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64-66 Jalan 52/4  
46200 Petaling Jaya, Selangor Malaysia  
Tel. No: 7551773, 7569728

# 3<sup>rd</sup> Pacific Association of Quantity Surveyors Congress

Quantity Surveying In The New Millennium  
- Challenges and Opportunities

## PROCEEDINGS

Sunway Lagoon Resort Hotel, Petaling Jaya  
**26 - 28 August 1999**

Jointly Organised by :



The Institution of Surveyors, Malaysia



The Board of Quantity Surveyors Malaysia

ICEC Approved International Congress

**371.3722**  
**PAQ**



# PROCEEDINGS

## 3<sup>rd</sup> Pacific Association of Quantity Surveyors Congress

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- Challenges and Opportunities

Jointly Organised by :



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Sponsored by

**DAVIS LANGDON & SEAH**  
SINGAPORE PTE LTD



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Ms. Katherine Thiang

# Messages

## *Message from President, The Board of Quantity Surveyors Malaysia / Chairman of the Organising Committee*



On behalf of the Organising Committee I would like to extend a warm welcome to members of Pacific Association of Quantity Surveyors (PAQS) and all other parties who participate in this 3<sup>rd</sup>. PAQS Congress held in Malaysia.

I am sure all participants would agree that the theme of this Congress "Quantity Surveying in the New Millennium – Challenges and Opportunities" is appropriate and timely as we are closing into the new millenium. All participants should take this opportunity to have open discussion and exchange of ideas. They should also embark on affirmative measures to alleviate the impact of the global economic downturn, and to ensure that the profession maintains its expertise/professionalism and continue to thrive and strive forward in facing the challenges of the future. Quantity Surveyors should also be made aware of the changes in the industry and its implications on the profession.

The pre-congress workshop which was held for the first time for Representatives from PAQS member countries should have provided them the opportunity to have comprehensive and in depth discussion on the proposed Competency Standard and the Accreditation of Quantity Surveying courses for the Pacific region. As such all members of PAQS should gain a better understanding of each other's views on these issues from this workshop.

I hope participants will find the keynote addresses by prominent professionals and the presentation of technical papers by professionals and academicians from various countries interesting and beneficial.

I wish to thank all participants, speakers, sponsors, PAQS Secretariat, members of the Organising Committee, and other parties involved in this Congress for the participation, support and cooperation in making this Congress another successful event. And to all our overseas participants I wish you all an enjoyable stay in Malaysia.

**Mohamed bin Gading**

President, Board of Quantity Surveyors Malaysia  
Cum Chairman of Organising Committee

## *Message From PAQS Chairman*



On behalf of the Pacific Association of Quantity Surveyors, I would like to welcome all participants to the 3<sup>rd</sup> PAQS Congress. The Congress will be hosted jointly by the Institution of Surveyors, Malaysia and the Board of Quantity Surveyors Malaysia at Sunway Lagoon Resort Hotel, Petaling Jaya, on 26 August 1999.

The main objective of the PAQS is to maximise the efficient and sustainable use of all construction resources and to ensure the delivery of high quality professional Quantity Surveying services throughout the Asia Pacific region. This Congress is part of our effort in achieving this goal. In addition, an opportunity is created for us to discuss and develop new ideas, whereby the services provided by the Profession can be enhanced and widen and new business opportunities created.

The Asian economy is facing a crisis at the moment. However, I strongly believe that with efforts and programmes implemented by leaders of the various Asian nations, the set back is only temporary and that the economy will be re-vitalised as we enter into the New Millennium. It is therefore timely for the Congress to deliberate on 'Quantity Surveying in the New Millennium - Challenges and Opportunities'.

I would like to take this opportunity to congratulate the Institution of Surveyors, Malaysia and the Board of Quantity Surveyors, Malaysia for organising this very important event for Quantity Surveyors in the Region. With the large gathering of Quantity Surveying professional at the Congress, I hope we can learn from the experience of one another and exchange new ideas.

On this note, let me wish all participants an enriching experience and a pleasant stay in Malaysia.

**Edward Tang**  
President  
Pacific Association of Quantity Surveyors

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## *Message from President, The Institution of Surveyors, Malaysia*



*Selamat Datang dan Salam Sejahtera*

On behalf of the Institution of Surveyors Malaysia, it gives me great pleasure to welcome you to the Third Pacific Association of Quantity Surveyors Congress at Sunway Lagoon Resort Hotel, Petaling Jaya, Selangor Darul Ehsan. I take this opportunity to congratulate the Organising Committee for a job very well done.

At the doorstep of the Third Millennium, the profession must recognise its significant role in the betterment of society, the nation's economy and nation building. In the midst of rapid technological advancements, evolving professional practises and standards, and the march towards liberalisation of trade in services and globalisation, it is most appropriate that delegates from around the Pacific Rim nations and beyond congregate to deliberate and discuss varying issues facing the profession and chart new directions. The Congress theme : 'Quantity Surveying in the New Millennium – Challenges and Opportunities' is most appropriate.

To all delegates, I wish your fruitful and beneficial deliberation and discussions. The event should also provide opportunities to renew past acquaintance and forge new friendships. Please spend some additional time to sample Malaysia's unique culture and sceneries and take this opportunity to know Malaysia

Welcome to *fascinating* Malaysia and God Bless.

**Teo Chee Hai**  
President  
The Institution of Surveyors, Malaysia  
Session 1999/2000



PROCEEDINGS

3<sup>rd</sup> Pacific Association  
of Quantity Surveyors  
Congress

Quantity Surveying In The New Millennium  
- Challenges and Opportunities

*Program*



# Program

## Wednesday

25<sup>th</sup> August 1999

- 0900-1030 Pre-Congress Workshop (*for Committee Members only*)  
(Caymans 3 & 4, Level 10)
- 1030-1100 Coffee Break  
(Caymans Foyer, Level 10)
- 1100-1230 Pre-Congress Workshop
- 1230-1400 Lunch  
(Sun & Surf Cafe, Level 1)
- 1400-1700 Pre-Congress Workshop
- 1700 Tea Break  
(Caymans Foyer, Level 10)
- 2000 Board of QS President's Dinner (By Invitation Only)  
(Kelana Jaya Seafood Centre, Kelana Jaya, Petaling Jaya)

## Thursday

26<sup>th</sup> August 1999

- 0900-1015 PAQS Annual Board Meeting (*for Board Members only*)  
(Bahamas 2 & 3, Level 12)
- 1015-1045 Coffee Break  
(Bahamas Foyer, Level 12)
- 1045-1230 PAQS Annual Board Meeting
- 1230-1400 Lunch  
(Avanti, Lobby Level)
- 1400-1500 PAQS Annual Board Meeting
- 1500-1630 ICEC Region IV Meeting  
(Bahamas 2 & 3, Level 12)
- 1630-1700 Tea Break  
(Bahamas Foyer, Level 12)
- 1630-1800 Registration for 3<sup>rd</sup> PAQS Congress  
(Business Centre 3, Level 15)



## Friday

27<sup>th</sup> August 1999

- 0730-0845      Registration  
(Lagoon Foyer, Level 15)
- Conference Opening**  
(Lagoon 1, Level 15)
- 0830            Arrival of the Honorable Minister of Works, Malaysia  
Y.B. Dato' Seri S. Samy Vellu
- 0845            Welcoming Address by Hj. Mohamad Gading  
Chairman of The 3<sup>rd</sup> PAQS Congress / President, Board of Quantity Surveyors Malaysia
- 0900            Welcoming Address by Mr. Teo Chee Hai  
President, The Institution of Surveyors, Malaysia
- 0910            Address by Mr. Edward Tang  
President, Pacific Association of Quantity Surveyors
- 0920            Address by the Honorable Minister of Works, Malaysia  
Y. B. Dato' Seri S. Samy Vellu
- OFFICIAL OPENING**
- 0945-1000      Coffee Break  
(Lagoon Foyer, Level 15)
- 1000-1030      **Keynote Address**  
(Lagoon 1, Level 15)  
*Chairman* : Datuk Hj. Mohd Isahak Yusof  
*Speaker* : Dato' Hj. Abdul Rahman b. Abdullah
- Conference Session 1**  
(Lagoon 1, Level 15)  
*Chairman* : Mr. Ong See Lian  
*Rapporteur* : Mr. Faizul Azli  
*Assisted by* : Ms. Amy Foo Siew Mee & Mr. Mohamad Shazali b. Sulaiman
- 1030-1130      *Topic 1* : **The Success Story Of The Kuala Lumpur International Airport (KLIA)**  
*Speaker* : Tan Sri Dato' Ir. Jamilus Hj. Hussein
- Conference Session 2**  
(Lagoon 1, Level 15)  
*Chairman* : Hj. Basar Juraimi  
*Rapporteur* : Mr. Hafez Salleh  
*Assisted by* : Guek Shy Yun & Ms. Ina bt Abu Bakar
- 1135-1155      *Topic 1* : **Professional Education : Are We On The Right Track ?**  
*Speakers* : Ms. Suraya Ismail and Mr. Zulkiflee Abdul Samad
- 1205-1225      *Topic 2* : **The QS Profession : Change And Effect With Particular Reference To South East Asia**  
*Speakers* : Mr. B. C. Symonds and Mr. S. W. Donohoe
- 1245-1345      Lunch  
(Lagoon 3, Level 15)
- 1400-1730      Technical Visit to :  
• The New Federal Government Administrative Centre at Putrajaya
- 2000            Hawkers' Style Dinner and the Malaysian Hospitality  
(Royal Selangor Golf Club, Kuala Lumpur)



## Saturday

28<sup>th</sup> August 1999

### Conference Session 3

(Lagoon 1, Level 15)

*Chairman :*

*Rapporteur :* Ms. Norizan Abdullah Sani

*Assisted by :* Mr. Ahmad Hisham Che Pa & Ms. Nuazaini Mokhtar

0905-0925

*Topic 1 :* **Value Management - Practical Applications**

*Speaker :* Mr. Mohd Mazlan Che Mat

0935-0955

*Topic 2 :* **Does The Quantity Surveyor Have A Role To Play In Construction Waste Management**

*Speakers :* Mr. Paul K. Marsden and Mr. Perry Frosythe

1005-1025

*Topic 3 :* **Innovation In Construction Procurement - A Case Study Of Major Museum Projects**

*Speaker :* Mr. John Hatfield

1030-1100

Coffee Break

(Lagoon Foyer, Level 15)

### Conference Session 4

(Lagoon 1, Level 15)

*Chairman :* Professor Dennis Lenard

*Rapporteur :* Ms. Norsiah Mohamad

*Assisted by :* Mr. Muhammad Shahrin Abd. Wahab & Mr. Mohd Sani Mohd Emran

1105-1125

*Topic 1 :* **Procurement Strategies And Contractual Arrangements For The New Millennium**

*Speaker :* Mr. Noushad Ali Naseem b. Ameer Ali

1135-1155

*Topic 2 :* **The Malaysian Construction Procurement Processes In The New Millennium : Constraints and Strategies**

*Speaker :* Dr. Khairuddin b. Abdul Rashid

1205-1225

*Topic 3 :* **A Quantitative Analysis Of Managerial Knowledge And Skills Of Quantity Surveyors (Do Quantity Surveyors Make Better Managers Than Architects Or Civil Engineers ?)**

*Speaker :* Associate Prof. Dr. Khalili Khalil

1230-1400

Lunch

(Lagoon 3, Level 15)

### Conference Session 5

(Lagoon 1, Level 15)

*Chairman :* Mr. Steve Flanders

*Rapporteur :* Mr. Faizul Azli

*Assisted by :* Ms. Shee Lee Soon & Mr. Mohamad Shazali b. Sulaiman

1405-1425

*Topic 1 :* **3D Object Oriented CAD And Automated Quantities - Essential Tools For The Quantity Surveyors Of The New Millennium**

*Speaker :* Mr. Peter Smith

1435-1455

*Topic 2 :* **Quality Management An Essential Tool For The Survival Of The Quantity Surveying Profession**

*Speaker :* Mr. Alistair Reid

1505-1525

*Topic 3 :* **An Overview Of The Australian Property And Construction Industry**

*Speaker :* Professor Dennis Lenard



# Program

- 1535-1555      **Topic 4 : Reform and Opening Up Policy in Shanghai Reconstruction**  
*Speaker : Mr. Xu Shengmo*
- Conference Session 6 - (Concurrent With Conference Session 5)**  
*(Bahamas 2 & 3, Level 12)*
- Chairman :*  
*Rapporteur : Mr. Hafez Salleh*  
*Assisted by : Ms. Amy Foo Siew & Ms. Ina bt. Abu Bakar*
- 1405-1425      **Topic 1 : An Overview of Investment In Construction and Civil Engineering Projects  
 With Limited Financial Resources Based On The South African Experience**  
*Speaker : Mr. Christo Heckroodt*
- 1435-1455      **Topic 2 : Unprecedented Depression of Japanese Economy And Changing  
 Circumstances Of The Quantity Surveying Profession**  
*Speaker : Professor Ryoichi Shimada*
- 1505-1525      **Topic 3 : The Future Outlook For Building Maintenance Stock And Quantity Surveyor  
 Market in Japan**  
*Speaker : Mr. Takayoshi Sato*
- 1535-1555      **Topic 4 : Partnering, a Cultural Myth ?**  
*Speaker : Ms. Ellen H. L Lau*
- 1600-1630      **Tea Break**  
*(Lagoon Foyer, Level 15)*
- 1630-1700      **Presentation by Hosts of 4<sup>th</sup> PAQS Congress**  
*(Lagoon 1, Level 15)*
- Chairman : Mr. Edward Tang*  
*Presenter :*
- 1700-1730      **Conference Conclusion**  
*(Lagoon 1, Level 15)*
- Presided by : Hj. Mohamad Gading*
- 2000            **Malam Muhibbah (GALA DINNER)**  
*(Lagoon 3, Level 15)*

## Sunday

29<sup>th</sup> August 1999

### Optional Tours

Delegates may select any of the following :

- Golf at Bukit Tinggi Golf Resort
- Day Tour to Historical Malacca
- Kuala Lumpur City Day Tour



# Accompanying Person Program

## Friday

27<sup>th</sup> August 1999

- 0730-0845      Registration
- 0845-1000      Conference Opening and Coffee Break  
(Lagoon 1 & Lagoon Foyer, Level 15)
- 1000-1300      City Tour  
Metropolitan Landmark

### Highlights

- Handicraft Centre
- Kuala Lumpur City Centre
- Jamek Mosque
- Chinatown
- War Memorial
- House of Parliament
- King's Palace
- National Museum
- Railway Station
- National Mosque
- Moorish-Styled Federal Courts
- Independent Square
- Kuala Lumpur Tower
- Tien Ho Temple

- 1400-1730      Join with delegates for Technical Visit to :  
• The New Federal Government Administrative Centre at Putrajaya
- 2000              Hawkers' Style Dinner and the Malaysian Hospitality  
(Royal Selangor Golf Club, Kuala Lumpur)

## Saturday

28<sup>th</sup> August 1999

- 1000-1300      Country Tour  
Rural Landmark and Handicraft
- Highlights
- Jalan Ampang - Embassy Row
  - Rubber Plantation
  - Malay Villages
  - Selangor Pewter Demonstration Centre
  - Batik Factory
  - Batu Caves
- 1400-1700      Shopping at Central Market and Suria KLCC
- 2000              Malam Muhibbah (GALA DINNER)  
(Lagoon 3, Level 15)



PROCEEDINGS

3<sup>rd</sup> Pacific Association  
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Quantity Surveying In The New Millennium  
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*Conference Session 1*



## The Success Story of the Kuala Lumpur International Airport (KLIA)

Tan Sri Dato' Ir. Jamilus Hussein  
Managing Director



**KL International Airport Berhad**

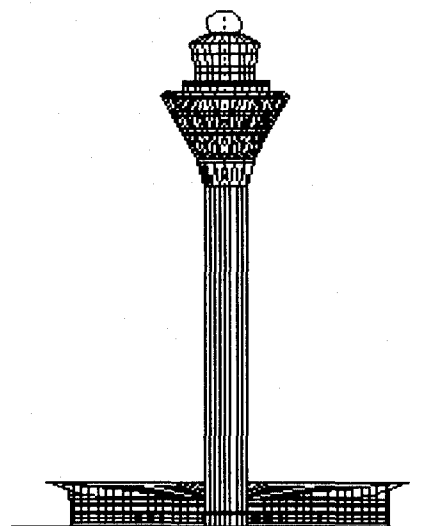
### Introduction

Over the past decade Malaysia has enjoyed exceptional economic growth, averaging around 8% per annum. This achievement is the result of Malaysia's political stability, prudent economic management, effective government policies, an educated population and a responsive private sector. Malaysia's federal capital Kuala Lumpur and the Klang Valley have been at the forefront of the economic development that is fueling the nation's relentless march towards its goal of becoming a developed nation by the year 2020. One of crucial catalysts in achieving Malaysia's Vision 2020 is the development and modernization of the nation's transportation infrastructure, in the form of highways, ports, railways, urban transportation systems, and airport such as the KL International Airport (KLIA) at Sepang.

But KLIA is more than just another piece of infrastructure. Located approximately 50 km south of Kuala Lumpur in Sepang and measuring at 10km by 10km in land size, it is perhaps the largest, most strategic and most ambitious single project to be undertaken by the Malaysian government. Designed to be an ultra modern and a high-tech international airport with a distinctive architectural features and a unique "airport-in-a-forest: forest-in-an-airport" concept, KLIA is also planned to be the gateway to the bursting Southeast Asian economies and the region's aviation hub that meet the industry needs well into the 21st century.

### *The Strategic Significant of KLIA*

Air travel within and out of the country prior to Malaysia's independence in 1957 and 8 years thereafter was handled through an airport located at the fringes of Kuala Lumpur near Sungai Besi. In 1965 the present Sultan Abdul Aziz Shah (SAAS) International Airport at Subang was commissioned. As the country grew over the years, from a predominantly agricultural-based economy to the present industrialized-based economy, the airport gradually expanded into a 3-terminal International airport with the capacity to handle up to 15 million passengers per annum (mppa).



As the world rebound from the recession of the 80's, it has seen great changes in the speed, characteristics and manner the countries of the world traded their commerce. Largely attributed to the maturing of the computer technology which drives the emergence of digital economy, and the changing spectrum of the world geopolitical map, have not only resulted in the increasing number of people traveling by air but also increasing "sophisticated" needs of these air travelers. The emerging trend of the so-called trans-border or borderless world has also contributed largely to this phenomenon.

These changes have exerted increasing influence on the functions and services to be provided by airports. From a mere "station" for people to immigrate and emigrate, to the more advent concept of an airport being an "airportropolis", an airport is expected to offer air travelers with a wide range of basic and sophisticated services. The main objective of these services are to meet all the personal, professional, commerce and recreational needs in an efficient, comfortable and affluently luxurious atmosphere. More so airport is now being considered as *gateway for continuous economic expansion and prosperity*.

Malaysia farsightedness in foreseeing the phenomenal growth of the region's economy and their emergence as the future world economic centred has seen the strategic need and significant of building an ultra-modern and highly sophisticated airport. The airport must be capable of meeting not only the changing patterns in the usage and functions of the future airports but also as a gateway to its quest and relentless pursuit to become a developed nation by the year 2000.

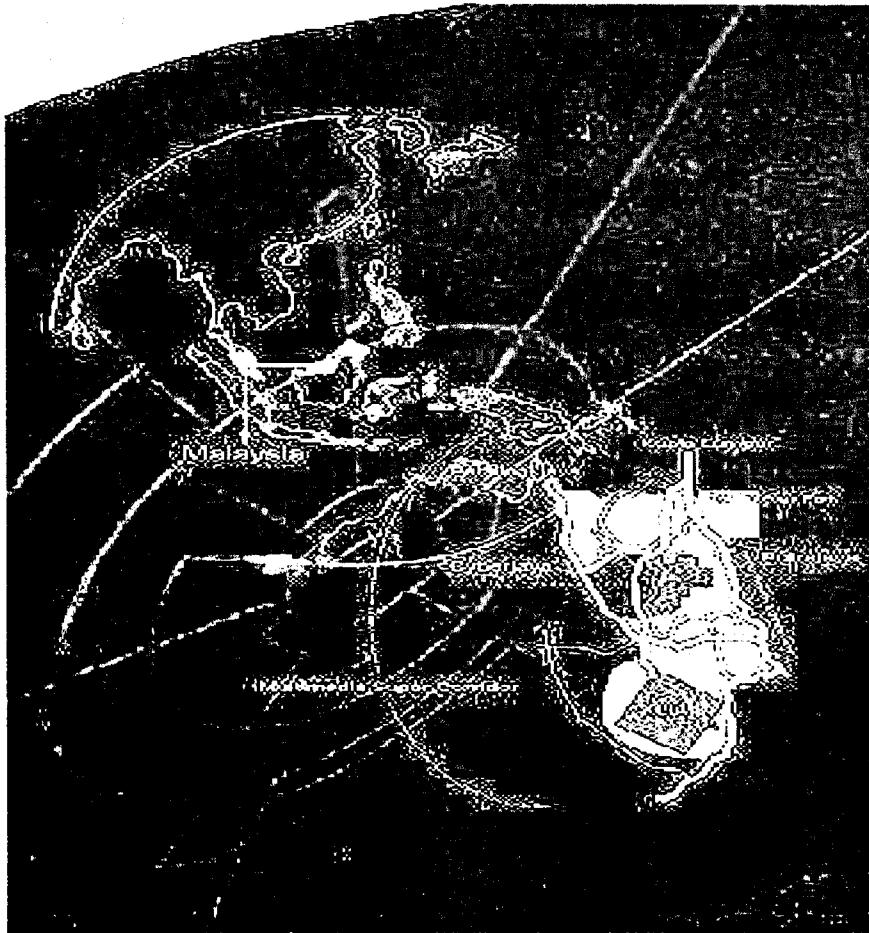
The growth recorded at SAAS Airport in mid 80's onwards has shown a double-digit growth rates in passenger and cargo traffic and aircraft movements. Strengthened by the forecast made by the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA) which expect this region would account for 51% of world's scheduled international air traffic, there is an urgent need for the government to expand its aviation capacity and services.

As the country's main gateway for air traffic, SAAS Airport has become woefully inadequate to meet this traffic demand. Surrounded by densely populated areas, any further expansion of SAAS Airport is likely to encroach on the pre-requisite buffer zone between the airport and the residential area. Even if all available areas within the buffer zone is utilised for expansion, it will still be considered inadequate in the longer term given the forecast levels of traffic growth. Furthermore, the heavy capital expenditure incurred to develop the available area would only yield short-term benefits, with cargo and passenger terminal congestion is expected to recur after the year 2000.

Based on the above grounds, the government dismissed any further expansion plan for SAAS airport. They instead, thoughtfully decided that a totally new airport be constructed.

In early 1991, the government undertook site selection studies covering eight possible sites around Kuala Lumpur. This culminated in the recommendation of a site located close to Sepang, approximately 50 km south of Kuala Lumpur. Planned to be an "economic" gateway, the location is within 20 km to Putrajaya - Malaysia's new government "digital" administrative city and 20 km to CyberJaya - Malaysia's first "intelligent" city. These new cities together with Sepang and Kuala Lumpur serve as the four nodes of the Multimedia Super Corridor (MSC), the electronic highway that is set to drive Malaysia into the forefront of information technology and towards impending digital economy in the new millennium (see Figure 1).





*Figure 1: Multimedia Super Corridor*

## **KLIA Project Development**

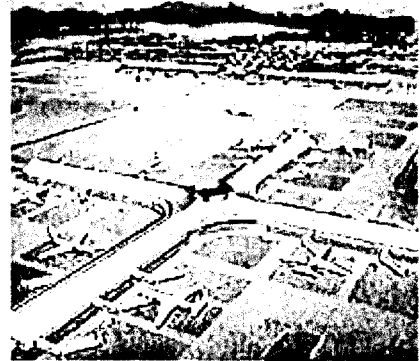
### **The Master Plan**

To make KLIA a successful aviation hub and "airstropolis" of the region, it was paramount that the airport should have a wide range of facilities that is well planned. The new airport should not only provide a full range of services for air travelers and commerce that are efficient, unhindered and integrated but also the need for unrestricted, professional and responsive airport operation. It should also have a sound ownership and financial structure, a development and promotion of commerce and industries around Sepang, as well as development and promotion of tourism related activities. The facilities and systems should also be planned to cater for the future long-term expansion needs of an airport.

To realize the accomplishment of these goals, in February 1992, the government of Malaysia commissioned the KLIA Master Plan for the development of the proposed new airport in Sepang. The draft Master Plan was expeditiously completed in September 1992. After a thorough review by the government officials and consultants, slight modifications were made to the draft plan. In February 1993, the KLIA Master Plan was fully accepted by the government for immediate implementation.

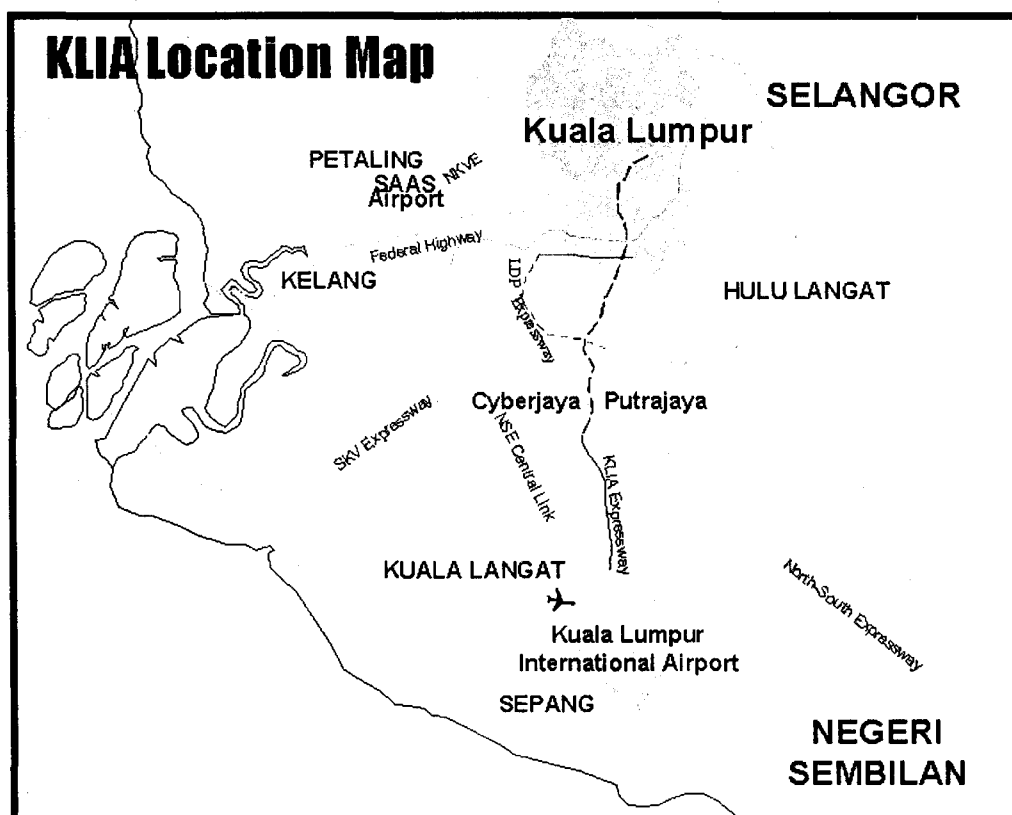
Recognizing the need for KLIA to be readily expandable and in anticipation of the rapid traffic growth expected of Malaysia's bursting economy, KLIA Master Plan was designed to comprehend the need for the new airport to be built on a modular phase expansion concept. The modular phase expansion programme allows KLIA to ultimately handle up to 90 million passengers per annum (mppa) with two main terminals, four remote satellites terminals, four rapid people mover system (called "aerotrain") linking the satellite terminals to the two main main terminals, four full service runways and a wide range of associated facilities including commercial centers, free trade zones and recreational facilities and amenities.

The opening phase of KLIA itself is capable of handling 25 million passengers capacity throughput per year (25 mppa) and 950,000 metric tons of cargo load capacity. The opening phase facility comprises of a main terminal building with contact pier, a four-armed remote satellite terminal building with its associated "aerotrain", a main air traffic control tower supported by a secondary "apron" control tower, and two parallel 4 km runways and their associated taxiways. Other supporting facilities includes complexes for cargo handling, aircraft maintenance and engineering, flight catering, short term and long term car parks, a five-star 450-room land-side hotel, and other ancillary facilities necessary for the operational needs of an airline, passengers, airport aviation authorities, operators concession holders, agents and handlers. All these facilities are fully integrated by a high-tech computer management system (TAMS) to further facilitate efficient and effective airport operations. Appendix 2 provides a brief schematic illustration of the main features of the key opening phase facilities at KLIA.



Malaysia already modernized roads and highway system, especially in the Klang Valley areas and its surrounding vicinity, provides a ready and smooth surface road access to KLIA. The privatized North South Central Link Expressway (NSCLE) provides direct and smooth access to and from KLIA. Parallel access to KLIA is also available through the North South Expressway network via a new interchange north of Nilai and through the NSCLE itself at Batu Tiga in Shah Alam. In addition, a new dedicated highway linking KLIA to Kuala Lumpur, which passes through Putrajaya, is currently being planned as another alternative road to KLIA. Plans are also already on the drawing board to construct a highway linking Malaysia's East Coast to KLIA (see Figure 2).





**Figure 2**

### *The Targeted Time-frame*

Acknowledging KLIA strategic significance to its economy, the Malaysian government recognized the critical need to complete and commission KLIA opening phase facilities for commercial operation as early as possible. Not to let the constraints of SAAS Airport impeding the growth of its economy, and to provide KLIA a good head start as the main gateway and aviation hub of the region, the government decided that the new airport should be completed within a five-year (5) period. KLIA should be completed and commissioned for commercial operation in early 1998, well in advance of the XVI Commonwealth Games that Malaysia successfully hosted in September 1998.

### *KLIA Macro Implementation Strategy*

To achieve this seemingly ambitious target time frame to complete a totally new and huge airport complex and the huge capital investment required for its implementation, three (3) key strategies were adopted. The first, on the organizational aspect, to quickly form a core team of experience professionals responsible in managing the project implementation function. Secondly, on the financial front, to bring in private sector to jointly develop the airport facilities. Thirdly, to formulate a fast and efficient procurement strategy.

The first strategy has resulted in the eventual formation of the K.L. International Airport Berhad (KLIAB) as the developer of the new airport. KLIAB is not only the agency made responsible to raise the needed funds to finance the project but also the main driving force responsible for the successful completion of the airport in earliest possible time and lowest possible cost without sacrificing the quality.

The second strategy was adopted as a result of the government's realization on the high capital investment required for the project implementation. This strategy has proven fruitful, as there was a full participation from the private sector. Known as the privatized facilities, the private sector was roped in to develop the airport supporting facilities such as the cargo complex, catering complex, gas and aviation fuel supply, the co-generation plant that supply chilled water for air-conditioning and power supply, and the free commercial zone.

The third strategy adopted was to formulate an effective implementation on the procurement strategy and implementation programme. The objective of this strategy was to cut government "red-tapes" and bureaucracy in the decision-making process. It was also intended to ensure that the numerous planned facilities and sophisticated systems can be completed, commissioned, and readied for commercial operation by the targeted time-frame. As a result, careful and critical evaluations of the various procurement methods were made. Through these evaluations, it was apparent that whatever procurement methods adopted, the processes within these methods must be able to "speed" up or "fast-track" the construction of KLIA.

To support the quick implementation of the adopted fast-tracking mode of procuring contracts, immediately after accepting the KLIA Master Plan, in March 1993, the government successfully commissioned an Engineering Design Contract (EDC). The EDC involved the preparation of preliminary designs for earthworks and drainage, terminal complex, and airspace traffic control facilities. Furthermore, it also involved the implementation of engineering layout planning of the airport core facilities, the production of "scope books" for all planned facilities and the preparation of land acquisition plans for the proposed Express Rail Link (ERL) from Kuala Lumpur to KLIA. This exercise was fully completed in March 1994.

At the same time, the environmental impact assessment (EIA) study commissioned earlier was completed. It was then accepted and given conditional approval by the Department of Environment (DOE) at the end of February 1994. The EIA report identified several main issues and potential impacts during all stages of the airport development and operation. These include noise, air and water pollution, waste management, and ecological and socio-economic issues. Mitigation measures to minimise the environmental impact were identified and incorporated into the design concept and the methods of construction. These were then strictly imposed on all the designs and during all construction stages of the project.

Even though the construction of the airport as a whole involved the clearing of large area of land, the proper integrated drainage and sewage system however, has greatly reduced the project impact on the environment. Coupled with a comprehensive landscaping and tree replanting carried out to achieve KLIA desired final appearance of "airport in the forest" and "forest in the airport" concept, the effect of land clearing on the environment was further marginalised.

### ***KLIA Micro Implementation Strategy***

#### ***Project Organisation***

In recognition of the extreme demands of the project, particularly the timeframe, the government recognised that one of the key strategies was that to ensure KLIA must be successful implemented at the shortest time and lowest cost possible without sacrificing the quality. Bearing this in mind, the government decided to form a core group of highly dedicated and experienced professionals to shoulder the responsibility of driving and managing the KLIA project.



In July 1993, in a bold and unprecedented move, the government assigned the responsibility to K.L. International Airport Berhad (KLIAB), a newly formed wholly government-owned entity under the Minister of Finance Incorporated. Initially formed as a team called the KLIA Project Management Group, under the supervision of the Ministry of Transport, the primary role of this group was eventually redefine from their initial limited project management function to the extended scope of being the developer of the new airport. By entrusting KLIAB with the developer's role, the government removed several layers of red tape that might impede the progress of a fast-track project. It would also served as a one-reference point of responsibility for the airport completion.

Conscious of the immense task faced and the importance of being effective in managing a large-scale project like KLIA, KLIAB immediately formulated and implemented a closed-loop matrix organizational management approach (refer to Figure 3) to execute the various project implementation strategies formulated earlier on. It was contemplated that this approach together with the implementation of an effective communication structure would ensure a clear and definitive flow of information between various parties in the organizational structure.

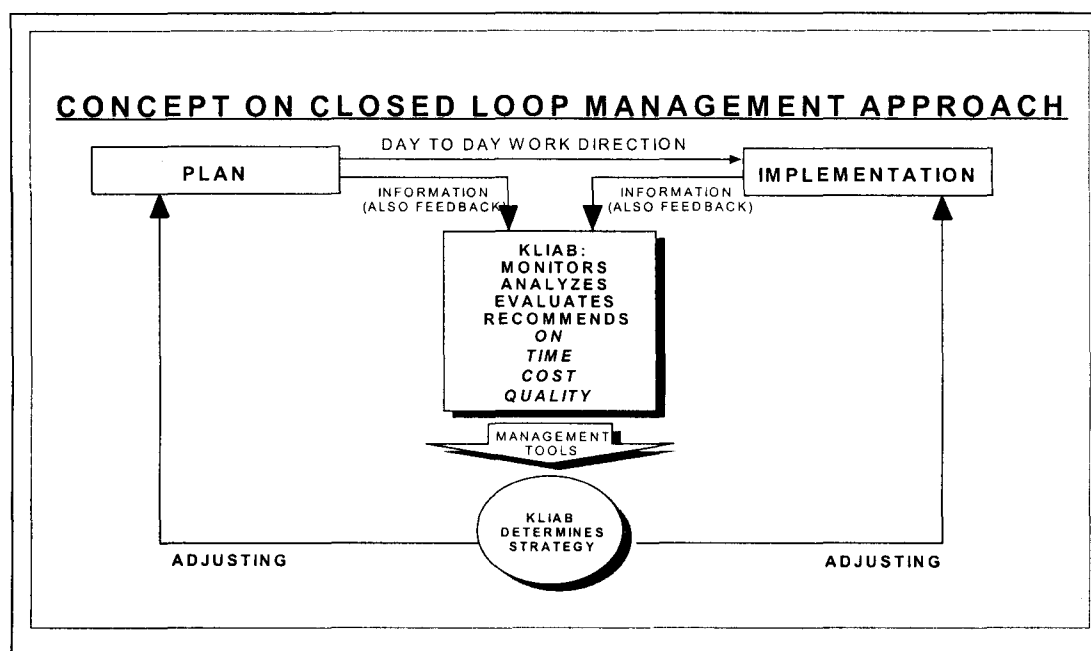


Figure 3

In addition to this, the matrix functional organizational structure approach (refer to Figure 4) was also adopted to provide a clear, effective and efficient command and control within the organizational structure. This approach reduced the need of having many functional implementation divisions and units that could be futile for a large-scale project like KLIA. In this setup, various special committees were formed to tackle specific issues on design, planning, construction and operational readiness of the airports.





To boost the effectiveness of these management approaches, KLIAB decided it would be advantageous to engage support consultants to assist them in ensuring all the ambitious and challenging goals were met. These consultants were given the tasks to provide a specific comprehensive support needed in certain areas of the project management function such as the design and engineering input and monitoring function, site supervision and monitoring function, and project planning function. To further reinforce the project organization, KLIAB has also sought the involvement of the Public Works Department (JKR) and other related government agencies to assist them to achieve the successful implementation of the KLIA project.

## **Procurement Strategy**

Being as one of the biggest challenges of the KLIA project, the timeline of 5 years for the completion of the majestic airport drove KLIAB to acknowledge the strategic significance of a sound and effective procurement strategy that prioritised fast-track methods to be implemented for the project.

The foundation for fast tracking was laid by the **EDC**, and out of this grew the KLIA Master Implementation Programme, the cornerstone of the procurement strategy, for the full development of KLIA. Described as "one of the most difficult tasks that KLIAB had to perform in 1994", the time-driven Master Implementation Programme organised all construction activities into a systematic framework of realistic timelines, with target completion in 1998.

Considered unique and radical in Malaysian context, KLIA's procurement strategy revolved around a selective combination of fast-track design-and-build and conventional fast track methods. This strategy fitted well into yet another strategy that divided the entire project into three distinct manageable geographical areas (the passenger terminal complex, the core facilities, and the privatized facilities) where work contracts are broken up into packages according to their respective areas (refer to figure 5).

The adoption of the fast-track procurement strategy had resulted in the award of three types of contracts, i.e. fast track conventional tenders, fast track design-and-build tenders, and conventional tenders. For the fast-track design-and-build and conventional contracts, tenders were invited based on preliminary engineering and architectural designs, with enough information for the contractors to tender. Successful contractors were then issued just-in-time working drawings during the construction stage. Competitive tendering and the just-in-time fast tracking approach eventually saved KLIAB a great deal of time in getting contractors to begin work on site.

Apart from the fast track procurement strategy adopted, the tools and systems that were implemented by KLIAB to manage the various contracts awarded had played a big role in ensuring the contracts were properly executed. The implementation of a system called KACA had proven to be successful in providing KLIAB with the ability to monitor cost in terms of contracted sum, approved variation cost and other cost exposures in relations to contracts awarded. It also facilitated fast and efficient responsiveness to construction events by notifying KLIAB and consultants on pending tasks including review and approval needs. Combined with the innovative management matrix approach, and the efficient and smooth flow of information between and within the project organization described earlier on, the contracts and the tremendous amount of interfaces required between them were successfully integrated and managed.

