palerm Auditorium
- Nigeria
 - Cameroon
 - France
 - USA
- 1400 Lunch
- 1500 Comparison Discussion
Angel Palerm Auditorium
- 1730 Arrive at Auditorium Theatre
Aula Sta. Teresa
- 1745 Welcome
Capt. Cesar Llana
Colegio de Pilotos Aviadores
- 1815 Signing of Letter of Endorsement for Aviation Research in Mexico
- 1830 "The Death Spiral in Technological Peripheries: A Look Into An evolving Drama."
Capt. Rafael Alejandro Perez-Chavez
Wayne State University
- 1930 Questions and Discussion

Thursday, March 11, 2004

- 0830 Arrive at Universidad Iberoamericana
Aula Amado Aguirre E zone
- 0845 Review of March 10
Dr. Allen W. Batteau
- 0900 Discussion: Identify Issues of Technological Peripheries
- 1000 Break
- 1030 Group Discussion: Research Agenda, Recommendations to Industry,
Recommendations to Governments
- 1100 Small Group Discussion
- 1200 Break
- 1230 Continue Small Group Discussion
- 1400 Lunch

1500 Plenary
1640 Break – Tour by Historic Archives
Iberoamericana Library
1700 Outline Report
1800 Adjourn
1815 Depart Universidad Iberoamericana

Friday, March 12, 2004

0830 Arrive at Universidad Iberoamericana
0845 Organize Commitments and Schedule for the Report
0945 Break and Media Interviews
1030 Discussion: Challenges to the Civil Aviation Community and an
Agenda for Research and Collaboration
Dr. Allen Batteau
Wayne State University
Institute for Information Technology and Culture
1230 Concluding Remarks
1300 Concluding Ceremony Outdoors

會議摘要

以大規模系統來描述航空系統，可以以系統規模之大小分為不同的階層，全世界航空系統可視為一個大規模系統，亦可將世界上不同區域之航空系統各自視為一個大規模系統。一個國家，一個航空公司，亦可視為一個大規模系統。

大規模系統的運作包括了許多不同的獨立單位，唯有當所有單位皆運作正常，且相互配合良好時，整個系統才能安全且有效率的運作。只要其中任何一個單位在運作上出了問題，或無法和其他單位配合時，整個系統運作上就會有問題，更甚者還可能因相互配合不良而產生飛安事件。

航空科技通常由科技發展較先進的歐美國家（核心國家）開發後，輸出至航空科技發展較為落後的國家（邊陲國家）。這些科技的傳輸，往往會受到兩國間可運用的資源、能量、及各國本身條件而有所影響。而快速的科技發展，往往造成科技水平不同的兩國間的無法配合，因而產生問題。有時一個發展完善的系統可適用於航空科技核心國家，但卻無法安全的在邊陲國家中運作。因此，唯有在這些問題被發現、研究、解決後，我們才能有一個更為安全的航空系統。

此次會議中，來自各不同地區的二十位學者專家同意開始針對如航空等大規模系統中，航空科技的發展、溝通、及對等關係等無法配合之處，透過討論、研究、及溝通，以提出可能解決的方案。以下為各國學者日後

研究的方向：

1. 詳細的定義「大規模系統」(Large-Scale System)，包括其中之元件為何，且能表現出其元件間的互動性。該定義亦應包括飛航安全及科技核心與邊陲國之間的關係。
2. 找出科技核心國及邊陲國所共同遭遇的問題。
3. 協助航空器及其元件製造商，在產品發展及售後服務上，結合客戶的需求，文化的差異，及公司的特性。
4. 協助航空器使用者和航空器及其元件製造商建立有效的溝通管道。
5. 研究如何才能提升系統運作的整體功效。
6. 建立模組以描述各個元件在系統中所扮演的角色及功用，且該模組應可適用於全球不同區域的航空系統。
7. 瞭解不同區域航空系統應用方面的差異性，如某區域發展出的訓練系統，是否適用於另一區域。
8. 瞭解不同區域中，在航空系統內的各個參與單位的需求。
9. 研究全球航空運輸系統的強健性，當突發事件如9 1 1或SARS事件發生時，對整個系統的影響。

詳細的會議討論內容及各國的報告請參考附件。

結語

核心國所建立的系統，邊陲（周邊）國家不一定要照單全收，但問題是邊陲國家是否知道自己要的是什麼？在邊陲國家清楚知道自己要的是什麼之前，核心國不會、也不能提供邊陲國所需要的幫助。

全球航空界是一個共同體，其中任一個區域或國家的航空體系發生問題，或無法跟隨航空先進國家一同進步時，整個系統就會產生漏洞，飛安事件亦有可能因飛航系統的無法配合（Mismatch）而產生。

會議過程中，各國學者不斷針對如何在核心和邊陲國家中做有效的資訊交流，正確說法應是如何在大規模系統中充分的交換資訊。本人在會議中則不斷思考，這次會議所得能如何改善台灣的飛航環境。

本人以為，資訊的交換是非常重要的，但更重要的是，我們知不知道我們航空界的問題在哪裡？我們知不知道我們要的是什麼？

在航空界，台灣在某方面是邊陲，如民航系統及法規的建立；在某方面卻可視為核心，如我們的獨立飛航安全調查機關，自願報告系統等，皆走在大部分國家的前面。當我們想要建立或改善我們的航空系統時，我們往往參照國際民航組織或國際民航先進國家的系統或法規，設立我們自己的系統。但別的國家的法規或系統是否符合我們的需要，適合我們的環境？則少有人去探討。當然，實際情況比我在此的敘述複雜得多，因為有時很多決定是必須配合國際，政治或經濟的壓力而做決定的，但我想表達

的是，我們自己有沒有能力去發現我們自己的問題？我們要的是什麼？只有在明確的瞭解問題在哪裡後，我們才能夠和核心國溝通，核心國才有辦法提供協助，尋求解決的方法。

目前我們往往追尋，或遵循航空先進國家的腳步建立我們自己的系統，事後則非常需要評估我們引進的系統是否真的適合我們？或應如何改善來適應我們自己的民航環境，CRM 開始在台灣實行時，航空公司引進美國 UA，NW 等航空公司的 CRM 訓練計畫應用在自己公司內部，而國內某些規模較小的航空公司則依循大航空公司的教材建立自己的 CRM 課程，或直接由大航空公司代訓。雖然國內外學者的研究皆指出，不同文化、不同單位應設立適合自己的 CRM，而國內的航空公司亦先後設立公司內部的 CRM 工作小組研發自己的 CRM 訓練計畫，國內許多研究單位亦提出我們應建立所謂的”本土化 CRM”的建議，但卻一直沒有任何單位提出”本土化 CRM”的研究成果，更別說是接著而來的 FOQA，LOSA 計畫。而這些林林種種計畫的實施後，亦沒有深入評估其實施成效。

這是一個說的比做的容易上百倍的事情，現實上的確有太多的因素橫互其中，在此提出看法及感想，建議政府及學術單位日後在考慮航空界研究議題及經費分配時，可將台灣飛航環境的建立，發展及實際應用上的評估列入研究方向。

附件－會議紀錄

A REPORT ON A TWO DAY INTER ACADEMIC WORKSHOP TITLED: "TECHNOLOGICAL PERIPHERIES OF LARGE-SCALE, TIGHTLY COUPLED SYSTEMS."

Wednesday, March 10. 2004

INTRODUCTION

Opening speech

**By Dr. José Ramón Ulloa
Vice-Rector of Iberoamericana University**

Distinguished members of the chair (Dra. Bueno, Dr. Allen Batteau, Cap. Alejandro Perez-Chavez), visitants, estimated professors and students

The members of the academic community of the Iberoamericana University we welcome the researchers and experts of the aviation industry that are gathered here today to participate in the "Technological Peripheries of Large-Scale Tightly Coupled Systems" workshop, dedicated to the security in the aerial transport system.

We warmly welcome the two teams convoked to this workshop: Wayne University team from Detroit and its institute of the Technologies of Information and Culture, and the Iberoamericana University through its Political and Social Sciences Department.

Especially we welcome the experts coming from US, France, Morocco, Mexico, Nigeria, Taiwan and Ukraine. Please feel at home.

We are glad to be hosting this workshop and to be contributing to the mission of understanding better the systems in which today's society develops with the aim of improving human beings life.

Aerial transport is one of the large-scale connected systems, it unifies multiple regions with different level of technological and social development sophistication and this generates some unexpected situations at the local level. The vast diversity of cultural and linguistic resources implicated in these type of systems implies a huge amount of risk.