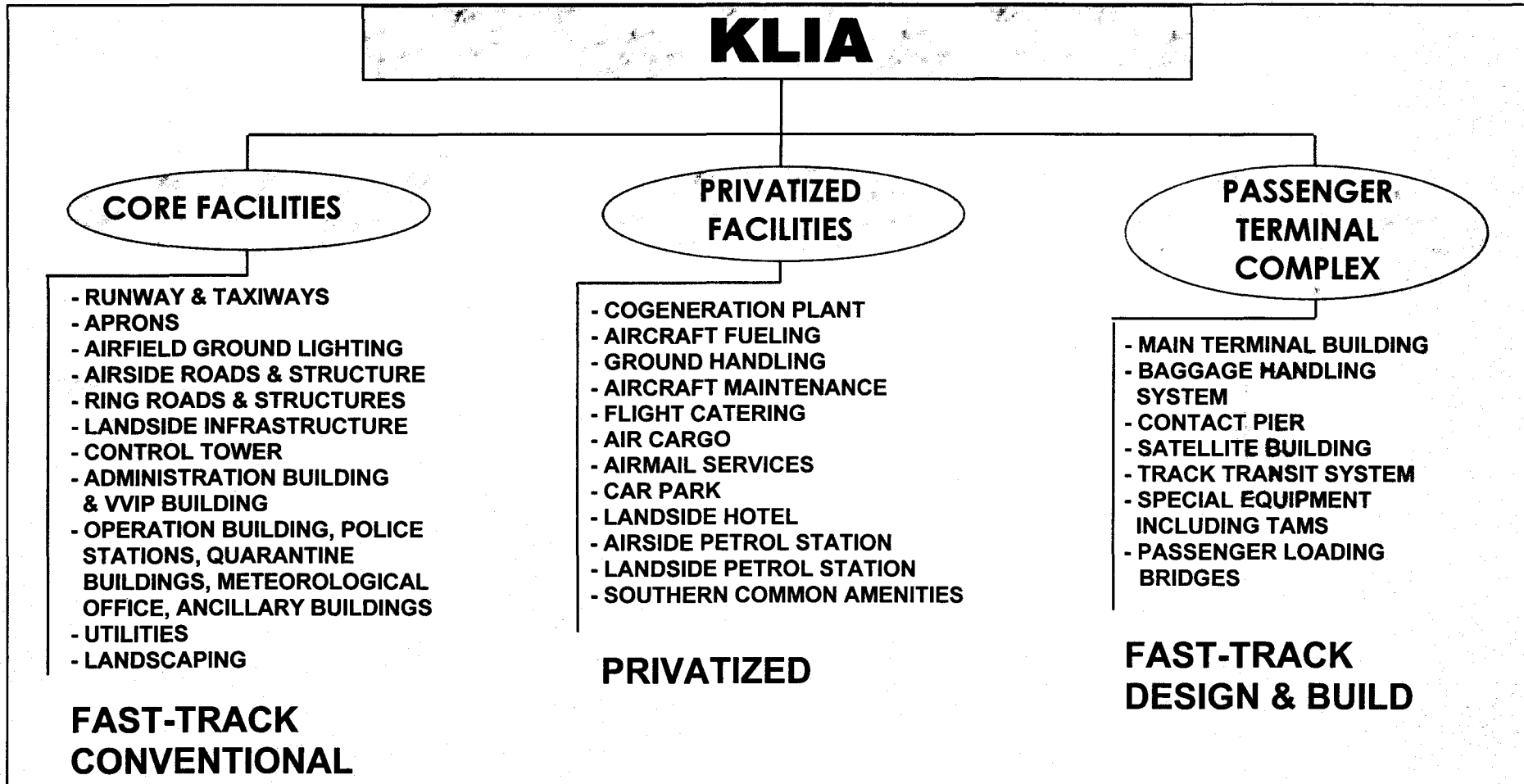


Figure 5

## **Project Monitoring and Control**

No amount of strategizing would suffice if the implementation of the project implementation, monitoring and control system planned is not "owned" by the different parties involved in the project. While KLIAB has instituted a comprehensive time, cost and quality monitoring and controlling system with the necessary IT system logistical support, the extensive and effective flow of information between the different level of personnel and parties involved is a critical determinant to the successful implementation of the project.

To this effect, KLIAB had implemented a total Quality Assurance System (QMS) which set out clear procedures, process flow chart, and lines of communication. A monitoring and reporting system that fed information to management and a comprehensive meeting structure for all levels and parties involved in KLIA project had provided KLIAB management with the necessary tools to be informed on all issues and at all time. This continuous cycle of planning and strategizing followed by implementation and feedback has enabled KLIAB management to always be on "top" of the situation which had augured well for the KLIA project completion.

## **Site Support Facilities**

In anticipation of the large workforce expected to converge on site (estimated at 30,000 workers), KLIAB prepared plans to provide a site support facility to meet the workers daily personal and work needs. The site support facility was to provide housing, transport, food, community, and commercial facilities for the huge number of workers. Being called "KLIA Township", the site support Facility was built in 1995, in a record time of 188 days. It offered the following facilities:

- Low cost housing blocks
- A 24-hour commercial centre of 78 shop-lots occupied by banks, hardware and groceries stores, supermarket, launderette, gift shops, restaurants, hawker centre, and others.
- Community services ranging from a police station, fire station, post office, surau, security company, dentist and a hospital.
- An industrial kitchen preparing and supplying take-away meals for workers scattered around the KLIA construction site.

By providing a conducive living and working environment, KLIAB believed the workforce would be fully motivated to meet the extremely tight construction schedule planned for the completion of the new airport.

## **Project Financing**

The total development expenditure for the first phase development of KLIA was estimated around RM8 billion to RM9 billion. To finance the huge cost to build the new airport, the government decided to raise the required funds through different financial papers and loans from local and foreign institutions. The government itself had allocated RM1 billion from the Federal budget for land acquisition, upgrading of roads to meet traffic requirements, water supply, consultancy fees and equity in KLIAB. The rest of the Ringgit was raised from private sector.

To-date, RM9 billion had been raised. Out of this, only RM400 million was from external/foreign fund, i.e. from the OECF of Japan to partly finance the construction of the Main Terminal Building and Contact Pier. RM6.9 billion was raised through Islamic financing notes and RM1.6 billion was raised through conventional bonds. The rest was raised through revolving notes issuance facility with the Employee Provident Fund.

#### Conclusion

Malaysia has been very successful in delivering one of the most modern, sophisticated and beautiful airports in the world. Through sheer dedication and professionalism of KLIAB's staffs as well as the strong leadership of its management team, it has indeed provides a strong and positive image that will indefinitely raise the profile of Malaysian planning, design, engineering, architectural and project management expertise on the international stage. The adoption of the right strategies and comprehensive tactical implementation plans throughout the project have proven to be very effective in bringing the project to its successful completion within the seemingly impossible target completion time and cost, without sacrificing the quality. With this achievement, KLIAB has set the new KL International Airport at Sepang on a strong footing of excellence for it to soar to a greater height in providing air travellers an efficient and unparalleled service through its spectacular physical grandeur and sophistication.



PROCEEDINGS

3<sup>rd</sup> Pacific Association  
of Quantity Surveyors  
Congress

Quantity Surveying In The New Millennium  
- Challenges and Opportunities

*Conference Session 2*

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# Professional Education : Are We On The Right Track

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## INTRODUCTION

In Christopher Evans' book, *The Mighty Micro* (1979), he makes a statement which encompasses the meaning of professions as "exclusive repositories and disseminators of knowledge". Behind this task of being an exclusive warehouse of knowledge are control mechanisms such as Codes of Ethics, rules, bylaws and examinations that make 'membership' to individual professions inaccessible to the public domain. He argued that even with the right degree and knowledge, a person is still not recognized by the professional institution if he or she does not conform to the core competency skills and knowledge, membership rules and procedure laid by the institution.

Larson (1977) asserts that professionalism is a process, which brings together two distinctive elements- a body of relatively abstract knowledge and a potential market for services for that knowledge. This brings us to the interesting question of how competence in both knowledge and skills are achieved (or perceived?) in the commercial market. Can we rely solely on the education institutions to do the job? Further, the profession is evolving in terms of scope and use of tools and therefore can academics teach the tools and skills deemed fundamentally necessary for the survival of the profession now, to graduates...for usage or application in 20 years to come?

## BRIEF HISTORY OF QUANTITY SURVEYORS IN THE DOMESTIC MARKET OF MALAYSIA.

During the period of 1946-1970, the role of the quantity surveyor was rather obscure. Housing developers at that time were self-made men who were initially builders themselves and worked their way up to become clients developing housing projects. They were familiar with the engineering, architectural and costing aspects of housebuilding of single-storey and double-storey houses. These houses did not require complicated structures or sophisticated construction techniques. The legal requirements of the industry at that time were that professionals were engaged to submit plans in which contractors have predetermined its 'approval' beforehand. How did the developers (or builders) do this? Normally they would make use of submitting existing plans of buildings successfully constructed in various parts of the country that had been previously approved by the authorities.

In the late 1970's developers engaged a pool of consultants or what was termed as consortium. This was as is normally practiced today when procuring a building, but in the 1970's and seen as "a more scientific and organized approach to housing development" in a particular

locality.( Hai, T.S., 1978). This longitudinal illustration shows that a ' scientific method' or new developments in the professional practice can become normal day-to-day practice in due time.

Malaysian Quantity surveying professional practice is based on United Kingdom practice. Previously, colonial quantity surveying practitioners set up their companies in Malaysia and when they returned home, the local Malaysians carry on the business (Yahya, S., 1978). Inevitably a transfer of methods and procedures took place when the locals took over the professional practice from their colonial counterparts. There was no opportunity of going through the Guild System to professionalism as evolved in the United Kingdom construction industry.

Over the past decade, the professional services demanded from clients have accentuated on traditional services. The inclination towards new scientific methods have penetrated the domestic market gradually, most of the methods having been developed elsewhere and implemented here. Some innovations in the last 5 years are still under a trial period, for example partnership, have not been widely used locally yet.

There are pros and cons by having a profession that has not evolved over time. On the plus side, our learning curve is steeper and we can take note of what has happened to other profession and try to implement the best practice for our own plausible use. Conversely, by not participating in the evolution process, the assumption of what can be considered best practice elsewhere might not be pertinent to our domestic market. Moreover, changes in certain laws, methods and procedures were made in response to problems that existed in other domestic markets, and without really knowing the rudimentary reasons for those changes we might be following an inappropriate recipe for the development of our own domestic profession.

## THE STUDY

The study involved obtaining opinions and information from three major sources; consisting of clients, consultants and academics. It is worth mentioning that this survey was conducted during a single-digit growth rate in the Malaysian construction industry.

**Clients:** A postal questionnaire survey was conducted for clients in Lembah Klang Valley, Federal Territory. Eighty questionnaires were sent out to clients' firms and thirty-six of them responded back. The aim of this cross-sectional survey was to get information on the skills clients ranked "highly needed" for an overall level of satisfaction attained by clients in using the professional service of quantity surveyors. This presumes that the industry is changing or maturing progressively and professionals should provide the necessary changes in their services accordingly. We have gathered from a similar survey conducted for the Building Surveying profession by Michael Hoxley, 1996, that since "services" are highly intangible, non-standard and inseparable, they are low in search qualities but high in experience qualities.

Therefore the sample of clients we approached have been asked to give their views on the level of satisfaction of service from their *experience* only. A client's evaluation of a professional service takes place before, during and after delivery. This correlates well with other models of evaluation, but note that this survey on clients is taken to obtain cross-sectional views of the skills deemed highly necessary for quantity surveyors now, and opinions on future skills warranted. The data on skills are measured through attitude scale, a 5 point unbalanced Likert-type scale. The survey does not assess the *quality of service* experienced by clients. That however should be the continuation of this study.

**Consulting firms.** Results from an existing cross-sectional survey conducted by ISM for the PAQS Inaugural Survey 1999 was relevant to this particular research because it gave an indication of the services that quantity surveyors are giving to clients now, and skills anticipated for the future. The importance of each type of service can be highlighted by way of correlation with the remuneration the consulting firms received. This is however somewhat contentious since sometimes remuneration is related to hours spent on doing the task and not the importance of the task.

**Academics.** Structured interviews were conducted with representatives of two different education institutions in the Federal Territory. In essence, the course design of the Quantity Surveying course in University Malaya will be the platform of discussion in addressing the current education and training given to graduates.

## RESULTS OF STUDY

### BACKGROUND OF CLIENTS

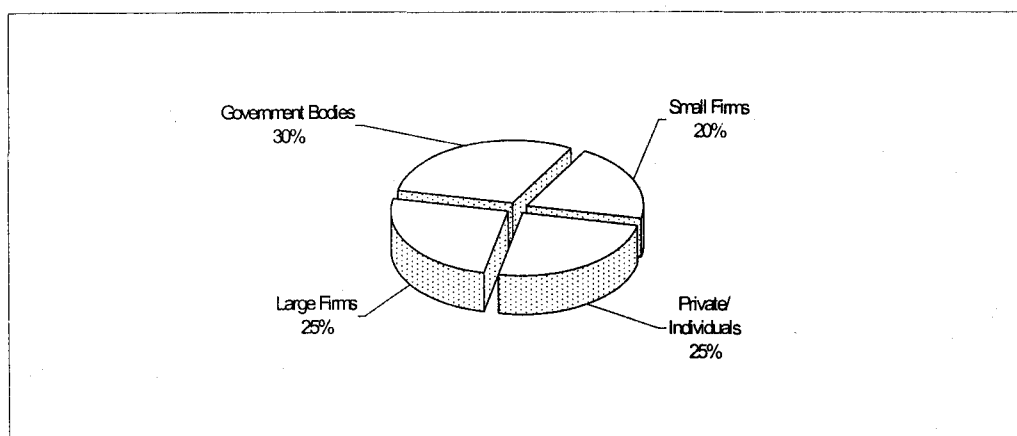
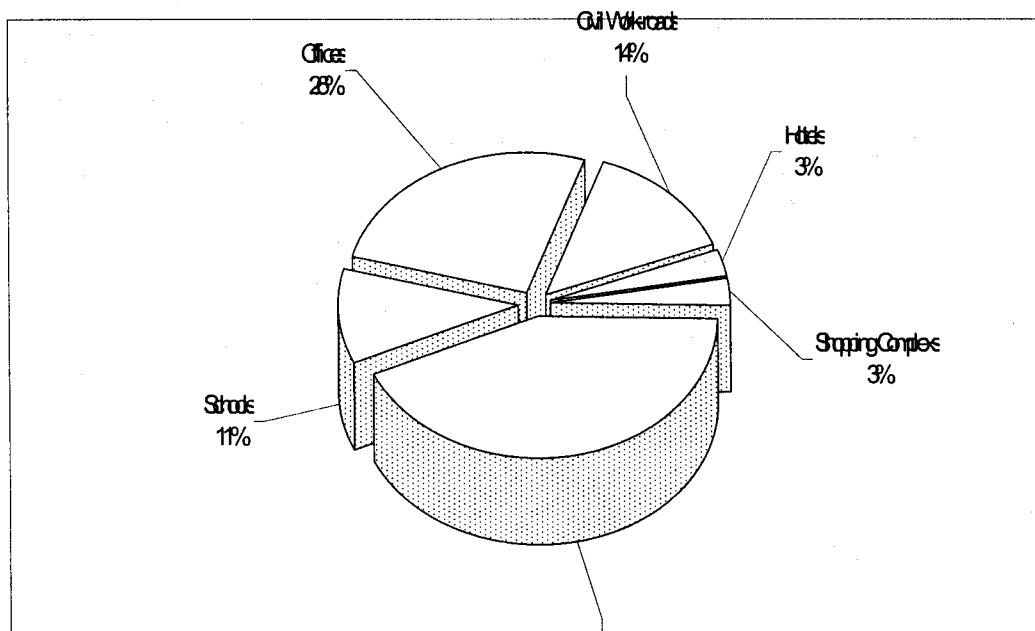


Figure 1: Types of clients

Figure 1 illustrates the types of clients who responded to the questionnaire. Government bodies represented the highest share of the sample which is 30%. This was followed by Private Individual clients and large firms both having 25%. Small firms accounted for about 20% of the sample. For the purpose of this study, small firms are those which have less than 10 employees whereas large firms employ more than 10 employees.

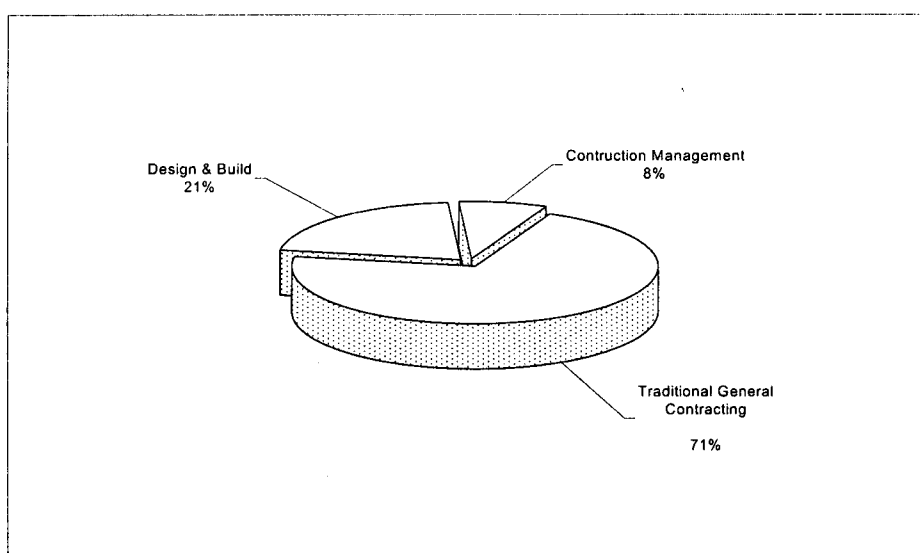




**Figure 2: Types of Construction Work Clients Engaged In**

Figure 2 demonstrates the type of construction work undertaken by the respective clients. Housing still plays a significant percentage in the work done by clients which amount to 43%. Next are offices, 26% and followed by civil-work (roads), 14%. This is followed subsequently by schools, 11% and lastly hotels, 3%.

Figure 3 reveals the types of procurement routes used by clients in sample. Traditional General Contracting leads the way by 71%, followed by Design and Build 21% and Management Contracting 8%. However, none of the respondents in this sample have used Construction Management in procuring buildings.



**Figure 3: Types of Procurement Routes Used by Clients**

## PROFILE ANALYSIS

The mean scores of each twenty-five-skill factors are signified graphically in the profile analysis in Figure 4. The data have been ranked into five attitude categories of *very strongly agree* ( 20 points), *strongly agree* ( 15 points), *agree* ( 10 points), *neutral* ( 5 points) and *disagree* ( 0 point). The dispersion percentage of each factor in this survey has been identified as quite low, in the range of +/- 10% to +/- 12%. Therefore the mean scores are reasonable measures to make deductions and generalizations from the survey. Items that have been given high mean scores, which shows more to *strongly agree* ( 15 points) are as follows:-

**Technical correctness of core service provided:** The services included in the core services or traditional services were taken from the PAQS Inaugural Survey 1999. These include Estimating, Cost planning/ Budgeting, preparing Bills of Quantities and Builders Quantities, Specification Preparation and Contract Administration. It can be seen that overall technical correctness of core services provided were still given high importance by clients. The highest mean was for Estimating ( 15.6) and secondly, Cost Planning/ Budgeting ( 15.0). Preparing Bills of Quantities and Contract Administration produced similar means (14.4) and still at the higher end of importance. Builders Quantities and Specification Preparation however were given lower rating (13.2 and 13.6 respectively). It is interesting to note that clients have put greater priority on Estimating and Cost Plan rather than on preparing Bills of Quantities and Contract Administration. This trend of shifting emphasis to value-adding activities such as Cost Plan/ Budgeting and Estimating from preparing Bills of Quantities is well acknowledged in the industry (Brandon, P.S., 1992). The lesser importance for Contract Administration is fortuitous. It is perhaps the perception of clients that based on the terms of contract, the contract administration is in the hands of the Superintending Officer (S.O) and the role of the quantity surveyor is taken as quite secondary to the S.O.

**Information Technology.** Speed of response ( 14.6), frequency of communication between professionals and clients( 14.2) and usage of specialist software( 14) were given high ranking by the clients. Speed of response and frequency of communication between professionals and clients are attributes deemed inherently essential in a professional practice and inevitably are appreciated by the clients as evinced from the survey. With the rapid proliferation of information technology there is no excuse for not responding expeditiously on clients' requirements. On the other hand, in times of recession, some firms have reduced staff numbers and they may find they are not able to meet deadlines when resources are stretched. This is termed as the 'strategic management trap' ( Gronroos, C., 1984). The specialized use of knowledge-based software in estimation, cost plans or contract administration is also critical in giving a response to clients efficaciously. Clients also gave a high mean score for standard of presentation of information/ reports in written form, or verbally (15.2) giving the impression that communication; the ability of consultants projecting their ideas, advice or knowledge in a clear and concise manner is highly important for clients.

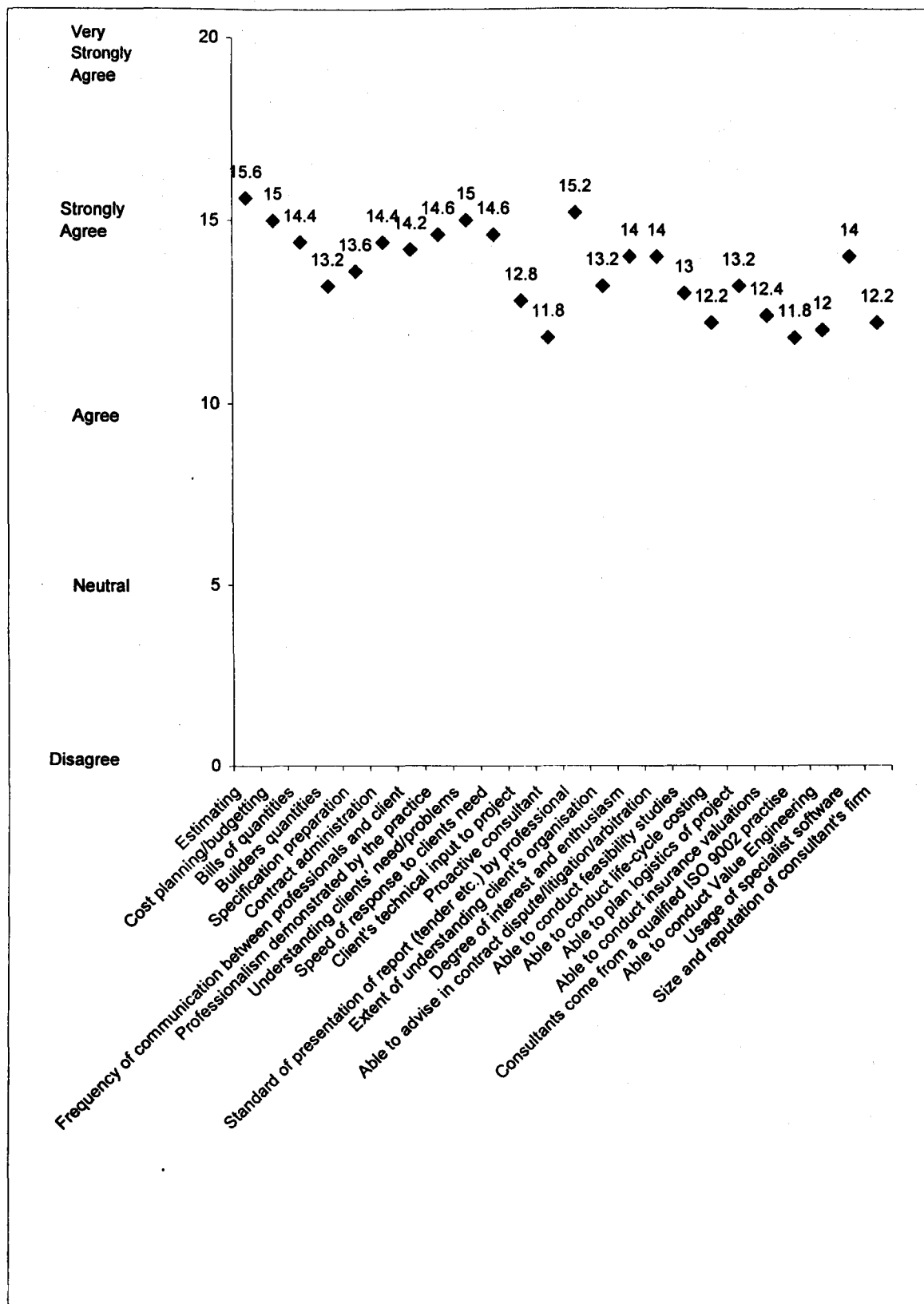


Figure 4: Mean Scores of Survey

**Professionalism in Service.** It is conceivable that this has been given a high mean score (14.6) by clients, in fact, it is surprising that it did not produce an even higher mean score. It is here that the role of the individual surveyor is assessed, and not the reputation of the consultant firm. (The size and reputation of consultant firm gained a lower mean score (12.2) from clients.) In this sense individual quantity surveyors should practice duty of care and follow Codes of Conduct/ Ethics as typified in the Rules and Regulations of the Professional Bodies to their best interest and knowledge.

**Understanding clients' needs/ problems.** This is also a factor which is significant to clients (15.0). It is also interrelated to another factor which is degree of interest and enthusiasm in project (14.0). However the information gathered from the survey provides an interesting paradox here. The client needs reassurance that the professional engaged understands the problems and the needs of the project, but does not suggest that the surveyor need to understand the client's organization involvement in the project. For the latter, the clients give a lower mean score (13.2). The client also gave a low mean for their own technical input into the project ( 12.8) which might infer one of two scenarios. Scenario 1- they are not expert client and do not understand the technicalities of the project or Scenario 2- clients, be they expert or not prefer not to be involved in the technicalities of the project.

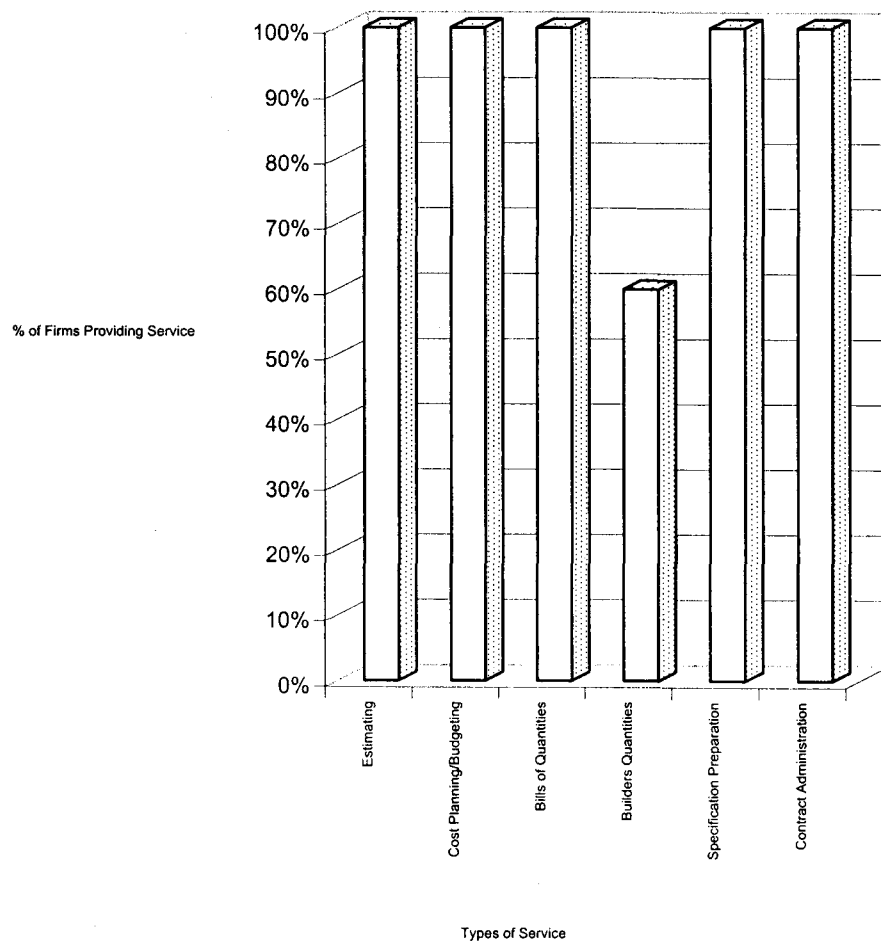
Factors which are given low mean scores by clients are as follows:-

- Able to conduct feasibility studies ( 13.0)
- Able to conduct life-cycle costings ( 12.2)
- Able to plan logistics of projects ( 13.2)
- Able to conduct insurance valuations (12.4)
- Able to conduct value engineering ( 12.0)
- Consulting firms are ISO 9002 compliant ( 11.8)

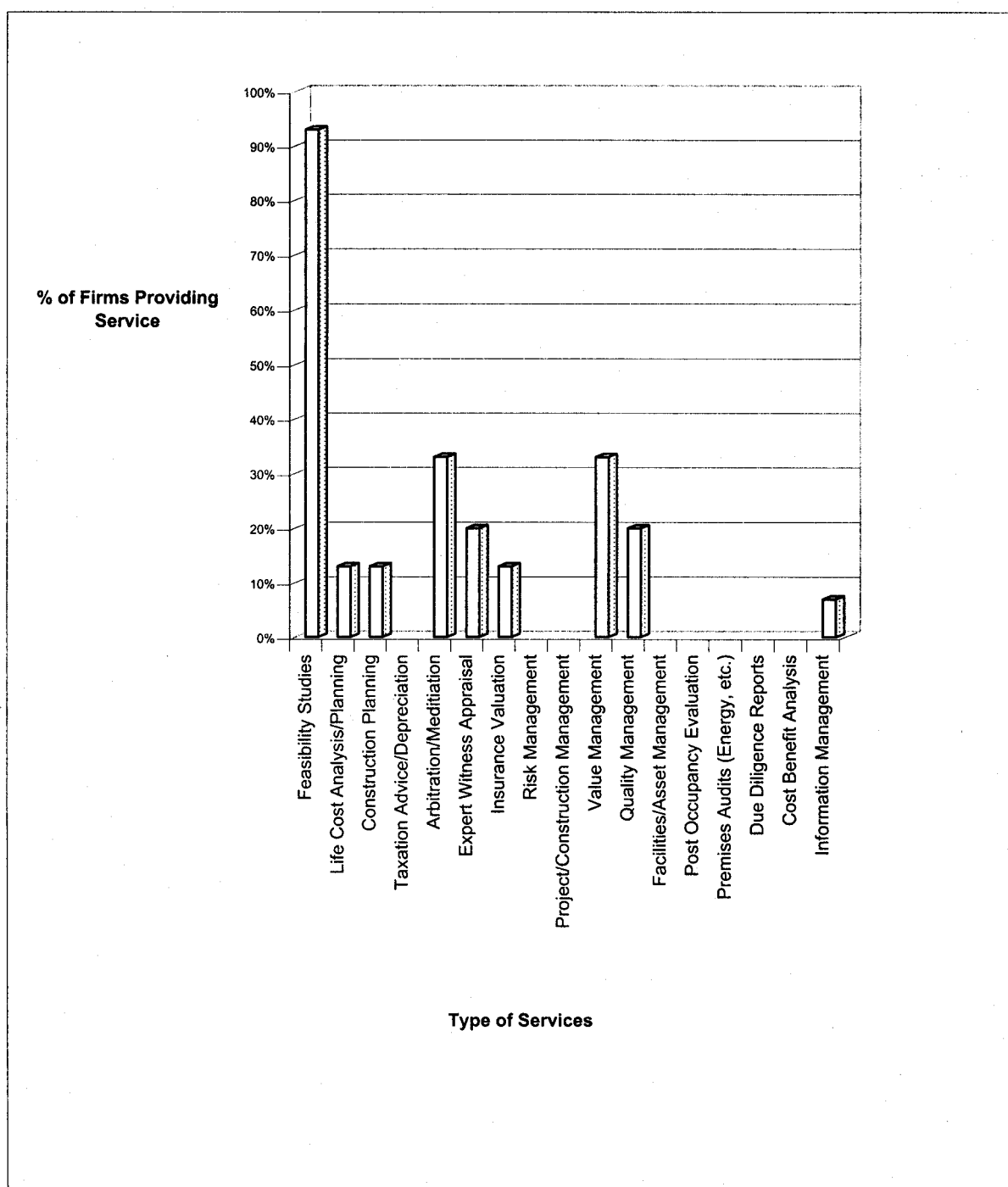
All of the above factors are considered instrumental in the development of the profession in giving better service to clients in other parts of the world, such as the United Kingdom, but not to Malaysian clients. We are of the opinion that exposure to new scientific methods such as those listed above is necessary for clients in order for them to fully utilize the services of quantity surveyors. We also strongly believe that most of the non-traditional services are not being utilized to the fullest capacity by the clients. This is not because a particular service is not offered by practicing quantity surveyors, but more to the fact that these services are not being effectively demanded by clients. They might not be aware of the extent that these scientific methods have contributed to project success in other parts of the world.

The non-traditional services are taken from the PAQS Inaugural survey 1999 and the difference between the traditional and non-traditional services is highlighted in Figure 5 and Figure 6 respectively. A breakdown of the traditional services and non-traditional services provided by firms is also illustrated. It can be seen in Figure 5 that all consulting firms provide the core/ traditional services. Figure 6 shows that only feasibility studies are extensively used by clients in the non-traditional services provided. The rest of the services provided were nominal apart from arbitration and value management.





**Figure 5: Traditional Services Provided by Consulting Firms**  
*Source: PAQS Inaugural Survey 1999- Initial Analysis for Malaysia*



**Figure 6: Non-Traditional Services Provided by Consulting Firms**  
Source: PAQS Inaugural Survey 1999- Initial Analysis for Malaysia

In order to boost the expertise in non-traditional services, the consultants must have sufficient practice in that specialist field. There must be a market for these services. From the survey findings, it can be seen that clients agree that these services are important but *do not demand them in practice* to stimulate effective demand. It is envisaged that if consultants want to export such services to other Asean counterparts then the domestic demand for specialist work must be stimulated to be more sophisticated and recurrent, and not as one-off cases. In

this sense, not only do consultants benefit by having a niche in certain fields but the industry advances as well from sophisticated value-adding services.

## **EDUCATION**

Quantity surveying as a body of knowledge is quite difficult to define. It is a multidisciplinary blend within a unique context. The disciplines include law, economics, accountancy, management, information technology, construction manufacturing technology and so on, within the context of the construction industry. New developments have come about with quantity surveyors now practicing in shipbuilding and oil and gas industries, as well as the construction industry.

A basic problem in designing academic courses is that if they are meant to last a full working life, these courses must prepare their graduates for professional activity for the next 50 years. (Angus-Leppan, P. V., Trinder, J., 1991.) This is an onerous burden to impose on academics, but this has been common practice for designing courses universally. The objective of equipping graduates for work for the next 50 years with their basic degree within a time limit of three years is hardly feasible. It is impossible to foresee the scope and methods of quantity surveying in the future but reasonable prognostications are possible for the next 15-20 years ahead.

It is difficult to predict the future but there are several responses to this problem. In essence courses should give emphasis on fundamental concepts, rather than on techniques. Greater emphasis needs to be given to fundamental knowledge, with complementary emphasis on skill formation and training. Students in our Department are taught how to learn, because we believe that throughout their careers they will need to develop an understanding of new or emerging developments. Educational breaks should occur at regular intervals, (after a Diploma or a Degree), but should be continued throughout the surveyor's working life. Education courses as well must be continually reviewed and updated with the recent developments.

Greater emphasis needs to be given on the core subjects such as Estimating, Measurement, Building Economics, Construction Technology, Construction Law and others since these are the basic education and training of a quantity surveyor. However the links of all core subjects to other issues such as the business framework of government bodies, clients and contractors are equally important. Graduates are taught the application of fundamental knowledge to everyday practice and circumstances. It is intended that our graduates do not just have the know-how for professional practice but also the know-why.

In the past, there have been significant shifts of emphasis in quantity surveying education, which can be summarized in the three areas below. Firstly a move to the front-end activities of the development process. This demands education in forecasting, involving understanding of the client's brief and an acceptance of uncertainty and risk. Quantity surveyors are engaged in assessing risk, not only in estimating but also in deciding such matters as whether to invest, whether to go into litigation and deciding alternative yields to projects. The new philosophy is to accept risk and uncertainty as variables of project and develop techniques that take them into account.

Secondly, computer based information technology in construction. Some advance technologies available in the market are integrated project databases, construction data management and knowledge-based engineering. The integrated project database will improve

both the quality of the finished construction projects and performance of the process by enhancing communications and coordinating design activities. Knowledge-based construction applications make use of artificial intelligence techniques. In principle they can be applied to all stages of the design, construction, operation, occupation and demolition of the building cycle. To date most attention has been devoted to use of rule base expert systems for the automation of routine tasks in construction.

Thirdly, and most crucial is the study of value-adding activities and value-impeding activities. The value chain in the industry is important to analyze since there is distinctive fragmentation in the formation of the project coalition in construction projects. The value analysis assesses activities of consultants through the value they deliver to the clients. It identifies costs, value-added and value drivers activities. It also identifies the linkages of each activity to another, so that activities done by consultants are not dealt in isolation. The value chain analysis is an intangible factor that has permeated into the research of scientific method and is expected to be of paramount importance in the near future.

It must be recognized that education is a perennial quest. Surveyors need to enhance their knowledge /education at periodic intervals, and this is where the widespread efforts of the professional institutions conducting Continuous Professional Development (CPD) talks and courses are most welcomed. The progressive development of the profession has its educational continuum. A strong relationship between the professional institution and universities is imperative for the progressive development of the profession. Figure 7 is an illustration of this very point.

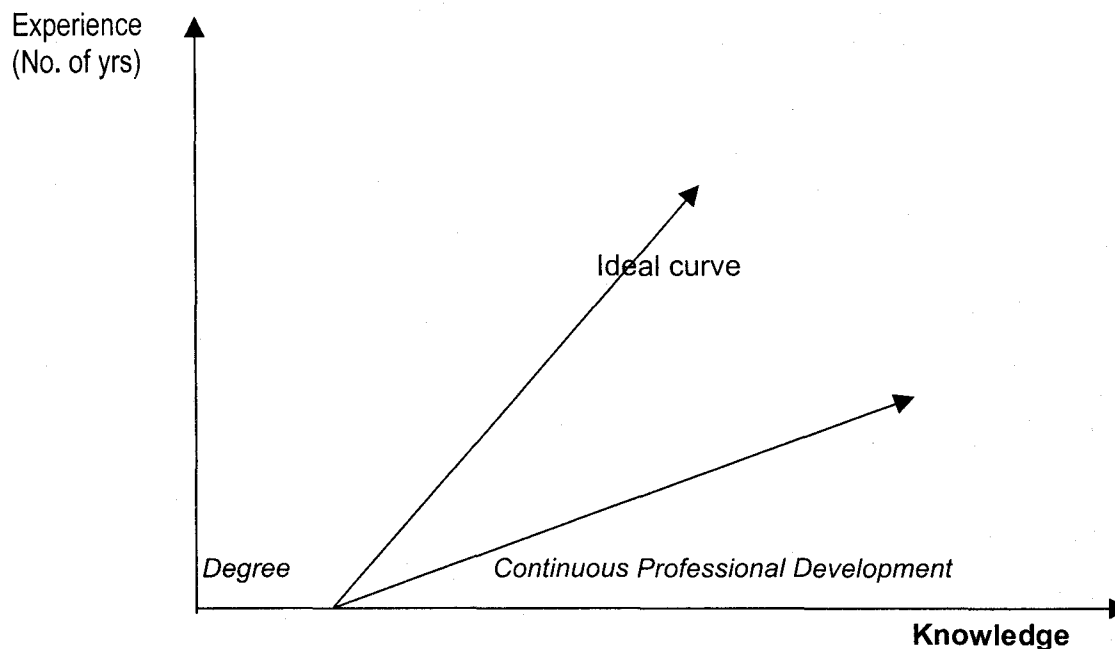


Figure 7: Continuous Development of a Professional Quantity Surveyor



Figure 7 illustrate the advancement of a quantity surveyor on the assumption that elementary knowledge of the profession is attained by a basic bachelor degree. The flatter curve is inferring that the learning curve of that person is steeper and thus more efficient. Certain traits can be learned on the job but emerging concepts and specialized knowledge like Information Technology in construction is formal knowledge. This is where professionals return to the educational institution for formal specialist knowledge. In the end, the education sector can mitigate the development of the profession by conducting more post-graduate degrees and research in the respective areas accordingly.

## CONCLUSION

The survey conducted has shown results inferring that traditional services are still important. However it is felt that value-adding activities and Information Technology will gain more significance with domestic clients in the future with proper exposure. The professional institutions and the education/research institutions both must take a principal role in disseminating knowledge and techniques to the domestic clients. Ideally, if domestic consultants intend to penetrate other Asean countries/ clients, the domestic demand in those countries for specialist service must be sophisticated as well. In the end, the strategy for the professional quantity surveyors is to enhance the knowledge of their profession in order to move swiftly into new areas as opportunities arise and simultaneously prepared to disregard old methods when technology and competition makes these methods redundant.

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# **The QS Profession: Change and Effect with Particular Reference to South East Asia**

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Keywords: Quantity Surveying; Malaysia; Singapore, Economy

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## **Introduction**

The development of Quantity Surveying in the United Kingdom can be traced to medieval times. Bowyer (1983) states that as early as 1685 detailed price books for calculating the costs of materials and labour for building projects were in existence. Despite these early indications of interest it is generally thought that no significant developments took place until the nineteenth century. Symonds (1994) comments that the ingredients for change were many during this period and cites such factors as: the building boom following the Napoleonic wars, the rise of a class of master builders such as Thomas Cubbitt and his contemporaries; the industrial revolution; innovations and advancement of science especially the development of the railways; as well as speculation amongst the new developer class of architects / builders. Wood (1997) quotes an extract from "The Builder 1884" which describes the quantity surveyor as "...trusted all round for a skilful, painstaking, intelligent man of business" it was further claimed "that the profession of the quantity surveyor has the valuable quality of being unattractive to the average youth."

In the twentieth century, the early years of quantity surveying were dominated by the need to find a standard system or method of measurement for building works. In 1922 the Royal Institution of Chartered Surveyors published the first Standard Method of Measurement (SMM) for building works in the U.K. Although at first the SMM was not universally welcomed in all parts of the U.K., it became grudgingly accepted and became the uniform standard for the measurement of building works in the U.K. Meanwhile quantity surveyors became increasingly important in the construction process. The services offered by quantity surveyors expanded to include estimating, cost planning, advice on procurement and representation in negotiations in addition to the traditional skills of measuring and quantifying building works for tender purposes. Employment opportunities for quantity surveyors grew in response to the increase in activities carried out by the quantity surveyor. Contractors were one of the first groups to recognise the useful technical and financial skills of the quantity surveyor and set up Q.S. departments within their organisations. Quantity surveyors also found employment in central and local government and other public sector organisations such as the National Health Service and British Rail and others.

## **Development of quantity surveying outside of the United Kingdom**

The development of quantity surveying outside the U.K. occurred almost exclusively within the British Empire and in those countries heavily influenced by the British. In the context of South East Asia this translates as Malaysia, Singapore and Brunei. Other countries in the region where ties with the U.K. are weaker have not developed a strong quantity surveying tradition although some offices have been opened in these countries by U.K. quantity surveying firms.

Examples include Indonesia, Philippines, and Vietnam. It is interesting to note that many Japanese contractors operating in Singapore and Malaysia employ quantity surveyors even though Japan does not have a tradition of quantity surveying. Outside of South East Asia a strong quantity surveying presence can be found in India, Pakistan, Hong Kong, Australia, and New Zealand respectively.

### **Quantity Surveying in Malaysia and Singapore**

An increase in quantity surveying activity is a reflection of the growth of the economies of South East Asia. Abdul Rashid & Morledge (1998) report that the economy of Malaysia grew between 7.8% and 9.7% during the period 1988 – 1996 with an average of 8.8% per annum. Growth in the construction industry during this period ranged 2.7% to 19.00% with an average of 12.3% per annum. The value of the construction industry based on the Malaysian Ministry of Finance estimates was stated to be RM 5,870,000 (Exchange Rate £1 = RM 3.9470 in February 1996). Since the economic “slowdown” in Asia the value of the Malaysian Ringgit has fallen to a rate of £1 = RM 6.58 in October 1998 (The Economist 14<sup>th</sup> – 21<sup>st</sup> October 1998). In addition since September 1998 it is not possible to purchase Ringgit outside of Malaysia following legislation passed by the government aimed at preventing speculation. The government has cancelled or postponed several high profile projects. The impact on quantity surveying has been predictable. A partner in a leading consultant quantity surveying firm told me “ Business is bad, I’ve had to shed some good people and cut the salaries of the staff who remain. It’s going to be bleak for the next couple of years”. Chong K.V. (1998) cogently summarised up the situation by the following comments which appeared in an article entitled “ The Regional Economic Crisis – A Construction Dilemma”. Chong said

“Many countries in the Asian Region have been affected by the current economic downturn. In Malaysia, the government has taken steps to divert funds from non-export to tradable products and in the banking sector tight loan policies were imposed. All these events have a profound effect on the construction industry”. (reprinted in the Journal of the Institute of Surveyors Malaysia).

In Singapore it has been officially announced that the economy contracted by 0.7% in the 3<sup>rd</sup> Quarter of 1998. This is the first instance of negative growth in a decade (The Straits Times). Construction and property sectors of the economy have been particularly affected. The average percentage change in private residential property prices between 1996 – 1997 was – 12.5%. These gloomy figures were compounded by negative percentage changes for commercial and industrial properties which were down by 11.3 and 4.7 percent respectively.

The position in Singapore for 1998 is expected to be worse. Ong Teck Hui of Colliers Jardine (Property Consultants) speaking to the Straits Times said “...if the economic scenario continues to worsen and people are worried about job security, if interest rates continue to be high and if attractive discounts are not offered to lure buyers back into the market...then the URA index would drop 15 –20 percent this year (1998)”.

In terms of quantity surveying activity there has been no dramatic shedding of jobs, however large scale redundancies have been announced by some leading architectural firms. Several quantity surveying firms have imposed pay cuts on staff and for the first time quantity surveying graduates from universities and polytechnics have reported some difficulties in finding employment. One of the biggest consultant quantity surveying firms in Singapore has recently cut the overtime rate of pay for new entrants from approximately S\$12 per hour to around S\$6

per hour. In the public sector, civil servants (including quantity surveyors working for government ministries and statutory boards) have been subjected to pay cuts between two and ten percent.

Economic indicators for Malaysia and Singapore for the future are set out in Figure 1 below:

*Figure 1 – Predicted Economic Growth for Malaysia and Singapore*

% Forecast of Economic Growth for year	Malaysia	Singapore	Status
1996	8.6	6.9	actual
1997	7.8	5.2	estimate
1998	- 5.8	-2.0	forecast
1999	- 0.7	0.7	forecast

[Source Deutsche Bank Research]

Some economists feel that the effects of the Asian recession are likely to last longer in Malaysia than in Singapore. The reason given is that Malaysia has a large domestic and external debt provision (estimated by Deutsche Bank Research as 250% of GDP) whereas Singapore has a net surplus. Dr Mahathir Mohammed, Prime Minister, said at the Association of South East Nations (ASEAN) summit in December that he "expected Malaysia's economy to decline by 6% or more during this year [1998]". (Reported in *Business Times* 18<sup>th</sup> December 1998). This view was worse than official government statistics but roughly in line with international economists' projections. The prevailing view is generally one of sluggish demand and lacklustre output in Malaysia at least in the short term.

In Singapore the government may take policy decisions to increase spending on infrastructure and other projects which will have an immediate and direct effect on construction and therefore quantity surveying. It was announced on 19<sup>th</sup> January 1996 by Singapore's Minister for Communications, Mr. Mah Bow Tan, the Singapore Government would expand the existing Mass Rapid Transit (MRT) system by extending the North East Line. The estimated cost of the project was anticipated to be S\$5 billion. In addition the Government also announced that S\$1 billion would be spent on establishing a Light Rapid Transit (LRT) system in Singapore. The first LRT project is expected to be completed at the end of 1999 and the North East Line of the MRT is expected to be running in 2002. These are two examples of government policy influencing construction which will indirectly increase demand for quantity surveying services in the Republic. However Government intervention alone cannot mask the overall effects of the economic slowdown.

#### **Observations from the U.K.**

In the U.K. the mid 1990s saw several examples of quantity surveying practices being taken over to form larger multi – disciplinary groups. In June 1993 a subsidiary of Général des Eaux (a French water company) bought I. E. Symonds & Partners for an undisclosed sum (Survival of the fittest – Building 21<sup>st</sup> October 1994). In the same month the Capita Group acquired Beard Dove and Partners for £2.7 million. (Birkbeck, 1994,p13.) There were also several other less spectacular examples of buy outs and acquisitions. The mergers and acquisitions experienced

by Q.S. firms in the U.K. in the mid nineties do not seem to have been mirrored in Malaysia and Singapore so far. However Godement (1999) commented:

“ There are signs that the scramble for capital in Asia is leading to an acceleration of purchases by foreign investors, which is sometimes akin to repossession, since the terms can be extremely unfavourable to sellers”

Several other business commentators have commented that due to the economic downturn Asian assets are generally cheap. This is especially true in the case of Malaysia due to the current low level of the Malaysian Ringitt. The situation remains volatile however there have been no instances of mergers and acquisitions involving the quantity surveying profession in Singapore or Malaysia. One spectacular acquisition which will have an impact in Singapore and Malaysia is the purchase of the Samsung Corporation's Construction and Equipment business by the Swedish car company, Volvo. Godement (op cit.) comments that “ It is likely that these example(s) will turn into an even larger flow of acquisitions”

### **The Future of Quantity Surveying**

The greatest change that has taken place in the working environment is the impact of information technology. In a special feature in July 1998, The Times posed the question “ What's happened to the office?” and detailed major changes to working practices as a result of computer technology.

Information technology (I.T.) is also changing the ways that quantity surveyors do their work. The Royal Institution of Chartered Surveyors stated that “ I.T. continues to develop at an exponential rate” (The Challenge of Change, QS Think Tank 1998, p.4) and that I.T. development will continue at an increasing pace. (Ibid., p.2). In his 1998 Presidential address Lay outlined what he saw as threats to the profession and added that all chartered surveyors (including quantity surveyors) must “persuade our markets that we can provide an added value service comparable to that given by other professions”. (Lay, 1998, p.5). Best (1998) stated that the future of quantity surveying involved a switch from a pre-occupation with “cost” to an emphasis on “value”. He also added that the future QS role would encompass that of information manager with a focus on management of a process and greater understanding of client's needs. A greater reliance on I.T. and the increased use of e-mail and Internet business were two of his other predictions.

### **Recent developments**

In Malaysia and Singapore most quantity surveying companies make extensive use of the computer. This ranges from computerised taking off packages to the production of detailed cost plans and expenditure forecasts. In Singapore one major government department is producing Bills of Quantities in a CD-ROM format rather than by the traditional method using paper. It is estimated that one CD can store upto 250,000 pages of text. The CD-ROM Bills of Quantities save storage costs and postal charges. Tendering contractors are able to print out any parts or sections and distribution to sub-contractors and suppliers can be done cheaply and efficiently.

The Quantity Surveying profession is developing software to measure quantities directly from drawings called Automated Quantities Taking Off System (AQTS). A business consortium for the AQTS is being sought to develop, own, distribute the AQTS (C.I.D.B.,1998). If the

consortium is successful then this may make a major impact on the quantity surveying profession not only in Singapore but throughout South East Asia in the next five years.

### **Conclusion**

The quantity surveying profession in Malaysia and Singapore may emerge from the current financial downturn in a leaner but more efficient state. It is likely that there will be less emphasis on traditional labour intensive quantity surveying techniques such as measurement. The emergence of I.T. will underpin a more client centred focus in quantity surveying. Flanagan and Tate, (1997) describe what clients want as:

- Certainty of Price
- Projects constructed within budget
- Completion on time
- Best quality possible for the price
- Value for money
- No surprises

Quantity surveyors who deliver these important client demands are likely to prosper not only in South East Asia but through out the world.



PROCEEDINGS

3<sup>rd</sup> Pacific Association  
of Quantity Surveyors  
Congress

Quantity Surveying In The New Millennium  
- Challenges and Opportunities

*Conference Session 3*

# **VALUE MANAGEMENT : PRACTICAL APPLICATIONS**

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## **Abstract.**

Value Management at present is currently widely used in many developed countries and attracting considerable attention in certain developing countries. There is a view held by some that Value Management is simply just another cost cutting tool, however it misses an important feature of Value Management which is creativity and systems approach to validate a certain proposal. The structured functional analysis is very significant during the Value Management methodology, in achieving the cost optimisation.

The fundamental contribution by the Value Management exercise is to eliminate the unnecessary cost which does not contribute to the value of the services, product, systems and that includes the construction projects. This paper begins with the brief history of Value Management, the explanation of its concept and definition, the function analysis, the Value Management's application, the job plan and an abstract of two factual case studies were facilitated by the author.

## **The Brief History of Value Management.**

---

Value Management originated in the United States emerging as a result of components and material shortages in the manufacturing sector during World War Two. Mr. Lawrence Miles (The Founder of Value Engineering) was greatly responsible for the establishment of the technique in 1942 and since the technique is very much accepted in various industries. Presently many US governments agencies and other developed nations use VM technique in their projects. In Australia, The New South Wales Governments required VM studies to be applied for its Capital works projects costing over A\$5m.

## **The Definition & Concept of Value Management.**

---

Value Management is a rigorous, systematic effort to improve the value and optimize the cost of project, facilities and system. Value Management generates these costs improvements without sacrificing the needed performance levels. It is a creative way of working together in achieving client's and stakeholders requirements. **Miles** in the original context of Value Management then called Value Analysis defined as *"philosophy implemented by the used of the specific of techniques, a body of knowledge, and a group of learned skills"*. **Dell 'Isola (1982)** later simplified the definition as *"the creative organized approach whose objective is to optimize and/or performance of a facility or system."*

Value Management has been defined in other number of ways such as :

- Kelly and Male (1991) define Value Management as an oriented effort to attain optimum value in product, system or service by providing the necessary functions at the lowest cost.
- "Australia's Department of Defence, reference book DRB 37 defines Value Management as "The systematic effort directed at identifying the function of systems, equipments, facilities, procedures and supplies for the purpose of achieving the essential functions at the lowest cost consistent with the needed purpose, performance, reliability and maintainability".

Kelly and Male (1991) characterised Value Management by being:

- Systems oriented-uses a formal job plan to identify and remove unnecessary costs.
- A Multy-diciplinary team approach - teams of experienced designers, estimators and Value Management Consultants.
- Life cycle orientated-examines the total costs of owning and operating a facility.
- A proven management technique.
- Function orientated - relates function required to the value received.

## The Definition & Concept of Value Management. (cont'd)

The relationship between Value, Function (worth), Quality and Cost can be symbolised as follows:

According to Carlos Fallon,

$$\text{Value} = \frac{\text{Worth}}{\text{Cost}}$$

Where:

Worth = The least cost of providing the needed function and the required performance and is found by means of comparison of costs of units which are functionally equivalent

Cost = The life cycle cost of the product/project

Another relationship by Dell 'Isola,

$$\text{Value} = \frac{\text{Function (F)} + \text{Quality (Q)}}{\text{Cost (C)}}$$

Where:

Function = The specific work that a cost design / item must perform

Quality = The owner's or user's needs, desires and expectations

Cost = The life cycle cost of the product

Therefore, we can say that :

Value = The most cost effective way to reliably accomplish a function that will meet the user's needs, desires and expectations.

As such, Value can be increased by the following approaches :

$$\text{Value (V)} = \frac{(F) + (Q)}{(C)} \quad \begin{array}{c} \rightarrow \\ \downarrow \end{array} \quad \begin{array}{c} \uparrow \\ \rightarrow \end{array} \quad \begin{array}{c} \uparrow \\ \downarrow \end{array} \quad \begin{array}{c} \uparrow \\ \uparrow \end{array}$$

At the core of Value Management process is the analysis of functions of the system as a whole.

### Function Analysis.

Function Analysis involves clearly identifying what things actually do, or what they must do to achieve the project objectives.. Through the analysis of functions, it is possible to identify the wastage, duplication and unnecessary expenditure thus providing the opportunity for value to be improved. The function analysis perspective not only enables Value Management to explore the project and/or program brief but also to test the assumptions and needs perceived by the author of the brief.

### Application of Value Management.

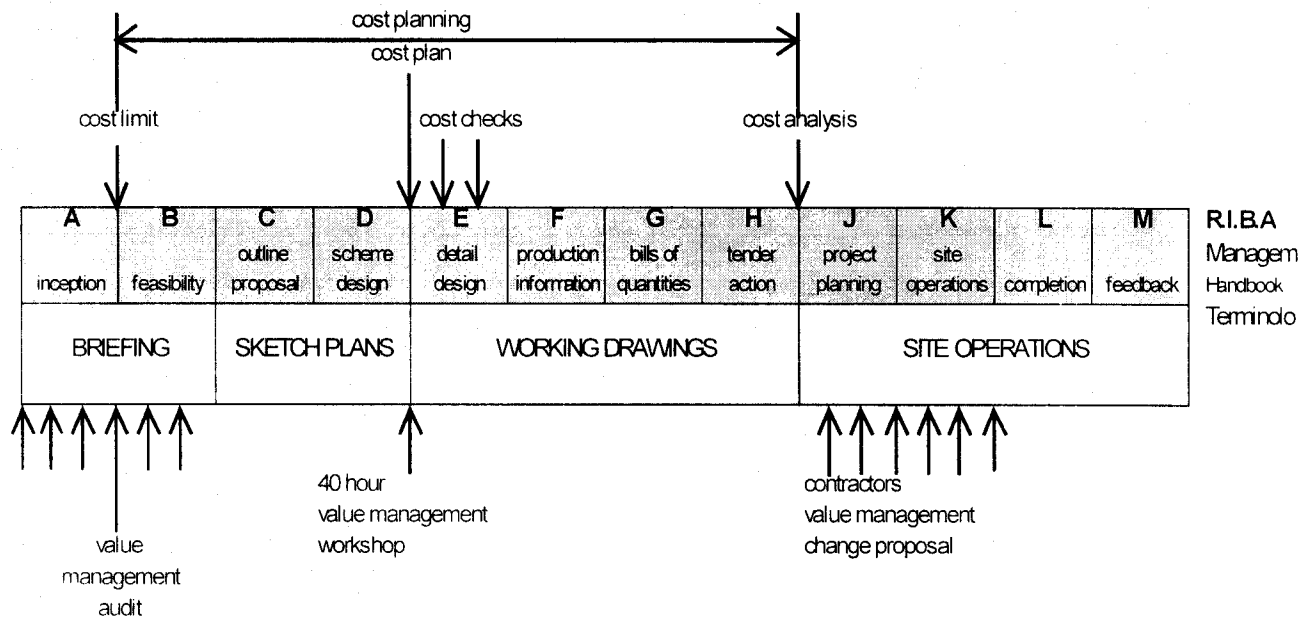
The success of Value Management study depends on the active participation from both the client's agency and the design team. One significant benefit of Value Management is the effective communication between the above group of people. The client's requirements are very well understood by the design team as shown (Figure 1) below.

Program Objective	Program Strategies	Project Concepts Objective Brief	Project Design Early	Project Design & Documentation
<b>VM Outcomes</b>				
Set and prioritise objectives	Identify and evaluate options	Set and prioritise project objectives against program objectives: identify project needs	Identify and evaluate options against projects objectives	Project review at approximately 35% design development: evaluate design function against projects objectives confirm delivery strategy
<b>Without Value Management</b>				
Client agency				Construction/consultancy agency
<b>With Value Management</b>				
Client agency				Construction/Consultancy agency

Source: Value Management Manual (1990) - NSW Australian Government

Figure 1 - Value Management Application

## Application of Value Management . (cont'd)



Source : Kelly JR & Male SP (1991), The Practice Of Value Management & Enhancing Value or Cutting Cost, The Royal Institution Of Chartered Surveyors

Figure 2 - The Application of Cost Planning and Value Management

The application of Value Management methodology at any stage of construction process (Figure 2) will identify those unnecessary costs. Its integration with cost planning is very significant.

Value Management studies can take place at any stage in the development of a project. However it is acknowledged that there is the potential for greater return on investment if it is used at the very early stages illustrated in Figure 3.

As such Value Management should be performed as early as possible even before the commitment of funds, approval of systems or design as to maximize results.

The cost of making changes and remedial works will be greatly increased later in the development stage.

Assuming the project is already committed the Main Contractor has already been engaged and then the client decides to review the design by using Value Management technique, some recommendation are put forward resulting in variation orders that leads to the possible loss and expenses claim by the Contractors and abortive fee claim by the Consultants.



### Application of Value Management. (cont'd)

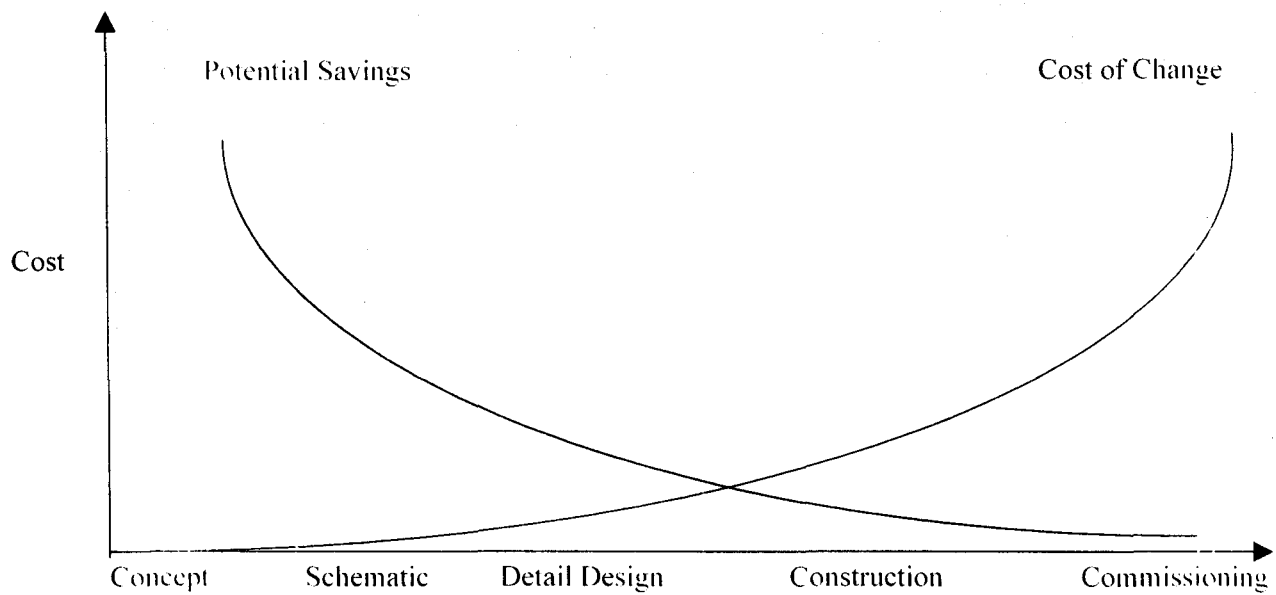


Figure 3 – Stage of Project and Savings Potential

### Value Management Job Plan.

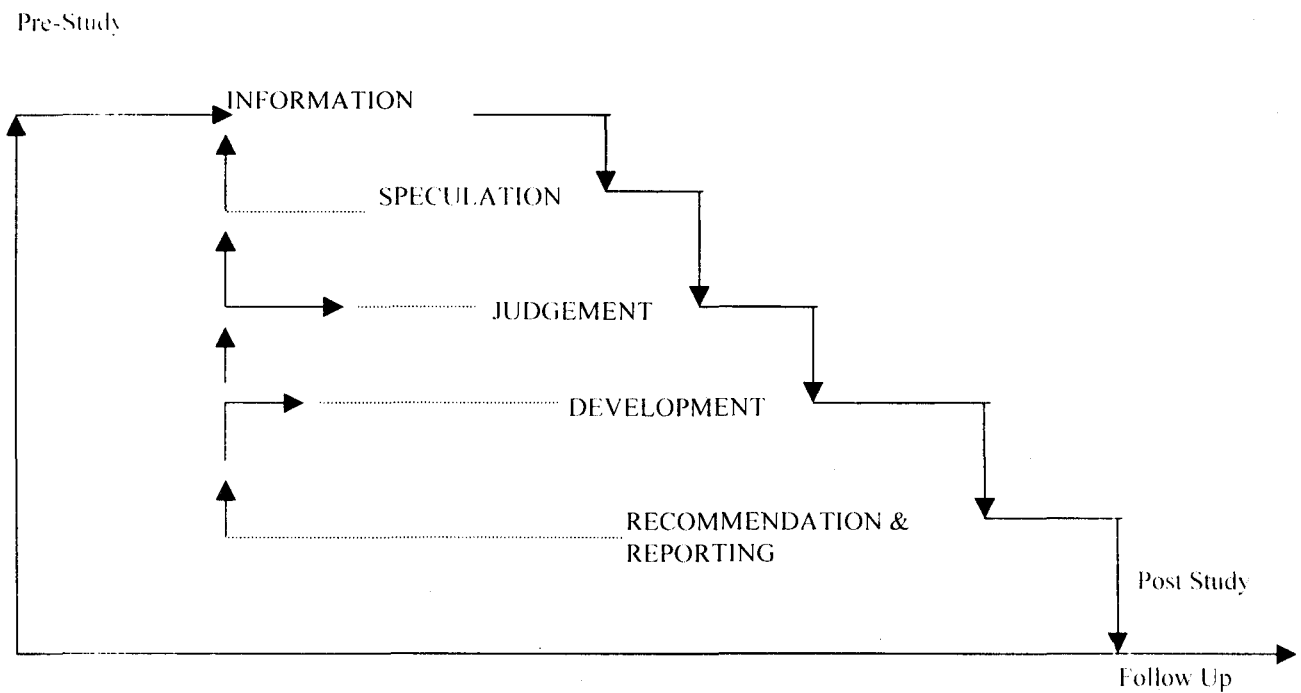


Figure 4 - Five steps on the Value Management Job Plan

## **Value Management Job Plan. (cont'd)**

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The five steps of the Job Plan are shown diagrammatically (*Figure 4*) above. The significant of the arrows is that, whilst a cascade system is used, with each phase flowing on from and using the output of the preceding phase, there is frequently reversion to a previous phase, as a result of some discovery or unexpected development.

### **Pre-study Preparation.**

Discussions with the project client prior to the actual workshop is very important so that each party to the study has a clear understanding of how and why a Value Management study is conducted and make known to them of their required input.

### **Information Phase.**

The information phase is the beginning of the Job Plan and understanding the decisions that have influenced the development of the project design is crucial. Designers are to present an oral overview of the project.

### **Speculation Phase.**

The information phase of Value Management study never ends as it keeps on adding as the study progresses. The Value Management team then accomplishes the creativity phase to generate as many ideas as possible.

### **Judgement Phase.**

Ideas generated from the creative phase are then judged as to their merits and demerits. Ideas found impractical and to be irrelevant or not worthy of additional study are disregarded. Those ideas that has potential for cost savings or improvements to the project are then developed further.

### **Development.**

The ideas that have been evaluated and selected earlier are expanded into workable solutions. Alternative design sketches and illustrations are prepared whenever necessary. The alternative proposal is estimated preferably its life cycle cost that includes not only initial cost but operation and maintenance during its economic life span. Although each job plan phase has specific items that must be accomplished and specific cut off time and dates it does not mean that the job plan is not flexible. It may be necessary, after receiving new information, to revert back to the earlier phases of the job plan to gain information or brainstorm new ideas.

### **Recommendation and Reporting Phase.**

The functions of the recommendation and reporting phase are to :-

- i. Sell recommendations  
The decision makers and the implementing people must believe this is a good recommendation.

## **Value Management Job Plan. (cont'd)**

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ii. Incite action

After the recommendations are accepted as being good, then there must be some direction to act. The Value Management team can reset if requested by the Client to review the implementation of the approaches recommended earlier.

iii. Convey information

The specific details must be communicated in order to implement the recommendations.

This phase is very important because without an effective report all the study effort does not bring much impact.

The reporting format comes in many approaches, attached are three typical report list of contents.

A complete report includes :

- Executive summary - A brief description of the project studied and a brief summary of the problem and recommendation.
- The results of the functional analysis.
- Sketches before and after design showing proposed changes.
- Technical data supporting the selection of alternatives.
- Cost analysis.
- Acknowledgement of the contributions by all parties involved.
- Action Plan – Preparation of an action plan to monitor the progress of the project.

## **Case Studies**

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Due to confidentiality, the identities of the parties involved and locations are not revealed. The case studies were chosen to demonstrate the significant contributions by adopting the Value Management methodology.

### **Case study A**

The objectives of the value study were to evaluate the designs by the present consultants, to optimise cost and also fulfilling the environmental and safety requirements.

The project has been tendered out, evaluated and in the process of awarding the contract. However, several major recommendations have been established by the end of the value study to be forwarded to the client's top management for their decisions prior to the award of contract.

The cost model was prepared based on the priced Bills of Quantities furnished by the Quantity Surveyor. Major cost components were identified and the modest target cost of savings was established in the region of RM4.3 million. ( See Appendix 'A' )

The 22 member participants (inclusive of consultants) were distributed into four (4) sub-groups. First sub-group worked on Value improvements of Bridges / Via-Ducts, Earthworks and Geometric Design. Several major design solutions have been proposed by changing the current design alignment at Km 7 i.e. to follow the existing access. Several major findings were proposed for Bridges and Via-ducts.

Second sub-group worked on the Pavement, Road furniture and Road safety. The pavement thickness has been reviewed, the current proposal to use New Jersey Barrier has been changed to double-sided guardrail at the medians and the shoulder structures have also been thoroughly discussed.

Third Sub-Group worked on drainage, culverts and related items. The group suggested the roadside drain to be in-situ in lieu of precast. The sub-group also highlighted the importance of having lighting at the junctions. Generally, the sub-group was satisfied with the existing design.

Fourth Sub-Group worked on Slope Protection and Environmental issues. Many major points were raised for further design evaluation. The cheaper alternative material for gabion wall was highlighted, the silt traps issues, silt fence and the proposal to provide the drainage blanket and surface drain are amongst others that were discussed.

During the three and the half (3 ½) day study, 104 ideas were generated of which 69 were set aside for evaluation amongst the consulting team and the client.

Outcomes of the study were two fold in that it identified many areas in the existing solutions where value improvements can be made without loss of functions, these improvements would lead to cost savings in the order of RM4.0 million - RM5.0 millions.

### **Case study B**

The objectives of the value study were to evaluate the current designs concepts by Architectural group to validate the space and to optimise cost without compromising the functions and performance of the proposed buildings.

The design was at the concept stage however detail space distribution has been established by the clients.

The sub-groups were asked to identify the "musts" of Architectural, Interior Designs, Structures, Mechanical and Electrical Requirements, Landscaping and External works. This gave a deeper insights of the building requirements, without which the building will not perform as what is expected as good performance buildings.

The space model was prepared based on the current space distribution given by the client. Space validation proved to be very significant as it resulted in RM2.9 million savings. ( See Appendix 'B' – Administration Block Only ).

The twenty two (22) member participants were distributed in four (4) sub-groups.

The first group, which work on the External Work has proposed a very few significant savings such as the reduction of the basement car park by one third and capitalise the external spaces as subtle car parks which resulted in RM 3.1 million savings. The shortening length of waterway also proved to be savings. The savings can also achieved by relocating the sub-station.

Second sub-group worked on Architectural component has also established few important ideas such as the relocation of service lifts to toilet area and reducing the number of lift to fully utilise the high museum roof space and proposing to reorientate the building are amongst others.

The third sub-group worked on Landscaping and suggested that the proposed building to reorientate facing towards the landscape area to get a better view. One number of pedestrian was found out not necessary and does not bring much added value this omission results in significant savings. The position of the water gate also suggested to be realigned to a smaller width river with lesser costs.

The fourth sub-group came up with an interesting idea and improved value by having at least one wall panel transparent for lift shaft over looking exhibition area.

## **Conclusion**

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Value Management provides a good platform for the members of the design team and stakeholders to discuss and solving the problems in the best possible manner, and works best for the construction sector due to the nature of its activities that involve many disciplines and background. As a Professional, as a manager, no matter what our positions are, we have to be open, pro-active in our attitude to accept new things and value improvements as Miles once quoted that "habits take us where we were yesterday and attitudes keep us there".

# Cost Model

## Value Management Study

Legend :

VM Target :  
Actual/Estimated :

Component  
or Element

Million RM

Million RM

Project :

PROPOSED ROAD WORK

Location :

Phase of Design :

Date :

NOTES :

Amount :

### TOTAL

108.43

112.76

Earthworks	Drainage	Pavement	Road Furniture	Bridges	Slope Stabilization	Bridge (V2) (Understudy)	Others
14.53	5.90	6.88	3.47	43.43	17.79	10.58	5.85
14.87	5.98	7.21	3.63	45.72	18.48	11.02	5.85
Earth Embankment	Toe Drain	Unbound Course	New Jersey Barrier		Soil Nailing	Reinforced in situ Concrete	Preliminaries
2.10	0.35	3.14	2.25		12.23	0.93	5.27
2.21	0.37	3.31	2.37		12.87	0.98	5.27
Embankment at Disposal	Cascade Interceptor	Bituminous Course	Guard Rails		Disposal at Sites	Pre-Cast Post Tensioned Beam	Retaining Walls
1.88	0.30	3.21	0.79		0.95	7.51	0.17
1.98	0.32	3.38	0.83		1.00	7.90	0.17
Protective Vegetation	Berm Drain	Miscellaneous	Miscellaneous		Miscellaneous	Miscellaneous	Environmental Monitoring
2.41	0.48	0.52	0.43		4.61	2.14	4.61
2.54	0.51	0.52	0.43		4.61	2.14	4.61
Miscellaneous	Stream Diversion						
8.14	0.37						
8.14	0.39						
	Miscellaneous						
	4.39						
	4.39						

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 Malaysia



## Function Analysis - Space

	Component	Function		Kind	Cost RM m2	Worth RM m2	Value Index	Remarks
		Verb	Noun					
	<b>Admin. Block</b>							
	<b><u>GROUND FLOOR</u></b>							
	1 LOBBY	RECEIVE	VISITORS	S	72.0	72	1.0	NO CHANGE
	2 STORAGE AREA	DISPLAY	EXHIBITS /					
			COLLECTIONS	B	619.5	619.5	1.0	NO CHANGE
	3 LABORATORY	TEST	EXHIBITS	B	238.5	238.5	1.0	NO CHANGE
	4 SERVICE (M&E)	HOUSE	SERVICES	RS	444.5	444.5	1.0	NO CHANGE
	<b>TOTAL</b>				<b>1,374.5</b>	<b>1374.5</b>		
	<b><u>FIRST FLOOR</u></b>							
	1 OFFICE	PROVIDE	WORKING AREA	B	369.0	157.0	2.4	REDUCE BY 57%
	2 LOBBY	FACILITATE	ENQUIRES	S	72.0	36.0	2.0	REDUCE BY 50%
	3 STORE	STORE	EXHIBITS / COLLECTIONS	B	859.0	859.0	1.0	NO CHANGE
	4 SERVICE	HOUSE	SERVICES	RS	414.0	355.2	1.25	14 % REDUCTION
	<b>TOTAL</b>				<b>1,714.0</b>	<b>1407.2</b>		

## Function Analysis - Space

	Component	Function		Kind	Cost RM m2	Worth RM m2	Value Index	Remarks
		Verb	Noun					
	Admin. Block							
	<b><u>FOURTH FLOOR</u></b>							
	1 OFFICE	PROVIDE	WORKING AREA	B	1215.0	1000.0	1.2	20 % REDUCTION
	2 LOBBY	FACILITATE	ENQUIRES	S	81.0	81.0	1.0	NO CHANGE
	3 MEETING ROOM	PROVIDE	MEETING PLACE	B	252.0	252.0	1.0	NO CHANGE
	4 SERVICE	HOUSE	SERVICES	RS	432.0	355.2		SAME AS LEVEL 1
	<b>TOTAL</b>				<b>1,980.0</b>	<b>1688.2</b>		
					<b>8376.50</b>	<b>6736.30</b>		= <b>1640.2</b>
								<b>@RM 980.00</b>
								= <b>RM 1,607,396.00</b>

## Function Analysis - Space

	Component	Function		Kind	Cost RM m2	Worth RM m2	Value Index	Remarks
		Verb	Noun					
	Admin. Block							
	<b><u>SECOND FLOOR</u></b>							
	1 OFFICE	PROVIDE	WORKING AREA	B	318.0	157.0	2.03	50 % REDUCTION
	2 LOBBY	FACILITATE	ENQUIRES	S	63.0	36.0	1.75	SAME AS LEVEL 3
	3 STORE	STORE	EXHIBITS / COLLECTIONS	B	405.0	405.0	1.0	NO CHANGE
	4 BILIK KEBAL	STORE	EXHIBITS	B	108.0	108.0	1.0	NO CHANGE
	5 PHOTO ROOM (DARK ROOM)	PROCESS	FILMS	B	90.0	90.0	1.0	NO CHANGE
	6 SEVICE	HOUSE	SERVICES	RS	472.5	355.2	1.33	SAME AS 1 ST FLOOR
	<b>TOTAL</b>				<b>1,456.5</b>	<b>1151.2</b>		
	<b><u>Third Floor</u></b>							
	1 OFFICE	PROVIDE	WORKING AREA	B	733.5	157.0	2.3	SAME AS LEVEL 2
	2 LOBBY	FACILITATE	ENQUIRES	S	72.0	36.0	2.0	50 % REDUCTION
	3 STORE	STORE	EXHIBITS	B	567.0	567.0	1.0	NO CHANGE
	4 SERVICE	HOUSE	SERVICES	RS	479.0	355.2	1.34	SAME AS LEVEL 1
	<b>TOTAL</b>				<b>1,851.5</b>	<b>1115.2</b>		

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# **Does the Quantity Surveyor have a role to play in construction waste management?**

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## **Abstract**

Construction waste is accepted as being unavoidable and construction estimators would concede that it is essential to include an allowance for waste when preparing a bid. Until recently, many contractors regarded the cost of waste as a minor component of the overall project cost. In Australia, recent changes in legislation, greater environmental constraints and public awareness, increased competition and a quest for improved efficiency and productivity by the construction industry has created a situation where improved waste management is a matter of importance. Given that one of the main services provided by the quantity surveyor is to advise the client on financial matters, then surely it is incumbent on the quantity surveyor to have a thorough knowledge and understanding of latest developments affecting construction costs. Minimally, quantity surveyors should be able to measure and include waste costs when forecasting tender bids. The contention of this paper is that the quantity surveyor is in an ideal position to offer a further service by preparing waste budgets and audits. Such budgets would forecast waste quantities and associated costs prior to construction whilst the audit would measure actual quantities and costs to assess waste performance. These would be of benefit where a waste management plan is required to obtain development approval. This paper proposes a model to facilitate this end. This would in turn allow waste management to objectively become a value-added service to the contractor, the client and ultimately would result in a better environment.

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## **A Changing World**

The world is changing at a faster rate than has ever been experienced before in our history. After two hundred years of rapid industrial growth the environment is under severe stress. Many scientists question earth's capacity to sustain an acceptable environment for human beings unless we change the way we live. Consider the following aspects:

- Threats to the bio-diversity
- The greenhouse effect
- Ozone depletion
- Air, water and soil pollution
- Over-consumption of resources

The construction industry has an important part to play in preserving the environment, since the industry's activities and current practices often impact adversely on the environment. This is apparent in the amount of solid waste generated by the industry and disposed of as landfill, and sometimes the squandering of valuable resources.

## **An Overview of the Construction Waste Problem**

In recent years there has been an increasing focus on construction waste. This is largely due to environmental concerns relating to the problem of disposing of solid waste from cities. It has been found in studies in the US, Netherlands and Australia that construction and demolition waste is in the range of 20-30% of all solid waste entering landfill (Bossink & Brouwer, 1996). Germany has a slightly lower rate at 19% which is thought to be a result of stringent environmental policies introduced in the late 1980s (Wilson 1996). In Australia, a recent survey (du Blet, 1994) indicates that housing construction waste accounts for as much 25% of the municipal solid waste stream in Sydney. The survey also reported that construction of a single family home generates about 17kg waste for every square metre of floor area (excluding any excavation spoil removed from site).

It is apparent that there is an environmental need to curb construction waste [Kumaraswamy and Dissanayaka (1997), Construct New South Wales (1998) pp. 29, Waste Not (1996)]. There is also a commercial need to reduce non-value adding production costs [Koskela (1994), Hammer and Champy (1993)]. These two areas are related in so far as increased environmental regulation tends to cause greater expense in traditional approaches to disposing of on-site waste. This causes contractors to review the way they economically deal with waste.

## **Legislative Requirements**

The legislation passed in New South Wales in recent years is typical of the approach being adopted by other western world governments. Policies have been formulated and legislation passed aimed at minimising waste and encouraging increased participation in recycling. The most recent legislation in NSW is the Waste Minimisation and Management Act, 1995 (WMM Act). The major thrust of this legislation is on waste reduction through a waste management hierarchy focussing on avoidance, re-use, recycling and lastly waste disposal. The aim of the WMM Act is to achieve, as a minimum, the Australia New Zealand Environment and Conservation Council's aims of a 60% reduction in waste disposal to landfill (based on 1990 per capita figures) by the year 2000.

One of the features of this legislation is the imposition of levies on operators of waste facilities for waste being dumped. A similar approach has been adopted in UK where landfill tax has been imposed. These levies and taxes are varied according to the nature of the materials being disposed of, and the aim of this legislation is to reduce the economic viability of using landfill.

In addition, the NSW Combined Sydney Regional Organisations of Councils have developed the "Waste Not - Model Development Control Plan" which is the main instrument used by Local Government to monitor and act on waste minimisation in the construction sector. It calls for builders and developers to submit a waste management plan that will be assessed as part of the development approval process on building work. It requires builders to estimate quantities of waste, under respective material categories, and then specify the measures they will use to avoid or minimise waste. The preparation of such waste management plans would appear to be a service that could ideally be rendered by the quantity surveyor, given their traditional role as construction cost consultants.

## **A Suggested Model for a Project Waste Management Plan**

The approach proposed for developing waste management plans aims to meet the cost control needs of contractors as well as the regulatory and client needs. This is achieved by firstly identifying the waste costs so that the contractor can then make a well informed decision about which waste management strategies will be most beneficial in meeting “cost” and “environmental” needs. However, environmental legislation aimed at landfill reduction is likely to be the main issue that contractors will need to comply with but it is considered important to make such decisions with a full understanding of the cost implications.