It is important to try to get the advance and evolution of technological development consequences of the aerial transport system be more manageable and foreseen than they have been until now.

To do this, it is necessary to make a thorough investigation of the peripheral regions and how they manage locally the technological adaptation to the large-scale systems in order to understand better the social and cultural factors that influence the aerial safety.

This investigation must demonstrate not only the limits and reaches of the socio-technical systems but also its value as social capital which can be accumulated and oriented in an efficient way to benefit cores and peripheries.

This group of participants is particularly adequate to tackle the subject of this kind of investigation, since as an international group it includes social phenomenon experts and aviation industry experts, which work drawn together will contribute to document specific situations related to aerial security and propose some solutions based on their experience.

We invite these participants to share generously their experience, analysis capabilities and creativity during the workshop to produce results that contribute to improve aerial transport security, strengthen international cooperation and advance in the mutual understanding to benefit everyone.

We thank everyone that has made this event possible, organizer, sponsorships, especially the Consejo Nacional de Ciencia y Tecnología (CONACYT) of Mexico and the National Science Foundation of the US through out its Americas' Program in their bilateral agreement. To the Asociación Sindical de Pilotos Aviadores (ASPA), to the Colegio de Pilotos Aviadores de Mexico and the Flight Safety Foundation.

Thank you very much to all of you.

Agenda and Conceptual Briefing

**By Dr. Allen Batteau
Wayne State University
Institute for Information Technology and Culture**

After welcoming all the participants and introducing them briefly, the way the workshop is going to be carried out is explained.

Each of the participants has to talk about the situation of aviation in his own country, point out what are the priority issues in the aviation of each country nowadays.

The purpose of the seminar is, in Dr.Allen's words, to approach the bigger picture of the global situation without imposing any particular point of view or perspective in order to approach the final goal of making recommendations on further research agenda, to the industry and on the policy issues. The big final goal to pursue with the organization of this workshop is to design an international project.

Then Dr. Batteau gives a speech on the topic of the workshop: Technological Peripheries of Large-Scale Tightly Coupled Systems.

Our role as scholars is to understand issues before someone else does.

"Technological peripheries" is a new idea or a new model of an old phenomena. We have created large-scale tightly coupled systems (like irrigation system, pharmaceutical system, which are old phenomena), which have a difficult environment.

Technology accelerates in geometrical proportion, but has an arithmetical diffusion (which means it grows quickly but spreads slowly) and this fact is a growing problem: acceleration in core systems creates a gap in periphery systems.

Nonetheless, there is dynamism between core and peripheries systems and the great challenge is to understand the puzzle of culture within technology because technology in use is very much a cultural thing. How we use or abuse technology? Are we ready or not to use technologies? –all these are cultural problems.

Aviation is a wonderful technology, which revolutionized the life in XX century. And it's delicate also.

According to investigations in the field, it was observed that certain kind of systems (tightly coupled) have the tendency to get out of control and cause accidents.

If we don't attend to the social cultural structure, then there is danger.

It's important to know what are the social institutions required to support these systems so they don't turn on our world and destroy it.

In order to understand culture we have to hold a dialogue, not a monologue kind of conversation. This dialogue must involve interest, willing to listen and respect for other countries.

COUNTRY PRESENTATIONS.

MEXICO

By **Mr. Rafael Alejandro Pérez-Chávez**

Captain of Aeromexico

Research Anthropologist

Wayne State University, IITC

Detroit, Michigan

USA

"Social capital and the 2 ways of intellectual problems:

Reflections about the semi-periphery"

Maintenance plays an important role in the aircraft industry and a failure in the industry is when the top management doesn't give importance to some ideas that emerge from the communication and discussion between mechanics. For example the Mexican mechanics are really good and capable of developing innovations that could help in the global industry. They are good bringing up novel solutions beyond current manuals. The existence of intellectual resources could trouble this innovation development.

With the phenomena of technological diffusion, new kind of knowledge develops in the semi-periphery beyond technical manuals sent by developers to the actual users of the equipment. Manuals don't mention anything about personal relations or how to interact with the crew. They only give instructions of how to operate the machine but it doesn't say how interrelations between captain and crew and they have to build a relation of trust.

Semi-periphery knowledge is not in the head in one technician only but rather in the community. When interacting with each other they get things done and develop new ideas to solve problems. This interaction knowledge will be called "repository knowledge".

Organizational structure of maintenance creates opportunities to develop this kind of knowledge. The aspects of social capital complement the lack of other kinds of capitals like financial, technological, etc.

Working interaction is an important part of innovation value. Technology before had more time to develop because technician had time to communicate among each other.

TAIWAN

By Dr. Jing Hung-Sying
National Cheng Kung University
Professor of the Department of Aeronautics and Astronautics
Tainan, Taiwan, ROC
And Mr. Hsing-Chung (Thomas) Wang
Aviation Safety Investigator
Aviation Safety Council
Taipei, Taiwan, ROC

"Technological peripheries in aviation: the case of R. O. China (Taiwan)"

Taiwanese problem comes from the cultural barriers of Chinese people trying to adapt western-based technologies.

Taiwan has a strategic geographical situation as being in the western edge of the Pacific Ocean. It has been a place of conflicts between the East and the West. This territory was controlled by the Dutch and the Spanish. From 1894 to WWII the Taiwanese territory returned to China and became independent during the Chinese war.

Japanese used this territory to build airfields, airfields that were bombed by the US during the WWII. When China took control of the territory in 1949, the government started to create new airfields. This was a chaotic period and a lot of Chinese people decided to stay in mainland as well as the airlines, rather than to move to Taiwan. At the end Taiwan only got two airlines. By 1951, they develop the first government owned Taiwanese airline named "Transasia Airline" but after an accident they got grounded for 30 years. In 1957, Far Eastern Airline became the most important airline and changed its name to China Airlines.

At the beginning this airline started as a cargo airline and in 1962 it started its domestic services and in 1967 became international. By 1984 it became a global airline. Privatization process ended by 1993. The main capital comes from a foundation controlled by the government, this means that China Airlines aren't totally privatized and an independence process hasn't come to an end yet. Taiwan has three main airports and in 1973 they got the biggest South-East Asian airport.

Air force was the Taiwanese aviation backbone for 40 years providing the civil industry operations, maintenance, manufacturing, research and development. Taiwanese civil aviation tried to get its independence from military researchers. Now they rely on US and French innovations because they lack these capabilities.

The regulatory structure and culture are based on the civil aviation authority founded in 1947 but started operating in Taipei two years later. When China lost its seat in the UN, they also got out of the ICAO.

The *open sky policy* got implemented in 1987 at the same time that it started in Europe. One of the key factors in Taiwanese aviation industry is its huge capability to catch up fast but they pay a lot for this fast catch up as seen from several accidents happening after deregulation of the industry.

Aviation plays a huge economic role in the Taiwanese economy as being the vital force to develop international trade. Land reforms implemented in the 50s laid platform to firm foundation, and after 70s an economical Taiwanese miracle started. In the 80s the air transportation began to grow rapidly and with the Chinese opening to the world Taiwan became a major attraction. Now it possesses half of the transportation going to Hong-Kong and Macau.

Taiwan has to address some challenges as knowledge, resources and cultural barriers needed to be overcome to catch up with the center of innovation. They need to increase their

know-how to accelerate the adaptation process but the adoption of aviation technology is influenced by the limitation of resources they count on.

There may be some solutions like including social pressure to distribute technology and accelerate the catch up process.

Cultural barriers represent a huge obstacle that has to be overcome and to be regarded as such. The authoritarianism faced by Chinese people represent an obstacle because they just follow orders without questioning them as they adopt ICAO and FAA standards and adapt the center innovations without doubting. Their catch up process sometimes is blind because they follow orders that not always are the best regarding their culture and the fact that it is really hard for Chinese to adapt western technologies.

UKRAINE

By Dr. Galina Suslova
Director of the Department of International Programs
National Aviation University
Kiev, Ukraine

Aviation is a very quick child of our epoch.

There is a complicated process between those who make innovations in technology and those who follow them. So we are to look at this process as a complicated system. We are to speak about it as a system which contains different components very important to understand. That is why it is very good that ICAO, some months ago, introduced a new term, the term "safety in aviation", because up to that time we used the terminology as flight safety than all the other items connected with.

Safety in aviation as a complicated technological systems, includes the following main elements: flight safety , continued awareness of the aircraft, aviation security, ecological safety and information security. So if we look at the development of aviation and all the innovations in this field we must analyze the in this complicated coordination and complicated relations between them. Because a flight safety, the way it is nowadays, can not be regarded as the term which really describes the safe operations of this complicated technological system. Looking into this, we in our University, try not only to investigate all those components, but also try to make our programs and our curricula on the basis of this theoretical approach. We try also to implement this attitude into a practical realization in Ukraine.