The project waste management plan (PWMP) is developed from the cost profile for the project. The cost profile is obtained from the project estimate that provides a trade (preferably) or elemental cost breakdown of the project. The information contained in the estimate is used to identify and quantify the cost of materials (e.g. brickwork, plasterboard, etc.) which are likely to be contributors to the waste stream.

The PWMP can be prepared in either an abridged format or comprehensive format. The abridged format only considers the large or most significant contributors to the waste stream which for most residential scale projects will involve only three materials. This is apparent from the study of agglomerated waste from a 10 cottage sub-division, refer Table 1. It shows that the top three materials account for 97.46% of materials to the waste stream measured by weight.

<b>Table 1: Proportional contribution of materials to waste stream</b>		
<b>Material</b>	<b>Mass (t)</b>	<b>% (by mass)</b>
Bricks	40.23	88.81
Timber	2.32	5.12
Plasterboard	1.60	3.53
Metal	1.00	2.21
Others	0.15	0.33
<b>Total</b>	<b>45.3</b>	<b>100.00</b>

The comprehensive format quantifies and costs all materials. The additional time and effort required to record all contributors is in most cases not considered warranted by the authors. The following example is presented in abridged format.

### **Preparing an Abridged Project Waste Management Plan**

A worked example of an abridged project waste management plan is provided with a detailed description of the steps necessary to complete the plan. This basic example involves a hypothetical single-storey three bedroom brick-veneer residence, known as House A01.

The steps below show the logic to the system. They should be completed from the perspective of the organisation that will use the plan and as such only relevant parts of the plan need be provided to other interested parties (e.g. local councils).



### Step 1

- Aim: Identify the type of construction involved
- Method: Tick the relevant boxes in Table 2.

Table 2 Waste Management Plan – Construction Profile for : House A01					
External Wall Type		Ground Floor Type		Roof Covering	
Brick Veneer	<input checked="" type="checkbox"/>	R.C. stiffened raft	<input type="checkbox"/>	Concrete roof tiles	<input checked="" type="checkbox"/>
Full Brick	<input type="checkbox"/>	R.C. waffle raft	<input type="checkbox"/>	T.C. roof tiles	<input type="checkbox"/>
Clad Frame	<input type="checkbox"/>	R.C. suspended slab	<input checked="" type="checkbox"/>	Metal deck	<input type="checkbox"/>
AAC	<input type="checkbox"/>	Suspended timber	<input type="checkbox"/>	Other .....	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	Other .....	<input type="checkbox"/>		
Other .....	<input type="checkbox"/>				
Notable Site Works		Design Standardisation		Areas	
Driveways/Paving	<input type="checkbox"/>	Highly standardised	<input type="checkbox"/>	Building Area: 90 m <sup>2</sup>	
Fencing	<input type="checkbox"/>	Standard design	<input checked="" type="checkbox"/>		
Landscaping	<input type="checkbox"/>	Non-standard	<input type="checkbox"/>	Site Area:	
Other .....	<input type="checkbox"/>				

This table can be stored on a database and would allow for comparison with other projects if necessary.

### Step 2

- Aim: Identify the major purchase waste items.
- Method: Abstract the relevant cost information from the estimate to obtain a cost profile of the main waste contributing items and list in the Construction Cost Profile column (refer Table 3, column 1). On prepared sites it will usually only be necessary to identify the three largest "purchase waste" items. Preference should be given to materials where the fabrication method is known to make it a relatively significant contributor to the waste stream. In doing this, preference may be given to either cost or landfill performance objectives. Where both objectives are important then more than three material categories may be selected in the Major Purchase Waste Items section.

### Step 3

- Aim: Create a basis for comparing "Expected project waste costs" with "Average project waste costs". This should definitely be completed for those materials expected to go to landfill and additionally for other materials where managers wish to know how much money is being expended on waste. This step will therefore flag areas where waste minimisation strategies are important when minimising waste costs.
- Method: Using the data obtained from previous similar residential projects, (refer Appendix A for an example of roof tiling waste margins), determine the "Average purchase waste

margin" for each material identified in the previous step and determine the "Expected purchase waste" margin which will apply to the project in question. This is an estimate arrived at, after considering if you can do better or worse than the average margin. Insert the figures into the Waste Margins columns (refer Table 3, *columns 3 and 4*). Then, multiply the respective margins by the previously determined material costs to calculate the "Average" and "Expected" Waste Cost Profile (refer Table 3, *columns 5 and 6* respectively). In all cases, the "Expected waste margins" should be supported by appending a completed "Causes and Minimisation Strategies pro-forma" for each material identified in step 2 (refer Appendix B for an example of roof tiling causes and minimisation strategies). They indicate how the "Expected waste margins" will be achieved. Since they are separate forms, they are cross-referenced to the main table by placing a tick in the Strategies column (*column 10*).

#### Step 4

- Aim: Identify and list other significant "unavoidable waste" items arising from demolition removal, excess spoil and vegetation removal.
- Method: From the project estimate identify items that broadly fall into the category of demolition waste, excavation spoil and vegetation to be removed from site. These items may vary significantly from one project to another, and must be quantified for each project. Furthermore, large demolitions may need an attached break-up of quantities to help validate the summarised figures in the main plan. These materials are often "unavoidable" and result in 100% waste to landfill unless dealt with via re-use and recycling strategies.

#### Step 5

- Aim: After having identified "purchase waste" cost and "unavoidable waste" cost, determine the cost of material disposed of as landfill.
- Method: Identify the materials that would go to landfill on the basis that no waste management strategies are applied. For these materials, determine the quantity of bricks, plasterboard, etc, that could be purchased for the previous "Average" and "Expected" waste costs. This can be determined from the project budget costs or from generic commodity prices in proprietary cost guides. Convert these quantities to kilograms and enter the amount in the "Disposal - Average" column (*column 7*), and temporarily enter the amount in the "Disposal - Expected" column (*Column 8*), refer Table 3. The temporary figures are not shown in Table 3, only final figures because in the example, the final figure for plasterboard is zero by virtue of a decision to re-use/recycling the plasterboard waste. The means of validating how this re-use/recycling will be achieved is by ticking the relevant parts of the appropriate "Causes and Minimisation Strategies" pro-forma.

#### Step 6

- Aim: Assess "Expected" waste performance compared with "Average" waste performance. From this, identify where additional waste minimisation intervention is warranted. This should definitely be done for large quantities of materials going to landfill. Comparison of

waste costs may also be undertaken where relevant for construction management purposes.

- Method: Total the "Average waste cost" and "Expected waste cost" items. Express, the total "Expected waste costs" as a proportion of the total "Average waste costs" to determine "Waste Cost Performance", refer, Table 3. Similarly, determine "Landfill Performance", refer Table 3.

#### **Step 7**

- Aim: Review and finalise the plan in accordance with any changes to the planned waste management strategies.
- Method: Make appropriate changes to the cost of purchase waste materials and also changes to disposal, re-use and recycling costs, where relevant. If the changes to cost significantly affect the viability of implementing waste management strategies then review the strategies and amend the figures as necessary.

#### **Step 8**

- Aim: Distribute the project waste management plan to the relevant parties.
- Method: Now the plan is complete and can be distributed to those involved in actively implementing and/or monitoring the strategies.

**Table 3: Abridged Waste Management Plan – House A01**

Waste Cost Centres	Construction Cost Profile		Waste Cost Profile				Landfill Profile			Strategies
			Waste margins (%)		Waste Cost Profile (\$)		Disposal (kg)		Reuse/Recycling (kg)	Refer Attachments
	\$	%	Average	Expected	Average	Expected	Average	Expected	Expected	Tick
Column	1	2	3	4	5	6	7	8	9	10
<b>Large “Purchase waste” materials fabricated on-site</b>										
Concrete slab	2,764	4.73	12.0	7.0	331	193	0	0	0	✓
Bricks	2,287	3.92	6.0	3.0	137	69	1,065	536	0	✓
Plaster linings	2,224	3.81	8.0	8.0	178	178	194	0	194	✓
<b>Other material purchases</b>										
Small purchases, pre-fab, pre-cut, manufactured goods	22,474	38.50	Not incl.	Not incl.	Not incl.	Not incl.	Not incl.	Not incl.	Not incl.	
<b>Unavoidable waste (from the pre-existing site)</b>										
Demolition removal (itemise separately where necessary)	N/A	0	N/A	N/A	N/A	N/A				
Excess spoil	N/A	0	N/A	N/A	N/A	N/A				
Vegetation removal	N/A	0	N/A	N/A	N/A	N/A				
<b>Flow-on waste costs</b>										
Disposal costs	650	1.11	N/A	N/A	650	550				
Re-use costs										
Recycling costs										
<b>Excluded items</b>										
Labour, equipment, overheads and profit	27,981	47.93	N/A	N/A	N/A					
<b>Project totals:</b>	<b>58,380</b>	<b>100%</b>			<b>1,296</b>	<b>990</b>	<b>1,259</b>	<b>536</b>		
<b>Waste cost (% of project cost)</b>					<b>2.22%</b>	<b>1.70%</b>				

**Table 3: Abridged Waste Management Plan – House A01 (cont.)**

Site fabrication waste factor: [Large purchase waste materials / Total materials * 100 ]	25%			
Landfill disposal (kg/ m <sup>2</sup> of floor area)			9kg/m2	
Waste Cost Performance: [ (Expected cost – Average) / Average * 100 ]		-31%		
Landfill Performance: [ (Expected Landfill – Average) / Average* 100 ]				-57%

### Discussion

The abridged waste management plan described above does not attempt to calculate the total waste for the project. This is because most of the landfill waste comes from a limited number of materials and there is a limited value in quantifying medium or minor contributors. In such instances, inter-project comparisons are still possible by ensuring that the projects have similar "Site fabrication waste factors". This factor is a measure of large waste generating materials expressed as a proportion of overall material purchases. As such, it excludes pre-fabricated items such as kitchen cupboards and timber wall framing. Consequently, the Waste Cost Performance and Landfill Performance results listed above do not reflect the total project situation, but are based on waste reduction for 25% of the overall material purchases plus flow-on waste costs. Also, the total project waste disposed of as landfill would be greater than the 536kg reported above. The importance of the plan is to indicate the actions that have been taken to manage and minimise the impact of waste generated by the project and to quantify the results of those actions.

It should be emphasised that when preparing the waste management plan it is necessary to review the strategies adopted to minimise waste several times if necessary, until an optimum solution is obtained.

Also, it is important that the forecast results should be reviewed in the field to determine actual performance against forecast performance. Such site audits are necessary to maintain reliable waste margin and minimisation strategies data. The preparation of accurate PWMP is very dependent upon comprehensive and reliable waste margin and minimisation strategy data.

### Conclusion

In Australia, recent changes in legislation, greater environmental constraints and public awareness, increased competition and a quest for improved efficiency and productivity by the construction industry has created a situation where improved waste management is a matter of importance. The quantity surveyor is in an ideal position to render an important service by preparing waste management plans and audits. The model described previously is regarded as a means of fulfilling this new industry need. It is considered that the proposed waste management plans would be a value-added service to the contractor, the client and ultimately would result in a better environment.

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## APPENDIX A

(Example of waste margin tables)

Roof Tiling - Purchase waste margins(concrete and terra cotta)		
Minimum waste (%)	Average (%)	Maximum waste (%)
<ul style="list-style-type: none"><li>• Good ratio of cut hip tiles that can be used in valleys</li><li>• Grid bond</li><li>• Good delivery and handling practices</li></ul>		<ul style="list-style-type: none"><li>• Poor ratio of cut hip tiles that can be used in valleys</li><li>• Staggered bond</li><li>• Poor delivery and handling practices</li></ul>
2.50%	4%	8%

**APPENDIX B**  
(Example of Causes and Minimisation Strategies Tables)

<b>Roof Tiling Purchase Waste Causes and Minimisation Strategies</b>			
<b>Causes of waste (common rank order)</b>	<b>Characteristic of waste causes</b>	<b>Specific Waste Minimisation Strategies (Tick menu for each job)</b>	<b>General Minimisation Strategies (tick menu for each job)</b>
1. Tile cutting and laying	<ul style="list-style-type: none"> <li>The ratio of hips to valleys will affect the quantity of useable off-cuts. A even ratio reduces off-cut waste</li> <li>Profile and thickness of the tile affects the ease of cutting and the amount of cutting waste.</li> <li>Staggered pattern creates more off-cut waste at gable ends.</li> </ul>	<p align="center"><b>Re-use</b></p> <input type="checkbox"/> Use a cutting box to help enable re-use of offcuts	<p align="center"><b>Avoidance</b></p> <input type="checkbox"/> Order roof tiles accurately, using best take-off practice e.g. direct from CAD drawing or from standard bill of quants.
2. Ordering Surplus	<ul style="list-style-type: none"> <li>The quantity of contingency tiles tends to increase where uncertainty exists e.g. roof extensions, large scale tile cutting.</li> </ul>	<p align="center"><b>Avoidance</b></p> <input type="checkbox"/> Apply best quantity take-off practice <input type="checkbox"/> Order minimum expected quantities then provide a top up order if necessary (Note: this is mainly only applicable to estates where regular deliveries allow economical delivery of extras)	<p align="center"><b>Recycle</b></p> <input type="checkbox"/> Site separate roof tiles on large tiling jobs or where demolition is involved (e.g. bins or piles) for either the bin supplier or waste remover to send to third party recycler or transfer station.  <input type="checkbox"/> New and demolished tiles are tipped into mixed waste bin, or pile, for either the bin supplier or waste contractor to send to third party off-site re-cycler.
3. Delivery and handling waste	<ul style="list-style-type: none"> <li>Carelessness in cutting vertical straps to pallets, increases the chance of tiles falling off the stack.</li> <li>The larger and more accessible the storage area, the less damage occurs.</li> <li>Sloping storage areas tend to increase the number of tiles toppling off pallets</li> <li>Tile conveyor can be a source of damage if not set-up evenly, positioned at a shallow angle, located near stack and secured properly</li> <li>Poor positioning of tiles or over stacking on the conveyor causes tiles to fall. This especially applies to ridge tiles which are less stable on the conveyor</li> </ul>	<p align="center"><b>Avoidance</b></p> <input type="checkbox"/> Provide a flat delivery area <input type="checkbox"/> Unstrap tiles in sequence. <input type="checkbox"/> Avoid stacking pallets where site area permits <input type="checkbox"/> Minimise carry from stack to tile conveyor <input type="checkbox"/> Position conveyor carefully <input type="checkbox"/> Stable and systematic use of stacking and unloading on conveyor	<p><b>Re-use</b></p> <input type="checkbox"/> Offer the customer left over (full) tiles.
			<p><b>Disposal</b></p> <input type="checkbox"/> Tiles are tipped into mixed waste to go to landfill

Note: "Quality mistakes" form a significant cause of waste. Mistakes are included in the waste margins but are not listed in "Causes"

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# Facility Management: A Role for the Quantity Surveyor in the New Millennium

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## ABSTRACT

In today's environment Quantity Surveyors need to look to expanding their horizons to use their expertise. The provision of a Facility Management service is one area that could become a leading component of a firm's revenue.

The role of a Facility Manager is explored in brief in particular for organisation that control properties but who may not provide a full facility management department/section within their own organisation. The services that we, as a profession, could offer to these firms is then explored together with any additional services we might be able to provide based on the assumption that we intend to remain in this field for the long term.

The effect of adding facility management services to quantity surveying practices will be explored and the possible returns to the practice evaluated.

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### 1. Introduction

Quantity Surveying as a profession has, over the last twenty years or so, expanded its frontiers of expertise into a diverse range of construction industry related opportunities. Most of the areas expanded into revolve around the areas of financial/economic advice and contractual advice. I believe that further expansion by the profession within our region, using these same skills plus some new ones, will lead the profession into offering services in the Facility Management area and thereby expand their core business.

### 2. Facility Management - defined

Several authors and groups have attempted to define Facility Management. The concept of Facility Management was first given a definition in the USA and the following definition is from the American library of Congress.

*Facility Management is the practice of co-ordinating the physical work place with people and work of the organisation, integrated the principles of business administration, architecture and the behavioural and engineering sciences.*

The above definition is a very broad and comprehensive view of Facility Management. This lifts Facility Management out of the realm of pure property management and brings under one definition the wide range of property and user related functions for the benefit of the organisation and its employees.

### 3. Facility Managers

The Facility Manager's responsibility is the non-core business area of an organisation although there may be times when the core/non-core areas are not clearly apparent. Managers are faced with the need to achieve their organisations stated goals by the most effective use of available resources. The most common way of achieving these objectives is to use an in-house system of Facility Management, with the exception of new construction work, which results in an increase of staffing in the organisation, together with the attendant increase in overheads.



Modern business has found that flexibility to meet changing conditions is essential and this will often include a downsizing of the organisation. However the current in-house method has been found wanting at times in flexibility. An alternative to this approach and one that is increasing in its application, is the "Contracting Out" or "Outsourcing" of all or parts of the non-core activities.

#### 4, Contracting Out

From the perspective of a Facility Manager one must now take a look at some of the perceived advantages and disadvantages of "Contracting Out" or "Outsourcing" of some or all of the Facility Management requirements of their organisation.

Perceived possible advantages to the organisation

- Reduced costs/economies of scale
- Concentration on core business/strategic appreciation of service
- Right sized head count/reduced space
- Improved productivity/operational efficiencies
- Increased flexibility/workload pattern
- No obsolescence/latest technology/specialist knowledge/current statutory knowledge
- Overcome skill shortage
- Value for money/quality
- Reduced management burden
- No career path development
- Implementation speed/response time
- Improved management control and performance levels targeted
- One stop shopping/one invoice/contractor acts as screen between user and supplier
- Improved accountability/performance levels monitored/user risk reduced
- Assist user to obtain a competitive advantage in the market place
- No capital outlay
- Tax gain

As with all advantages there are usually some disadvantages that a Facility Manager may see from an organisations prospective.

#### 5. The Professional Quantity Surveyor

Practices could promote themselves in the field of Facility Management based on their contract and contract management analysis and control expertise.

The promotion of the following list of our expertise to a Facility Manager would illustrate the advantages of service to be purchased by the organisation when "Contracting Out" to a professional Quantity Surveyor

- Appropriate contract methodology
- Competitive quotation
- Contract management
- Economic financial managementContinuous control
  - Analysis
  - Estimating
  - Life cycle costing
- Planning
  - Financial
  - Maintenance
  - Project
- Value for money
- Quality Management
  - Contractors
  - Sub-contractors
  - In-house

- Independent assessment
- Skilled special staffing (including consultants)
- Continual output information including reports

To this would be added the list of perceived advantages that would accrue to the organisation previously stated.

To complete for services in the field of Facility Management requires us to adapt our current practices to embrace additional statutory requirements and when expertise is lacking then employment of a consultant or new staff member is essential. An increase in the practice workload for ancillary staff would also increase depending on the workload created by new clients.

## 6. **Quality Management**

Organisations in various countries are taking on board the requirement of Total Quality Management. This requirement operates within their own internal system and those with whom they contract including suppliers. It will therefore be incumbent upon any practice contemplating working in the field of Facility Management to become ISO 9000 series accredited or local equivalent. Some practices have already taken the appropriate steps to become accredited.

## 7. **Information Technology**

The majority of practices now use some form of information technology, i.e. word processing, spreadsheets, database or a combination in specialised packages, in their day to day operations. This is born out by recent studies in Australia and New Zealand by the Construction Economics Research Committee of the University of Technology Sydney and presented at last year's conference.

Exchange of electronic information between the traditional parties in the construction industry is growing in New Zealand and will continue to do so provided that the capacity of compatibility between programmes is not decreased.

Recently moves have been made for the transference of CAD originated documents electronically between parties in the industry. This has meant for some practices an upgrade in their computing capacity. Facility Management requires a combination of CAD and database.

Several CAFM software programmes are available commercially. A combination of CAD, Excel spreadsheets and databases can provide information needed though they usually lack the ability for automatic upgrading of information from one source.

It is impossible to elaborate in a short paper the problems of selecting the correct software and firms need to discuss their requirements with individual software suppliers to obtain the most suitable products.

An illustration of some of the information that may be required from a CAD system is illustrated in attached Appendix A.

## 8. **Future Returns**

It is impossible to predict future income returns due to the diverse range of possible clients and their capital base. However, the work provided by Facility Management would greatly enhance the cash flow of practices provided that the contract with the client was not a lump sum base per annum.

## 9. **Education**

Undergraduate and postgraduate courses are becoming increasingly available throughout the world incorporating facilities management.

10. **Professional Organisations**

Professional organisations exist in several countries to promote Facility Management and to further the exchange of ideas and information. A brief list of some are:

IFMA	United States
JFMA	Japan
AFME	Australia
BIFM	United Kingdom

Several other countries including New Zealand include Facility Management within their Property Associations.

11. **Conclusion**

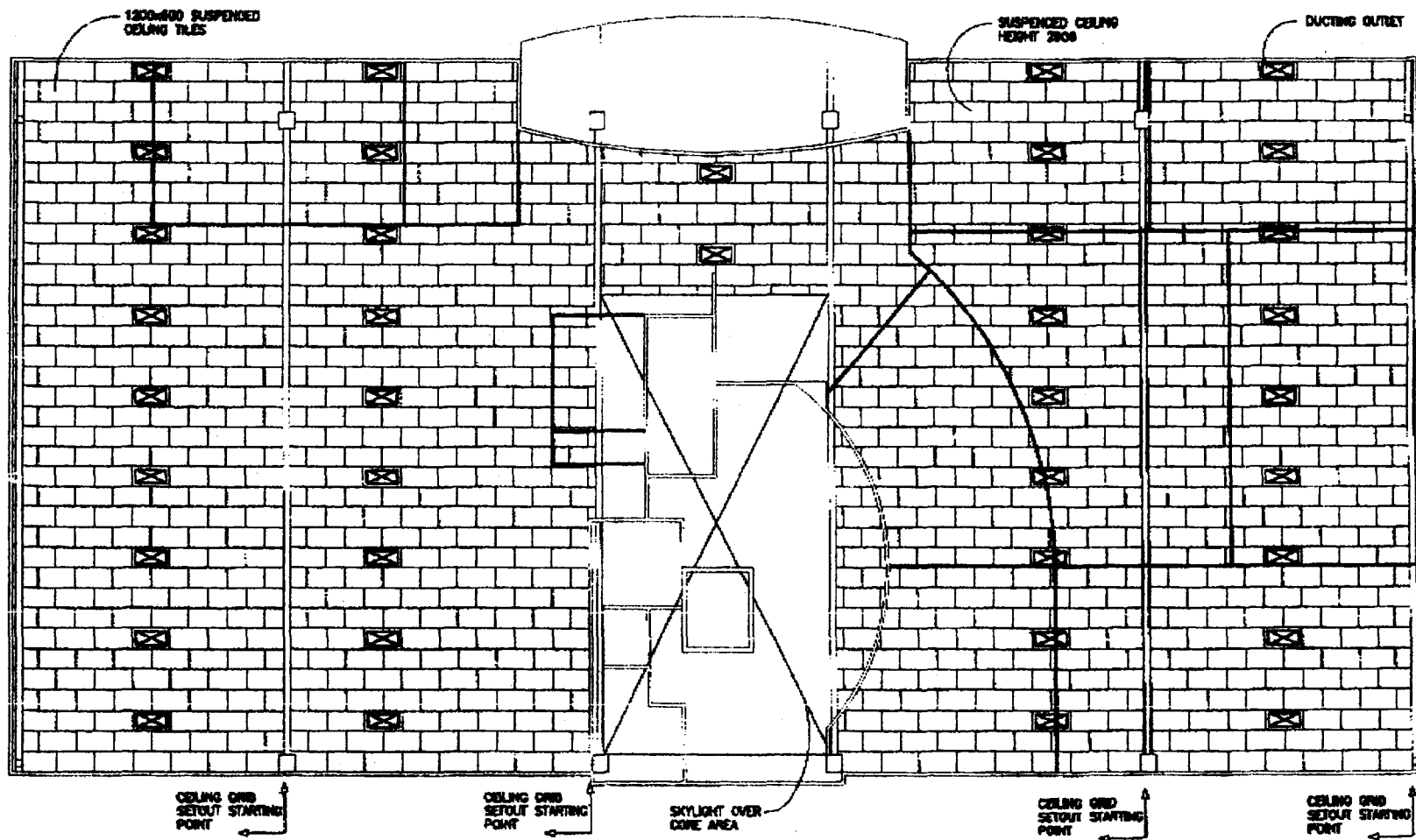
This paper attempts to interest the entrepreneurial quantity surveyor to look at a possible future source of work.

Practices that take up the challenge of Facility Management must look to this as being a long term commitment. It will not be financially practicable to attempt to go into this type of market as a short term solution to a down turn in more conventional work as investment in a CAFM system would be required and cost recovery would not be possible in the short term.

Quantity Surveyors have the background expertise to be able to operate successfully in the field of Facility Management.

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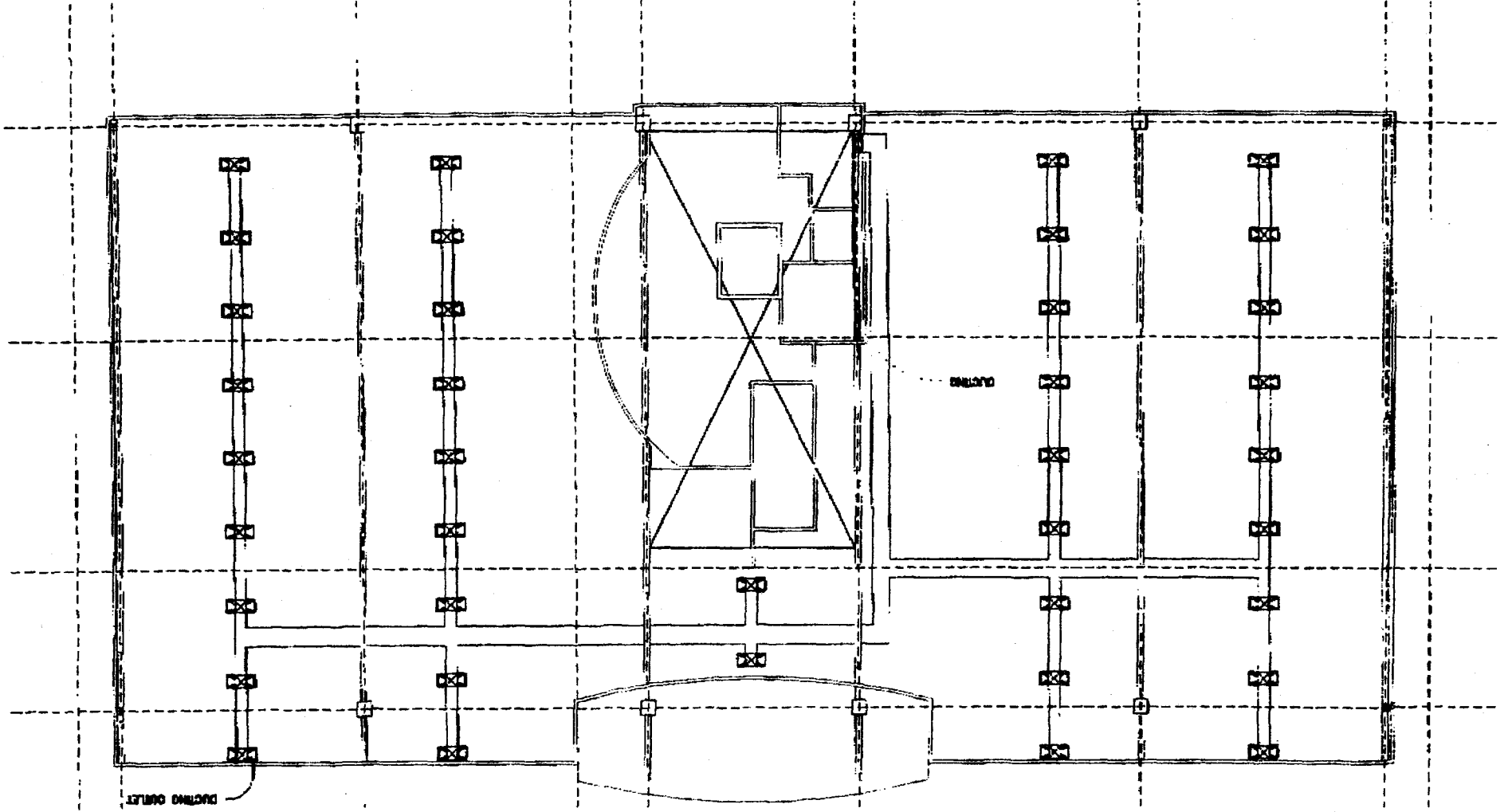
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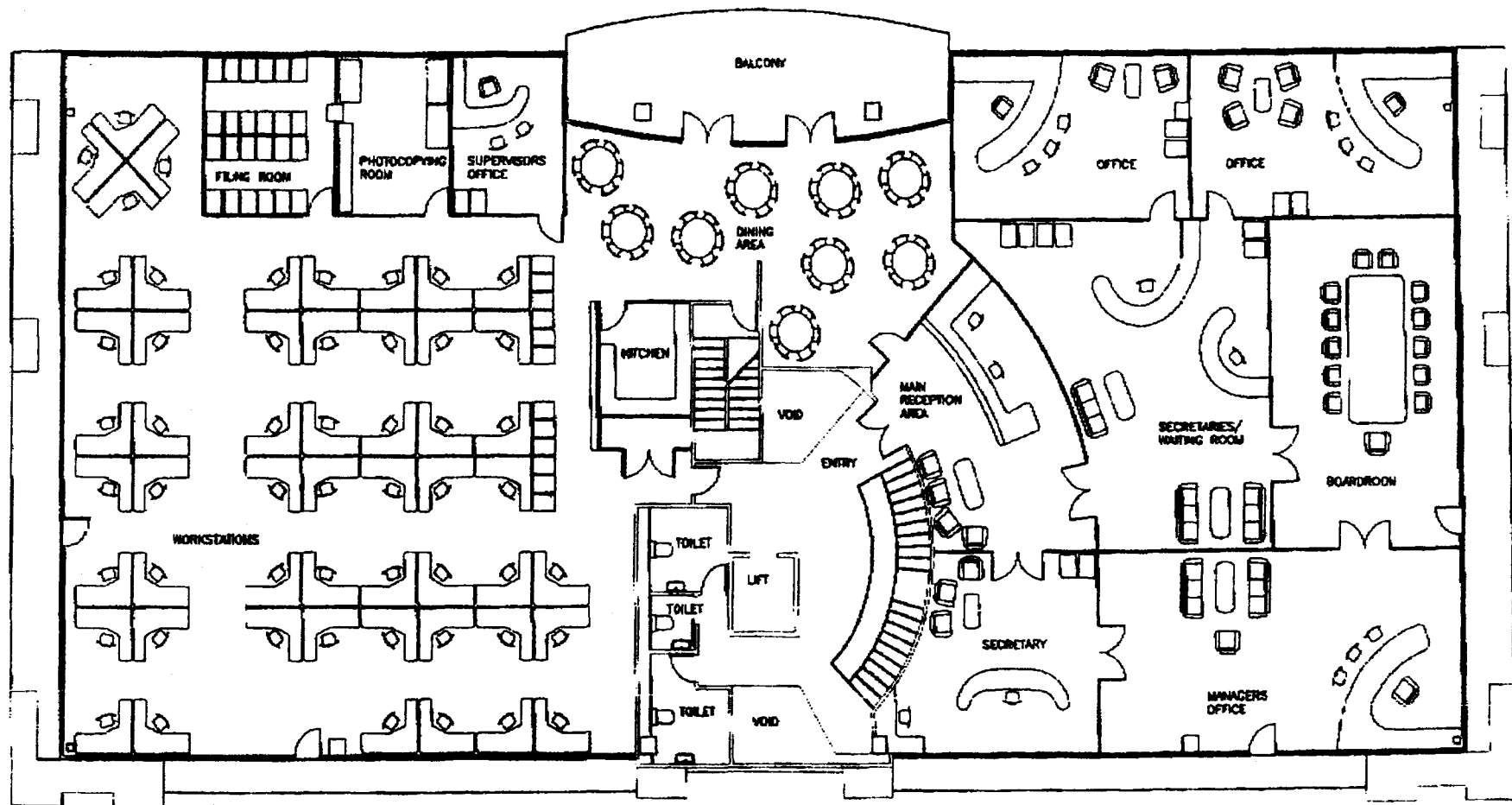
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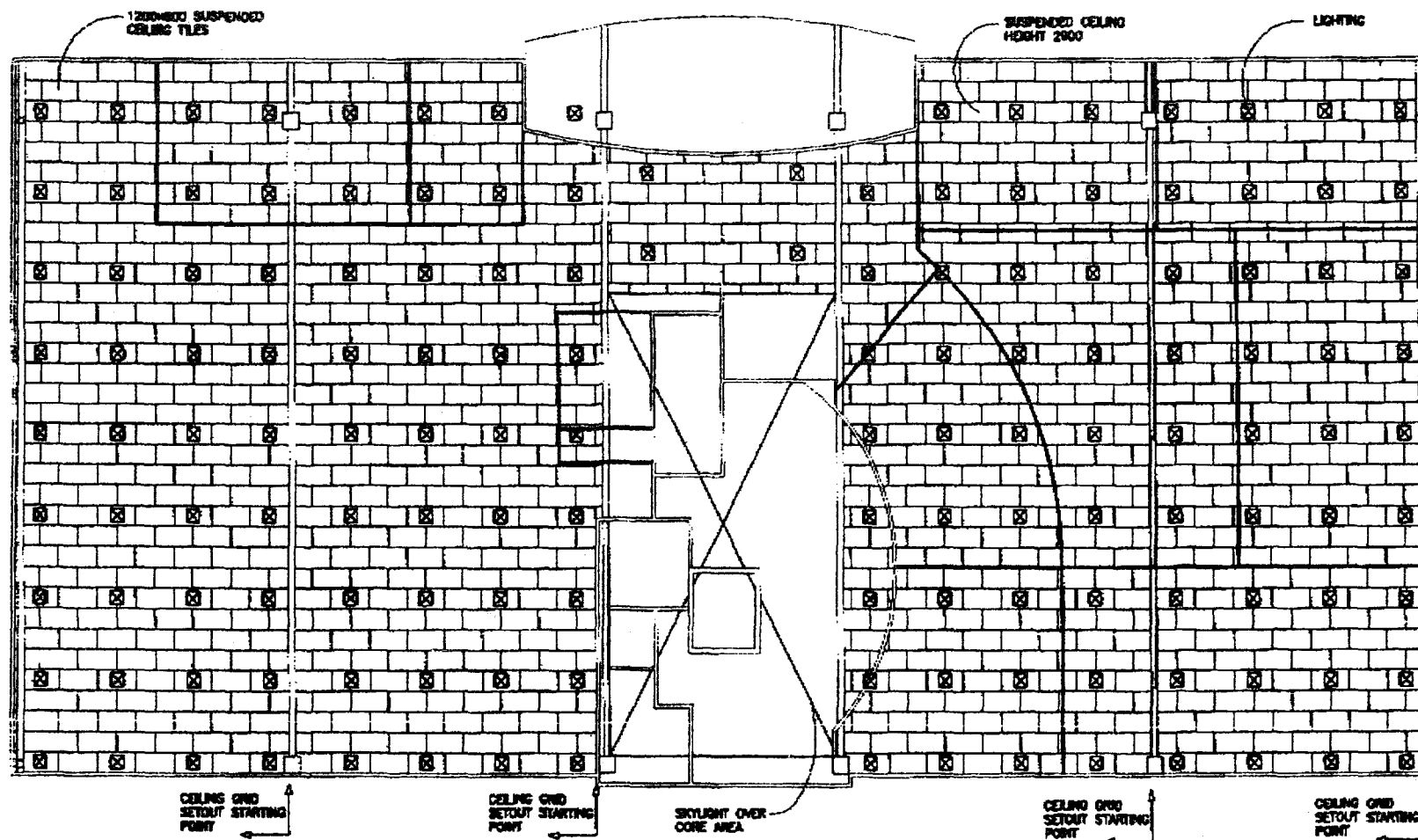




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*Conference Session 4*

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# Procurement Strategies And Contractual Arrangements For The New Millennium

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## 1.0 TRENDS IN THE PROCUREMENT OF CONSTRUCTION PROJECTS AND THE CORRESPONDING CONTRACTS

Procurement in the construction industry is a major area of interest particularly given the trend of Employers insisting projects are completed earlier - whether in time for the festive season sales or in time for their 60th birthday celebrations or in time for the one-off Olympic or Commonwealth Games.

Some of the targeted times insisted upon by Employers would under the traditional procurement routes be near impossible.

There is little doubt from experience in both Malaysia and other parts of the world that the traditional procurement methods as currently practiced takes rather long. It is because of the urgency of the projects and the sequential mode of operations of the traditional procurement process that alternative procurement methods developed.

This part of the paper examines the procurement trends and the corresponding contractual arrangements over the past 2 decades and poses some food for thought for the new millennium.

## 1.1 The Traditional Procurement Route

The 'traditional' system has been used for centuries with the function of design being provided direct to the client, linked quite often additionally with a role for the designer to be one of management of the development process.

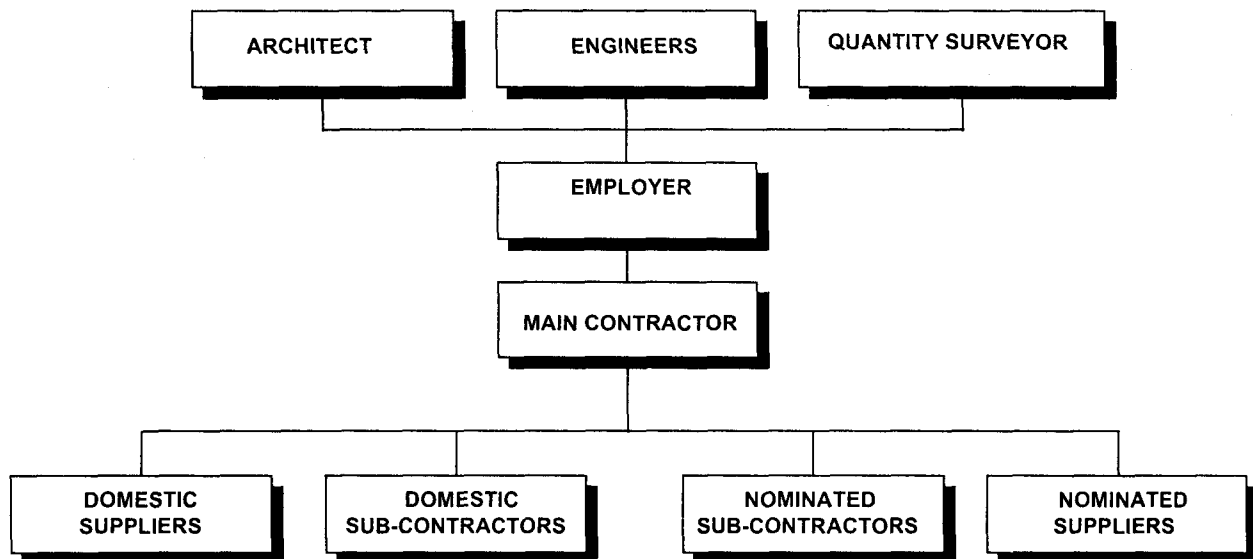
In the traditional system the client appoints consultants for design and for cost control. Then, generally after design has been taken to any one of a number of stages, a main contractor is appointed to carry out the construction work.

The traditional procurement route has generally been criticised for being slow and for creating a *"them and us"* attitude. Yet it has stood the test of time. That in itself is sometimes argued as being its strength - *"Better the devil you know?"*. In considering the appropriateness of this procurement route in the Construction Industry today and into the next century let us ponder the following :

- Why is this route generally regarded as slow ?
- It is in fact intrinsically a slower procurement method ?
- Are there means of speeding up to obtain speedy completion comparable with newer alternatives?

- What are the advantages of the traditional procurement route ?
- Why has there been a move to alternatives ?

Let us now have a look at the contractual relationships among the key parties under the traditional route.



**DIAGRAM 1**

## **THE TRADITIONAL PROCUREMENT ROUTE - CONTRACTUAL RELATIONSHIPS**

### **1.2 Management Contracting**

Management contracting came about following dissatisfaction with the rather slow traditional procurement route. The key difference from the traditional route is that the bulk of works is sub-contracted. The benefits of savings in time by overlapping design and construction and incorporating buildability are well known in more developed countries such as the U.K.