To talk a little about the historical background of aviation in Ukraine, I should say

that by 1992 when Ukraine got its independency after the collapse of the USSR, it already had much experience in design and manufacturing and other components of aircraft industry in order to be called "the aviation power", "the aviation state".

The history of aviation in Ukraine began in 1919 and I can tell you that names of outstanding aviators like Sikorsky, for example, are closely connected to our University.

That's why I can tell you, in terms of core and peripheral countries, we must understand that whether these country just follows the technologies developed somewhere else in another countries and implement them in their own activities or whether the country produces, generates new technologies and spreads them among other countries. So, I can tell you that, if we consider countries of aviation, then Ukraine has the close cycle of aviation technology, I mean, the design, it is the country of design, manufacturing, we manufacture airplanes, we have the system of maintenance and continued awareness, we have the system of flight accidents and incidents investigation, we have the system of repair and also the system of training aviation specialists. That's why, looking at all these components, we can say that in Ukraine we generate new airplanes and air engines, as well as equipment. I am very proud to say that one of the professors of our University, Mr. Antonov, was the designer of very good airplanes which are flying all over the world now, beginning with Antonov 24 and to Ruslan - Antonov 124, which maximum take off weight of this airplane is about four hundred tons. The largest one is Antonov 225, which maximum take off weight is about six hundred tons. The efforts of our designers and manufacturers in the years of independence were about how to continue with the heritage that has been gained through the years. Two years ago a new passenger airplane for short routs, Antonov 140, was introduced into practice, it is built not only in Ukraine, but also in Iran after buying a license for manufacturing this airplane. Another one is coming now to make its first flight in June of this year, Antonov 148, which is also a passenger airplane for middle routs.

The same we have Engine Design Bureau, involved in the design of turboprops and turbojets and propane. Because Antonov 70 is one of the most sophisticated airplanes designed and produced by Antonov Design Bureau, it has propane engines, it's quite a new approach to thrust generation. This airplane can be used both as the transport airplane for military force and as the cargo airplane for civil applications.

So these are only some examples which show that Ukraine, after the years of independence, followed a good pace of development of new items in civil aviation.

But it also had the problem, like other CIS countries, of carrying out aviation issues according to Soviet legislation. All the emerged independent countries also found themselves with the inherited weight of the submission of market economy to the state interests, absence of service system and maintenance support of the aircraft, incompliance with the modern requirements of navigation and environmental reasons.

Ukraine began solving these problems quickly and soon opened its way for

international air activity.

Part of our success in aviation is due to the fact that in Soviet times there was a large concentration of intellectuals in Ukraine, and the concentration of design bureaus, and the manufacturing side too. And we didn't lose it.

In 1990 the License Agreement on Air Communication with the USA was obtained. Direct flights between Kyiv and New York began the same year. Now we fly also to Toronto, in American continent, to Thailand, to Delhi and to all capitals of Europe.

In September 1992 Ukraine became the 172nd state of ICAO. It was the first CIS country to enter this organization. This fact played a great role in formation of civil aviation in Ukraine. At the time the first Ukrainian airline, joint venture of "Ukraine International Airlines" was established. Ukraine was the first of the CIS countries to operate the Boeings.

This University I studied and work in, was the largest university of aviation in the territory of the former Soviet Union. And now it is in Ukraine, in Kiev, and that is our task was not letting our scholars to fly away but rather trying to keep them. And this was not an easy task, there were times we had no salary and I don't know how did we manage to survive, and finally we could not only keep our human capital, but also attract younger generations to the University.

Our University was founded in 1933 and last year we celebrated the 70th anniversary of its existence. We train pilots, mechanical engineers, space law and aviation law specialists, economics of aviation enterprises, management in airports and airlines and so on and so forth.

Our main airplanes are from the Boeing family. This year Ukraine has got 2 Airbus (319 and 320).

In December 1999 Ukraine was affiliated to the European Conference of Civil Aviation.

The state body of central executive power regulating activity in the sphere of civil aviation in Ukraine is the Ministry of Transport of Ukraine.

Nowadays Ukraine is looking forward to joining European standards. JAA is now transformed into European Agency of Safety in Aviation, but the JAR (Joint Aviation Regulation) standards are now applicable in Ukraine. We are in the transformation period from aviation regulations which have been adopted by Russia and we followed Russian standards and now we are transferring into European standards, which are presented by JARs., as well as for FAR (Federal Aviation Regulations). Our regulatory basis is more close to FAA, because first the literal agreement was signed with FAA while the implementations of FAR were only taken in account in its general sense when we developed our own regulations. But the main difficulty we face is related to manufacturing and design sides, because all the aviation producing and manufacturing plans of aircraft and air engines have been built on Russian standards, which do not comply with JARs.

The regulatory basis has changed already but the appliance of these changes is the problematic issue.

So the main function of our University is, first of all, to unite the regulatory authorities (called "Ukraviatrans", which is the State Department of Aviation Transportation) and manufacturers and designers in order to find the common platform for the implementation of European standards and European regulations.

In terms of our meeting, I'm glad about being here and having the opportunity of exchanging opinions.

Aviation is the world structure. We can't say that the sky is one and the same for everybody. According to ICAO documents of statistics, the 87% of incidents and accidents in aviation in the year 2002 were due to human factors. But what is human factors? In ICAO there is a great dispute about that, because many of those people who are involved in the problem, are trying to say that human factor is the interface "man-machine". But we do realize that this is not only about this.

But what is man in this system?

If he is only an operator, as my colleague said today, I don't agree. Pilot can not be only operator. Because the human being is engaged into the loop of the control. When everything is going smooth, he is just an operator, but at this very moment he relaxes thinking that the system is going to solve all the problems for him. But when an incident or an accident takes place, the man, the operator, the pilot, if he is not trained as a person, as a personality, he wouldn't get enough time to return to the loop of control. He has to be aware of the probable failures in the machine and of his own capacity to act .

Culture reunites such traits as knowledge, experience, national background and specific local particularities.

We can standardize knowledge, ICAO has done it, but how can you standardize cultural experience?

Universities should say their own word in this. Universities, trying to come deep into the problem, should give recommendations to practical airlines training centers. And sometimes, because the training is so repetitive process, using manuals, they do not tell you how to behave, how to use your resources as a person. Universities, therefore, are great forums to provide a deep insight into the problem and should educate people involved in aviation.

Regard people involved in aviation system not just as simple operators, but as humans, is the solution.

MOROCCO

By Mr. Mohamed Mehdi Alaoui

Aviation Consultant
Casablanca, Morocco
And Dr. Saad Laraqui

Director, MBA and Executive Programs and Economics and Professor of Economics
Maryland, USA

Technological Peripheries in Aviation:
The Case of Morocco

Background:

It is important to comprehend how the industry has diffused from the First World countries to the Third World.

In the case of Morocco, several factors have influenced this diffusion like its proximity to Europe, the influence of the French colonial power, the inherited infrastructures and the country's regulatory structure and aviation culture.

It's important to point out that peripherilization is a dynamic process, understanding the way it happened may help us forecast the method and the pace of future technological diffusion in Morocco.

To talk a little about the history of aviation in Morocco we should say that our geographical proximity to Europe had a strong influence on the development of the airline industry in Morocco. Our first commercial flight was held by the French airline: "Compagnie Espagne Maroc Algérie Latécoère" in 1919 and the first commercial flight for Iberia: Seville – Larache in 1921.

Morocco was under a French protectorate with over 80,000 Frenchmen residing, creating a need for air mail service but also for passenger service.

"Air France" formed a French-Moroccan airline "Air Atlas" in 1946 and "Air Maroc" too. In 1953 the two airlines were merged to form the airline which would be further named "Royal Air Maroc"

To talk about the present industry structure it's important to mention that in February 1996, the Ministry of Transport granted a local entrepreneur a license to start the country's first private airline after almost 4 years of lobbying, this will put an end to the monopoly situation of RAM.

Regional Air Lines (RGL) started operations in July 1997 with a small fleet of 4 Beech 1900D airliners. RGL will operate to selected domestic cities but also to Spain, Portugal, and the Canary Islands.

Regional had forgone the opportunity to become a major regional operator, and continues today to operate under its original scheme.

The initial relationship with Air France was also capitalistic, in fact the two colonial powers in Morocco were both shareholders in Royal Air Maroc.