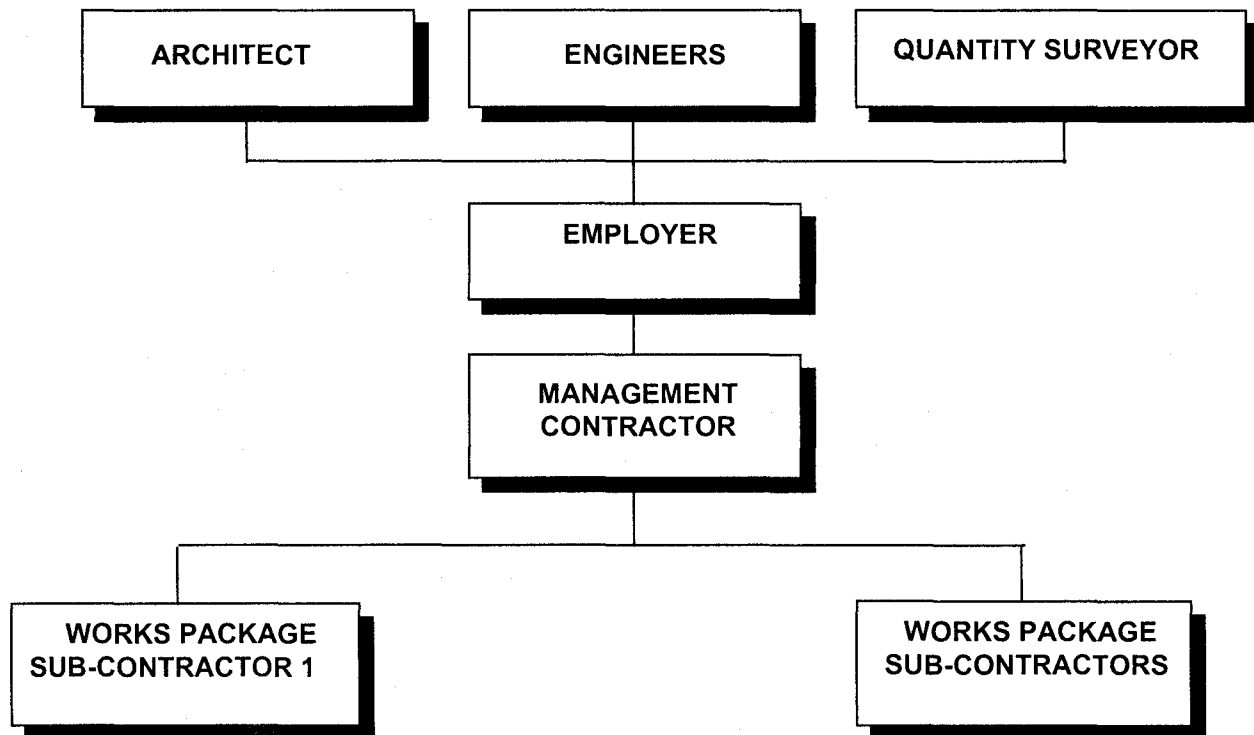
There was a growth in management contracting in the UK during the 80s. Some of the main reasons for the growth include :

- Increasingly complex projects to be completed within continually reduced time frame.
- The financial reward including the extremely liquid position of companies involved in management contracting. This is however not generally cited by management contractors as being a reason for venturing into management contracting! An analysis of management contractors' audited accounts clearly reveals an attractive cash cow situation which can in turn finance traditional contracting works.

- The growth in large specialist sub-contractors
- Responsibility with "*limited liability*". This is explained in a little more detail later.

Consider now contractual relationships under management contracting.

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**DIAGRAM 2**

## **MANAGEMENT CONTRACTING - CONTRACTUAL RELATIONSHIPS**

### **1.2.1 Advantages of Management Contracting**

- Work can begin on site as soon as the first one or two works packages have been designed.
- Overlapping of design and construction can significantly reduce the time requirement, resulting in an early return on the client's investment.
- The contractor's practical knowledge and management expertise are available to assist the design team.

- Where the nature and extent of the work may be uncertain, as in refurbishment contracts, the design of later work packages may be delayed until more information becomes available as the work progresses, without extending the construction period.
- The contractor, being part of the client's team, is able to identify with the client's needs and interests.
- Because works contracts are entered into close to the time of their commencement on site, they can be based on firm price tenders with greater accuracy rather than an early firm price with risks loaded on.

### **1.2.2 Disadvantages of Management Contracting**

- Uncertainty as to the final cost of the project until the last works contract has been signed.
- The number of variations and the amount of remeasurement required may be greater than on traditional contracts because of the greater opportunity to make changes in design during the construction period, because of problems connected with the interface between packages and because packages are sometimes let on less than complete design information.
- It is the potential legal pitfalls that are less known even in countries where management contracting is in common use. This is considered in some detail next.

### **1.2.3 The Liability of the Management Contractor for Breaches by Works Package Contractors**

Management Contracts are normally let on contracts drafted by Management Contractors or on Standard Forms e.g. the 1987 JCT Form of Management Contract published in the UK. Most of these contracts including the JCT 87 standard form provides that the Management Contractor is to be *"fully liable to the Employer for any breach of the terms of this Contract including any breach occasioned by the breach by any Works Contractor of his obligations under the relevant Works Contract"* (Clause 1.7 of JCT 87).

The clause appears to put total responsibility on the Management Contractor even for breaches by the sub contractors - sometimes known under management contracting as "works package contractors". Further on in the contract, Clause 3.21 of the same form requires the Management Contractor to operate the terms of the Works Contract for dealing with breach or non-compliance by the Works Contractor in a particular way. The outcome of it all is that the Employer, in recovering compensation which he sustains resulting from the breach or non-compliance, is subsequently able to recover those amounts to the extent, but only to extent, that the Management Contractor himself recovers them from the Works Contractor in breach.

*"The Employer shall be entitled to recover from the Management Contractor all amounts paid or credited to the Management Contractor but only to the extent that such amounts have been recovered by the Management Contractor from the Works Contractor" (Clause 3.21).*

A similar provision is provided in respect of liquidated damages which the Employer would ordinarily be entitled to recover from the Management Contractor if breach by a Works Contractor has put the Management Contractor in delay (although breach of a Works Contract under the Management Contract is not per se a ground for granting an extension of time to the Management Contractor). The Employer is entitled to keep an account of liquidated damages accruing due to him but can only recover them to the extent that equivalent liquidated damages are recovered by the Management Contractor from the Works Contractor in breach.

The net effect of this - at least, according to the interpretation of the JCT form as expressed by the JCT official commentary in Practice Note MC/1 and by various other commentators is perceived to be that a shortfall in amounts recovered by the Management Contractor from the Works Contractor, when compared with the loss and damage suffered by the Employer resulting from that breach, is borne by the Employer rather than the Management Contractor.

Of course, the Management Contractor's own risk is not entirely excluded. Clause 3.21.3 of the JCT 87 form deals with the position where the Management Contractor is not reimbursed by deduction from the works contractor who is in breach of his Works Contract, in respect of a claim which the Management Contractor has to meet from another Works Contractor resulting from the first Works Contractor's breach. The Management Contractor can only look to the Employer for reimbursement of any shortfall if he is not fully reimbursed despite compliance by the Management Contractor with the terms of Clause 3.21.3, which presumably means he has to pursue any arbitration or litigation so far as is possible, before falling back on his claim on the Employer. The Management Contractor may thus incur significant expense, and may have to make available an appreciable amount of management time for some considerable period before he can expect to be compensated for it.

It is not the contention of this paper that the basic philosophy of freedom to contract should be dispensed with. Only a warning that a failure to read the contract as a whole and to understand it may have with it consequences which may not have been contemplated. The wise learn from other people's mistakes. Let us learn from the case of *Chester Grosvenor Hotels v Alfred McAlpine Management* (1991) 56 BLR 115.

McAlpine as Management Contractor negotiated with the hotel company (Grosvenor) and offered its standard McAlpine management contract which provided that where works contractors were in breach of contract, McAlpine would have no liability beyond sums recovered from works contractors. This clause is similar to the JCT 87 Contract. The hotelier said that this was unfair and contrary to the Unfair Contracts Term Act 1977, an Act of Parliament in the UK.

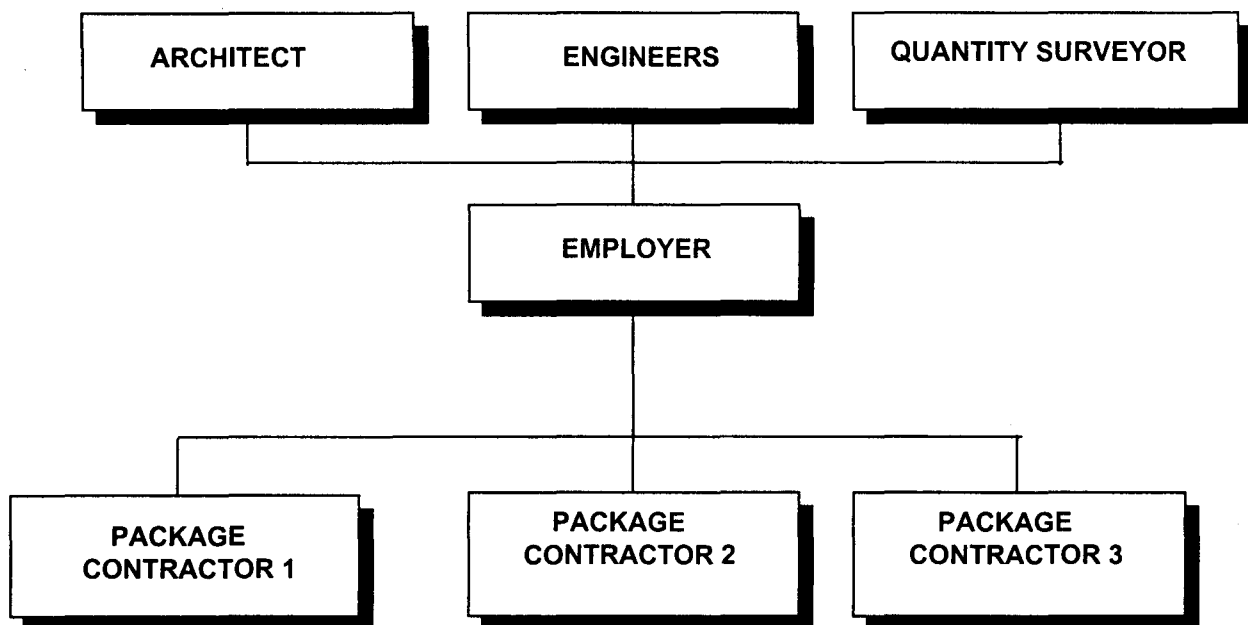
The Judge gave very careful consideration to the arguments and it would seem the Judge was even willing to look at the fairness or unfairness of contracts in the context of legislation. However, the Judge rejected this claim and found for McAlpine. The Judge particularly remarked that he did not accept that the failure by McAlpine to draw this exclusion clause specifically to Grosvenor's attention was relevant since "this is not a consumer contract and Grosvenor are able to look after themselves".

2 lessons to be learnt :

1. Read the contract, read the words in context and as a whole, seek to understand it and price for the risks, although it is accepted that ultimately a commercial decision will have to be made.
2. If unsure seek professional advice on interpretation.
3. Particularly where Management Contracting is adopted ensure direct collateral warranties are entered into between the Employer and every Sub-Contractor.

### 1.3 Construction Management

This procurement route was an evolution from management contracting following dissatisfaction amongst some Employers particularly with regards to direct accessibility to the Works Contractors. The contractual relationships are shown in the diagram below.



**DIAGRAM 3**

## **CONSTRUCTION MANAGEMENT - CONTRACTUAL RELATIONSHIPS**

The term construction management as a procurement route as explained here and as illustrated should not be confused with similar phrases used loosely in the industry.

Let us now consider :-

- What is the difference between Construction Management and Management Contracting. Are either a “con-man” as alleged by some?
- What are the key benefits of this procurement route ?
- What is the role of the Construction Manager who takes on a consultancy like role and not as a contractor ?
- Consider the interfacing works between packages to be done.
- Consider the practicality of such a system in countries where the construction industry is at a developing stage.

#### **1.3.1 Advantages of Construction Management**

- The construction work is more closely integrated into the management of the project.
- Close liaison between the construction manager and design manager leads to prompt identification of and decisions relating to practical problems.
- Detailed design can continue in parallel with construction, work packages being let in succession as the design of each is completed, thus shortening the project time.
- Privity of contract between the client and each of the works contractors provides the client with a readier means of redress in the event of difficulties, such as when delays occur.

#### **1.3.2 Disadvantages of Construction Management**

- The client has one more consultant and a number of contractors (and the corresponding number of contracts) with whom (and with which) to deal instead of only one main contractor and one main contract.
- The client's financial commitment is uncertain until the last of the works contracts has been signed.

It would seem, over the years this procurement route never took off in a big way. Why is this the case? The problem with successfully implementing the construction management procurement route in countries where the construction industry is less developed include:

- Lack of construction management expertise
- Problems associated with interfacing works which will need to be done by a general contractor.



Contrast this lack of popularity with Turnkey or Design and Build Contracts which is considered next.

#### **1.4 Turnkey And Design and Build Contracts**

The terms "Design and Build" and "Turnkey" are commonly used interchangeably in Malaysia. It is preferable to distinguish the two by reference to the manner in which payment is made for work done.

It is generally accepted that under turnkey, payment is made on completion and handing over of the "key". Under Design and Build, on the other hand, payment would be made as work progresses - either based on fixed periodic valuations or by reference to milestones achieved. For the purpose of this paper I have used both terms interchangeably as the Malaysian construction industry uses the term interchangeably.

This procurement route (and its ingenious and seemingly unlimited number of variants whether real or theoretical including Build-Operate-Own, Build-Operate-Transfer, Build-Own-Operate-Transfer etc.) has always been in use since man's first involvement in construction projects but has been particularly identified and used increasingly during the boom period of the 90's.

- Why has turnkey procurement been so popular ?
- Has it been well received by Employers, Contractors and Consultants alike?
- Whilst practically it seems to work, are the Turnkey contracts appropriately drafted?

Whether turnkey or design and build there are various advantages and some setbacks. They are as follows.

##### **1.4.1 Advantages of Design and Build**

- Single point responsibility is provided, i.e. the contractor is solely responsible for failure in the design and construction.
- The client has only one person to deal with, namely, the contractor, whose design team includes architects, quantity surveyors, engineers, etc.
- The client is aware of his total financial commitment from the outset.
- Close intercommunication between the contractor's design and construction teams promotes co-operation in achieving smoother running of the contract and prompt resolution of site problems.

##### **1.4.2 Disadvantages of Design and Build**

- Variations from the original design are discouraged and, if allowed, are expensive.

- The client has no means of knowing whether he is getting value for money unless he employs his own independent advisers, which adds to his costs.
- If the contractor's organisation is relatively small, he is unlikely to be an expert on design as he is on construction, and the resulting building may be aesthetically less acceptable. He may have to employ external consultants - conflict could then arise between aesthetically pleasing schemes and best value for money schemes and the cheapest schemes.

#### **1.4.3 The Client's Representative**

It is not intended for this paper to go into details on the operation of the Design and Build Procurement route. However, successful cases of Design and Build Contracts are often the result of good management practice. In particular the Client's Representative, whatever his background, plays a critical part.

Here are 10 areas a Client's Representative and Contractors should pay attention to which if properly attended to can help a project be completed in a timely manner to a reasonable level of quality within a pre-agreed budget.

- Agree detailed Brief
- Ensure price is based on detailed documents and that bids are correctly priced
- Ensure mode of payment agreed is in line with programme
- Ensure exclusions are clearly identified
- If let on competitive tender compare the tenders returned on a like with like basis.
- Ensure the appointment of a good Employer's Agent
- Agree realistic programme
- Establish good change control procedures
- Ensure there are clearly drafted coordinated conditions of engagement for design consultants
- Establish clear lines of communication

In one word - ***pre-plan***.

One other crucial ingredient for success of a design and build contract is the extent of documentation provided at the pre-contract and contract stage, in particular those provided in the Employer's requirement.

#### **1.4.4 The Employer's Requirements**

The extent of information to be included in the Employer's requirement would depend on the following :-

- The extent of expertise already retained by the employer.
- The extent of reliance placed on the expertise of the contractor
- Pre contract time available

In general, the more information and restrictions specified the more "traditional" the turnkey contract becomes and the more restrictive the variety of options that can be provided by bidders.

Distinguish between providing **information** and excessive **restrictions** in the Employer's requirements.

As far as the contract documents are concerned however, the more detailed the "merrier". How detailed should this be ? Time permitting detailed specifications and drawings should be incorporated in the contract documents but not the detailed programme.

No matter how advanced a procurement route, traditional or alternative, any procurement option can go badly wrong if the corresponding contracts are either not properly drafted or they are not properly administered.

"Quantity Surveying in the New Millennium - Challenges and Opportunities" is the title of this Congress.

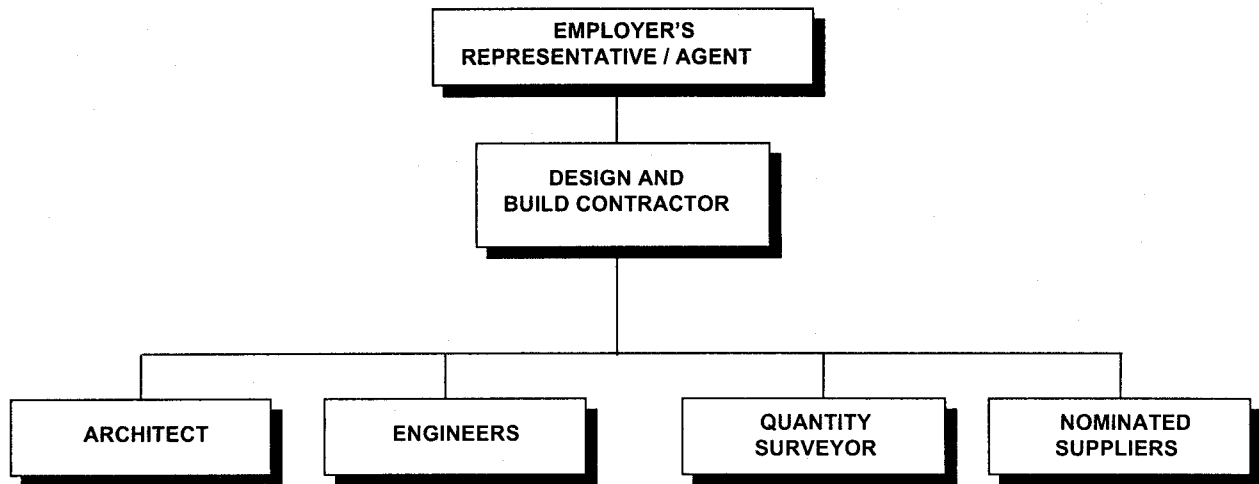
If Design and Build is going to continue to grow in the new millennium as it has during the last boom; then here are some opportunities and challenges for the Quantity Surveyor in the new Millennium.

### **The Opportunities**

- Maintain the Quantity Surveying role acting on behalf of the Employer even if the other consultants may be novated to the Design and Build Contractor.
- Expand services to Design and Build Contractors as part of the design team employed by the Design and Build Contractor including among others preparing works package contract documents for the Design and Build Contractor.
- Take on the role of Employer's Representative or Employer's Agent.
- Revisit the ten points identified earlier and decide whether the Quantity Surveyor has sufficient expertise in providing the service.

### **The Challenge :**

- It is all well and good treading or expanding into uncharted or non-traditional areas. What must be borne in mind though is the liability that goes with it. The next section deals with duties and liabilities of construction professionals be they Quantity Surveyors or others in relation to contract administration of construction projects.



**DIAGRAM 4**

**DESIGN AND BUILD - CONTRACTUAL RELATIONSHIPS**

## 2.0 THE DUTIES AND LIABILITIES OF CONSTRUCTION PROFESSIONALS IN RELATION TO CONTRACT ADMINISTRATION OF CONSTRUCTION PROJECT

This part of the paper covers the duties and liabilities of construction professionals in relation to contract administration generally and design liability under the design and build procurement option, the major difference between design and build contracts and traditional contracts being the addition of the element of design.

There is at present no standard form of Malaysian turnkey contract published for the Malaysian construction industry. There is however the Public Works Department (PWD) turnkey contract published internally which is used on government projects. The private sector use their own "one-off" by amending the FIDIC Design and Build, JCT 81 or the JKR turnkey contracts. The Australian Design and Build Contract and the Engineering and Construction Contract published quite recently in the UK can, with appropriate amendments be used in Malaysia.

A key difference of vital importance between traditional contracts and Design and Build contracts is the element of design. The variety of ways in which the design obligation are imposed on Design and Build contractors is significantly different as is the corresponding legal and financial consequences. This is dealt with in some depth.

### 2.1 Implied Design Obligations Under Design and Build Contracts

It is trait law that the obligation for producing goods as in the contractor undertaking construction work is a "**fitness for purpose**" obligation whereas the liability for professional negligence such as negligent design is a "**reasonable skill and care**" obligation. Fitness for purpose basically means an obligation to guarantee the end product whereas a reasonable skill and care obligation allows one to plead that one had done what any other reasonably competent professional would have done. He need do no more. In the words of the judges in *Eckersley v Binnie and Partners (1988) 18 Con LR 1*

*"... it follows that a professional man should command the corpus of knowledge which forms part of the professional equipment of the ordinary member of his profession. He should not lag behind other ordinarily assiduous and intelligent members of his profession in knowledge of new advances, discoveries and developments in his field ..... He must bring to any professional task he undertakes no less expertise, skill and care than other **ordinarily competent members** would bring but need bring no more. The standard is that of the reasonable average. The law does not require of a professional man that he be a paragon combining the qualities of polymath and prophet."*

Where a contractor undertakes a contract on a design and build basis, it has been held by the courts that in the absence of an express term to the contrary, the contractor would owe a fitness for purpose obligation for both design **and** construction. See for example, *Greaves & Co. (Contractors) Ltd v. Baynham Meikle (1975) 4 BLR 56*

### 2.2 Express Obligations under Design and Build Contracts

Most design and build contracts such as the JCT With Contractor's Design Form published in 1981 in the UK states the contractor's basic design obligations as

those generally implied in common law i.e. that of reasonable skill and care. E.g. Clause 2.5.1 of JCT 81 reads:

*Insofar as the design of the Works is comprised in the Contractor's Proposals and in what the Contractor is to complete under clause 2 and in accordance with the Employer's Requirements and the Conditions (including any further design which the Contractor is to carry out as a result of Change in the Employer's Requirements), the Contractor shall have in respect of any defect or insufficiency in such design the like liability to the Employer, whether under statute or otherwise, as would an architect or, as the case may be, other appropriate professional designer holding himself out as competent to take on work for such design who, acting independently under a separate contract with the Employer, had supplied such design for or in connection with works to be carried out and completed by a building contractor not being the supplier of the design.*

These words clearly put the contractual liability back to the common law position. It could however have been done in far fewer than the 142 words in one sentence and one paragraph!!

Would advocates of plain English e.g.: the Plain English Campaign of the UK accept this style of drafting? The 142 words basically mean in simple English that the Contractor owes the Employer a reasonable skill and care obligation for design. The question is can the words in clause 2.5.1 be reduced to plain English without destroying the meaning? If the answer is yes, then it should. I am sure the late Lord Denning, Master of Rolls who was also renowned for being the Master of Short Sentences, would agree. So would those administering contracts. After all, it is not expected of contract administrators to be a polymath or a multi-disciplinarian.

Whilst the above may be an illustration of appropriate allocation of risk (albeit written in complex language) in line with common law provisions, there are occasions where onerous provisions put the contractor under near-impossible or impossible obligations. Take the following example extracted from a Malaysian design and build contract.

*"The Contractor shall upon and subject to the Conditions complete the design of the Works and carry out and complete the Works in strict accordance with the Contract Documents.*

*The Contractor hereby **absolutely guarantees the Government that the design is independent of fault and is suitable for the known requirements of the Government** for a period of 5 years after completion of the whole of the Works. This guarantee includes workmanship and materials but does not include the normal replacement and maintenance".*

This is clearly a fitness for purpose obligation for both construction **and** design.

- What are the consequences of such a strict obligation ?
- Should the contractor accept this obligation ? Or should he pass it to the designers?

- Can designers ever undertake such an obligation?
- Can other professionals ever undertake fitness for purpose obligations? Would lawyers ever guarantee they will win their cases? Can doctors guarantee a cure? Can Quantity Surveyors guarantee their forecasts of construction costs, feasibility studies or inflation assumptions used in their reports?
- Finally, even if the professionals were prepared to undertake such onerous or even impossible obligations, would insurance companies be prepared to provide professional indemnity cover? What would the cost be ?

These are major issues that need to be addressed by the construction industries in the region as globalisation becomes a reality in the new millennium. What are the legal consequences of retaining these types of design obligations under a Design & Build Contract?

Professional Indemnity insurance in all likelihood will not cover liabilities for fitness for purpose but merely reasonable skill and care. It would appear the only solution given the circumstances, impossible or not, lies in total project insurance including fitness for purpose coverage for design liability. Are there any insurers out there who are willing ? PS: can we have a quote please?

Perhaps we should also look at the experience of non common law countries such as France and Belgium who do still maintain absolute obligations even for design statutorily enshrined.

Before moving on to looking at other duties and liabilities of professionals in relation to contract administration, it is worth trying to understand why historically professionals are treated differently from lay person and from those producing products.

### 2.3 Professions

In order to fully understand the liabilities of a professional, it is worth expanding on what is meant by a profession and where the professional derives his authority from.

There appears to be a lack of understanding in the construction industry generally of the concept of "*professions*" as distinguished from "*occupations*" and further a near total lack of appreciation of the concept of "*professional authority*". The understanding of this concept and a refined understanding of these terms is vital to the healthy growth of our industry.

Judges have always been reluctant and cautious in defining the word "*profession*". In *Carr v Inland Revenue Commissioners* (1944) 2 All ER 163 Du Parc LJ said at p. 166E:

*" It seems to me dangerous to try to define the word "professions", .... I think that everybody would agree that, before one can say that a man is carrying on a profession, one must see that he has some special skill or ability or some special qualifications derived from training or experience. Even then one has to be very careful, because there are*

*many people whose work demands great skill and ability and long experience and many qualifications who would not be said by anybody to be carrying on a profession."*

Much can be gained by professionals if the meaning of the term 'professional' is understood and the basis of their authority established. This can help in identifying their roles and responsibilities within the profession and industry in general and in particular their roles on contract administration of construction projects.

Confusion and misunderstanding surround the word "*professions*" and "*professionals*" due to our indiscriminate colloquial use of these terms. Consider for example:

- [1] the use of the term professional to indicate persons engaged in an occupation possessing certain skills [as in the medical, legal, architectural, engineering or surveying professions]; and
- [2] when it is used as an adjective to indicate individuals performing their jobs in a highly skillful manner, for example, professional footballer or wrestler.

One would, I am sure agree that there is a big difference between the two definitions in the "services" offered to their "clients"! In the present context I obviously refer to the former.

Under this approach, one can list many common attributes of professions. Some examples suggested by leading researchers in the field include:

- 1. A high degree of generalised and systematic knowledge;
- 2. Members of a profession subordinate self-interest to the client interest and the social interest;
- 3. A system of rewards [monetary and honorary] that is primarily a set of symbols of work achievements and thus ends in themselves, not means to some end of individual self-interest;
- 4. A high level of technical expertise;
- 5. A profession is based on a systematic body of knowledge;
- 6. Membership of a profession generally depends on the observance of certain rules of conduct or behaviour;

I would add that I have excluded from the list some major potential derivative traits such as high prestige, power and income which is normally conveniently not acknowledged.

Given the above attributes of a profession, there is little doubt that the design team and contract administrators including the Architect, Engineer and Quantity Surveyor can all be classified as professionals. What is equally important is an understanding of how they derive their authority.



## 2.4 Professional Authority

Any profession, to be credible needs professional authority. Where does a profession derive its authority?

Professional authority originates from society. Society gives to certain "professional groups" the **exclusive** right to operate, based on the trust that these groups have the technical competence, that they observe certain rules of conduct or conform to codes of ethics and that they are altruistic and responsible for their actions. Friedson, a renowned sociologist succinctly summarises the origin of professional authority:

*"The leaders of an occupation persuade leaders of society that its member possess some technical competence so special and such importance that the public should be prevented from using any other occupation with the domain but assertedly lesser competence or integrity. The formal institutionalised status of a profession is granted by society on the basis of having been persuaded that an occupation is **competent and responsible**."*

Thus, for example the leaders of a group of people practising the then "occupation" of town planning and building surveying have persuaded or are persuading leaders of society i.e. government that they should be given the exclusive rights to practice their occupation. If they succeed in persuading, they are then called professionals with the sole rights to practice their profession to the exclusion of all others. The more established professionals such as architects, engineers, lawyers and doctors did exactly that. So did Quantity Surveyors, a little later, at least in some countries.

It is assumed that the professional knows better what is good for the client than the client himself i.e. the professional demands autonomy of judgment of his own performance. This puts the client in a potentially vulnerable position. In fact the very notion of a "client" in contrast to a "customer" can be differentiated on the following basis:

The customer determines what services or commodities he wants. He has the capacity to appraise his own needs and judge which potential service or commodity would satisfy them.

The client, on the other hand, has no choice but to accede to professional judgement on the premise that, because he lacks the requisite specialised knowledge, he cannot diagnose his own needs or discriminate amongst the possibilities for meeting them. Hence the customary view of the established professions that it is unethical for individual members as such to advertise.

It should be noted that in practice this professional authority is not as absolute as that portrayed as an ideal type above. However, general speaking, the more essential the services offered by the professional and the more monopolistic the level of control, the greater this degree of professional authority. Thus Building Surveying or Project Management as a "profession" does not, as yet, possess a high degree of monopolistic control. Any organisation can offer building surveying or project management services. As such the professional authority of a Building Surveyor or Project Manager presently is at present still very limited.

The recent move in Malaysia to recognise both under Acts of Parliament would give both "professional" recognition.

It is important for professionals to appreciate where they derived their authority from. They should not take it for granted as if they continuously fall below a reasonably acceptable standard, the same society through the leaders of society i.e. the government, can withdraw their exclusive right to practise.

Having established that professionals or more specifically the design team possess a special skill, let us look at the standard of skill and care owed by the design professional.

## 2.5 The Standard of Skill and Care of Professionals

The standard of care expected of an ordinary man is "*reasonable care in all circumstances*". He is the man on the "*Clapham omnibus*". He is neither perfect nor a "*paragon circumspection*" per Lord Reid in *Billings (AC) Ltd v Riden* [1958] AC 240.

However, a person who professes a special skill such as a construction professional is not judged by the standard of the man on the Clapham omnibus, but by the standards of his peers. He does not undertake to use the highest possible degree of skill, but "*he undertakes to bring a fair, reasonable and competent degree of skill*" per Tindal LJ in *Lanphier v Phipos* [1838] 8 C&P 475, i.e., he will be judged by the standards of a person who is reasonably competent in the exercise of that skill.

What is required to fulfil the standard of care will vary according to the circumstances of each case. The starting point is the professional man's contract. In the absence of an express term, a term will be implied into a contract for the supply of a service (e.g. design or contract administration services) that the services will be performed with **reasonable skill and care**. The standard of care required to satisfy this obligation is the same as in the tort of negligence. The classic statement of McNair J in the leading medical negligence case of **Bolam v Friern Hospital Management Committee** [1957] 2 All ER 118, 121 is worthy of mention:

*"The test is the standard of the ordinary skilled man exercising and professing to have that special skill. A man need not possess the highest expert skill at the risk of being found negligent. It is well established law that it is sufficient if he exercised the ordinary skill of an ordinary competent man exercising that particular art."*

This test, which has come to be known as the "*Bolam test*" has been accepted to be of general application to any profession or calling which requires special skill, knowledge or experience in Malaysia and other countries under the common law jurisdictions.

This standard was similarly expressed for construction professionals. See for e.g.: the case of *Eckersley v Binnie and Partners* [1988] 18 Con LR 1 involving an engineer's negligence.

McNair J went further in clearly stating that the professional is to be judged by the standards prevailing at the time of the alleged negligence and not with the

benefit of hindsight. In other words, the professional was entitled to rely on the defence of "state of the art":

*"In deciding whether a professional man has fallen short of the standards observed by ordinarily skilled and competent members of his profession, it is the standards prevailing at the time of acts or omissions which provide the relevant yardstick. He is not ..... to be judged by the wisdom of hindsight. This of course means that knowledge of an event which happened later should not be applied when judging acts and/or omissions which took place before that event....."*

Despite the apparently clear authority established by the *Bolam* test, there remains the question of whether the requisite standard is that which members of a particular profession do in fact commonly achieve i.e. the standards of the "ordinarily skilled man" or that which **ought** to be achieved by members of the particular profession [the standards of the "reasonably competent man"].

It would seem preferable and in line with some leading authorities' opinion e.g. Dugdale and Stanton and Jackson and Powell that the second alternative is the correct approach. Thus, if a profession collectively adopts very lax standards the courts will not treat itself as bound by the standard.

I would suggest that this is the best approach not just from a legal point of view but also from a wider sociological perspective. It is worth reminding that the professional authority of a profession originates from society, and that society gives these professional groups [in some cases at least] the exclusive right to operate based on the trust that they have a **certain minimum degree of technical competence**.

What is reasonable is ultimately a question of law to be determined by the court. Not surprisingly the courts place heavy reliance on expert evidence which can be crucial to the outcome of an action. It is also suggested that codified professional standards may also be significant evidence of what constitutes reasonable care. Other documents that may be used in evidence could be manuals published by professional bodies. A good example is the 'Manual of estate agency law and practice' sometimes referred to as the 'Blue Book' published by the Royal Institution of Chartered Surveyors, UK for all members who do estate agency work.

Another important well established principle of law which is relevant to professionals particularly those who are venturing into new areas in the next millennium is that where a person holds himself out as having a specialist skill he will be judged by the standards of a reasonably competent man exercising that skill, even though he does not in fact possess the requisite skill. Thus in *Philips v William Whiteley* [1938] 1 All ER 566 it was held that a jeweller when piercing ears must exercise the degree of care appropriate to a jeweller capable of piercing ears [although not the degree of care of a surgeon]. By analogy an Architect or Engineer who carries out the tasks of a Quantity Surveyor or Project Manager will be judged by the standards of a reasonably competent Quantity Surveyor or Project Manager. A quantity surveyor who claims to be specialised in a particular area and appointed on that basis would thus be judged on the basis of actually possessing those skills whether or not he does in fact possess the same.

It is worth reminding that the standard of care discussed above can by express provisions be increased or reduced. Thus even the onerous fitness for purpose obligations can be contracted into by construction professionals.

### **3.0 DUTIES AND LIABILITIES IN RELATION TO CONTRACT ADMINISTRATION OF CONSTRUCTION PROJECTS - SPECIFIC ILLUSTRATIONS**

I now illustrate liability issues using specific examples of duties undertaken during the administration construction contracts. The liabilities during the administration of contracts would apply primarily to the party responsible for the same, whether it is the Architect, Engineer, a named Superintending Officer or Quantity Surveyor. Joint liability of two or more persons where advice is given jointly is possible. The proportion attributable to each party would then have to be determined.

#### **3.1 Selection of Contractors**

In selecting and recommending the contractor or a nominated subcontractor, apart from the ability to perform works of the nature contemplated, the solvency of the contractor may also be an important consideration. This, it is suggested, is because the contractor is in the business of not only executing the works but also partially funding the works until such time as they are reimbursed in full or in part through, e.g., interim certificates.

In the case of *Valerie Pratt v George J Hill Associates* [1987] 38 BLR 25 an architect was under a duty to recommend a suitably reliable builder. The architect was held to be in breach of his duty to recommend a reliable builder when he described a builder as "*very reliable*" whereas, in fact, he was wholly unreliable - the builder that is!

To what extent does a contract administrator have to inquire into the solvency of a contractor? While it is recognised that accounting information referring to past years affords only a poor prediction of the financial position of a firm, it seems likely that courts would nevertheless infer negligence if the enquiries were not made - even if these would have produced a poor prediction of the financial position of a firm.

#### **3.2 Advise on the Need for Collateral Warranties**

Moving on to selection of sub-contractors, similar provisions will apply. Further, although there may be no mention of express duties for the Contract Administrator to advise on subcontractor warranty agreements it is suggested that it may be part of the Contract Administrator's implied duty to his employer to advise him of the difficulties and problems of nomination and to advise that such direct warranties may be necessary. This would particularly be the case in contracts such as the PAM 69 contract where the Employer may be picking up the consequences of delay on the part of NSCs under clause 23(g) or under Management Contracts where the bulk of the work is done by sub-contractors.

While a construction professional is not expected to have a detailed knowledge of the law it is submitted that any "*reasonably competent*" construction professional must be familiar with legal developments affecting his tasks. Members of various professions have in the past been held liable for failing to take account of in the past judicial developments concerning the practice of their professions. See for example the surveyor's case of *Weedon v Hindwood, Clarke and Esplin* [1974] 234 EG 121

regarding the negligence of a valuation surveyor in failing to take into account a change in the law when assessing compensation for compulsory acquisition.

### **3.3 Issuing Instructions and Establishing Systems for Administering the Contract**

The contract administrator, typically the architect in building contracts, should provide all necessary instructions, drawings and information for the execution of the works within reasonable time. What is reasonable will depend on the facts of each case. See, e.g., *Minter (FG) Ltd v Welsh Health Technical Services Organisation* [1979] 11 BLR 1 where Parker J suggested that a building contractor would succeed against an architect who took "*more than a reasonable*" time in settling the final costs and claims due.

In *Holland, Hannen & Cubitts (Northern) Ltd v Welsh Health Technical Services* [1981] 18 BLR 80, an architect was held liable to his employer on the basis that his failure to issue the contractor with a variation order to remedy certain defects had impeded the progress of the work and opened the way to the contractor bringing a claim against the employer.

In *Croudace Ltd v London Borough of Lambeth* [1986] 33 BLR 20, it was suggested that an architect's failure to ascertain, or instruct the quantity surveyor to ascertain the amount of direct loss and/or expense incurred by the contractor as required by the contract was a breach.

There may well be some duty on the contract administrator that he establishes a reliable "*system for administering*" to ensure that such contract administration duties are carried out at the right time. Dugdale and Stanton in their book on Professional Negligence suggest that while it may be difficult for a plaintiff to establish a negligence claim when matters of professional judgement are at issue "*it is only too easy to do so if damage can be shown to have been caused by a failure of management or procedure on the part of the professional person*".

As to the type of system to be maintained, the "*reasonable conduct*" test of establishing negligence requires measures appropriate to the circumstances of the case. One of the considerations will clearly be the cost of the system.

In the United States an economic formula for negligence was suggested by Judge Learned Hand in *US v Carroll Towing Co* [1947] 159 F(2d) 169. Where the cost to the plaintiff of the damage multiplied by the probability of its occurring exceeds the burden [i.e. the cost] of precautions to the defendant then the defendant is liable to the plaintiff in tort for negligence. An English counterpart to this is the observation by Lord Denning MR in *Latimer v AEC* [1952] 1 All ER 1302: "*In every foreseeable risk, it is a matter of balancing the risk against the measures necessary to eliminate it*".

It is suggested that based on this view, a contract administrator who does not invest in a costly information system of limited practical value would not be negligent whereas a contract administrator who does invest in such a system but who fails to extract or convey a crucial piece of information which ought to have been so

conveyed would be liable. It is submitted that the likelihood of the contract administrator being found negligent under the latter circumstances is greater. Analogy can be drawn from numerous other professions. Accountants have been held liable for failing to make obvious checks: *Twomax Ltd v Dickson, McFarlane and Robinson* [1983] SLT 98. Hospital authorities and doctors have been held negligent for failing to ensure that adequate information as to the treatment given was passed on to their patient's general practitioner or another hospital who would subsequently treat the patient: *Coles v Reading and District Hospital Management Committee* [1963] 107 SJ 115.

Indeed the claim in the famous case of *Sutcliffe v Thackrah* [1974] AC 727 was based on the architect's failure to furnish the quantity surveyor who was drawing up the interim certificates with information relating to defects in the work. All these failures could have been avoided by the use of an adequate work system.

The mere establishment of a system of work will not be sufficient. Failure to operate a system designed to secure the client's protection will be strong evidence of negligence.

### **3.4 Advice on Choice and Terms of a Construction Contract**

It has been suggested (in the opinion of some as somewhat harshly) e.g.: by Professor Ian Duncan Wallace that certain standard forms of contract are so disadvantageous to the building employer that a construction professional adviser would be negligent in advising their use without modification.

If the contract administrator is concerned about "faulty" clauses in the standard forms, it is suggested that it will be prudent for the contract administrator to amend a standard form himself or if beyond his ability, to advise the client to seek legal advice in amending the terms of a standard form.

It is possible, however, that a contract administrator will not be held liable for negligence if he recommends an unamended standard form in **current and common** use so long as these do not fall short of what a responsible professional body competent in its field recommends its members to use and provided the standards do not fall below one that can be reasonably expected of a competent professional body.