Air France had an initial share of 17.53% that will be reduced later to 3.97%, Iberia also remains today a shareholder with 1.3%.

The establishment of the first privately held airline RGL will have a capital entirely made up of private equity.

It's important to have in mind the factor of colonial and neo-colonial development of aviation industry in Morocco. The technological and industrial development of aviation has to be seen as a form of colonial and neo-colonial development and that's the main point to understand the structure of our aviation industry.

Our country first experience was a direct result of the French airline Latécoère; this contributed to bringing Morocco very early to the aviation age.

The first Moroccan airline was started by Air France during the colonial era.

The ties with the colonial power were depicted in the company management, organization, and policies even after the country became independent.

The initial relationship was also capitalistic, both Air France and Iberia contributed to RAM's initial capital.

At the end of world war II, Morocco was selected by the US as a site for development of strategic air command (SAC) bases; this will result in important infrastructure being built. Shortly after the independence of Morocco(1957), the country will continue to rely on the French expertise using French aviation standards. Besides, the majority of the country's engineers and technicians were trained in French school. French executives and qualified technicians were used to help organize and run the airline during its first years of existence.

By now our country is rated Category I by the FAA International Aviation Safety Assessment (IASS) program.

Ambitious development program started in 1993: modernization of existing facilities, secondary radar coverage, extension of 5 existing terminals, additional facilities for the training institute, and a new parallel runway at Mohammed V airport.

The Moroccan regulatory agency "Direction de l'Aviation Civile" (DAC) was established in 1961.

DAC sets policies, regulations, and standards to protect the safety, and the security of aviation in Morocco, run by a director that reports directly to the Minister of Transport.

To talk about needs and challenges we have to address, is that the country needs to develop its aviation industry. The fleet of RAM has not significantly increased in the past ten year. Only a small fledging regional operator has been started in 1996. Other recent experiences such as the two newly stated charter operations have not been successful

Morocco has set an ambitious goal of being at the forefront of the Tourism industry

and reaching a 10 million tourists mark by 2010. The expansion of the tourism sector is highly correlated to the development of the airline industry

Morocco has developed a safe, secure, modern, and reliable air transportation system and infrastructure.

The technology has diffused from the core countries to the peripheries: Royal Air Maroc maintenance center is performing “Heavy checks” on Air France B737’s enjoying the same highest level of European certification: the JAR 145.

Another challenge is related to the regulatory framework. The local regulatory framework continues to evolve accompanying local industry changes.

Aviation continues to play a crucial role in the development of the Moroccan economy.

Further liberalization of the industry could only have positive results for the country.

Morocco’s goal of being a major tourism payer could only be achieved with a strong airline sector.

Challenges such as the future integration of the European airspace by Morocco means that the Moroccan airlines need to be fit to address the challenge.

In terms of the current discussion on the technological transfer, we have to look into the issue of transfer of technologies and integrate it into the global picture. We have to come up with new ideas, new models so we can look at different aspects like human resources, operation, finances.

Globalization is a very complex phenomena. There are things that work and things that don’t work. We are all under the same roof. That’s why solving all the problems related to aircraft business in US doesn’t imply solving problems of other countries automatically.

We are in a transition, a lot of things are being shift and transformed.

So we can generate new ideas to fix out the way, think in institutions that can do it, improve the situation. We have to invest in human capital and find the way of doing it.

We are to be optimistic.

CAMEROON.

**By Dr. John W. Forje
Lecturer at the Department of Political Science
University of Yaounde
Senior Research Officer
Ministry of Scientific and Technical Research
Yaounde, Cameroon**

First of all I would like to thank everyone who made it possible for me to be here

and meeting you, friends. Secondly, it's quite interesting because I'm being introduced to a new area and it is happening in Mexico. Mexico is the place where Cameroon has got its first Olympic medal in boxing so there seem to be some linkages between Cameroon and Mexico.

Cameroon is a very compound, complex country. And when I studied in Sweden, people always connected me with Cambodia, so I found the way of introducing Cameroon to them. When I said I was from Africa, they asked me Where in Africa?, and I used to point at my foot (meaning the lowest part of African continent).

The brief history of Cameroon is that it was first discovered by the Spaniards and the name "Cameroon" comes from "camarones" (meaning "shrimps", in Spanish) which is because the Spaniards discovered many shrimps, but when the British came they could not pronounce "camarones" and they said "Cameroon". Then it became more complicated because after the Spaniards the Germans took over, and now you can find many plantations with German names. Following the I World War Cameroon became part of the League of Nations and during the II World War it became a trust territory, so it suffered the consequences of colonial administration, first by the Germans. Then the British and the French came in as the administrators of the two trust territories. And then lately we became part of Nigeria, the part where I come from, eastern Nigeria. And then in 1961 there was a reunification. This is the complex situation of Cameroon comes from.

The history of civil aviation seems to follow the same pattern of colonization.

The first airlines created were The West African Airway Cooperation, which embodied all the British-speaking territories of West Africa. When Ghana got its independence, it broke away from this airline creating Ghana Airways. Nigeria followed the same path creating Nigeria Airways. The English part where I come from operated with the Nigeria Airways Cooperation for a long time until 1961. And so, when we broke off joining the Federal Republic of Cameroon, we had this complex situation, so we moved away from the British to the French, and the French during that period operated "Air Afrique" and another airline.

Cameroon was the first country to break away from Air Afrique to create its own airline "Cameroon Airlines", and this fact created a chain encouraging many African countries from the South Sahara to create airlines of their own.

Given the situation of Cameroon and its French dominance, Air France has been the dominating partner in the development of civil aviation in my country.

If you pay attention to this fact, you discover that there has been a lot of political influence moving from the colonial past to the post-colonial period. So the question is: Where do we go from here? Specially nowadays with the globalization and the issue of regional integration in Africa.

In terms of airports in Cameroon there are international airports, military airports

and small airport used by private companies and private airlines. The whole situation has to do with the signing of policies and the question of clear vision of current situation.

The presentations of Taiwan and Morocco in some way summarize the situation of developing countries, and Cameroon in particular, as it is the core of the whole periphery, because of being the least developed in terms of airports. In Africa, the only country that has had the best development is South Africa and this is because of certain political attributions.

In the case of Cameroon, the first great challenge we need to address is the so-called "syndrome" of dependence, because we depend; we only consume what is being produced. This kind of syndrome is also related to the issue of good governance, what policies have these countries, and Cameroon in particular, put in place in order to develop better communication.

Secondly, there is the capacity development issue we need to address too. What type of capacity do we have in terms of human capacity and infrastructure?

Thirdly, you may look at it in terms of security and safety. How safe these airports are?

And finally, in respect of expansion. Are we going to expand when we don't have the manpower capacity, nor the question of security?

And the bottom line, the way I look at it, is that of partnership, participation, responsibility sharing between the various actors, and these actors are the United States, the society, the individual and the international society.

In other words, how do we address the question of the clash between cultures, and how do we get human beings to play a major role? We have to realize that there is no perfect human being; therefore there can be no perfect mechanical instrument to be put in place. It's the human being the one that creates the mechanism and the one that approaches it too. So it is only on the basis of the interface between various actors that we can create a safer sky. That's why it's true that there must be a respect for people from different cultures put together today, as said before, but even more important is the fact that there must be more respect for cultural differences of people who are to use a particular instrument or equipment.

We, Cameroonians, as being still under the French dominance in terms of aircraft manufacturing, need to know our inputs into the type of equipments and other things that are being constructed and put to the public use. And here again we talk about the question of human capacity, we have to build our human capacity in order to understand the social political aspects of the transformation of the transitional society and how these different cultures and techniques can merge into one single technique in order to create a safer sky.

Globalization should not distance us; it should bring us closer in order to understand our cultural differences.

FRANCE

By Dr. Caroline Moricot
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Université Paris 1 Panthéon-Sorbonne
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Paris, France

In our University there is a Project dealing with the issues of knowledge and practice in terms of aviation. We are sociologists, anthropologists and historians and philosophers and since 15 years ago we have been developing the socio anthropology of civil aviation. More recently we have been working on the issue of military aviation.

We have been working with the macro system of aeronautic technique, large technical system of civil aviation, from both micro and macro perspective, towards the global and the local approach of the subject.

These large scaled tightly coupled systems concerning aviation deal with the morphology of flows.

To talk about the history of a large technical system in France, I have to say that the setting up of the worldwide network of the civil aviation took place at the end of World War II.

It is important to emphasize the creation of the ICAO and IATA to understand them as bearers of the philosophy of globalization. Hence single language becomes official for use in civil aviation, English becomes compulsory as soon as one crosses the border of one's own country.

The member states accept that regulation must be standardized across the borders and follow the recommendations of ICAO. Airlines define the norms of competition in the IATA and establish rules of good conduct. Big technology, you see, is also a philosophy of life. Of course, the establishment of this network took place on a different basis in each country.

In France, for example, BOAC Dakota crashed in 1948 because it lacked the guidance system necessary for landing. This was the determining factor of the evolution of the infrastructure of the ground and its updating to the American standards. It was at that time that the French Minister decided to create the special corps to fund air navigation engineers choosing in France among the students of the prestigious Ecole Polytechnique (Technical School), air traffic controllers and the National School of Civil Aviation to train them.

Such particularities of these large technical systems as accidents are ways to revitalize areas that fall short of standards. From the beginning aviation used accidents to convert disaster events into profitable data. The Department for Investigation of accidents,

which prototype was the English AIB created in 1915, had the role of data bank for the analysis of human error, which facilitates the development of preventive measures.

One of the key notions to help us understanding better these large technical systems is the notion of "reverse salient". The concept of "reverse salient" comes from a military vocabulary of the World War I. It brings out the way in which parts of technological ground are interdependent.

In aviation there have been many cases of barriers by reverse saliency since the World War II, and one of the most famous being known is the case of sound barrier. The Concorde seems to have beaten it, but in the end it went down in the history as a prototype made in several models. In 1969 the founder of Airbus predicted that hundreds of Concorde would be required to satisfy the demand. In 1980 he shared the common illusion that the quality of the product would create the demand and the technological progress push would impose itself slowly. He didn't realize that this kind of evolution would encounter another trend and the awareness of nature. Ecology then invented a new reverse salient: noise. The Federal Aviation Administration with the help of American Aeronautic Industry, which at that time took a defensive stand, soon followed by the ICAO, rapidly banned the supersonic Bang over the continent. From then the plane became unusable on the heavily frequented line between New York and Los Angeles and it also had considerable troubles being admitted to the New York by the port authorities.

The civil aviation as a system has not concluded with the problem of the sound barrier to these days and probably there will be no new Concorde.

This end is not just an issue for engineers. The sound barrier is a political, industrial and certainly a commercial issue. Actually, the reverse silent is what in anthropology was called "a total social phenomena". Although the name of the concept inspires an interpretation at a technical level, the phenomenon has different meanings depending on the level of interpretation.

Our approach is integrating both macro and micro levels, global and local approaches, in order to understand how human being is involved in these large technical systems? How do they live in these systems?

Our first fieldwork was about air traffic control.

According to previous presentations we heard this morning, I just have to say that I felt very thrilled about the fact that we feel so close to each other in different topics, like maintenance, mentioned by Alex (Captain Alejandro Perez), and the concept of human factor Galina (Dr. Galina Suslova) talked about. This closeness made me very happy, as we all in some way talked about human beings in aviation.

There is something I have to say about the concept of technological periphery Allen talked about this morning, and the co-dependence between the core and the periphery. Maybe we should say "the cores", and "the peripheries". I insist on this view of

co-dependence, because there's really a dynamics of these socio technical systems. And this co-dependence is REAL. It's also true that we should pay more attention to local appropriation in peripheral regions. That's an important research program. Core and peripheries do face sometimes the same problems in the same domain. The fact that the technology is designed in the core regions is not a guarantee of the easiness of its use for the core users. Maybe we should think about superposing to the problem of core-peripheries another problem of the concept of users, for instance. There is a community of pilots which problem is transversal to the problem of core and peripheries.

The big issue we have to address is to bring to Europe harmonization. In France we have a great history of certification of planes, so for France it's a big issue in terms of transfer of expertise for certification, in terms of developing a common regulatory structure.

Key issues of US aviation system.

**By Dr. Allen Batteau
Associate Professor of Anthropology and Director, IITC
Wayne State University
Department of Anthropology
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Detroit, Michigan
USA**

How did US emerge as one of the core-systems regarding civil aviation industry?

By 1917 US led the leadership of aviation industry to slip out of its fingers. So, what was it that happened that enabled the United States to emerge in the last part of the XX Century to be leading core?

The answer is quite simple, and it's that US has never had the experience of being either colonized, overrun or defeated in the XXth century, in contrast to what happened to another countries and how terrible the XXth century was for some of them.

After the World War II and after the end of colonialism, the United States came out in a very strong position.

The development of aviation, as seen from the expositions, has always been close to the government, either directly through a military sponsorship or indirectly through a governmental regulation approach.

A present US aviation network spread from an integrated airmailed network.

The civil aviation industry has been benefited by the innovation.

The current challenges of US aviation are related to the fact that the government can not handle a lot of issues at the same time like economics of the industry as it has never

paid for its capital because of having been receiving different indirect subsidies, and security issue which makes us expect that in future we become less vulnerable (September 11).

Technological innovations are a challenge, which reveals a need of a counselor to address cultural particularities.

Privatization is another challenge in order to modernize aircraft business.

COMPARISON DISCUSSION

Main remarks made by each participant during the discussion session.

Dr. Julia Gluesing, Associate Director, IITC:

1. The meaning of words change from culture to culture and this gets us in a global alienation.
2. Technology is developed in cores and transferred to peripheries where changes are made and then get back to cores developing a reinvigorated process for cores.
3. As auto-industry has made partners around the world and has allowed ideas to flow from every part the aviation industry should be able to use this model and let peripheries share their knowledge with cores.

Dr. Allen Batteau, Director, IITC:

1. Questions proposed by Allen:
 - a. To what extent in XX C. aviation played a role of national mobilization?
 - b. What are the obligations of international organizations and MNCs in the context of rebalancing the aviation industry in practical grounds?
2. Words are unique and sometimes some expressions are not able to be translated because they loose part of their meaning.
3. The difference between core and periphery lies in the periphery's lack of network density. Core countries have military industry complex that help them to develop technology.
4. There is a rising need of developing institutions outside the core to get a more balanced system, education is not enough.
5. Aviation has been used as a national mobilization instrument in US, France and Germany.
6. Government policies and economic development is not in scholars' hands but education process is and as scholars "we" can do something about this.

7. We need to develop a more balanced relationship between the core and the periphery and acknowledge that this is not stable and core can change to periphery anytime.

Dr. Lisa Whittaker, Assistant Professor, Western Michigan University:

1. Maintenance and pilots have to work together to increase capabilities. Same dynamics between workers happen in all countries.
2. Within the human factor we need to involve other aspects of culture and gender to describe it.
3. A new model needs to be developed to include peripheries in the big picture but they cannot push to be included, it doesn't work. They need to be accepted by the cores. Even though the proposal is idealistic is more realistic than to expect cores to trade places with peripheries just because they acknowledge they have investing in them, so they need feedback and innovation from them.

Dr. John W. Forje, Senior Research Officer, University of Yaounde:

1. We need to increase capacity building and gender empowerment because there is a 52% of handicap population just because of its gender (women). To get capacity building we need to attract more than the current 3% of women interested in sciences and motivate parents to let women assist to school.
2. To get things done we need to change the model by taking out men as the main and almost the only actor and increase policies and institutions that are not men dominated.
3. Public policies need to change and address the increase of resources designated to increase research and development. These public policies also need to consider that by taking out the women population and marginalizing it in the developing countries we widen the handicap.
4. Aviation has been a national mobilization instrument especially after independence was gained, first by Ghana, then Nigeria and so on. These national owned airlines were created to show the world and the regional population that countries were truly independent, although it wasn't true.
5. African countries face a lot of management and lack of legitimacy problems. For example during the 70s Arab war, surplus dollars got African countries to borrow money without restrictions and invested in "white elephants" and this got them a lot of problems to pay, the problem was bad management. Also the lack of governmental legitimacy got the people to their current situation where government and economics have failed them and the only unification point is soccer.

6. The lack of periphery unification prevents the periphery to pressure the core.

Dr. Galina Suslova, Director of International Programs, National Aviation University:

1. Gender factor has been overcome in Ukraine and aviation has admitted women population in every aspect. Rather than to focus on gender in the aviation industry politics and social matters are more important to be addressed.
2. Education is really important and since this industry changes every 3-5 years, there is a need to keep studying. “We” can determine a new methodology to teach trainees not only in knowledge but also in personality aspects to overcome some cultural and national characteristics that interfere with the learning and developing process.
3. In Ukraine if pilots don’t get some courses over the year they get their license suspended until compliance as a way of keeping up with technological development.
4. About the “Concorde failure”, it helped to be developed because it materialized a dream and started an ongoing process to develop new technologies and ideas. Sometimes failure discovers new things and this is important.