I do not think the judiciary expect a new contract to be drafted every time a client commissions a project nor for the contract administrator to seek legal advice when a standard form negotiated or prepared in consultation with representatives of all parties concerned is used. This will defeat the whole purpose of having a standard form.

Consider the following issues in deciding the most appropriate form to use :

#### **3.4.1 Definition of Contract Documents**

The PAM 69 building contract used in Malaysia (which is similar to the JCT 63 published in the UK) does not properly define Contract Documents allowing

ingenious arguments in challenging whether a document (e.g.: Letter of Acceptance or Specification etc.) does or does not form part of the Contract. The later part of Clause 3(3) reads (in passing) :

“So soon as is possible after the execution of this Contract the Architect without charge to the Contractor shall furnish him (unless he shall have been previously furnished) with two copies of the specification, descriptive schedules or other like document necessary for use in carrying out the Works provided that nothing contained in the said specification, descriptive schedules or other documents shall impose any obligation beyond those imposed by the **Contract documents, namely, by the Contract Drawings, the Contract Bills, the Articles of Agreement and these Conditions.**”

Where does the Contract Administrator stand if a dispute arises on contradictions between the letter of award and the other documents such as the Bill of Quantities?

Compare that with the clear definition of contract documents under the Institution of Engineers (IEM) Contract or the PWD 203A Contract (both of which can be amended to suit private sector building works projects) or under Article 7 of the new PAM 98 Contract which reads:

*“Contract” or “Contract Document” means the Articles of Agreement, Summary of Tender, Letter of Acceptance, Conditions of Contract, Contract Drawings, Specifications, Contract Bills and Appendices.*

*“Contract Bills” means the Contract Bills referred to in the Articles of Agreement, comprising :*

- i) Instructions to Tenderers*
- ii) Form of Tender and Conditions of Tendering*
- iii) Specification To All Trades incorporating Trade Preambles and Specification*
- iv) Preliminaries and Generally*
- v) Measured Works, Provisional and Prime Cost Sums and Final Summary*
- vi) Appendices, including inter alia the Letter of Acceptance*

Consider however documents not intended to form part of the contract which may inadvertently be included in the Appendices under the PAM 98 Contract.

### **3.4.2 Hierarchy of Documents**

*Should contract documents have a hierarchy or should they be mutually explanatory of one another ?*

When there are discrepancies between documents, the contract administrator should in general apply those principles of law which govern the interpretation of contracts. For example, one of the common law rules is that written words prevail over printed words. That rule is based on the idea that documents which are



prepared for a specific job, rather than being taken "off the shelf", are more likely to reflect the parties' true intentions. It would mean for example that provisions in bills of quantities would override the printed conditions of contract such as the PAM 98 Contract. However, these general principles are expressly modified by the PAM Contracts.

Unlike the PWD and IEM Contracts and other Contracts used on international projects eg: FIDIC which state that all documents are to be taken as mutually explanatory of one another, the PAM 98 Contract provides categorically that the conditions will prevail over the Bills of Quantities. The wording does not prevent the bills from imposing extra obligations on the contractor. It does mean that where a particular matter is dealt with in the Conditions, any special provisions on that subject in the bills which contradict the conditions are to be ignored. **Any amendments must thus be made in the conditions itself.** This, it is submitted, must be understood by all Contract Administrators. A failure to appreciate the same can result in the Employer suffering damages who in turn may seek to recover the same under an action for negligence against the Contract Administrator.

A good example of a case illustrating the above is *MJ Gleeson (Contractors) Ltd v Hillingdon London Borough Council* (1970) 215 EG 165, where a contract based on JCT 63 which is similarly worded provided for the provision of a large number of houses and which gave a single completion date of 24 months after the date for possession. In reality, as the preliminaries bill showed, the parties' intention was that blocks of houses were to be handed over at 3-month intervals from 12 months onwards. When the first blocks of houses were not completed after 12 months, the employer deducted liquidated damages at the contract rate, but this was held to be invalid. The Conditions of Contract made no provision for a pre-agreed contractual sectional completion, and it could not be varied by the contract bills.

The moral of this and similar cases is clear. If the parties really do intend to override or modify the printed conditions of the PAM contracts, then those conditions must themselves be formally altered to reflect this. If this is not done, the intended changes will be ineffective. The argument for such clause in the PAM Contract is presumably that any ad-hoc meddling could result in an even bigger mess. The assumption, not unreasonably, is that contract drafting (as opposed to contract administration) is not a core competency expected of a qualified construction professional.

### 3.4.3 Definitions of Words and Phrases

There are arguments for and against defining words and phrases in contracts. Consider for example a definition of the phrase "Practical Completion" which is not usually defined in building contracts. Arguments then arise on whether completion has been achieved. When in the hands of lawyers they extend the argument further by suggesting there is a difference between "Completion" and "Practical Completion". Even judges seem to have difficulties grasping the difference in a construction industry context.

Prior to the PAM 98 Contract, among the few contracts that had such a definition was the Australian Standard General Conditions of Contract where Clause 2 defines Practical Completion as :-

*"Practical Completion" is that stage in the execution of the work under the Contract when -*

- (a) the Works are complete except for minor omissions and minor defects -*
- (i) which do not prevent the Works from being reasonably capable of being used for their intended purpose, and*
- (ii) in relation to which the Superintendent determines that the Contractor has reasonable grounds for not promptly rectifying them, and*
- (iii) rectification of which will not prejudice the convenient use of the Works, and*
- (b) those tests which are required by the Contract to be carried out and passed before the Works reach Practical Completion have been carried out and passed, and*
- (c) documents and other information required under the Contract which, in the opinion of the Superintendent, are essential for the use, operation and maintenance of the Works have been supplied.*

Whilst the IEM, PWD 203A and PAM 69 Contracts are silent, the PAM 98 Contract defines Practical Completion in Clause 15.1 as :

*"When the Architect is of the opinion that the Works are practically completed, meaning that the Contractor has performed and completed all the necessary Works specified in the Contract and the patent defects existing in such Works are "de minimise", the Architect shall forthwith issue a Certificate of Practical Completion. The Works shall be deemed to be practically completed for all purposes of this Contract on the day named in such Certificate".*

The choice of wordings in Clause 15.1 reflect definitions from case law. Thus conflicting case law definitions cannot now be used. The PAM 98 definition would override any case law definition that contradict the interpretation of the words in Clause 15.1.

The outcome of the express words of Clause 15.1 is to impose a stricter test and leaves less room for arguments as to whether the work is generally "substantially complete for the purposes intended with minimal disruption during the rectification of defects". The practical impact of such stricter definition on the Contract Administrator remains to be seen.

Here is some food for thought on contracts drafting for the new millennium :

*"Completion is when the **Contractor** has*

- done all the work which the Works Information states he is to do by the Completion Date and*
- corrected notified Defects which would have prevented the **Employer** from using the **works**."*

Too simple or simplistic? Well the clause above comes from the 2nd Edition of the Engineering and Construction Contract published in the UK. That, I am sure the Plain English Campaign would approve.

#### **3.4.4 Variations**

In the absence of an express right to unilaterally vary the scope, quality or quantity of works, there would be no right to any variations. Variation clauses are thus important clauses. A contracts advisor advising a Main Contractor on sub-contract drafting must take this into account as a failure to include a variations clause when variations are reasonably foreseeable could amount to negligence.

Another relevant point worthy of mention is that although the power to vary by way of "omission or substitution" under standard forms are normally couched widely it does not enable the Contract Administrator to omit the work in order to give it to another contractor. The instruction must be one for a genuine omission, i.e. something to be omitted entirely from the Works. See e.g: *Carr v Berriman (JA) Pty* (1953) 27 ALJ 273.

It is submitted that the same applies to Consultancy work on a project, unless otherwise expressly provided for. With mutual consent of course, anything is possible - unless it is illegal.

Some Contracts e.g.: the PAM 98 contracts have "deeming" provisions either by express terms or those that can be implied. These, by implication, do not normally require formal instructions before they are executed.

For example :

- Remeasurement of provisional quantities
- Errors in quantities under Clause 12 (2) of the PAM/ISM 69 contract.

Clause 12 (2) of the PAM/ISM 69 Contract reads :-

*"Any error in description or in quantity or in omission of items from the Contract Bills shall not vitiate this Contract but shall be corrected and deemed to be a variation required by the Architect."*

Whilst Quantity Surveyor may get away with some under or over measurement due to the "no loss" argument, any gross undermeasurement which is then to be rectified under clauses such as the above may result in a major shift in the

feasibility of the project and perhaps even in the decision on whether to proceed with the project. The "no loss" argument may then be futile.

### 3.4.5 Commencement and Extension of Time

The contractor is generally obliged to commence, progress and complete on or before the Date for Completion under most construction contracts.

**The PAM 69 Contract for example reads :**

*Clause 21 Possession Completion and Postponement*

- (1) *On the Date of Possession stated in the appendix to these Conditions possession of the site shall be given to the Contractor who shall thereupon begin the Works and regularly and diligently proceed with the same, and who shall **complete the same on or before the Date for Completion** stated in the said appendix subject nevertheless to the provisions for extension of time contained in clauses 23 and 32 (1) (c) of these Conditions*
- (2) *The Architect may issue instructions in regard to the postponement of any work to be executed under the provisions of this Contract*

The PAM 69 Contract does not have a provision for extension of time in the event there is delay in giving possession of site. The consequences of the unamended PAM/ISM 69 Contract is that if possession is not given on the due date, time will be at large resulting in the contractor only needing to complete within reasonable time. The Liquidated Damages clause then becomes inoperable. The PAM 98 Contract has now rectified this grave defect with the express provisions for extending time where there is delay in the giving of possession of site and the built-in provision for sectional completion. Both the IEM and PWD 203A do not have this fundamental flaw.

Given that the above is trait law and the potentially devastating consequences, a failure to understand and advise on the same by a Contract Administrator could lead to a successful action for negligence.

### 3.4.6 The Obligation to Proceed Regularly and Diligently

The Court of Appeal decision of *West Faulkner Associates v Newham London Borough Council* (1994) 71 BLR 1 provides a lesson for all construction professionals on the need to keep up to date with current practice.

The case concerns the obligation to proceed "regularly and diligently" which is often found in many construction contracts.

The Architect on the project and the Quantity Surveyor who he consulted, were stumbling around in interpreting the phrase because they thought this phrase had two parts. They asked themselves if the Contractor was proceeding regularly, and replied that he was. True, the Contractor was not proceeding diligently, but surely

both ingredients were needed? The project architect in his evidence said he thought that the contractor had to fail on both counts.

The Court of Appeal decided the architect's interpretation of these words was an impossible contention which gained no support from any textbooks or previous cases or from commercial logic, or least of all from common sense. The words "regularly" and "diligently" overlapped and it was unhelpful to seek to define two quite separate and distinct obligations.

Taken together, the obligation on the contractor was held to be to essentially proceed continuously, industriously and efficiently with appropriate physical resources so as to progress the works steadily towards completion substantially in accordance with the contractual requirements as to time, sequence and quality of work.

The second question for the Court of Appeal is based on this simple point: merely because an architect errs, does it mean he was negligent? The test for an architect's alleged error is to establish what the average architect would have done in the circumstances. ***The average architect must have a general knowledge of the law as applied to most important clauses of standard building contracts. The architect here, at least, ought to have recognised that the clause could be construed differently to his and the quantity surveyor's conclusion and in those circumstances the architect should have sought, or asked his client to seek, legal advice specifically on that point.*** The architect did not do so. This fell below the level of competence required and the Architect was held liable.

I repeat, the wise learn from other people's mistakes. Let us learn from the mistakes of Messrs West Faulkner Associates.

What then happened to the Quantity Surveyor? It has been said quantity surveying is a profession with (some) authority but no liability! Whilst normally this is because of the "no-loss" argument, in this case it is probably because the Quantity Surveyor was not duty bound to advise on contractual issues.

This is not to say the Quantity Surveyor could not have been contributorily negligent. If indeed the duty to advise on the same was squarely on the Quantity Surveyor then the liability would have been fully on the Quantity Surveyor.

Whether duty bound or not Quantity Surveyors do most of the time provide advise on contractual issues. Are Quantity Surveyors in the new millennium going to continue to provide the same and hide behind the Architect (on whom traditionally lies the liability and the fees for it!) or are Quantity Surveyors going to recognise contract administration as a core competency, get formally appointed to provide this service (and hopefully paid fees for it!) and be prepared to face the consequent liability that goes with it.

### 3.4.7 Non-completion

In *Algrey Contractors Ltd v Tenth Moat Housing Society Ltd* (1972) 1 BLR 45 it was clear that the Architect's certificate of delay under clause 24 of JCT 80, similar to clause 22 of the PAM/ISM 69 and PAM 98 contract was a condition precedent to the contractor's liability to pay liquidated damages. Once such certificate has been issued, the Employer (and not the Architect) may deduct liquidated damages from amounts due to the contractor under interim certificates.

Yet, the number of times liquidated damages are deducted without a valid certificate of non-completion or its equivalent are alarming even till today.

Further, architects still do deduct liquidated damages from certificates even though generally only the Employer or the SO (under the PWD Contracts) may do so.

Have we not learnt from mistakes of others committed decades ago?

### 3.4.8 Liquidated Damages

The position on liquidated damages in Malaysia is different from that in many other common law countries where there is no Acts of Parliament governing contracts. The following, it is suggested, ought to be known to all reasonably competent contract administrators practising in Malaysia today.

In Malaysia, Section 75 of the Contracts Act 1950 provides:

*When a contract has been broken, if a sum is named in the contract as the amount to be paid in case of such breach, or if the contract contains any other stipulation by way of penalty, the party complaining of the breach is entitled, whether or not actual damage or loss is proved to have been caused thereby, to receive from the party who has broken the contract **reasonable compensation not exceeding the amount so named** or, as the case may be, the penalty stipulated for.*

Roberts CJ in *Chung Syn Kheng Electrical Co Bhd v Regional Construction Sdn Bhd* [1987] 2 MLJ 763 suggests that the effect of section 75 is that all liquidated damages clauses are to be treated as if they had been penalties under English law.

The position as it stands in Malaysia now following the *Selvakumar a/l Murugiah v Thiagarajah a/l Retnasamy* (1995) 1 MLJ 817 case, even if it appears unsatisfactory, is that if challenged, the Employer would have to prove actual loss. The whole purpose of liquidated damages does not seem to be served. Worse still is the ceiling or cap to the amount recoverable !

The problems of the enforceability of liquidated damages in Malaysian can to a certain extent potentially be reduced or eliminated by :

- a) ensuring a reasonable sum is stipulated with full back-up of all calculation kept for reference. This could help avoid potential challenges as to the reasonableness of the amount stated.

- b) Contracting out of Section 75 of the Malaysian Contract Act 1950. Whilst the possibility of contracting out of Section 75 specifically has not been tested in the Malaysian courts, analogy from other cases would appear to enable this possibility.

The PAM 98 Contract is the only standard form of building contract in Malaysia which attempts to contract out of Section 75. Whether or not it is successful remains to be seen. What can be said now is that at least Contractors who wish to challenge would think twice or thrice before doing so.

If any reasonably competent Contract Administrator practising in Malaysia ought to know the current legal position on liquidated damages in Malaysia, it is suggested that he would be well advised to either :

- a) use a standard form which does contract out of Section 75; or
- b) ask the Client to employ specialists to advise on drafting amendments; or
- c) delegate such work to a specialist himself but retaining his legal rights.

#### **3.4.9 Extension of Time**

The doctrine of privity of contract means that it is not possible for a sub-contractor to be made directly liable to the employer for a breach of the main contract. Equally, the employer, who is not a party to the sub-contract, cannot in principle claim damages for breach of it. In practical terms, this means that unless the main contractor is liable to reimburse the employer for the loss caused by the sub-contractor, neither of them can sue the sub-contractor for that loss.

Although the ordinary contractual structure does not provide for any direct claim by an employer against a sub-contractor, there is nothing to prevent the parties from creating an additional contractual link commonly referred to as a collateral warranty. This it is suggested would be imperative where the PAM 69 contract or management contracts are used.

The PAM 69 contract has generally treated delay by an NSC as an area where the employer should take responsibility by providing for the main contractor to be granted an extension of time. The problem is, where such an extension of time is granted, the employer is deprived of the right to claim liquidated damages which the main contractor would otherwise have passed on to the delaying sub-contractor. As a result, unless the employer can make a direct claim against the sub-contractor under a collateral warranty agreement, the main incentive for the sub-contractor to keep to time will simply disappear.

The House of Lords in *Westminster v Jarvis* (1970) 7 BLR 64 criticised this clause as 'unjust and absurd', 'illogical and defective' and 'a provision under which a sub-contractor can benefit from its own default'. Yet, for nearly 30 years we had the same clause intact in Malaysia!! If it is of any consolation, perhaps this shows Malaysians are a non-litigious society!

The PAM 98 Contract now restricts such extension of time due to delay on the part of NSCs to only when the reasons are as for the other reasons set out and not for the delay due to the NSCs own fault. See Clause 23.7 (vii).

*23.7(vii) delays on the part of Nominated Sub-Contractors or Nominated Suppliers for the same reasons as set out in the sub-clauses 23.7(i) to 23.7 (vi) and sub-clauses 23.7 (viii) to 23.7 (xii).*

A similar solution is found in the PWD 203A and IEM Contracts.

Again, given the rather serious consequences on the Employer coupled with clear judicial criticism dating back to 1970, it is suggested that a failure to advise the Employer on the same could tantamount to gross negligence.

Litigious or non-litigious society, the saying "in times of peace prepare for war" is good advise, particularly when the cost of "preparation" is minimal. The cost of this Congress and the subsequent implementation of knowledge learnt for example, is negligible in comparison to the risk of being found negligence.

#### **4.0 CONCLUSION AND RECOMMENDATIONS**

This paper attempts to analyse the historical trends in the procurement routes adopted by the construction industry. It would seem there is continued strong demand for the traditional route with a growing trend towards design and build and its variants. It is likely that these are the two key routes that would sustain way into the new millennium. Incidentally Design and Build as a procurement option probably pre-dates what we now call the traditional procurement route.

What is more important than the choice of procurement routes is the way contracts are drafted to cater for any of the procurement routes and the proper administration of the contract.

The core outcome expected of a construction project is a quality end product completed within a pre-agreed time frame and completed within a budget. Contracts must be drafted to help these expectations to be met. Any contract that hinders this cannot be said to serve the construction industry's best interest. Disputes may still be inevitable but the formal resolution of it has to be a last resort. During a formal dispute resolution process the parties in dispute, say the Employer and Contractor, would be distracted from their core businesses and spending precious resources resolving the dispute and engrossed in the process of resolving the same. The only parties that would be engaged and continue to concentrate on their core business during a dispute would be the lawyers or "dispute specialists" and the tribunal on whom the parties are relying upon for a binding decision!!

On this note I would recommend using a common sense approach in deciding the most appropriate procurement route and in the selection and administration of contracts. This can help upgrade standards in the construction industry as we head towards the new millennium. Thus :

- where drawings and documents are substantially complete go for the tried and tested traditional route



- where speed is essential and design and construction needs to overlap then consider alternatives
- having chosen a particular contract, read it. They are generally in English (but not necessarily plain English). The illustrations given earlier backed by case law and case studies appear to indicate fundamental failure even to read the contract before administering it.
- if still in doubt then seek assistance - after all no one is perfect
- continue to update one's knowledge by way of continuing professional development (CPD) in any appropriate form. Moves by Professional Institutions which encourage or enforce CPD are to be welcomed.
- be cautious when treading into uncharted waters, however bear in mind, nothing ventured nothing gained.
- consider unifying the contracts issues affecting the industry through a special task force looking into the standard forms that are currently in use with a view to having a common set of standard forms for the construction industry. The task force should also identify gaps in the present contracts regime and structure.
- consider implementing the advise "the wise learn from other people's mistakes" by having an annual or more frequent national and international forum to exchange ideas. The Pacific Association of Quantity Surveyors could be one such body to initiate this forum on an international basis. Unity in diversity may have to be the order of the day. Whilst many issues can be addressed in a global manner each country may have to cater for its own cultural diversities.

Finally,

1. Like what George Bernard Shaw said, I am sorry for preparing a rather long paper - I did not have time to write a shorter one.
2. The best way to learn is to teach. I have learnt something today - I hope you have too. My request is: share it with others. Knowledge shared is knowledge gained.

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# **The Malaysian Construction Procurement Processes in the New Millenium : Constraints and Strategies**

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## **Abstract**

The paper reports the findings obtained from a research to identify constraints in the processes of construction procurement in Malaysia and the appropriate strategies that could be implemented to remove or alleviate the constraints identified. The findings suggest that constraints in some resources and functions that may inhibit the level of construction output are being experienced and that constraints in some resources and functions are perceived to exist until at least 2001. The findings also suggest the strategies that could be implemented to remove or alleviate the constraints identified.

**Keywords:** Constraints, Construction Procurement, Economy, Malaysia, Strategies.

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## **Introduction**

A country's economy is to a large extent dependent upon a capable indigenous construction sector, i.e., in terms of its relative size and the adequacy and timely supplies of the main resources, functions and institutions required for its processes. This is because construction establishes the basic physical, social and institutional infrastructures, housing and other facilities that are necessary to stimulate growth in the economy (see Abdul Rashid, 1998).

The presence of constraints in the processes of construction procurement therefore, may restrict or limit the effectiveness of the procurement process. Ineffective procurement processes would affect construction output, would inhibit growth in a country's construction sector and subsequently, may act as a constraint on growth in the national economy (Abdul Rashid, 1998).

In the context of Malaysia, desk study by the author during the first quarter of 1996 indicates that constraints in the supply side of the construction industry are developing. This is indicated by the presence of several issues facing the construction industry, the more important ones are thought to include (see Abdul Rashid, 1998):

1. The relatively small size of the construction sector. The construction sector (measured in terms of construction's annual contribution to GDP) ranged from 3.2% in 1988 to 4.7% in 1996 (see Ministry of Finance, 1988 - 1997). According to Wells (1986) a middle income developing country such as Malaysia requires the construction sector to contribute not less than 5.4% to GDP. Wells (1986) and Ruddock and Lopes (1996) contended that should construction's contribution to GDP is less than the minimum recommended level, inadequate construction output may be acting as a constraint on long term sustainable growth in the economy;
2. The relatively poor performance of construction such as its failures to implement planned development projects, to meet target delivery dates, to meet clients' requirement on quality, and poor health and safety records on construction sites; and
3. The continuous and upward increase in construction prices.

Constraints in the processes of construction procurement in Malaysia, if it exists, may render fulfilling the much higher demands of a more modern and industrialised economy (as Malaysia enters the new millenium) unattainable. Consequently, rapid and sustained economic growth as envisaged under Vision 2020 (see Mahathir Mohamad, 1991) may be unachievable, unless radical steps are taken.

The issues discussed above therefore, pose several questions including:

1. Are there constraints in the processes of construction procurement that may inhibit the level of construction output?
2. If there are constraints, can the types of constraints be identified and their extent ascertained?
3. If there are constraints and the types and extent of constraints identified, are there appropriate strategies that could be implemented to remove or alleviate the constraints identified?

This paper is based on a study carried out by the author to seek answers to the above questions in relation to the construction industry of Malaysia.

### **Definitions of Main Terms**

The two key concepts being investigated in the study are: (1) constraints in the processes of construction procurement, and (2) strategies to remove or to alleviate the constraints identified.

Construction procurement is defined as "the framework within which construction is brought about, acquired or obtained" (CIB, 1991).

In this study, constraints within the processes of construction procurement is defined as limitations or restrictions imposed on the process of acquiring construction projects. Constraints in the processes of construction procurement are divided into two categories, i.e.,

1. Current constraints - constraints in resources and functions experienced by respondent organisations at the time of study; and
2. Future constraints - constraints in resources and functions that are perceived by respondent organisations as likely to exist until at least 2001.

In this study, strategy is defined as plans or methods to be employed to remove or to alleviate the constraints identified. Strategies to remove or to alleviate the constraints identified are divided into two categories, i.e.,

1. Strategies to remove or to alleviate current constraints identified; and
2. Strategies to remove or to alleviate future constraints identified.

### **Scope of Study**

The study focuses on the major resources of manpower (management and labour), construction materials, plant and equipment, and financial; within the context of the procurement functions of (1) initiation/promotion, (2) funding, (3) design, (4) statutory approval for construction, (5) tendering, (6) construction, and (7) risk allocation among the parties involved (see definitions in Table 1).

In addition, the study focuses at the Malaysian construction industry-wide level and in the formal sector of the construction industry (see Abdul Rashid, 1998). It does not, therefore, attempt to identify constraints or to develop strategies to remove the constraints

identified at micro level, viz: types of construction; categories of organisations that are involved in the procurement process; sizes of organisations; or geographical locations of construction projects which may be particularly affected.

## **Methodology**

The study employs the triangulation approach in terms of data sources and research methods. It involved:

1. Extensive literature review to develop lists of resources and functions that are likely to be in constrained and lists of appropriate strategies to remove or alleviate each constraint identified. Proposed strategies were developed from procurement practices adopted by the construction industries in the United Kingdom (UK), Japan and South Korea for reasons including: (1) procurement practices in those countries appeared to have led to efficiency and effectiveness in the processes of construction procurement; (2) the economies and construction industries have experienced a period of sustained growth; and (3) the UK, Japan and South Korea have strong ties in politics, economy and in construction with Malaysia;
2. Questionnaire surveys of Malaysian organisations involved in the processes of construction procurement in Malaysia. There are two surveys, i.e., (1) a survey to identify constraints in resources and functions within the processes of construction procurement in Malaysia (referred to as Survey 1); and (2) a survey to appraise proposed strategies designed to remove or alleviate the constraints identified (referred to as Survey 2); and
3. Semi-structured face to face or telephonic interviews amongst Malaysian organisations involved in the processes of construction procurement and professional institutions within the Malaysian construction industry to validate the constraints identified and the proposed strategies.

The database for Survey 1 comprises names and addresses of 1,852 respondent organisations across Malaysia. It consists of 113 clients' organisations (government ministries and property developers), 1,262 designers (the offices of the Jabatan Kerja Raya across Malaysia, firms of architect, engineers and quantity surveyors), and 477 CIDB registered Malaysian contractors.

In all 84 types of resources and functions for current constraints and for perceived future constraints respectively, were included in the questionnaire for Survey 1. A subjective assessment approach was used to record the expert opinions of the respondent organisations. Respondent organisations were given opportunity to rate, on a Likert style scale, the extent or otherwise of constraints in each resource or function, either 1, 2, 3, or 4 representing No Constraint, Low Constraint, Medium Constraint or High Constraint, respectively. A rating of 1 indicates no constraint in a resource or function thus implying that the processes of construction procurement could be performed very efficiently. A rating of 4 indicates high constraint in a resource or function thus implying that the processes of construction procurement could be severely restricted or limited.

In the analysis of data the scores for 1 were combined together with the scores for 2 to become 1 representing Low Constraint. The scoring system is set as 1, 2 and 3 for Low Constraint, Medium Constraint and High Constraint ratings, respectively. The constrained resources or functions are those that received medium or high ratings.

Survey 1 was conducted by post (administered from the UK) between November 1996 and January 1997.

The database for Survey 2 was compiled from the respondent organisations from Survey 1 that indicated willingness to participate in Survey 2. It consists of names and addresses of 186 organisations comprising 11 clients, 127 organisations representing designers, and 48 contractors.

In the questionnaire for Survey 2, a list of strategies was provided for each constraint. Respondent organisations were asked to appraise, on a Likert style scale of 1 to 5 the viability and feasibility of each strategy in the context of both the constraint and the Malaysian conditions and environment. A rating of 5 indicates that the strategy is highly viable and feasible while a rating of 1 indicates that the strategy is not viable and unfeasible to be implemented.

The analysis of data for the survey is set as follows:

1. Proposed strategies that showed agreement by 80% or more of the respondent organisations overall, above by 80% from each of at least two out of the three categories of respondent organisations, (i.e., clients, designers or contractors), were considered to be prominent strategies. A prominent strategy suggests that the strategy is viable and feasible to be implemented in Malaysia and that its successful implementation would lead to success in removing or alleviating the constraints identified; and
2. The strategies are given relative ranking to indicate the priority in implementation. The ranking is based on the percentage of respondent organisations indicating agreement with the proposed strategies.

Survey 2 was conducted by post (administered from the UK) between April 1997 and July 1997.

The database for the interviews was compiled from the respondent organisations in Survey 2 that indicated willingness to participate in the interview (24 organisations) and a stratified random sampling of respondent organisations used in Survey 1 (40 organisations).

The database for the interview also included 7 institutions relating to the construction industry of Malaysia, i.e., the Housing Developers' Association (HDA), the Pertubuhan Akitek Malaysia (PAM), the Institutions of Engineers Malaysia (IEM), the Institution of Surveyors Malaysia (ISM), the Master Builders Association (MBA), the Persatuan Kontraktor Melayu Malaysia (PKMM) and the Construction Industry Development Board (CIDB).

In all, the interview database comprised names and addresses of 71 experienced practitioners (Malaysian) in organisations involved with the processes of construction procurement in Malaysia.

In the interview questionnaires each constraint was linked to a list of prominent strategies, listed in order of importance. The respondents were asked to indicate their agreement or disagreement to each strategy in terms of its viability and feasibility. In addition, if the respondents disagreed with the proposed rankings, they were asked to indicate their alternative preferred order of importance.

The analysis of data from the interviews is set as follows:

1. The strategies that received a simple overall majority, i.e., 50% or more respondents, (i.e., clients, designers and contractors) indicated agreement; and
2. The strategies that received a simple majority of each of two out of the three categories of respondent organisations, (i.e., clients, designers or contractors), i.e., 50% or more respondents indicated agreement; are considered to be valid. A valid strategy indicates that the strategy is viable and feasible to be implemented in Malaysia and that its successful implementation would lead to success in removing or alleviating the constraints identified. In addition, the majority rating indicates that the implementation of the strategy would receive the support of a majority of the respondents.

All interviews were held in Malaysia between August and September 1997.

## **Results**

### **Constraints in the processes of construction procurement in Malaysia**

In relation to Survey 1, 205 valid responses (11.24%) were received and used in the analysis of the research findings.

The results suggest that in Malaysia the majority of respondent organisations experienced constraints in some resources and functions within the processes of construction procurement (see Tables 2 - 4).

The results show that 29 types of resources and functions suffer constraint at the time of the survey and 32 types of resources and functions are perceived to suffer constraint until at least. The resources and functions in constraints currently and perceived to be in constraints in the future for up to 2001 (ranked in order of relative importance) are as shown in Tables 5 and 6 respectively.

Chi-square Test of Independence was performed on each constrained resource and function in relations to the categories of organisations of clients, designers and contractors. The results of the Chi-square Test of Independence (where  $p = 0.05$ ) show that there were no significant relationship between any of the constrained resources and functions and the categories of organisations. It may be concluded that there is a general consensus amongst the respondent organisations of the extent and the types of current and perceived future constraints in resources and functions within the processes of construction procurement in Malaysia.

### **Strategies to remove or alleviate constraints identified within the processes of construction procurement in Malaysia**

In relation to Survey 2, 54 organisations (29.03 %) returned completed questionnaires. All 54 responses provided the basis for the research findings. The results indicating the two most prominent strategies that are considered to be appropriate to remove current and perceived future constraints are as shown in Tables 7 and 8, respectively.

To determine the extent of consensus among the clients, designers and contractors involved in the study the Chi-Square Test of Independence was performed on each prominent

strategy in relation to the categories of organisation. The results of the Chi-square Test of Independence (where  $p = 0.05$ ) show that there was no significant relationship between a majority of the appraised strategies and the categories of organisations. However, the Chi-Square test results also indicated that there were some proposed strategies that did not receive a full consensus. The latter supported a decision to carry out interviews to validate the prominent strategies preferred by the respondents.

### **Validation of constraints identified and proposed strategies**

In all, 47 interviews with the representatives of the clients, designers and contractors organisations were carried out and provided the basis for the research findings.

The results of the interviews with the respondent organisations show a high level of agreement with the constraints identified and with the prominent strategies. The results also indicated agreement with the order of importance of the prominent strategies given by the respondent organisations in Survey 2.

The results of the interviews with the representatives of the professional institutions also showed a high level of agreement with the constraints identified and with the prominent strategies. They also indicated agreement to the order of importance of the prominent strategies.

The results of the interviews suggest therefore, that (1) the constraints identified in Survey 1 are valid; (2) the prominent strategies appraised by the respondent organisations in Survey 2 are valid; and (3) that the order of priority for implementing the strategies be retained.

On implementation of the strategies, the majority of respondents interviewed suggested that it is the government (through agencies such as the CIDB) that should principally initiate and implement the strategies. They argued that the government possesses the legal framework and resources to do so. The respondents indicated, however, that their organisations would support and assist the government in implementing the strategies.

### **Conclusions**

The purpose of the study reported in this paper was to identify current and perceived future constraints in resources and functions within the processes of construction procurement in Malaysia and to develop, appraise and validate strategies to remove or alleviate the constraints identified.

In relation to these objectives the findings indicate the resources and functions that are in constraints at the time of study and the resources and functions that are perceived to exist until at least 2001. In addition, the findings indicate the strategies considered to be viable and feasible to be implemented in the conditions and environments specific to the construction industry of Malaysia to remove or alleviate the constraints identified. Table 9 shows the key elements of the proposed strategies.

The findings of the study also suggest that government is seen as the prime mover in the implementation of the strategies.

The findings of the study provide useful guidance for the authorities responsible for the development of the construction industry in Malaysia. In this context, the CIDB could gain invaluable information in respect of the constraints identified and of the strategies that it could implement to remove or alleviate the constraints identified.

Since the study reported in this paper, there has been a downturn in the economies in Malaysia and elsewhere. At present, there are indications that the economy is picking up and Malaysia is refocussing on its development objectives to prepare itself for the challenges of the new millenium. It is contended that growth in the construction industry will again become a key factor. Many of the constraints reported in this paper may still exist and most of the strategies adopted may to still be relevant. This may be confirmed by repeating the methodology carried out in this research process.

In addition, the robustness of the methodologies that have been adopted suggest that similar methodology may be repeated to identify constraints and propose appropriate strategies to remove or to alleviate constraints within the processes of construction procurement at other times or in other countries.

Table 1. The Framework of the Malaysian Procurement Processes

Function	Definition
<b>1. Initiate / promote</b>	The process of recognising the need for a facility for owner occupation, as an investment, or as a speculative development.
<b>2. Funding</b>	The provision of the finance required in order for the project to be undertaken.
<b>3. Design</b>	The translation of the requirements of the initiator/promoter into drawings and specifications to facilitate construction. This process is sub-divided into three parts: <ol style="list-style-type: none"> <li>1. Concept/schematic design - the process of translating the requirements of the initiator/promoter into a basic design form, indicating the general design in terms of shape, size and function of the facility;</li> <li>2. Detailed design - the production of detailed drawings and specifications, from the concept/schematic designs, detailing and describing each element of the facility so that it may be constructed; and</li> <li>3. Specialist design - the development of detailed drawings and specifications for a specific component or element within the structure, which requires specialist technical knowledge to design and construct such as mechanical, electrical, heating and ventilation systems.</li> </ol>
<b>4. Approval</b>	The process of obtaining official permissions from the relevant authorities to: <ol style="list-style-type: none"> <li>1. Initiate and to construct buildings and civil engineering works; and</li> <li>2. Occupy and/or use the completed facility.</li> </ol>
<b>5. Tendering</b>	The process of selecting a main contractor or specialist contractors by the client on the basis of design information leading to a contract.
<b>6. Construct</b>	The process of physically fitting the various components of a facility together, to form a final structure. This process may be sub-divided into two parts: <ol style="list-style-type: none"> <li>1. Management of construction - the management of the construction process for the initiator/promoter; and</li> <li>2. Construction production - the physical construction of all or part of the structure for the initiator/promoter, in accordance with the detailed designs.</li> </ol>
<b>7. Allocation of risk</b>	The susceptibility of each of the above generic functions to varying degrees of risk. The degree of risk is dependent upon the type of procurement system used and the individual functional roles.

Source: Abdul Rashid (1998).



Table 2. The presence of current constraints in resources and/or functions in construction procurement processes in Malaysia as experienced or perceived by respondent organisations (overall)

Current constraint	No	%
<b>Yes</b>	<b>170</b>	<b>82.90</b>
<b>No</b>	<b>35</b>	<b>17.10</b>
<b>Total</b>	<b>205</b>	<b>100.00</b>

Table 3. The presence of current constraints in resources and/or functions in construction procurement processes in Malaysia as experienced or perceived by respondent organisations (by sector)

Current constraint	Public sector		Private sector	
	No	%	No	%
<b>Yes</b>	<b>33</b>	<b>75.00</b>	<b>137</b>	<b>85.09</b>
<b>No</b>	<b>11</b>	<b>25.00</b>	<b>24</b>	<b>14.91</b>
<b>Total</b>	<b>44</b>	<b>100.00</b>	<b>161</b>	<b>100.00</b>

Table 4. The presence of current constraints in resources and/or functions in construction procurement processes in Malaysia as experienced or perceived by respondent organisations (by client, designer, contractor)

Current constraint	Client		Designer		Contractor	
	No	%	No	%	No	%
<b>Yes</b>	<b>10</b>	<b>71.40</b>	<b>119</b>	<b>85.00</b>	<b>41</b>	<b>80.40</b>
<b>No</b>	<b>4</b>	<b>28.60</b>	<b>21</b>	<b>15.00</b>	<b>10</b>	<b>19.60</b>
<b>Total</b>	<b>14</b>	<b>100.00</b>	<b>140</b>	<b>100.00</b>	<b>51</b>	<b>100.00</b>

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Table 5. Resources and Functions in Constraints at the time of study (ranked in order of importance)

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1. Availability of facilities for training skilled labourers
  2. Availability of semi-skilled labour
  3. Constraints at project planning stage caused by procedures in obtaining statutory approval
  4. Availability of quantity surveying assistants
  5. Availability of plasterer/pavior
  6. Availability of mechanical and electrical engineering assistants
  7. Availability of carpenter
  8. Availability of civil and structural engineering assistants
  9. Availability of mechanical and electrical engineers
  10. Availability of quantity surveyors
  11. Availability of architectural assistants
  12. Availability of civil and structural engineers
  13. Availability of bricklayer/mason
  14. Availability of tiler
  15. Availability of joiner
  16. Availability of construction plant operator
  17. Availability of unskilled labour
  18. Availability of bar-bender
  19. Availability of cement
  20. Availability of architects
  21. Availability of concreter
  22. Availability of metalworker
  23. Availability of welder
  24. Availability of licensed electrician
  25. Constraints in contract administration due to political and/or bureaucratic interference
  26. Constraints caused by procedures in obtaining Certificate of Fitness
  27. Availability of technically competent, experienced and financially capable specialist contractors
  28. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)
  29. Availability of plumber
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Table 6. Resources and Functions Perceived to be in Constraints in the Future for up to 2001 (ranked in order of importance)

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1. Availability of plasterer/pavior
2. Availability of carpenter
3. Availability of semi-skilled labour
4. Availability of tiler
5. Availability of bricklayer/mason
6. Availability of joiner
7. Availability of construction plant operator
8. Availability of concretor and Availability of unskilled labour<sup>1</sup>
9. Availability of of bar-bender
10. Availability of facilities for training skilled labourers
11. Availability of quantity surveying assistants
12. Availability of mechanical and electrical engineering assistants
13. Availability of civil and structural engineering assistants
14. Availability of metalworker
15. Constraints at project planning stage caused by procedures in obtaining statutory approval
16. Availability of welder
17. Availability of mechanical and electrical engineers
18. Availability of architectural assistants
19. Availability of licensed electrician
20. Availability of quantity surveyors
21. Availability of plumber
22. Availability of civil and structural engineers
23. Availability of painter
24. Availability of glazier
25. Availability of drain-layer
26. Constraints in contract administration due to political and/or bureaucratic interference
27. Availability of architects
28. Constraints caused by procedures in obtaining Certificate of Fitness
29. Availability of suitable sites
30. Availability of timber
31. Availability of technically competent, experienced and financially capable specialist contractors

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<sup>1</sup> Resources received equal ranking

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**Table 7. Strategies to remove or alleviate current constraints within construction procurement processes in Malaysia +**

<b>Constraint and strategy</b>	<b>p (%)</b>	<b>r</b>
<b>1. Constraint at project planning stage caused by procedures in obtaining statutory approvals</b>		
Streamline and standardise administrative procedures in Local Authorities	88.89	1
Simplify and standardise procedures nation-wide	85.18	2
<b>2. Constraints in availability of Malaysian produced cement</b>		
Existing cement plant should increase production to relieve shortages	92.31	2
Improve enforcement to curb hoarding and black marketeering of cement	94.23	1
<b>3. Constraint in availability of unskilled, semi-skilled and skilled Malaysian labour</b>		
Increase intake of new trainees	94.31	1
Contractor should move towards greater use of plant to reduce the use of labour	92.45	2
<b>4. Constraints in availability of facilities for training skilled labour</b>		
Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth	96.15	1
CIDB and other bodies should set up new training centres specialising in the training of skills required by the construction sector	90.38	2
<b>5. Constraints in availability of key design team members - architects, engineers and quantity surveyors and their assistants</b>		
Promote the construction industry and its key professions to schools	96.15	2
Expand the capacity of existing university/colleges to train more students in key construction courses	98.11	1
<b>6. Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors</b>		
Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer	86.79	2
Develop mechanisms to allow local specialist contractors to gain experience	88.46	1
<b>7. Constraint caused by procedures in obtaining Certificate Of Fitness For Occupation (CF) for completed facilities</b>		
Streamline and standardise administrative procedures in Local Authorities	92.31	2
Disseminate information on approval procedures	94.00	1
<b>8. Constraint in contract administration due to political and or bureaucratic interference</b>		
Superintending Officer should be fully qualified and experienced professional	98.08	1
Improve organisational and functional co-ordination between clients and other bodies to avoid administrative bottlenecks	92.31	2
<b>9. Constraints in availability of reliable sources of information (on statutory requirements, cost data, project opportunities)</b>		
Encourage local universities/colleges to conduct relevant research and development and in publishing the findings	96.15+	1
Encourage professional institutions to conduct relevant research and development and in publishing the findings	96.15+	2

- + In this paper, the constraints have been synthesised into 9 types of current constraints. Only the two most prominent strategies are reported in this paper.
- p Percentage of respondent organisations indicating agree and strong agreement with the proposed strategy.
- r Relative ranking in accordance with percentage of respondent organisations indicating agreement and strong agreement with the proposed strategy.
- + Equal percentages; ranked in accordance with the number of organisations indicating strong agreement with the proposed strategy.

**Table 8. Strategies to remove or alleviate future constraints within construction procurement processes in Malaysia +**

<b>Constraint and strategy</b>	<b>p(%)</b>	<b>r</b>
<b>1. Constraint at project planning stage caused by procedures in obtaining statutory approvals</b>		
Streamline and standardise administrative procedures in Local Authorities	92.31	2
Improve organisational and functional co-ordination within Local Authorities	95.92	1
<b>2. Constraint in availability of unskilled, semi-skilled and skilled Malaysian labour</b>		
Contractor should move towards greater use of plant to reduce the use of labour	98.00	1
CIDB should speed-up its efforts on the accreditation and certification of skilled workers	93.75	2
<b>3. Constraints in availability of facilities for training skilled labour</b>		
Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth	93.88	1
CIDB and other bodies should set up new training centres specialising in the training of skills required by the construction sector	91.84*	2
<b>4. Constraints in availability of key design team members - architects, engineers and quantity surveyors and their assistants</b>		
Promote the construction industry and its key professions to schools	97.96	2
Expand the capacity of existing university/colleges to train more students in key construction courses	98.00	1
<b>5. Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors</b>		
Develop mechanisms to allow local specialist contractors to gain experience	87.75	1
The 'umbrella' and 'dedicated contractors' scheme for training Bumiputera contractors by the government to be extended to include training for specialist contractors	82.35	2
<b>6. Constraint caused by procedures in obtaining Certificate Of Fitness For Occupation (CF) for completed facilities</b>		
Streamline and standardise administrative procedures in Local Authorities	97.96	1
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments – federal, state and district – and between governments departments and the private utility providers	93.75	2
<b>7. Constraint in contract administration due to political and or bureaucratic interference</b>		
Superintending Officer should be fully qualified and experienced professional	100.00	1
Improve organisational and functional co-ordination between clients and other bodies to avoid administrative bottlenecks	93.88	2
<b>8. Constraints in availability of suitable sites</b>		
Local Authorities should speed- up preparing and gazetting the latest structure plan	94.34	2
Create new urban and industrial sites in suitable locations	96.15	1
<b>9. Constraint in availability of timber</b>		
Government policies on sustainable forest management should be implemented strictly and urgently	94.34	1
Encourage research to identify alternative materials to replace or to minimise using primary timber in construction	88.68	2

- + In this paper, the constraints have been synthesised into 9 types of future constraints. Only the two most prominent strategies are reported in this paper.
- p Percentage of respondent organisations indicating agree and strong agreement with the proposed strategy.
- r Relative ranking in accordance with percentage of respondent organisations indicating agreement and strong agreement with the proposed strategy.
- \* Equal percentages; ranked in accordance with the number of organisations indicating strong agreement with the proposed strategy.

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Table 9 : Key Elements of the Proposed Strategies

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1. Local Authorities
    - **Reform the organisation structure and systems of statutory approvals.**
    - **Revise the planning legislation.**
  2. Cement
    - **Increase production.**
    - **Curb unfair trading practices.**
    - **Initiate research into alternative materials.**
  3. Labour (Malaysian citizens)
    - **Increase productivity.**
    - **CIDB should speed-up implementation of its policies on construction labour.**
    - **Enhance the capacity of facilities for training skilled labour.**
    - **Include the construction industry into the government's training initiatives.**
  4. Professionals and semi-professionals (Malaysian citizens)
    - **Increase productivity.**
    - **Firms should form alliances to increase human resource capacity.**
    - **Draw more students to pursue tertiary education relating to construction.**
    - **Enhance the capacity of local educational institutions.**
    - **Facilitate entry of non-construction graduates into the construction industry.**
  5. Specialist contractors (Malaysian)
    - **Enhance the transfer of technology.**
    - **Firms should form alliances to increase expertise and financial capabilities.**
    - **Provide training facilities for specialist contractors.**
    - **Include specialist contractors into the government's contractors' training initiatives.**
  6. Contract administration
    - **Appoint full time S.O.s with full contractual powers to supervise projects.**
    - **Reform the system of communication between the participating authorities.**
  7. Information
    - **CIDB should speed-up implementation of its policies on research and development and dissemination of information relating to the construction industry.**
    - **Enhance efforts on research and development and in publication of findings.**
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Table 9 Cont'd

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8. Land

- Curb land speculation activities.
- Local Authorities should speed-up preparing and gazetting structure plans.
- Revive derelict land in urban areas.
- Create new urban and industrial sites.

9. Timber

- Strictly enforce the government's sustainable forest management policies.
- Use alternative materials.
- Initiate research into alternative materials.

10. General/Government

- Develop mechanism to monitor construction demand and supply.
  - Produce a policy on the construction industry.
  - Take the lead in modernising the construction industry.
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# A Quantitative Analysis of Managerial Knowledge and Skills of Quantity Surveyors (Do Quantity Surveyors Make Better Managers Than Architects or Civil Engineers?)

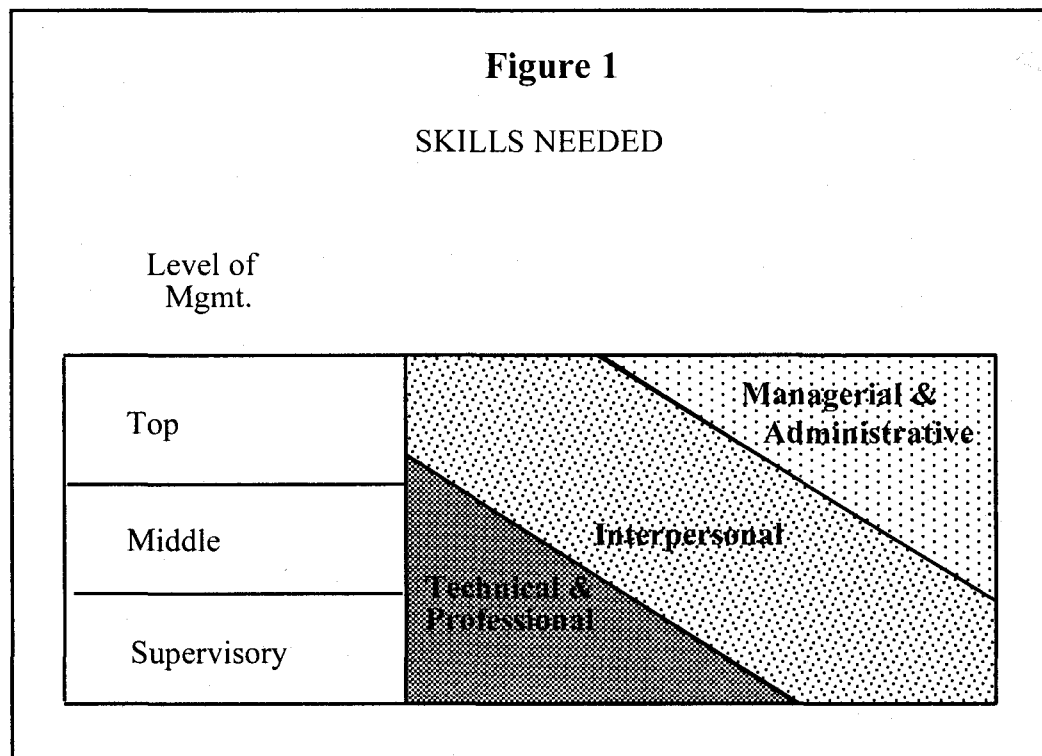
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## 1. Introduction

### 1.1 Can Technical Professionals Cope As Managers ?

Can technical professionals cope with the different skills demand of a managerial job? Researchers such as Mandt and the much-quoted Katz have pointed that the higher the position of a technical professional in an organization the more responsibilities of management he has to undertake and the more skills of management he must possess. Conversely he will be using less and less of his technical and professional expertise the higher he is in the organization (Mandt, 1979). The illustration below shows how skill demands vary according to job level.



(Adapted from Mandt, E.J., (1979). "A Basic Model of Manager Development". Personnel Journal, June 1979: 395).



If Mandt is correct, then technical professionals who have been in service for, say six years or more, would probably need managerial development. If this presumption is true, this need is not being met by what is available at present. For example a well planned series of seminars for the continuing education of technical professionals in management is not available. If we study the **trends in management education** in industrialized countries such as Australia, the U.K. and the U.S.A., we find that management education for technical professionals is given priority and is on the rise. It appears that the global view is taken by these countries that managerial development of technical professionals (of all industries) is a key to **international industrial competitiveness** (Kemper, 1983; Hussey, 1988).

## **1.2 Issues of Technical Professionals in Management Roles**

Case studies such as the ones below show that some technical professionals in the construction industry are doing functions they are not specifically trained for. How many technical professionals are following career paths similar to, or are transforming roles from technical professional to manager like Razi and Hadi?

### **CASE STUDY I**

*Razi is the General Manager of CDTM. He is 41 years old. He qualified as a quantity surveyor in 1977 and started his career with the Public Works Department. He left after eight years with the Department to work for CDTM. He was promoted to G.M. after five years with the company.*

*Numerous problems of various nature come to his desk to be solved. Some recent examples of these problems were: How to get large quantities of quality-controlled and regular supply of ready-mixed concrete for the 113 km. four-laned highway project in the south of the country. Then there was the project in Seremban where the Project Manager had refused to take staff sent by the HQ.; he wanted to pick his own staff. Another situation was an Engineer who complained that he was not given enough responsibilities by the Project Manager and he (the Engineer) felt left out of the project. And recently too Razi had to review the structure of the organization because he found that some departments were loaded with work while others did not have enough to do; it was even becoming a problem to evaluate the performance of the staff for the annual bonus payment.*

### **CASE STUDY II**

One day in December 1992 Hadi's boss called to tell that Hadi was to be in charge of the Marketing unit (of BSPN., one of the biggest development companies in Malaysia). The young but unflappable Hadi took this news in his stride although he was aware of several major difficulties he would be facing. For example there were no job specifications coming with his new assignment as Head of Marketing. There had never been any and he would have to write his own job specifications, he decided. Another potential problem was that he knew that the marketing unit had a staff of 15 consisting of many senior members who were qualified in marketing and with many years of experience. But he had neither the right qualifications nor the most relevant experience. He graduated with a degree in Quantity Surveying from the Bristol Polytechnic in England in 1981. Being talented and hard-working he was noticed very quickly by the organizations he had worked for. He hardly had time to practice quantity surveying before being promoted to a manager. That was five years after he had graduated. Since then he had been a manager in different organizations. He has remained in the same industry but has been carrying roles not of a specialist technical person. He became a manager.

This role change or career change phenomenon raises important questions such as: How successful are they as managers?

There are many other issues and questions arising when we speak of technical professionals as managers. Some of these are: How important is management itself? What are the basic skill demands for a manager? Can the technical professionals cope with the different skill demands of the managerial position? Did his professional academic training and experience help or hinder him in a managerial job? It has been said that there is no "psychological fit" for technical professional to be managers. Is this true? What are other factors for or against a technical professional becoming a good manager?

Some research have been done on the above issues. These are described briefly in the following paragraphs before a focus is made on some of the most important questions in the following section.

### 1.3 Why is Management Important ?

Why is management important? Put simply, many things will be chaotic without management. However the importance of management is its use to handle resources to create goods and services; and this is vital at all levels, organization, national and global. Management determines the effectiveness and efficiency of organized activities. Management too has become a well established profession, with its theories, concepts, scientific methods, tools and techniques.

Many technical professionals in the construction industry are carrying out managerial functions. Not being trained to become managers, technical professionals have nevertheless been managing projects, or promoted to management positions, or are owner-managers of construction firms and consultancy services. The importance of good management is clear. It has been found that one third of the causes for non-productive time in construction can be attributed to management related factors (Adrian, 1987). Perhaps the influence of management is more extensive than a proportion of one third because of the manager's position at the top of the organization pyramid. The manager's strategies and decisions affects the working of the whole organization.

### 1.4 Negative and Positive Factors Influencing the Performance of Technical Professionals as Managers

Research has also shown that there are both negative and positive factors influencing the performance of technical professionals as managers. Many factors indicate that the technical professional would be unprepared for this transition into management<sup>1</sup>. His academic background would have prepared him to solve technical problems and make decisions on technical matters. **Course contents for technical degrees** at universities normally stress on the technical subjects with a near total neglect of managerial subjects<sup>2</sup>. His **work experience** in

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<sup>1</sup> A study in the U.S. indicates that there is substantial evidence to say that the transition to management has been troublesome for many technologists (Badawy, 1982: 42-50).

<sup>2</sup> Many observers of management education for technical professionals have pointed this out, for example:  
In the U.S. : Poirot, 1986: 101;  
In the U.K. : Thompson, 1986: 68;

his first five to eight years is generally highly technical and would not normally have prepared him to be a manager. **Paradoxically** he may have been promoted to be a manager because of his ability not as a manager but a technical professional.

### Minus Factors

Generally technical professionals choose their careers because of their inclination and ability in technology and they find that work exciting and challenging and generally did not choose that career because they wanted to be managers. Furthermore, what makes technical work appealing to the professionals is actually in conflict with much of the nature of management<sup>3</sup>. Lorsch and Mathias (1987:79) give three main reasons for this perception. Firstly, technical work is a good **"psychological fit"** for the professionals partly because in technical work they can get fast and quantifiable results. A consultant can watch a building taking shape and get immediate feedback from the client. However a manager generally achieves results gradually over a long period of time (notwithstanding project management); even then the outcomes may not be concrete and visible and there is often no clear feedback.

Secondly, according to Lorsch and Mathias professionals regard their work as **intellectually challenging** and demanding but look at the generalist work of a manager with some disdain and some may even consider it unglamorous. Managers may have to create or monitor a new administrative process or come to terms with a worker's lack of motivation or attend long meetings. Tasks which may make the technical professional not too comfortable since they are so different from his line of work. Thirdly, Lorsch and Mathias also say that professionals often work alone or with a **small team of associates**. They have the **autonomy** to pursue any direction that seems to make business sense. In contrast, managers deal continually with a more complicated web of relationships with superiors, peers and subordinates.

### Plus Factors

Thus far the factors that work against the technical professional being an effective manager have been noted. However there are also many strong factors that can make a technical professional a good manager. A study by Morrison (1986) identifies **eight factors** in the technical backgrounds of professionals that make them effective managers. Among the factors mentioned by Morrison are that technical people are "logical, methodical, objective and make unemotional decisions based on facts". Morrison also says that technical managers check the validity of information using their technical knowledge. They also analyze problems thoroughly and ask good questions to find alternative solutions to technical problems.

## 1.5 Measuring the Performance of Technical Professionals as Managers

We may accept the reasoning that technical professionals can become good managers, and we may be even able to identify some examples of successful technical professional-managers. But could we measure the performance of technical professionals as managers in some ways and say that *this is* the standard of managerial knowledge and skills of technical professionals in the construction industry in Malaysia? Is it possible to create a measuring instrument that could do this? We need to provide a quantitative perspective to complement the qualitative ones, some of which are mentioned above. A quantitative approach is useful for a number of reasons; for

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In Malaysia: based on the researcher's own 15-year experience in technical education.

<sup>3</sup>Morrison (1987: 260-261) gives a good detailed account of the role differences between engineers and managers.

example if we need to formulate a training policy for technical managers we need to know the performance of not only a few of the technical professionals but really what is the performance of technical professional population?

At the moment we are perhaps relying too much on our perception (or educated guess) and intuition on the issue of technical professionals as managers, although this issue has a great significance on the overall efficiency of the construction industry. There are many questions which have not been investigated so that answers which are the results of scientific enquiries may be presented.

## **2. Scope and Assumptions of the Study**

### **2.1 Scope of the Study : The Focus on the Technical Professional as a Manager**

The scope of the research is defined as: a study of the technical professional as a manager. Research in management in the construction industry has very often looked at management procedures and techniques<sup>4</sup>. The human aspect, the individuals concerned has been less investigated. This study did not cover detail on the systems and procedures except when incidentally they pertain to the assessment of the individual technical professionals as managers.

The importance of the manager is that he can influence the efficiency of the organization: But management of business and organization have been getting more demanding and there is more pressure on the technical professional as a manager. Management in itself has evolved into a profession in its own right with its own systematic body of knowledge.

### **2.2 Assumptions of the Study**

The principal objective of the Survey is to audit the managerial competency of the technical professionals. There are perhaps several means to achieve this objective. In this section the rationales for certain directions taken or choice made are presented.

At certain points in the study the researcher faced alternatives and choices on the directions or methods or scope. For example there are several ways of assessing managerial competency as was mentioned above. One method was chosen over the others and the rationale was given for this (item (d) below). There are many variables which influence managerial competency. A few variables were left out but focus was given to others and the rationale was also given for this (items (c) and also (d) below). Certainly the direction not taken or the choice not made do not mean there is only one way to do it or one best choice to be made. This is why it is important to state the scope and assumptions of the study particularly the Survey part.

#### **a. Management is universal**

There are two schools of thought on this issue. One is of the view that management is universal and therefore there is no uniqueness of management in the construction industry. The other of the view that management in the construction industry is unique.

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<sup>4</sup>The Steering Group's appraisal of research in construction management in the U.K. shows that amongst others: "The majority of projects had been related to management procedures and techniques with very little work having been carried out into human aspects of the subject." (Trimble et al., 1984).

The following are some examples of writers representing the former point of view and following that the latter point of view.

Fayol proposes that the activity of management is "universal", suggesting that managerial skills are transferable to different organizations. Wren and Voich (1984) found that some 60% (or 308 CEOs of the Fortune 500) of these individuals (CEOs) job-hopped and succeeded supporting the idea of transferability of managerial skills. Managers from different organizations different sectors and different industries, all can, and do draw upon the same fundamental body of management knowledge.

An example of the opposing point of view is Follows et al. (1983) who started their book by stating: "This book is concerned with management in the context of the construction industry and this industry possesses a number of features that distinguish it from others. As a result, construction management differs from that observed in other industries". However, going through the book one finds that the uniqueness of the industry is evident but the universality of management theories and concepts applied in the construction industry is also evident.

Regardless of the not unusual debate on semantics, there are truths in both points of views. Perhaps one can say that management theories and concepts are the same everywhere but adjustments have to be made to the particular circumstance or uniqueness of the circumstances. For example Maslow's theory on the hierarchy of human needs may be applied to labour in the construction industry but perhaps participative leadership may not work as well as strong task-oriented style of leadership on the construction site.

**b. The two-tier paradigm of management in the construction industry**

The application of management theories and practices to suit the particular circumstances or requirements of the construction industry is in fact an issue which has been addressed by the current management thinking of "contingency management". However, this can be viewed as only one-half of management in the construction industry.

In an academic sense a paradigm for looking at management in the construction industry as a whole would be very useful in making the issues concerning management in the construction industry clearer. The researcher would like to propose a two-tier paradigm. The first tier concerns general management theories and concepts. The second tier consists of specialized management applied in the construction industry for example construction management, facility management, value management and others which are technology-based practices. Each one of these is a vast subject in itself and no attempt will be made in this study to cover these practices.

A pilot study had been done which involved technical professionals in the construction industry. There were no indications that this paradigm was not acceptable. In fact the response from the technical professionals towards this paradigm was positive.

**c. Selection of Variables for the study**

The literature review indicated a lack of information on this area of study. This presented an opportunity to explore many variables which were believed to influence managerial knowledge and skills of technical professionals. Variables like type of

profession, length of service, sector, size of organization and methods of learning management were studied. However certain variables like culture were left out for specific reasons. Firstly, some studies<sup>5</sup> have found no significant effect of culture on management. Secondly, the almost homogeneous characters of the sample (English-speaking and the majority trained overseas) would make the factor of culture act equally on everyone. And thirdly, this very sociological aspect is best left to the experts in this area.

d. **Different ways of assessing managerial competency**

There are many ways of assessing managerial competency. Each method has its merits and demerits. And each method may be appropriate in certain circumstances or to meet certain objectives than others. Among the methods is appraising managers by traits. The criticism against this approach is that the emphasis on trait is at the expense of rating on job knowledge and job performance. The second major method of assessing managers is against the achievement of set objectives. The weakness of this method is that it is impossible to judge whether it is the manager's abilities or the circumstance (e.g. the economy) which are responsible for the manager's success or failure.

Similarly, the third method of assessing the organization's productivity or the project's success or failure, has the problem of who to credit the results with: the manager or other equally influential variables.

The method chosen for appraising the technical professionals as managers uses the manager's basic functions of planning, organizing, leading and controlling. This method has found much support in the literature. One of the reasons for the appropriateness of this method for the task at hand was that it had the common denominator for a variety of technical professionals doing a variety of functions.

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<sup>5</sup>For example Sarachek and Hamid (1987), in their study "A Survey of Malaysian Personnel Practices and Problems" state very definitely that: "The least serious personnel problem originated from relations between people of different races and religions. Only 14 respondents (out of 129) indicated that this is even a source of moderate difficulty."

### **3. Methodology : The Survey Approach**

The Survey was focused on determining the level of managerial skills and knowledge of the technical professionals and correlating the performance to selected variables namely: profession (architect or civil engineer or quantity surveyor); length of experience in the industry; whether the technical manager is working in the private or public sector; and the size of organizations. The study sought answers to specific questions as follows:

1. What is the standard of managerial knowledge and skills of technical professionals of the construction industry.
2. Are any of the technical professional groups better managers in general than the others?
3. Is there any significant difference in the standard of performance between private and public sector technical managers?
4. How much influence is the size of organizations on the managerial performance of technical professionals?
5. How much of influence is length of service on the performance of technical professionals as managers?
6. What are the strengths and weaknesses of technical professionals in managerial knowledge and skills ?
7. Is there any significant relationship between the level of performance in one managerial function to the level of performance in another managerial function?
8. Is there a bias towards some management styles or a particular management style as regards task/people orientation among technical professionals?
9. Which methods of learning are perceived by technical professionals to improve their managerial performance?
10. Is there a relationship between perceived effectiveness of the management learning methods and the technical professionals' managerial knowledge and skills?

#### **3.1 Definition of Concepts : Managerial Effectiveness**

The concept of managerial effectiveness or managerial competence has various definitions. Experts have discussed widely traits, leadership styles and organizational efficiency, attributing managerial success to one or some of these factors. The literature does not show agreements on what makes a manager successful (or how to measure managerial success). Certain managerial knowledge and skills are preconditions to managerial success. Studies of what the manager does, indicate certain key functions of management. Different authorities offer different names for the key functions; however there is general agreement on most of the actual duties of a manager. The four functions used to describe management are Planning, Organizing, Leading and Controlling. For the purpose of this study managerial knowledge and skills are operationally defined as knowledge and skills in planning, organizing, leading and controlling. This study defines managerial knowledge and skills as a "total" ability: knowledge and skills are taken as

an integrated factor of having the theoretical cognizance and applying the theories in the work situation. The key functions of management: planning, organizing, leading and controlling, are made the dependent variables in this study. Managerial knowledge and skills will be measured in terms of the manager's actions and ideas in these functions. The scores in the dependent variables for each sampling unit will be compared with one another to determine significant differences in its respective subgroups of profession-type, length of service, private or public sector organization, and size of organization.

### 3.2 Definition of Terms

The dependent variables have been described above. The independent variables are defined as follows:

- a) Professional group: the three major professionals in the construction industry in Malaysia viz. architects, civil engineers and quantity surveyors.
- b) Length of service: The number of years the professional has been working since graduation at the bachelors degree level.
- c) Private organization: any business enterprise belonging to a person or a group involved in the construction industry.
- d) Public organization: any government department or agency which has the function of dealing with the construction industry.
- e) Size of organization: total number of persons employed in the organization.

### 3.3 Developing an Inventory of Managerial Knowledge and Skills

The approach adopted for data collection was self-assessment by the technical professionals using a questionnaire. The self-assessment questionnaire approach has been much used and accepted as a research strategy; in a study by Hales (1986) for example, 10 out of 30 of the studies on the manager that was reviewed use the self-assessment method for collecting data. Data could also be collected from other sources (e.g. from peers, subordinates or superiors of the subject). Although subordinates cannot evaluate all aspects of a manager's performance, subordinates' appraisal of managers is still important (Antonioni, 1993).

The survey of literature revealed that there is no measuring scale or inventory available which fitted the requirements of the study. An inventory in the form of a questionnaire using four measuring scales for the four basic functions of management was developed using the study's objective as the starting point. Questions were developed to test the technical professional's understanding and competence in applying the basic managerial knowledge and skills in planning, organizing, leading and controlling in Malaysia.

**Parts A of Questionnaire.** The questionnaire has 3 parts. Part A consists of 10 items meant for gathering background information on the respondents. Data for the independent variables of professional group, length of experience, private or public sector, and size of organization are obtained from these information

**Part B of Questionnaire.** Part B measures the managerial knowledge and skills. Koontz (1971) provides the guidelines and checkpoints for the construction of a managerial knowledge and skills inventory. The inventory constructed is in the form of a structured questionnaire.



The questionnaire consisted of four scales: the managerial knowledge and skills in planning scale (MKSPS); the managerial knowledge and skills in organizing scale (MKSOS); the managerial knowledge and skills in leading scale (MKSLs); and the managerial knowledge and skills in controlling scale (MKSCS).

Part B has 32 items with 8 items in each scale. This is felt to be a practical and reasonable length for the questionnaire, at the same time the items cover all the points considered to be critical.

#### **4. Findings and Conclusion**

##### **4.1 Results of Inferential Analysis**

- a. **What is the standard of managerial knowledge and skills of technical professionals?**

On the 5-point scale, the technical professionals scored the following way:

Scale mean	=	3.0
PLANNING	:	3.0
ORGANIZING	:	3.6
LEADING	:	2.9
CONTROLLING	:	3.3
OVERALL	:	3.2

In these terms the managerial knowledge and skills of technical professionals can be judged to be average.

- b. **Is there a significant difference in the standard of managerial knowledge and skills of architects, civil engineers and quantity surveyors?**

The three professions came out very even in the comparison. Comparison in each managerial function showed no significant difference. In fact when the overall mean score for each profession are converted to scale scores and the decimals are rounded up the scores are equal for all the three professions at 3.2.

The statistical evidence supports that the architects, civil engineers and quantity surveyors are of equal standard in managerial knowledge and skills.

- c. **Is there a significant difference in the standard of managerial knowledge and skills between Private Sector and Public Sector technical professionals?**

Private Sector and Public Sector technical professionals have close mean scores in all managerial functions. When the data was tested, the inference was that there was no significant difference in the standard of performance of Private and Public sectors technical professionals in Planning, Organizing, Leading and Controlling.

- d. **Is there a significant difference in the standard of managerial knowledge and skills of technical professionals in small, medium or large organizations?**

Technical professionals in large organizations scored marginally better than technical professionals in small and medium organizations in the functions of Planning, Organizing and Leading; and technical professionals in small organizations had the best mean score in the function of Controlling. However from the statistical test results it can be inferred that there were no significant difference in the performance of technical professionals in all the managerial functions.

- e. **Is there a relationship between managerial knowledge and skills and the number of years of service of the technical professionals?**

The scatter diagrams of score in each of the four managerial functions against years of experience did not show any linear pattern of relationship between the two variables. Low coefficient of correlation also supported this opinion. It is concluded that the length of service does not significantly correlate with the standard of managerial knowledge and skills in the functions of Planning, Organizing, Leading and Controlling. (One plausible explanation for this finding is that there exists one (or more) variable which has a greater influence than the influence of the time factor).

- f. **What are the areas of strengths and weaknesses in managerial knowledge and skills of technical professionals?**

Tests on the data yielded significant results. On a 5-point scale the converted mean scores are as follows : Planning, 3.0; Organizing, 3.6; Leading, 2.9 and Controlling, 3.3. The tests provide evidence that technical professional are best at Organizing and secondly at Controlling; and these scores are above the scale mean of 3.0. Technical professionals' knowledge and skills in Planning and Leading are close to the scale mean. It is concluded that a ranking of competencies in managerial functions of technical professionals from the highest to the lowest has Organizing at the top followed by Controlling, with Planning and Leading ranked equal third.

- g. **Is there any significant relationship between the level of performance in one function to the level of performance in another function?**

Positive correlation were found between each one and all mean scores of the four managerial functions. However, there were no strong correlation. About 12% of the variability of scores in Planning and 11% of the scores in Controlling are attributable to the Leading factor, and about 11% of the variability of Organizing scores can be attributed to the linear relationship with performance in Planning. It is concluded that there are no strong correlation between performance in one managerial function to performance in another.

- h. **Is there a bias towards some management styles or a particular management style as regards task/people orientation among technical professionals?**

A comparison of four categories of task-people orientations showed that most technical professionals are Medium High to High "Task"/Low to Medium Low "People" oriented. It is concluded that technical professionals tend to place more emphasis on task than people.

**i. Which methods of learning are perceived by technical professionals to improve their managerial performance?**

The data show evidence that technical professionals did not rely equally on each of the 6 methods of learning listed. Inferences based on the data give support to the conclusion that learning by "experience" was by far perceived to be the most influential method of learning by the technical professionals. The next method of learning perceived to be effective was "thinking and discussion".

**j. Is there a relationship between perceived effectiveness of the management learning methods and the technical professionals' performance on the Inventory?**

The data indicated that there appeared to be some weak correlation between perceived effectiveness of learning methods and scores on the Inventory. When tested for significance none of the correlation with the exception of one was found to be significant. The significant correlation is between Planning scores and the perceived effectiveness of learning by "testing". This is a negative correlation; and almost 43% of the variability of Planning scores can be attributed to the perceived effectiveness of learning through "testing". Over this, all the methods of learning management perceived to be effective by technical professionals have not shown much influence on their managerial knowledge and skills.

**k. What activities under the functions of Planning, Organizing, Leading, and Controlling are perceived to be important to his success by the technical professional?**

A list of 15 topics were ranked in order of their perceived importance to the success of the technical professionals. The top 5 topics are as follows:

- (i) Specifying jobs for staff
- (ii) Applying control techniques/methods
- (iii) Communicating with people
- (iv) Motivating employees
- (v) Managing information

#### **4.1 Conclusion**

Empirical evidence is provided by this study on how the technical professional is fared as a manager. This study found that in the four basic functions of management, planning, organizing, leading and controlling, the technical professional is average in two of them: organizing and controlling; and slightly less so in the other two functions of planning and leading. There is an estimated 40% area for improvement in all the four functions of management.

The issue of relationship of performance in one managerial function with another was also investigated. It would be useful to know whether there was a function which could influence another function such that ability in this function or education and training in this function could enhance ability in other functions. The data analysis did not indicate any strong correlation between performance in one managerial function to performance in another.

The other facet of the technical professional that has been thought to work against the technical professional achieving success in management is the notion that management work may not be

a good "psychological fit"<sup>6</sup> for the technical professional. This may be true. On evidence collected by the study it was found that technical professionals tended to emphasize on "task" than "people". But whether this is effective or ineffective management will depend on the situation. Studies by Fiedler (1967) indicate that the "task" oriented leader will perform well in both favourable and unfavourable situations. In a project management situation for example where the task structure may be poor and the leader's power is unclearly defined, it might be expected that the technical professional will perform well.

This study also has been able to gather data to describe more about the nature of technical managers. Towards this end the researcher had worked on four hypotheses which concern the questions of the influences of different academic backgrounds; private sector and public sector environment; various sizes of organizations; and length of service.

Traditionally the architects have always been the leader in the building team. More recently in projects using construction management, the construction manager can be from any profession, though usually from within the industry, he can either be an architect or a civil engineer or a quantity surveyor. The question may be posed as to who would make the best manager in the traditional context or in the new Construction Management approach. It was hypothesized that any one of the professions would make satisfactory managers in construction. In other words when compared, the three professional groups would have equal managerial knowledge and skills. The hypothesis was proven true as all the three professions scored equally on the managerial Inventory. All the three professions performed almost to similar levels on all the four basic managerial functions. The implication arrived at from this finding is that the different technical/academic backgrounds have no discernible influence on managerial knowledge and skills. A technical professional trained as an architect, or a civil engineer or a quantity surveyor can be equally good as a manager.

Secondly it was hypothesized that a technical professional working in the private sector or the public sector would be influenced by the nature of the environment in which he is working. A preconception here is that, due to different organizational cultures, different forces of influence within the two sectors, and their different priorities, private sector and public sector technical professionals would have been molded to different levels of abilities. However it was found that the sector environment exerted negligible influence on the managerial knowledge and skills. Technical professionals in the private sector and public sector have equal standard of managerial knowledge and skills.

Thirdly a hypothesis was made regarding the standard of managerial knowledge and skills of technical professionals from different-sized organizations. Again, organization culture, facilities for managerial development, different sizes of staff, different sizes of working budget, different levels of sophistication, different sized contracts and projects and different nature of clients between small, medium and large organizations would be expected to foster technical professionals with different levels of capabilities. This trend was not found. Technical professionals representing the three subgroups of three classes of sizes of organization do not have significantly different standards of managerial knowledge and skills.

The fourth hypothesis concerned the influence of length of service in the industry on the managerial ability of technical professionals. It was anticipated that length of service would have

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<sup>6</sup>A concept propagated by a number of writers for example Lewey and Davis (1987), discussed in Chapter II, to explain the different attributes and attitudes of the technical profession and the manager.

positive correlation with level of managerial knowledge and skills of technical professionals: the longer the length of service the higher the level of managerial knowledge and skills. However the results of the data analysis did not show this. There are no significant correlation between years of service and standard of managerial knowledge and skills.

The following three points are relevant in connection with this issue:

- (i) Experience was perceived by the technical professionals to be the most effective method of learning management. However data from this study do not support this perception to .
- (ii) Long years of service and experience will not be productive if there is no structure in the learning. Most technical professionals rely on "thinking" and "discussion" besides "experience" in learning. These unstructured learning methods were proven ineffective.
- (iii) One plausible explanation for non-significant correlation between years of service and standard of managerial knowledge and skills might be the nature or content of the experience during service. This may account for technical professionals with longer service who have relatively low scores. In conjunction with this, the relatively good scores of technical professionals with shorter length of service might indicate more emphasis being put on management subjects in the curricula and this has benefited the younger technical professionals.

Several research questions were posed to determine matters relating to the learning of management by technical professionals: the relative importance of the main activities under the four functions of management; what are the methods of learning management used and perceived to be effective by technical professionals; and are these perceived effectiveness in fact supported by the scores on their performance.

As mentioned earlier in this chapter, it was found that technical professionals' level of managerial knowledge and skills was average. On the five-point scale the score was 3.2 which is just slightly above the scale mean 3.0. Further questions were asked as to how the technical professionals had learnt managerial knowledge and skills. The response indicated that out of six basic methods of learning, technical professionals had used learning by "experience" most and perceived this method the most effective. "Thinking and discussion" was the next most employed method of learning. The data also provided evidence that "testing" was the least used method and perceived least effective.

The following question was what are the method or methods which have the most influence on the performance of the technical professionals in management. The perceived effectiveness of the methods of learning were correlated to the performance of the technical professionals on the managerial Inventory, to provide a non-biased perspective on the effectiveness of the methods of learning. There were no significant correlation except one. There was evidence to support that there was a negative correlation between Planning scores and the perceived effectiveness of learning by "testing".

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Table 1..Frequency Distribution of Scores in Planning: Comparison between Professional Groups

	Categories of Scores			
	Low	Med. Low	Med. High	High
Architects (N=21)	-	29%	71%	-
Civil Engineers (N=24)	-	42%	54%	4%
Quantity Surveyors (N=23)	-	43%	57%	-

Table 2..Frequency Distribution of Scores in Organising: Comparison between Professional Groups

	Categories of Scores			
	Low	Med. Low	Med. High	High
Architects (N=21)	-	5%	67%	28%
Civil Engineers (N=24)	-	4%	88%	8%
Quantity Surveyors (N=23)	-	9%	65%	26%

Table 3..Frequency Distribution of Scores in Leading: Comparison between Professional Groups

	Categories of Scores			
	Low	Med. Low	Med. High	High
Architects (N=21)	5%	57%	38%	-
Civil Engineers (N=24)	4%	46%	50%	-
Quantity Surveyors (N=23)	5%	52%	43%	-

Table 4..Frequency Distribution of Scores in Controlling: Comparison between Professional Groups

	Categories of Scores			
	Low	Med. Low	Med. High	High
Architects (N=21)	-	33%	57%	10%
Civil Engineers (N=24)	-	17%	79%	4%
Quantity Surveyors (N=23)	-	22%	78%	-

Table 5.Frequency Distribution of Overall Scores:  
Comparison between Professional Groups

	Categories of Scores			
	Low	Med. Low	Med. High	High
Architects (N=21)	-	29%	71%	-
Civil Engineers (N=24)	-	17%	83%	-
Quantity Surveyors (N=23)	-	26%	74%	-



## Further Reading – An Update

This appendix contains a selection of new (post-thesis) books and articles on the subjects of management and leadership.

Title: An interview with Barbara Barrett, AMA's president and CEO  
Subject(s): BARRETT, Barbara; AMERICAN Management Association  
Source: Management Review, Dec97, Vol. 86 Issue 11, p5, 1p, 1c  
Author(s): Ettorre, Barbara  
Excerpts:

**Q. What skills and leadership does it take to provide leadership to an organization today?**

BARRETT: All the skills required in decades past, with added requirements in the field of technologies. Written communication through e-mail, technology-aided presentations and increasingly visual communication through videoconferencing make technology imperative for a fully-engaged CEO. It is axiomatic that the primary role of a CEO is to communicate his or her leadership; technology enhances leadership by offering many new tools.

**Q. What skills and qualities do you personally value in CEO?**

BARRETT: From my perspective, a leader is someone who has followers. A leader deserves followers only if they are themselves possessed of integrity, honesty, if they respect others, are fair, tell the truth and work hard. Differences of opinion often make an organization better, but a lack of honesty or integrity can do nothing but damage it. Values like honesty and integrity wear well over time and set a reliable course for future leadership. Further qualities would be communication skills, knowledge of the basics-- legal and financial environments, the customer world, the supplier world, the caring for and understanding of employees.

**Q. You've cited many qualities. What do you think is the most important?**

BARRETT: Overall, the sine qua non trait of leadership is integrity.

Title: Asia's best practices  
Subject(s): INDUSTRIAL management -- Asia  
Source: Industry Week, 09/15/97, Vol. 246 Issue 17, p28, 4p, 5c  
Author(s): McClenahan, John S.; Clark, Tanya  
Abstract:

Describes best practices in business management in Asia. Includes Yokogawa Electric Corp.'s Bullet-Train Thinking scheme for cost reduction; Samsung Electronic Co. Ltd.'s 21st Century CEO & Leadership Program; Partnership between Boeing Co. and Japan Aircraft Development Corp. (JADC).

Title: The end of delegation? Information technology and the CEO  
Subject(s): INFORMATION technology -- Management  
Source: Harvard Business Review, Sep/Oct95, Vol. 73 Issue 5, p161, 8p, 1c  
Abstract:

Focuses on the shift of rules in the information technology game. Requirement for general management leadership; Entanglement of information technology risks with business risks; Effective use of technology; Requirements for chief information officers; Decision-making on technology investments.