Captain Alejandro Perez-Chavez, Research Anthropologist, IITC:

1. Adaptation is not an easy task. In less developed countries there is not enough economical development to get a platform to provide a social order or civil society to increase property rights and technology. So the gap keeps widening.
2. Institutions are conformed when people decided to follow a set of ideas and rules. Research and development are embedded in institutions, as core countries have this institutions they have developed new technologies. But in developing countries there are no institutions that promote this kind of development.
3. Core companies come to less developed countries and beneficiates from cheap labor and brainpower; this brainpower goes back to the core.

Dr. Caroline Moricot, Maitre of Conferences in Sociologie, Sorbone:

1. Core and periphery face same problems but maybe responses change from country to country.
2. Concorde was a failure in terms of sustainable development but it was dream come true. And probably this dream got other ideas to be created. Sometimes dreams need to happen.

Eng. Ricardo Dominguez, Engineering Development Manager, P & W Composites

Mexico:

1. We need to have a continuing education in the aviation industry as an industry that moves technologically fast.
2. Aviation is a demanding industry where its human factor has to know the risks, the low wages, and the big amount of stress aviation personal suffers; they have to enjoy doing it with all the downsides. This is why men are the important actors in the industry, although some women had started to become involved in it.

Dr. Ben Mejabi, Associate Professor, Wayne State University:

1. We cannot stay away from the global power structure although it hasn't changed since the de-colonization period. This structure has to be considered more carefully after recent events.
2. Core isn't going to be interested in trading its place with the periphery but we can develop cooperation among them.

Dr. Ashleigh Merritt, Researcher, University of Texas at Austin:

1. Core doesn't want to listen to what periphery has to say but they should because they have knowledge and feedback that will increase core's capabilities.
2. The problem is that core doesn't want to listen and periphery doesn't want to talk.

Dr. Jing Hung-Sying, Professor, National Cheng Kung University:

1. Periphery is a source of innovation and the core thinks its diffused technology is perfect but sometimes it has problems. China airlines follow everything without questioning so when a negative event arises, they blame the core companies for giving bad the instructions and take the blame off their backs.
2. Periphery doesn't have the power to change the core and challenge it.
3. Recommendations to core countries:
 - a. When they diffuse knowledge ask the periphery to give the core some feedback so they are not afraid to do so but rather encouraged.
 - b. Don't disregard cultural barriers as the difference between the Chinese pictorial way of thinking since they learn by characters and pictures, opposed to the western sequential way that learns by sequences.

Mr. Mohamed Mehdi Alaoui, Aviation Consultant:

1. The Magreb countries got their independence and developed their national airlines as a requirement to get national mobilization. Now aviation has lost this prestige and is just another industry that needs to get profitable.
2. The “Concorde Case” represents a conflict between two cores: Europe and US but at the time Europe had more political power and the US interference with the developing process. Maybe without this interference Europe could have developed a supersonic plane.

Dr. Saad Laraqui, Director of MBA and Executive Programs, University of Maryland:

1. Considering brainpower is what makes the difference, less developed countries have a 50% handicap because of the marginalization of their female population. This situation aggravates by the fact mothers educate the men.
2. Most countries are deprived of a good institutional network and that’s an important factor to get development, to build good legal institutions.
3. Aviation industry needs to be aware that they need to continue investing in their personal and continue educating them. You need to adapt education to the lifestyle of your personal and adapt the teaching “tool” to the persons working in the industry.
4. To decrease technological handicap we need to develop a distant learning program with a bottom-up approach.
5. Cultural factors are within society and institutions, is not about a clash of cultures but rather a clash within cultures and societies. In less developed countries, the problem comes from the lack of institutions that sometimes had been destroyed by the founding fathers because they were colonial heritage and society was alienated from government. But when civil society started to increase its power it became the people’s oppressor. Population has to be free and educated to develop and you need to see it from a holistic approach.
6. Aviation industry has witnessed a shift and it needs to increase its education base.
7. During the 60s and 70s governments were the only ones that could invest in this industry but now is private capital who finance this industry. From the 80s until now government changed their roles and as well as the industry they need to adapt to the new situation. Governments need to negotiate with MNCs and analyze where to invest to be productive.
8. In the 60s governments look for FDI to gain the core’s know-how and technology. As a FDI recipient you get technology transfer in to your country and as a sender you give it away and spill it over other economies.
9. A good way to describe the Core and Periphery dynamics is to think it as a marriage,

sometimes they work and sometime they don't. Cultural barriers are important in this relationship and they have to be considered to make this couple work.

Thursday, March 11, 2004

Review of March 10 and Discussion on Identifying Issues of Technological Peripheries

By Dr. Allen Batteau

We are here to set the stage of where we want to go and how to get there.

Building academic collaboration to develop and explore new ideas.

The dialogue is between academia and industry in which we've been exploring cultural differences.

The academic culture and industrial culture are quite different too, and this dialogue requires a special effort from us as representatives of different fields, but it's worth it because we are looking forward to build a larger understanding.

We have to be sure that no one sitting here represents the interests of a Nation or an agency, but expresses his own point of view to build a larger understanding.

Large-scale systems have a particular characteristic, and that is that nobody owns them, there's no single authority that owns it.

Our focus here is on the air transport, which is one representative of these large-scale systems.

The vulnerability in these systems is because they are the circulatory systems of our society and going after them, is going after the whole society. Here is the reason why terrorists choose transportation systems for their attacks.

Synthesizing the main issues that came out of yesterday discussions, I should mention the following:

- Capacity building
- The youngness of the industry
- Human beings, the human aspect of aviation systems

- Problematic of aviation and sustainable economic growth
- Communication between the core and the periphery
- Cultural barriers that require openness and dialogue
- Manufacturers are only one integrants of this large-scale system and no one owns these systems.

Lots of ideas and questionings regarding the topics and methodology of the workshop and its guidelines came from the participants like:

- How do the peripheries find their voice? From what facilities can this voice be heard?
- A need of a cultural mediator. And his role, which is going to be his role?
- How do we actually identify the mismatches in the communication between the core and the peripheries? How can we design local solutions to these mismatches?
- Create a framework for the discussion and decide what level of integration are we looking for.
- Necessity to give definitions to “large-scale systems”, “industry systems”, “the role of culture in this relationship”. Define better “core” and “peripheries”.
- Identify common problems for both core and peripheries and then analyze how to overcome these problems.
- Pay more attention on the dynamics of the system (codependence). How this system of dependence has been raised? Focus on the tensions that cut across the whole system.
- Local appropriation issue. How can we integrate new devices to a culture, which already exists? Re-contextualization of the technology.
- Safety issue related to the way we represent safety as a social construction. What are the things we need to feel and to be protected from? What are the differences between the core and the peripheries in these ways of appropriation of safety?
- There’s not just the need to understand how people think, but also how they feel. Core and peripheries can be regarded as integrate pieces of the same whole –Yin-Yang picture.
- Cross cultural communication.
- Understand the other people’s context
- How to improve the quality of life/livelihood for the majority of people

- System of interdependence, interconnection
- Interaction/Dynamics
- Balancing power and global connection
- Sustainable growth and how to define it
- Reward structure

GROUP DISCUSSION

GROUP I. **Yin Yang Model**

PARTICIPANTS:

-Dr. Galina Suslova

-Dr. Micola Kulyk

-Dr. Jing Hung-Syng

-Mr. Hsing-Chung (Thomas) Wang

-Dr. Ashleigh Merritt

-Dr. Caroline Moricot

Dr. Julia Gluesing

Dr. John W. Forje

The set of topics for the discussion:

I. Ying Yang Model

- Definitions
- Levels of analysis
- How does the periphery find its voice
- Identifying common or cross-cutting problems
- Our own re-appropriation of the core-periphery problem
- Awareness by manufacturers - heart of the customer in the heart of the field rep in the heart of the customer's company

Final goal:

To establish issues for

*Research Agenda

*Recommendations to Industry

*Policy Issues

The work process of the group

First we began with a kind of brainstorming on the following definitions.

-Core and peripheries.

There is much dynamics in the relationship between core and peripheries, as there can be core inside peripheries and peripheries inside core. In United States there are peripheries too. Taiwan is the core of many countries that are peripheries. When does periphery become core?

Everything is relative, rather than complementary.

How can we use this relativity in terms of LTS (large technical system) as these are systems where there is power relationship, domination and tensions also?

How to you achieve harmony, dynamic equilibrium between 2 contradictory forces? LTS is not so harmonious

There is no word for "peripheries" in Chinese.

But there is an engineering concept "source - sink". The first is the one that generates and originates, while the second one absorbs or consumes.

-Large scaled tightly coupled

1. Large. It's large because nobody owns it. But it's not only technical; it works because human beings make it work.

2. Tightly-coupled. It may be explained by a comparison with the relationship between man and woman, which is a tightly coupled one. Networks are the key elements of these LSTCS.

-Safety and efficiency

These are very important concepts in aviation. They involve the same Yin Yang relationship, as being the two sides of one concept. We cannot think about safety without thinking about efficiency.

Safety merges out of the system. It also implies the notion of Risk. What kind of risk do you have to take?

Then we came with an anthropological definition of risk related to issues like perception as a major problem:

The way we perceive risk. What is the risk in the history of civilization? What is collectively felt or perceived as risk? What kind of risk are we deciding to prevent ourselves from?

Do we have the same perception of risk and how does the system handle these differences?

What are the common things in our perceptions?

What is the public perception of risk? Is it varied from core to periphery?

Things are being created in the core, but are being used in the peripheries, so there are inherent mismatches.

-Mismatches

How does the system handle these mismatches?

What are the mismatches in the perception of risk?

Does the system need the same perceptions of safety to be efficient? How possible it is to come up with the unified perception of this phenomenon? This might be impossible -that's the conclusion we made

Nevertheless we are probably not going to be able to unify the different perceptions, we need to detect these mismatches in the context of LSTCS and find, maybe in the future, the ways of solving them. This brings us to the concept of "working culture", the way of making it work from the detection of these mismatches. So that in future we can be able to look for some definition of safety in core and peripheries based on these perceptions of safety and risk we all have from our cultural backgrounds.

-Culture

We need to define culture in terms of LSTCS, as culture is part of this system.

Culture, according to us, involves human understanding (in this case, of LSTCS), as well as historical, traditional behavioral, and institutional aspects. It also deals with attitudes and language proficiency issues. Levels of knowledge and skills when operating or dealing with these systems is not quite the same as cultural barriers. In this case we can talk about noise and the way noise gets cultural effects. It creates noise when you are moving from one part of the system to another. Meaning affects the relationship with the system, the technology and the subsequent behavior.

-Barriers

When we face technology, we face different kinds of barriers or interface.

Critical points of connection. Why do they exist? Where are the critical points of connection in LSTCS? Talking about communication and culture took us to the way technology, practices and resources become familiar to the users placed in different cultural contexts where these LSTCS reach.

Here is when we realized we needed to define the re-appropriation concept.

-Re-appropriation

Is something that is crosscutting frontiers?

If you introduce a technology (for instance, Airbus, coming from the designers) to users (pilots, crew), they have to understand this technology, own it in their own way, translate it into something that has meaning in their own way, giving it some different and new sense.

The concept of re-appropriation is closely related to "re-contextualization", in English, which means taking something from one context and putting it into another.

It also might have the circular notion, meaning that when the technology moves from source to sink, the sink appropriates it or not and then it goes back to the source. Japan is a good example of being technological source, which transfer its technology to other countries, where it's being appropriated and then gets it back in a re-appropriated way.

This notion of re-appropriation revealed the existence and necessity of multiple levels of analysis of how the common problems can be understood.

-Innovation-diffusion

These were another concepts we came up with.

Diffusion, according to our discussion, is related to channels, speed and barriers. What facilitates or impedes the successful diffusion of technologies?

Innovation was a very complicated notion for us, as it resulted to have different meanings in different cultures and countries. Innovation is not necessarily invention; therefore, it's not characteristic of core countries. Nevertheless, innovation is part of the LSTCS' dynamics.

Both concepts, diffusion and innovation are, for us, related to the notion of re-appropriation because when re-appropriation takes place in the process of diffusion or transfer of technologies, then the diffusion is successful, but when it's not so, the diffusion doesn't happen to be successfully achieved. Innovation fits in this dynamics as the feedback, as the challenge for the cores and as the invention from the peripheries.

When trying to define our research agenda, we faced the need to detect these common problems, mentioned in the definition of "re-appropriation".

We found two main common problems to both, core and peripheral countries.

1. Harmonization, homologation and regulation of resources
2. Security. There must be a global approach to security. How does the whole system protect people from aggression? -in one question regarding the system as the giver of security, and, on the other side, how does the system protect itself? This took us the idea that LSTCS were

essentially vulnerable.

Conclusions.

This way we found out that the primary research agenda should be defining LSTCS in terms of aviation safety and core-peripheries. Common problems might be another research agenda

Our recommendations to industry were related to the issues of defining the common problems, and the goal-finding common definition of safety, tolerating multiple perceptions of these notions and taking in account the re-appropriation and diffusion strategies.

The policy issues would, therefore, be related to harmonization, regulation and homologation processes, as well as to the notions of security.

Finally, with all these concepts in mind, we came up with the possible approach to the definition of LSTCS, which would be:

There have to be multiple perceptions of risk, safety and efficiency. You have to be able to accept and tolerate and work together with different languages and communication styles when dealing with LSTCS:

Criticizing the Model I during the further large group discussion.

- There is a dichotomy in the notions "source-sink". When you come to innovation, can you expect the sink (being a recipient) to innovate anything?
- Is there going to be evolution in aviation industry or is it always going to be one way process of giving and consuming?

Defending the Model I

-Source and sink is not a one-way concept. It is an engineering concept, but we used it to describe a both way process. Source and sink are very relative terms and changeable too, people change roles, sometimes sink is source and vice-versa.

Communication is a both-way phenomenon.

Within this definition, which is a rich metaphor we can see a dominant flow of something called technology. But there's also the notion of a counter-flow, the upstream.

Both of these words are much more dynamic than core and periphery notion.

GROUP II.
Global/Structural Model

PARTICIPANTS:
-Dr. Saad Laraqui
-Dr. Barbara Kanki
-Dr. Ben Mejabi
-Mr. Mehdi Alaoui
-Dr. Lisa Whittaker
-Eng. Ricardo Dominguez

The set of topics for the discussion:

II. Global/Structural Model

- Input/Output
- Hidden Aspects
- Output: Quality of livelihood
- Definition of large-scale system
- Stakeholders

Final goal:

To establish issues for

*Research Agenda

*Recommendations to Industry

*Policy Issues

The work process

First we started with a brainstorming of the components of the complex aviation network such as:

~Airlines/Operators (general aviation, business aviation, charter, cargo)

~Manufacturers/Suppliers

~Regulators/Governments

~ATC

~Airports

~Customers

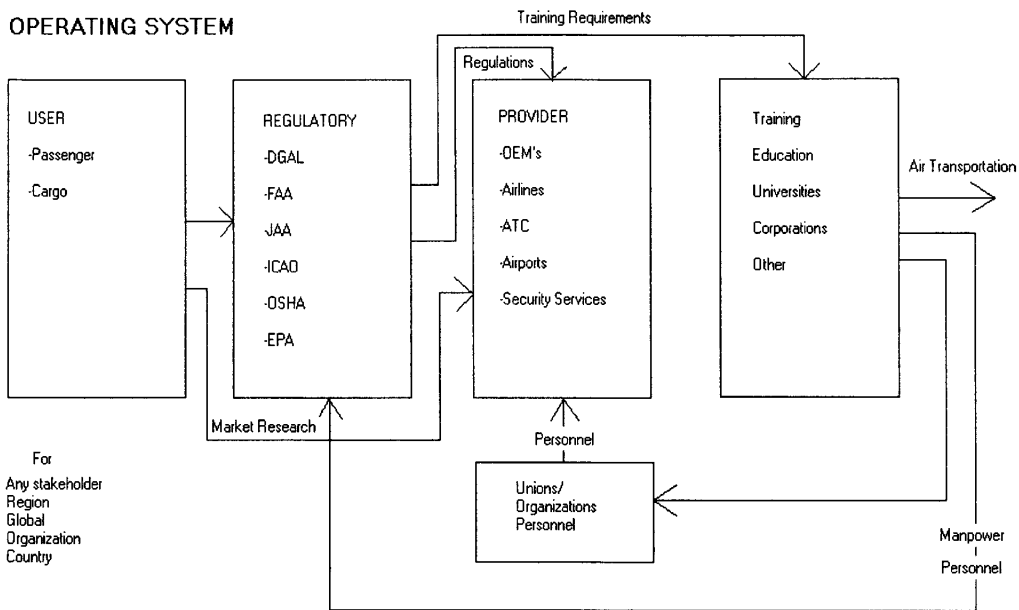
- ~Industry Organizations (IATA/ICAO)/Associations
- ~Unions/ ALPA IAM
- ~Trainers/Educations
- ~Military/NASA (here we had our doubts if NASA should be in Educational issue of in Military issue)
- ~Security

Then we tried to bring these pieces into groups:

1. Providers, meaning manufacturers, suppliers (repair stations, caterers, components, fuel) and airlines
2. Facilities: ATC and airports
3. Personnel or labor: Pilots, technician, ATC controllers, engineers, ground support, inspectors, Security, Dispatchers, Flight Crew
4. Regulators such as DGAR/FAA/JAA, NTSB, OSHA, EPA, CAA
5. Manufacturing: OEM

First we thought that the whole system spreads from Regulators and Manufacturing.

When thinking in categories “User”, “Regulator” and “Provider” we found out that most of the parts of this system can perform the role of being whether one or another category in different moments. That’s why finally we designed the following graphical representation of the whole system operating, with no regard to any specific stakeholder, region or country, but trying to make it applicable as a general structural model of the aviation system.



Conclusions

Finally, we tried to define the purpose of the whole aviation system, which would include all of its components and take in account a human aspect too. Finally we came up with this:
To develop safe and efficient global transportation system for improving the environment and capitalizing on the opportunities offered by different cultures that will ultimately benefit the stakeholders.

These are the recommendations we made:

1. Regulatory agencies should listen more carefully to users.
2. Training/Educational organizations should increase emphasis on safety and culture.
3. Educational/Training organization should address issues of cultural differences.
4. Airlines should work more closely with OEM's and other providers to meet regulatory requirements and enhance both safety and efficiency. This issue is related to the direct transferring of technology from the core to the peripheries. Core should try to facilitate the relationship with peripheral areas in terms of the regulation system.
5. OEM's/Manufacturers need an increased level of awareness and sensitivity regarding different global cultures and operating environment.

The next set of recommendations is for the Research Agenda

6. Development of tools/techniques to help OEM's better cater to customer need and their varying cultural/human situations
7. Develop tools and techniques to help customers communicate their needs and wants to OEM.
8. Improving communication and mutual understanding of economic and cultural constraints throughout the industry (manufacturer and provider). The providers need to understand the needs and culture of their customer.
9. Determine profiles of individuals (select proper people) needed to enhance performance in all areas. Establish and assess metrics of performance level of consistency with policy, whether the policy is still applicable.

Further large-group discussion

Previous and further discussion of these recommendations aroused the ideas on the global point of view issue, the importance of cultural issue to be taken in account while designing the policies, the global integration issue and whether it would benefit all the countries in the same way as there is huge disparity between poor and rich countries.

GROUP III
Local/Relationship Model

PARTICIPANTS:

Cap. Alejandro Perez-Chavez

Dr. Carolyn Psenka

Dr. Servando Ortoll

Director David Robertson

Tasks:

III. Local/Relationship Model

- Identify the decision-making styles
- Identify the mismatches
- What pieces are already in place?
- What is the dynamic aspect of the system?
- How do we represent safety in this kind of relationships?

- What happens inside the structure?

Summary of the work done:

Started off by making some recommendations:

- 1) Diffuse knowledge of aviation safety into other industries. No other industry has gone so far in security and safety issues.
- 2) Education has to address rational decision-making and risk analysis for all high school and college students.

They realized they needed definitions to give good recommendations to the industry, and a model to represent the local system.

Some of the ideas that emerged were that at the global level aviation is well regulated while at local level depends of the existence of good institutions, government resources, regulations and rational analysis. In the case of the periphery its voice is not always heard. Sometime it has a hard time to get its way to influence the core, especially in defining aviation regulations.

Actually, international organizations define and give the regulations to governments, which implement them at the local level. And at the local level there are other actors that intervene in this implementation process like manufacturers, companies, MNCs, lobbying groups. Sometimes we can find inside a country, industry or company many cores and many peripheries, this core-periphery relationship isn't exclusive for the system level, it can happen everywhere. It depends on the point of view you take to look at these relationships.

After analyzing the conflict between Airbus and Boeing about flying two motors over the Atlantic and how this conflict accelerate the process of buying smaller airplanes where Brazil happened to be beneficiated. The team came up with the periphery definition.

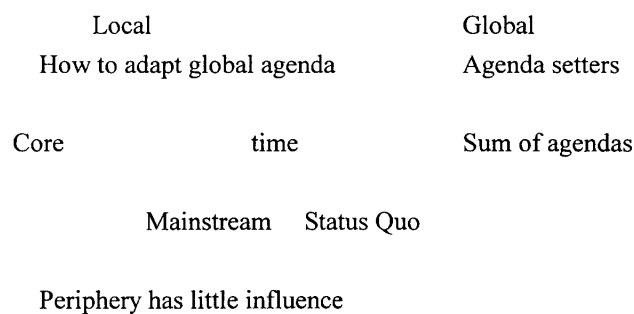
Periphery was defined by as the actor who has little influence in the mainstream of the rules of the game. Brazil before this conflict didn't have any possibility of interfering in the decision-making process but now as an important supplier it got this power.

They also found that at the local level huge companies and MNCs have a lot of power and influence to change the market structure like Airbus and Boeing. From time to time this is important because to change globally you need to change locally first. This changing of rules starts off from the status quo. And to change the status quo you need to change expectations.

Dynamics in the relationship model come from the feedback loops that make technology

and information go back and forth. When this ideas go up-stream they change expectations and influence the global level. Dynamics go local-global and core-periphery.

The model developed was a general model since they wanted to address many issues involved at the local level as context, history, society and culture. They decided to be a “river/flow” model representing the mainstream of the status quo which led to the setting of agendas into a global agenda. This global agenda was the sum of all *cores*’ agendas. This mainstream changes overtime according to the fluctuation of actors that go in and out of it. In the global level they found the agenda or global objective setters while the local focuses in the way to adapt the global agenda. The course of the river is defined by the sum of the agendas and the core interests.



The mainstream represents the set of rules in the industry defined by the core in a time context because status quo changes over time. Periphery just gets the rules without being able to influence them. The feedback is the dynamic part of the system but this just happens when someone at the global level let the local operator to influence the mainstream.

Final conclusions:

Hidden Aspects: local information is not always consider or available at the global level. Periphery has several times important knowledge that is hard to get to the global decision-making process. Also, now and again, implementation process at the local level doesn’t know some important information that gets the actors at the global level to come up with certain rules so when implementing this rules they are not aware of what is the main objective or what do they need to do.

Mismatches: appear when the global rules are implemented at the local level, cultural

factors and people involved in this process now and then don't follow strictly the rules.

Representation of safety: Have a common language and a set of common conventions to be able to speak in the same track between parties.

Recommendations: increase training and education. To be a global citizen you need to get a global education and that comes with the idea of developing a common language.

Research Question: How to close the gap between feeling and being safe?

Plenary Session

Critics to the “river/flow” model:

- The model doesn't pay enough attention to the periphery. People in the core need to pay more attention to the periphery because their decisions affect the core and feed it.
- In the system there are flows and counter-flows; both core and periphery are important. It is a dynamic model.
- The body is a Large-scale Tightly Coupled System and blood goes up and down it. So the “river/flow” model just goes in one direction, it doesn't represent these types of large-scale systems.
- Local model should be concern with human beings more than the core and periphery.

Defending the “river/flow” model:

- The model defines core-periphery relationships in the aviation and how rules in this industry come from the mainstream as they are developed by ICAO, Manufacturers, JARS and FAA. Sometime periphery has something to negotiate. Sometimes somebody at the local level has some elements to influence the mainstream.
- This mainstream is constantly moving.
- This model talks about human beings because they are the ones that adapt the global agenda.

CONCLUSIONS.

We still face disparities in terms of economical growth between core and peripheries, but being interacting within the same large-scaled tightly-couples kind of system like

aviation, the need of understanding cultural differences and balancing varied interests and interpretations brings us to the unique scenario which enables different actors involved to meet a mutual understanding.

Regarding core-periphery relationship as a dynamic, interdependent, interpenetrating and two-ways type of communication is the solution to the conceptual problem.

The reality of globalization phenomenon we encounter is that of sharing the same market. US market has already satisfied its needs, it has grown mature. Now it has to look at the "peripheries" as the solution to its problems. But it has to adopt, finding out the adequate way of doing it, a responsible kind of vision, in order to harmonize different perspectives without trying to undertake the dominant position, but rather trying to balance and evaluate everybody else socio-cultural and political-economical realities.

We are in the same world; therefore we need to find spaces for building a deeper mutual understanding.