Today IT plays a role in most aspects of a company's business, from the development of new products to the support of sales and service, from providing market intelligence to supplying tool for decision analysis. For a global company, the ability to take information from multiple systems and make it broadly accessible to managers and employees is critical. Many observers believe that this fact, along with the increased opportunities for using IT to achieve strategic advantage, requires that CEOs reexamine what they need to know about this resource to manage it effectively.

Which IT investment responsibilities should CEOs delegate and to whom? When they consider IT investment options, what should they look for? How do they learn what they need to know in order to ask the tough questions? What roles should other managers, such as chief information officers and business line executives, play in the decision?

Title: In Search of Perfect Leaders.

Subject(s): INDUSTRIAL management; LEADERSHIP; HUMAN Resource Institute (Organization); BUSINESS -- Management

Source: Workforce, Feb99, Vol. 78 Issue 2, p26, 1/3p

Abstract:

Reports that leadership worries topped the list of 'Major Issues Impacting People Management' according to an annual survey of senior executives conducted by the Human Resource Institute (HRI). Leadership challenge in most organizations; Factor which affect the business environment; Top management worries:

1. Leadership
2. Managing change
3. Focus on the customer
4. Improving productivity
5. Information technology
6. Employee communications
7. Skill level of the workforce
8. Stimulating innovation.

Title: The Traits and Leadership Styles of CEOs in Korean Companies.

Subject(s): CHIEF executive officers -- Korea; BUSINESS enterprises -- Korea

Source: International Studies of Management & Organization, Winter98/99, Vol. 28 Issue 4, p40, 9p

Author(s): SHIN, YOO KEUN

Abstract:

Explores the distinctive traits and leadership styles of chief executive officers in Korean companies. Behavioral traits of Korean chief executive officers; Leadership styles; Discussion and conclusion

The CEO trait of successful firms, called "management's respect for employees" (rated first) indicate that the CEO is interested in staff welfare and career development With an "initiator attitude" (rated second) include such traits as sincerity and diligence, initiative, site-oriented behavior, responsibility, and aggressiveness. The trait "tenacity and sense of summoning" (rated third) means that, even when faced with difficulty in the course of promoting a business, the CEO will not bend in his will. Through "network-building ability" (ranked fourth), the CEO promotes friendly relationships among the employees and uses external relations efficiently. Finally, "emphasis on competency" means that the CEO strengthens competitiveness through an endless development of technology and of employees.

Traits of CEOs of unsuccessful firms: (1) With the "irresolute decision making" trait, the CEO has no concrete opinions, drifts in confusion, and makes decisions based solely on irrational factors that are not related to management. (2) The trait "poor treatment of the workers" means that the CEO treats the employees poorly or is very intent on controlling them without providing appropriate compensation. (3) The trait "lack of network-building ability" describes the CEO who creates serious friction among the workers or worsens relations with external stakeholders, such as financial institutions and the government, due to lack of networking ability. (4) The trait "inability to respond to environmental changes" means that the CEO does

not respond actively to changes in the business environment, thus becoming a laggard or losing the opportunity to transform the firm, and finding himself unable to overcome management crises smoothly. (5) Finally, "contempt for competency" means that the CEO diminishes organizational competitiveness by relying far too long on the firm's prior technology or human resources and by copying other firms' technology and neglecting R&D and human-resource development.

Title: Management's new paradigms.

Subject(s): MANAGEMENT -- Philosophy; INDUSTRIAL productivity; EXECUTIVES --Conduct of life; BUSINESS ethics

Source: Forbes, 10/05/98, Vol. 162 Issue 7, p152, 18p, 1c, 8bw

Author(s): Drucker, Peter F.

Abstract:

Examines the basic assumptions and practices of late 20th century management. Rapid changes in the validity of assumptions about the economy, business and technology; Fundamental importance of the assumptions about reality on which management discipline is based; Identification of seven underlying assumptions about organization that are out of date; Incorporation of entrepreneurial activities in every institution; Why management matters.

Fayol laid down the principle that there was one right structure for every manufacturing enterprise: a functional division into engineering, manufacturing, selling, finance and personnel, each division to be managed separately and to come together only at the level of the chief executive. Though theories about what constitutes the right organization have changed several times in the past century, practitioners and students of management still hold the assumption that there is a single right form of organization for every business. This is just one of seven underlying assumptions about organization that are out of date:

- ° That there is only one right way to organize a business.
- ° That the principles of management apply only to business organizations.
- ° That there is a single right way to manage people. Way back, the right way was top-down control--centralization. Later, decentralization came into vogue. Today the team approach is considered to be ideal.
- ° That technologies, markets and end-uses are fixed and rarely overlap. That is, each industry has a specific technology and a specific market.
- ° That management's scope is legally defined as applying only to an organization's assets and employees.
- ° That management's job is to "run the business" rather than to concentrate on what is happening outside the business. That is, management is internally, not externally, focused.
- ° That national boundaries define the ecology of enterprise and management.

Title: To Plan or Not to Plan.

Subject(s): BUSINESS planning; CONFLICT management

Source: Management Review, Oct98, Vol. 87 Issue 9, p70, 1p

Author(s): Tetenbaum, Toby

Abstract:

Provides information on long-range planning as a way of resolving conflicts in a company. Linearity of the long-range planning with Newtonian view of cause and effect; Characteristics of chaos; What should managers do in preparing an organization for chaos. In management, any map to the future is likely to be highly inaccurate and instantly obsolete. Yet the elimination of planning would feed into "either/or" management. The "both/and" lens suggests that managers plan the day-to-day events that are relatively stable and predictable, and have the courage to allow unpredictable future events to emerge.

To prepare an organization for chaos, managers should do the following:

1. Focus on ideas and make the flow of information accessible to everyone.
2. Delay, decentralize and destroy bureaucracy. Create flexible project groupings that maximize the collective intelligence of everyone in the organization.
3. Eliminate rules. Encourage experimentation and risk-taking.
4. Strive to grow comfortable with "messes" and tolerate disequilibrium.
5. Ensure that everyone is involved in learning. Reflect on what worked, what didn't and why.

**Few managers are comfortable with the self-organizing and "messy" side of the process. But if they allow patterns to emerge and identify the hidden rules that govern chaos, they can forecast**

**the conditions under which chaotic behaviors will occur and be confident that they can learn their way to the future as they go.**

Title: Participative leadership or project analysis.

Subject(s): LEADERSHIP in women; INDUSTRIAL project management

Source: Women in Business, Sep/Oct98, Vol. 50 Issue 5, p36, 4p, 1c

Author(s): Lewis, Jan

Abstract: Examines the role of an effective leadership plan in the completion of projects for women in business. Characteristics of a manager who effectively overcomes project paralysis; How to determine whether you are caught in project paralysis; Details on identifying your level of authority; When to assume the role of a leader; Importance of organization and cultivating conditional thinking.

A good leadership plan plays a major role in completing projects. If there's one common thread in business today, it's project paralysis. There's lots to do, but everything is often slowed by a lack of focus, direction and clear priorities. This chaos around projects can bring everyone to a standstill. Mistakes happen. A "blame and justify" attitude sets in. Most projects become paralyzed not because team members can't do the job, but because they don't have an adequate leadership strategy for getting done on time and on target. Overcoming project paralysis requires a manager with four characteristics:

1. A backbone strong enough to be responsible and to take on the role of leader,
2. An open mind for learning the hard lessons of experiences as they occur;
3. A positive outlook for making sure that bad news always brings an opportunity; and
4. An ability to get organized.

Every project is filled with paths that can lead to getting bogged down in project paralysis. It's the responsibility of managers to create a way out of the mire. There are five steps that can be followed to be free from project paralysis and avoid it in the future: (1) identify your level of authority, (2) assume the role of a leader, (3) cultivate conditional thinking, (4) get organized and (5) capitalize on mistakes.

Title: Leadership skills make a difference on the line.

Subject(s): LEADERSHIP; PRODUCTION management

Source: IIE Solutions, Mar99, Vol. 31 Issue 3, p16, 1/3p

Abstract:

Reports on the benefits of leadership training at the production and service levels based on a study by K. Peter Kuchinke, a professor at the University of Illinois. Survey of manufacturing sites of a multinational telecommunications company; Outcomes of transformational leadership techniques.

As part of the survey, he looked for signs of "transformational leadership" -- where managers and supervisors set examples for their subordinates, reward them for thinking creatively about how work can be improved, plan for their individual development, and inspire them to put the good of their work group and organization above their self-interest. "We found that where transformational leadership techniques are practiced at the production level, they lead to good outcomes," noted Kuchinke.

Title: Improving Your Leadership Skills.

Subject(s): LEADERSHIP; MANAGEMENT -- Technique

Source: Public Relations Quarterly, Spring99, Vol. 44 Issue 1, p40, 2p

Author(s): G.A. "Andy" Marken

Choose Your Method of Leadership

As stated at the outset, there is not a best method of leadership...only the most appropriate for a particular occurrence. This means that you have to plan your actions for a given situation. You can't choose between autocratic and democratic leadership. That's like making a golfer choose either woods or irons. During any golf game, they're all used. Decide on the type of leadership that is needed based on:

1. Individual Personality
2. Situation
3. Organizational Flavor

Title: What Makes a Leader?

Subject(s): LEADERSHIP -- Study & teaching; EXECUTIVE ability -- Testing; SOCIAL skills -- Study & teaching; EMPATHY; INDUSTRIAL management -- Evaluation

Source: Harvard Business Review, Nov/Dec98, Vol. 76 Issue 6, p93, 11p, 1 chart, 2c

Author(s): Goleman, Daniel

Abstract:

Examines business leadership skills and the need for emotional intelligence. Use of psychological evaluation of leadership candidates for self-awareness, self-regulation, motivation, empathy and social skills; Comparison to value of intellect and technical ability; Learning emotional leadership skills.

Can Emotional Intelligence Be Learned?

Superb leaders have very different ways of directing a team, a division, or a company. Some are subdued and analytical; others are charismatic and go with their gut. And different situations call for different types of leadership. Most mergers need a sensitive negotiator at the helm, whereas many turnarounds require a more forceful kind of authority.

Psychologist and noted author Daniel Goleman has found, however, that effective leaders are alike in one crucial way: they all have a high degree of what has come to be known as emotional intelligence. In fact, Goleman's research at nearly 200 large, global companies revealed that emotional intelligence especially at the highest levels of a company- is the sine qua non for leadership. Without it, a person can have first-class training, an incisive mind, and an endless supply of good ideas, but he still won't make a great leader. The components of emotional intelligence- self-awareness, self-regulation, motivation, empathy, and social skill-can sound unbusinesslike. But exhibiting emotional intelligence at the workplace does not mean simply controlling your anger or getting along with people. Rather, it means understanding your own and other people's emotional makeup well enough to move people in the direction of accomplishing your company's goals.

The Five Components Of Emotional Intelligence At Work

(1) Self-Awareness: the ability to recognize and understand your moods, emotions, and drives, as well as their effect on others. (2) Self-Regulation: the ability to control or redirect disruptive impulses and moods the propensity to suspend judgment to think before acting.(3) Motivation: a passion to work for reasons that go beyond money or status a propensity to pursue goals with energy and persistence. (4) Empathy: the ability to understand the emotional makeup of other people skill in treating people according to their emotional reactions. (5) Social Skills: proficiency in managing relationships and building networks an ability to find common ground and build rapport.

Title: Covert Leadership: Notes on Managing Professionals.

Subject(s): INDUSTRIAL management; EMPLOYEE motivation; LEADERSHIP; EMPLOYEES Attitudes; WORK

Source: Harvard Business Review, Nov/Dec98, Vol. 76 Issue 6, p140, 8p, 1 diagram, 1c

Author(s): Mintzberg, Henry

Abstract:

Examines the metaphor of the orchestra leader as applied to business management. Role of the business or profession in supplying much of the structure and coordination of management; Roles for management of information, people and actions, including skills in leadership and communication; Limits to managers control over work; Coordination, inspiration and support of employees. Covert leadership means managing with a sense of nuances, constraints, and limitations. When a manager like Tovey guides an organization, he leads without seeming to, without his people being fully aware of all that he is doing. That's because in this world of professionals, a leader is not completely powerless-but neither does he have absolute control over others.

When someone asked Indian-born Zubin Mehta about the difficulties of conducting the Israel Philharmonic, where everyone is said to consider him or herself a soloist, he reportedly replied, "I'm the only Indian; they're all the chiefs!"

Title: Soft skills can be hard for tech managers.

Subject(s): INFORMATION technology -- Management -- Technique; CHIEF information officers.

Source: InformationWeek, 05/11/98 Issue 681, p144, 1p

Author(s): Caruso, Brian

Abstract: Focuses on the communication, diplomacy and leadership skills of information technology (IT) managers. Result of a Harberg study on the problems of IT managers in managing people; Importance of soft skills; Tips on how to make the transition from a technical environment to a management position.

Nearly one-quarter of executives in high-tech positions are "in trouble" due to poor people skills, says Hagberg Consulting Group, a Foster City, Calif., management consulting firm. There's also a 50% greater likelihood of execs who have trouble in their jobs being in technical positions within high-tech firms, a Hagberg study found.

Title: Transformational Leadership: A Response to Critiques

Source: New York: Academic Press, 1993): 49-80.

Author(s): B. Bass and B.J. Avolio, (in Martin Chemers and Roya Ayman (eds.), Leadership: Theory and Research Perspectives and Directions).

Abstract:

Bass and Avolio's charisma factor is markedly different from Weber's concept of charisma. However, they still attribute their charisma to Weber. The most extensively used measure of transformational leadership is the Multifactor Leadership Questionnaire (MLQ). Several versions of the MLQ exist, some comprising only 10 items, others having up to 94 items. Regardless of how short or how long a particular MLQ is, the items intended to measure charisma do not seem to have a lot in common with Weber's definition. Bass's original instrument contains six items for measuring charisma as one of the characteristics of a transformational leader. Bass and Avolio list them as:

1. transmitting a sense of joint mission and ownership;
2. expressing dedication to followers;
3. appealing to the hopes and desires of followers;
4. addressing crises head-on;
5. easing group tension in critical times; and
6. sacrificing self-gain for the gain of others.

Title: A paradigm for leadership excellence.

Subject(s): LEADERSHIP; TOTAL quality management

Source: Total Quality Management, Jul98, Vol. 9 Issue 4/5, pS75, 5p, 4bw

Author(s): Edgeman, Rick L.; Dahlgaard, Jens J.

Abstract:

Discusses a report about leadership excellence, presented at the 3rd World Congress for Total Quality Management: Business Excellence Through Quality Culture. Characteristics of systemic leadership; Elements of profound trust; Importance of clear communication and unity of purpose in business excellence; Basic areas for assessing winners for several leadership awards.

Title: Leading organizational change in the 21st century.

Subject(s): ORGANIZATIONAL change

Source: Industrial Management, May/Jun98, Vol. 40 Issue 3, p25, 6p, 3c, 1bw

Author(s): Harper, Stephen C.

Abstract:

Provides information on the need for organizational change in business organizations before they enter the 21st century. Factors needed for change in leadership for the 21st century; Information on guidelines for change leadership; Reference to Rosabeth Moss Kanter's book entitled 'The Change Masters.'

Title: How high is your return on management?

Subject(s): INDUSTRIAL management

Source: Harvard Business Review, Jan/Feb98, Vol. 76 Issue 1, p70, 11p, 6c

Author(s): Simons, Robert; Davila, Antonio

Abstract:

Puts forth the return on management (ROM) ratio, which is the productive organizational energy released divided by the management time and attention invested, as a way to determine whether one's managerial energy is misdirected or diffused. The enemies and allies of ROM; Questions to ask concerning ROM; Knowing the limitations; How the fear of failure affects decisions; Diagnostic measures; Paperwork; The leadership example of the boss; Focus and communication for ROM.

At high-ROM companies, planning, budgeting, and control systems operate differently: they are exception based - alerting managers to anomalies to sound practice. Think of the thermostat in your home. What to do? We recommend that managers use a new business ratio. We call it return on management (ROM), and it can be expressed as the following equation:

ROM = Productive organizational energy released/Management time and attention invested

Like its cousins, return on equity and return on assets, ROM measures the payback from the investment of a scarce resource-in this case, a manager's time and attention. It indicates how well managers have chosen among alternative courses 'of action to deploy that resource optimally. The ratio answers the question, Are you getting the maximum payback from every hour of the day that you invest in implementing your business's strategy? But first things first: ROM is not a quantitative formula: it does not generate a specific number or percentage. Instead, it is a qualitative measure: both the numerator and denominator, and the equation's result are estimates, of magnitude that managers must construe in their minds and guts. ROM's output is directional; like all quantitative return ratios, ROM is maximized when the numerator is large and the denominator is small. By using the ratio, managers can "calculate" if their ROM is high, medium, or low. It's a rough measure, but we have found that executives who understand ROM's value possess a powerful tool for understanding and for change.

Title: Managers vs leaders: A corporate fable.

Subject(s): INDUSTRIAL management; LEADERSHIP

Source: Management Review, Nov97, Vol. 86 Issue 10, p5, 1p

Author(s): Fagiano, David

Abstract:

Compares management and leadership skills both required in business enterprises. Definitions of management; Task of leaders on his subordinates; Significance of sharing knowledge with others. If the old definition of management is "to get things done through other people," then the new definition of leadership is to "help others do the things they know need to be done to achieve the common vision."

Title: Leadership for the new age.

Subject(s): INDUSTRIAL management; LEADERSHIP -- Philosophy

Source: Nation's Business, May97, Vol. 85 Issue 5, p18, 7p, 8c

Author(s): Nelton, Sharon

Abstract:

Looks at the management style of business owners going into the 21st century. Less focus on authoritarian rule; Increasing view of leadership as that of working with people; Various business owners who have adopted a relaxed leadership style; Challenges facing business owners in the 1990s; Need for flexibility in a rapidly changing marketplace; Changes in the work force; Advice for business leaders; Resources for further study.

In the foreword to *The Leader of the Future* (Jossey-Bass Publishers), a collection of essays by experts on management and leadership, management thinker Peter F. Drucker says, "The only definition of a leader is someone who has followers." He says leadership is characterized by results--that is, by the followers doing the right things. Because they are highly visible, leaders set examples. "Leadership is not rank, privileges, titles, or money," he says. "It is responsibility."

Title: View from the East.

Subject(s): INSIDE the Kaisha (Book); DIFFERENT Games, Different Behavior (Book); MATSUSHITA Leadership (Book)

Source: Industry Week, 04/21/97, Vol. 246 Issue 8, p26, 1p, 3c

Author(s): Pospisil, Vivian

Abstract:

Reviews three books in Japanese management. 'Inside the Kaisha: Demystifying Japanese Business Behavior,' by Noboru Yoshimura and Philip Anderson; 'Different Games, Different Rules: Why Americans and Japanese Misunderstand Each Other,' by Haru Yamada; 'Matsushita Leadership: Lessons from the 20<sup>th</sup> Century's Most Remarkable Entrepreneur,' by John P. Kotter.

Title: The leading question.

Subject(s): PERSONNEL management -- Great Britain; PERSONNEL directors -- Great Britain; LEADERSHIP for Strategic Change (Book)

Source: People Management, 01/23/97, Vol. 3 Issue 2, p21, 1p, 1c

Author(s): Adair, John

Abstract:

Opinion. Discusses the need for personnel management practitioners in Great Britain to be equipped for exercising strategic leadership in business. Thesis of the book 'Leadership for Strategic Change,' by Brian Wallace and Christop Ridgeway; Centrality of leadership in line management; Personnel as a traditional maintenance function; Need to revise the Master of Business Administration (MBA) degree.

"What we need first is to revise the MBA degree radically and turn it into an MBL (master of business leadership). In my view, no manager should be appointed as a team, operational or strategic leader without the appropriate training in leadership. We now have the content and methods -- even the infrastructure -- for such training. All we lack is the political will and also a touch of vision."

Title: Six critical management issues.

Subject(s): INDUSTRIAL management -- United States; FACILITY management -- United States

Source: Hydrocarbon Processing, Dec96, Vol. 75 Issue 12, p65, 3p, 2 charts, 1bw

Author(s): Woodruff, D.M.

Abstract:

Examines six critical workplace issues that were highlighted in a survey that was conducted among executives and managers from various business sectors in the United States. Examination of 'people' issues, cost and competition, government regulation, leadership and management, change and technology and quality and productivity.

**Top categories of the six critical management issues:**

- "People" issues
- Cost and competition
- Government regulation
- Leadership and management
- Change and technology
- Quality and productivity



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of Quantity Surveyors  
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*Conference Session 5*

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# **3D Object Oriented CAD and Automated Quantities – Essential Tools for the Quantity Surveyors of The New Millennium**

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## **Abstract**

This paper examines the impact of 3D Object Oriented Computer Aided Design (CAD) and CAD generated automatic quantities on the Quantity Surveying (QS) profession and the construction industry generally. If the QS profession is to flourish in the next millennium it is essential that practitioners utilise and evolve with these technological tools. The demise of the technical measurer working with a scale rule and "rolls of drawings" is approaching. Dramatic improvements in productivity and efficiency can already be achieved through CAD generated quantities and these benefits will improve exponentially as the quantification capabilities of CAD programs increases and system compatibility problems are overcome. 3D Object Oriented CAD is central to the evolution of the "virtual project team" and information management systems. This type of CAD system also provides the optimum platform for automated quantities generation.

A PAQS supported IT survey of QS firms in the Asia-Pacific region underpins the research for the paper. The survey examines current utilisation of and future attitudes toward IT generally and CAD specifically. The main finding of the study is that the QS profession is lagging other construction professionals in the utilisation of CAD and is in danger of being left out of the virtual project team of the future. The profession is still clinging to traditional paper-based measurement despite huge efficiency improvements now possible through utilising automated quantities. Most of the profession has even resisted the use of digitisers in the measurement process; a tool that has been around for over a decade and which is already considered obsolete due to advances in CAD generated quantities.

The paper concludes with some strategies that can be adopted by the profession to address these problems and enhance the prospect that the Quantity Surveyor will be a key player in the construction industry of the new millennium.

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## **Introduction**

This paper explores the area of 3D object-oriented Computer-Aided Design (CAD) technology and demonstrates why expertise in the use of this technology will be essential for not only Quantity Surveyors but all construction professionals of the new millennium. For the Quantity Surveying (QS) profession, automated quantities generation is but one, albeit very important, of the numerous benefits to be gained. By using 3D intelligent object-based CAD, quantity surveyors can not only increase their efficiency but can add significant value to their services and become entrenched in the inevitable evolution of the virtual project team.

Information Technology (IT) is now driving tremendous change in the construction industry. Future projects will increasingly be awarded on the basis of consultants' CAD/IT facilities and their ability to use these technological tools with expertise, deliver information faster, share this information with the project team and provide higher quality value-adding services. Furthermore,

the development of the Asset/Facilities Management area has seen increasing moves towards "whole-of-life" assessment and this is now being incorporated into CAD and project information management systems. The QS is ideally placed to take advantage of this and expand their operations to become a key financial consultant through the entire property process. Firms without CAD facilities will increasingly be left out in the wilderness perhaps ruing the decline of the "good old days". Firms will basically fall into three categories: those who make things happen, those who watch things happen and those who wonder what happened. It is to be hoped that QS practitioners will be in the former category.

The paper identifies what 3D object-oriented CAD is, outlines the benefits and current problems associated with this technology, examines current automated quantities capabilities of CAD systems, evaluates current levels of CAD/IT utilisation by the QS profession based on the results of an international survey conducted on behalf of the Pacific Association of Quantity Surveyors (PAQS) and concludes with some strategies to assist the profession in embracing these technological tools.

### **3D Object-Oriented CAD**

"Object-Oriented" has quickly become the latest catch-phrase in the CAD industry yet the term is widely misunderstood by users and exploited by software manufacturers by applying their own interpretations for their own commercial advantage. Whilst many programs purport to have object-oriented platforms particularly in an "add-on" format, the only large commercial CAD system with a true and dedicated stand-alone object-oriented system is the ArchiCad program (Shorter 1999). Shorter also contends that Building Simulation is beginning to emerge as a better descriptor of object-oriented systems as this is what such a program actually does; simulates the planned design in a real-life visual form.

Sanders (1996) describes an object as a synonym for an element or an entity and that in an object-oriented system the object consists of data and procedures stored together. Harrod (1997) describes a true object-oriented system as one with a three-dimensional computer modeling system that stores and uses representations of real-world objects rather than lines, arcs, curves and polygons that look like the objects concerned. Each object needs to store intelligent data not only about its own details but also data about other aspects of the building that it is related to.

Sanders (cited in Lee 1997 pp. 50-51) describes the following four basic attributes of true object-oriented software:

- "1. Encapsulation: Software objects combine data with the operations to be performed on that data. The benefit is that an object can only be changed using simple, well-defined methods associated with it. The modular objects are highly reusable and reliable.*
- 2. Data Abstraction: Complex data structures are made simpler and more understandable by removing their detail and generalising their behaviour.*
- 3. Inheritance: Specialised objects inherit the attributes and behaviour of simpler, generalised objects and add their own unique attributes and behaviour to them.*
- 4. Polymorphism: Data that through the same command or message can be interpreted differently by different objects. The command 'draw', for example, is interpreted differently by a rectangle object (which displays a four-sided shape) and a triangle object (which displays a three-sided one)".*

Lee (1997) uses the example of the design of a wall as a more practical means of describing the concept and benefits of object-oriented systems. Each wall in a building has a specified purpose and may comprise a variety of materials and planned methods of construction. Finishes and openings for windows, doors, services and the like add further to the data related to the wall component. With conventional CAD drawing, wall details are drawn separately in plan, sectional and elevation formats with accompanying written details. Finishes details may be indicated on these drawings but usually the full details are prepared separately in a "finishes schedule". Constant checking between these drawing details and documents needs to be made to ensure consistency.

Object modeling however enables the user to attach intelligent data to the wall. Every aspect of the wall details can be stored within the wall object and hence form part of the building's total database. This obviates the need to prepare schedules and elevation/sectional details separately as these are automatically produced by the system. Sectional drawing details are automatically produced in three-dimension based on the information related to the wall object. In other words, once the wall is "drawn" on plan in a two-dimensional layout and pertinent data attached to it, all other aspects (sections, elevations, finishes schedule, quantities and the like) are automatically produced. The object components used in drawing are not merely lines and arcs as they are programmed as solid objects. Sectional 3-D viewing of the building from any point or angle is then possible. When changes are made to the design, all data/design that changes as a consequence is automatically taken into consideration.

Lee (1997) then further describes the actual process used in designing the wall. The object-oriented menu will have a number of different wall types stored in its menu (cavity-brick, brick veneer, timber stud, concrete block, and the like). The appropriate one is selected and then all the pertinent information and requirements for the wall will be automatically incorporated. If an opening for a doorway is required, conventional 2D CAD requires the designer to "cut, trim and stretch" the opening on the plan. Object-oriented modeling enables the user to bypass these geometric commands; the user simply chooses the appropriate door from the menu and then places it on the wall. The wall is automatically adjusted to incorporate the door.

The major benefit of such a system lies in the drawing details and data that can be automatically assigned to objects and have intelligent links to every aspect of the building. This data can be automatically produced and forms the basis for the virtual project management system. In essence, it is an integrated building simulation model with automatically generated documentation.

### ***Benefits of 3D Object-Oriented CAD***

## **Automated Quantities**

The potential productivity improvements available to Quantity Surveyors by utilising CAD for measurement are enormous. This is possible now with most CAD systems but 3D object-oriented programs offer the greatest scope for automatic quantities generation. The preparation of quantities in the traditional paper-based mode is tedious and time-consuming and often accounts for over 80% of the total time spent in preparing tenders, budgetary estimates and cost plans. Lend Lease, one of the largest contracting organisations in Australia, have ascertained that their estimators spend approximately 80% of their time measuring and only 20% of their time actually pricing and compiling their tender/budget prices. Their objective is to turn those percentages around where their estimators are only spending 20% of their time

measuring and the use of CAD is seen as the means of achieving this (Legg 1998). Vincent Shaw, Chief Quantity Surveyor for the NSW Department of Public Works and Services, estimates that measurement accounts for approximately 60% of the time spent on budget/tender preparation and feels strongly that this could be reduced to 10% with the appropriate use of CAD (cited in Lee 1997).

Apart from potentially massive time savings, the use of CAD has the potential to free up the quantity surveyor's time to develop more sophisticated and rigorous cost management systems and processes, provide greater analysis of design alternatives and provide much greater value to their clients. The important thing is not who or what prepares the quantities but what is done with the quantities. Quantity Surveyors have a key role to play in ensuring that the quantities generated are accurate, appropriate and organised in a form that can be best utilised in an expert cost management system. Designers and even some CAD software manufacturers are loath to accept liability for the accuracy and appropriateness of automated quantities which presents the QS with many opportunities.

The automated quantities capabilities of CAD systems are improving all the time but the challenge to the QS profession is to ensure that the quantities produced are in a form that suits the QS's purposes. To this end, a significant development has been the Automatic Quantities Take-Off System (AQTS) currently being developed in Singapore through initiatives of the Construction Industry Development Board. The objective of this project is to have automated quantities generated in a Bill of Quantities format all measured in accordance with the local standard method of measurement. Other developments include work being carried out by Cyrrill-Sweet in the United Kingdom and the NSW Department of Public Works and Services.

However, quantity generation from 3D object oriented CAD software is likely to be of most use to the QS. With data (including quantities) for every object integrally linked in the overall project database, the quantities can form the basis of the information management system as virtually all activities relate to quantities and from there time and cost. During the administration stages of projects, any changes or variations made will automatically result in appropriate changes to all linked data which includes quantities. In other words, all objects and data are linked and any changes result in automatic adjustment of all related data.

As mentioned previously, the ArchiCad program is the only true stand-alone large commercially available 3D object oriented CAD program currently on the market. Accordingly, the author has regularly put this program to the test and found that quantities can be prepared for every aspect of the building that is shown in the building model. The quantities are produced in a spreadsheet format and can be linked to other spreadsheet or estimating applications. Instead of measuring via a scale rule and roll of drawings, measurement is achieved by extracting quantities from spreadsheet calculations. Additionally, if changes are made, quantities are automatically recalculated and comparison of "before and after" is immediately available which is obviously extremely useful from a contract administration perspective.

These quantities can be generated with minimal instruction. At the University of Technology Sydney, final year Construction Economics students were recently set an assignment by the author to prepare a Bill of Quantities for a small commercial building utilising only CAD generated quantities from the ArchiCad program. With minimal instruction, all students were able to prepare the Bill in a relative short time frame. What also struck the author was the enthusiasm exhibited by the students for CAD generated quantities and the eagerness to explore all aspects of the CAD program. Rather than being a threat, the students felt that CAD

generated quantities would provide them with tremendous opportunities and elevate them above the drudgery of paper-based measurement. They also felt that gaining expertise in CAD measurement would provide them with employment advantages over older practitioners less amenable to this technology. Perhaps the point in time when a young QS asks "what's a scale rule?" is not far away.

Many firms cite cost and the time spent learning CAD as a major reason for not investing in CAD. As indicated above, this learning curve may not be as great as often perceived. In terms of cost, CAD software and the necessary hardware can be bought for around A\$6000 for an individual licence with this price reducing as the number of licences increases. The average annual salary of a QS practitioner in Australia is approximately A\$55,000 which relates to a cost of approximately A\$80,000 to the employer when salary loadings for workers compensation, superannuation and the like are taken into account. A\$6000 is very low in comparison and when one considers the potential productivity improvements, the cost of investment in CAD may not only be negligible but in reality will not be a cost at all due to the enhanced profitability of the firm's operations. The pay-back period can be a matter of months after the initial training phase.

### **Virtual Projects**

The move towards virtual projects where every member of the project team is linked electronically (i.e. computer to computer) is already occurring. Major projects such as the construction of the new airports in Kuala Lumpur and Hong Kong were based on this concept. Clients, both public and private, are increasingly demanding that their consultants have expertise in the use of CAD and have appropriate facilities to transfer and receive all project information electronically. Investment in CAD is a strategic investment in the future. Not only will it reap tremendous competitive advantage and increased value of service, it will gear a firm up to take advantage of the opportunities that will flow from the evolution of the virtual project.

### **Computer-Aided Facility Management**

Facility Management is the fastest growing discipline in the property industry today and offers the QS profession a huge new window of opportunity. This growth has been accompanied by increasing attention to "whole-of-life assessment" and the advantages of utilising a 3D object oriented building simulation model from inception through design, construction, occupation, management and disposal/re-adaptation stages are quickly being acknowledged. Data and information created from one central location (i.e. the CAD system) can be utilised for the entire life of the project.

Quantity Surveyors are ideally suited to provide key financial consultancy advice in this area but CAD facilities will be necessary. At a recent AIQS seminar on Facility Management, a panel of expert Facility Managers all concurred that CAD was fundamental to their operations and hence essential for any organisation intent on establishing themselves in the Facility Management area.

## **Current Problems**

### **Standardisation**

The main inhibitor to the development of CAD is software interoperability where information/drawings/data can be shared and exchanged automatically (without translation or human intervention) regardless of the type of software being used or where the data might be stored. This necessitates consistent standards and guidelines for programmers to follow. Consistency in data and object descriptions is essential if it is to be effectively embraced on a universal basis. To this end, the most significant developments for the construction industry have been STEP (Standard for the Exchange of Product Model Data), IFC (Industry Foundation Classes) and IAI (International Alliance for Interoperability). These developments are based on the utilisation of 3D object oriented CAD.

STEP is coordinated by the International Standards Organisation (ISO) and is an initiative developed to *"create an all-encompassing file format that fully describes a model in four dimensions: its 3D dimensions and its life cycle, from design to manufacture through disposal"* (Grabowski 1997, p. 30). STEP has led to the development of Industry Foundation Classes (IFC) which are described as the development of a *"method for information sharing in the building industry. They will supply a "common language" for defining a building project. Using object-oriented and component software technologies, IFC will provide customisable industry-based objects that encapsulate information about building elements as well as design, construction and management concepts. New object-oriented software technologies have simplified the incorporation of building-industry information into interoperable objects. The IFC builds on these developments to provide intelligent objects for the building industry that will dramatically increase the sharing of information in the planning, design, construction and management of buildings"* (IAI 1995, pp. 2,6). The IFC define a single object model (i.e. object oriented data model) of buildings shared by all IFC-compliant applications. IFC project models define individual buildings for which compliant applications can exchange information accurately and error-free.

The International Alliance for Interoperability was formed in 1995 and comprises a consortium of key industry players with the main objective of providing *"international linkage and coordination for speedy delivery of an information infrastructure as a basis for sharing information throughout the construction project life cycle and across disciplines and computing applications"* (Multi-CAD 1997 p. 6). The IFCs are governed by the IAI. The IAI has already released two versions of the IFC object model: IFC 1.0 at the end of 1996 and IFC 1.5 at the end of 1997. The next release, IFC 2.0, is due shortly.

Problems still do remain in terms of compatibility between CAD systems. This is a major concern for QS firms who wish to invest in CAD as they will invariably have a range of clients using a range of CAD systems. Transferring 2D CAD drawings into 3D CAD models remains problematic. However, these compatibility problems are eroding and it has been estimated that these problems will be overcome within two years (Mitchell 1998).

## **Current CAD/IT Utilisation - PAQS Survey Results & Analysis**

In late 1998, the Pacific Association of Quantity Surveyors (PAQS) commissioned an international survey of Quantity Surveying firms operating in the Asia-Pacific region. The survey was prepared by the Construction Economics Research Unit from the University of Technology Sydney which has conducted two similar national surveys in Australia. The survey was separated into three distinct sections: General Practice Details, Information Technology and Future Directions. This paper will focus on the Information Technology results and the Future Directions responses relating to this area. These survey results enable evaluation of both current and future levels of IT utilisation by professional QS practices in the region.

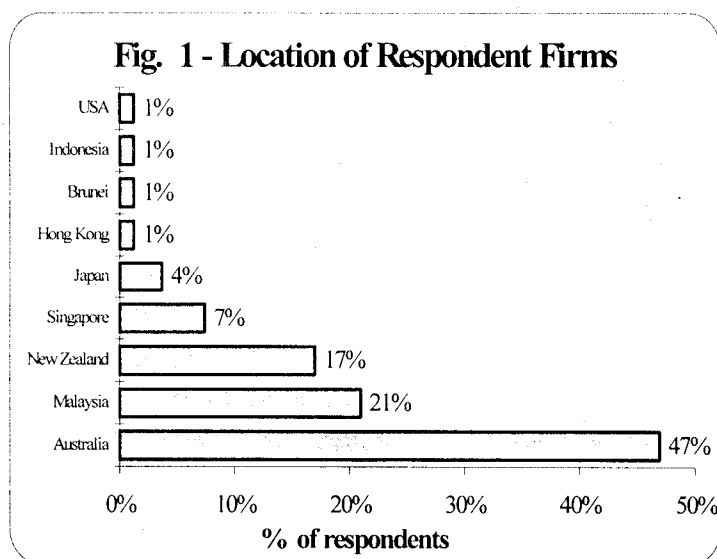
### **Survey Details**

The survey was sent to all Quantity Surveying members of PAQS member associations at the time of posting. These associations comprised the Institution of Surveyors Malaysia (ISM), the Singapore Institute of Surveyors and Valuers (SISV), the Hong Kong Institute of Surveyors (HKIS), the Building Surveyors Institute of Japan (BSIJ), the Australian Institute of Quantity Surveyors (AIQS) and the New Zealand Institute of Quantity Surveyors (NZIQS). Total collective membership of these organisations is approximately 14,000 but it should be noted that not all of these members are actually Quantity Surveyors (some being building surveyors, land surveyors, and the like) and this number also includes non-corporate members such as students and probationers. Additionally, members were asked to ensure that only one survey was completed for their firm.

### **Respondent Profile**

Despite the size of the survey, only 81 replies were received. Nevertheless the sample was sufficient from a statistical perspective and does provide a good indication of current practice, procedures and attitudes of QS firms in the region.

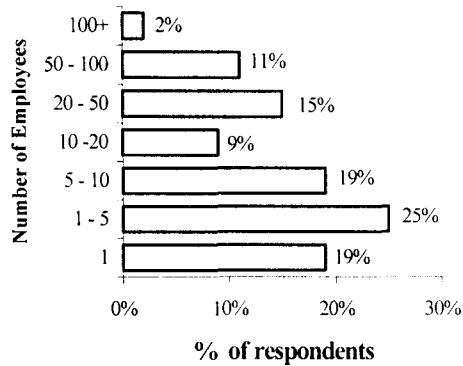
Figure 1 provides details of the geographical distribution of the respondent firms by country. Three responses were received from firms outside of PAQS member countries (USA, Brunei and Indonesia). Due to the small number of responses, a comparison of results between countries was not considered viable.



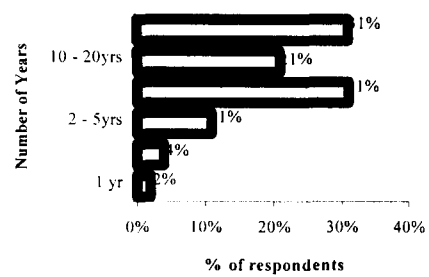


The respondents predominantly comprised small to medium sized organisations which is typical of the profession's structure. 63% had 10 or less employees, 24% had between 10-50 employees and 13% had more than 50 employees. In terms of age, over 50% of the firms had been in business for more than 10 years, 31% for 5-10 years and the remainder less than 5 years (Figures 2 and 3).

**Fig. 2 Size of Respondent Firms**



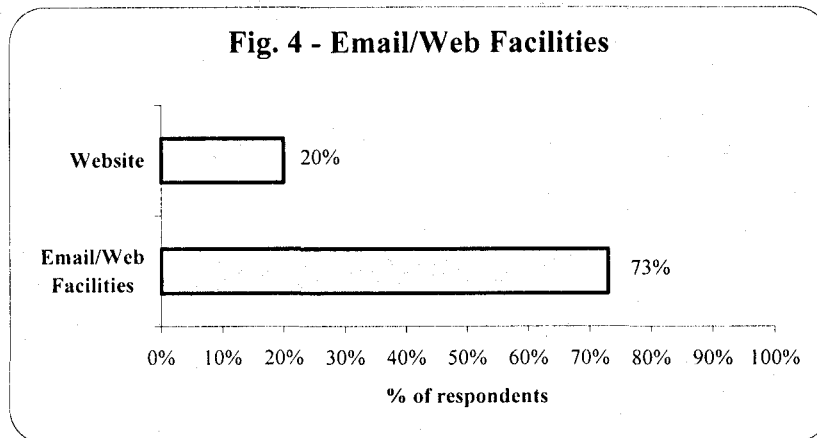
**Fig. 3 - Age of Respondent Firms**



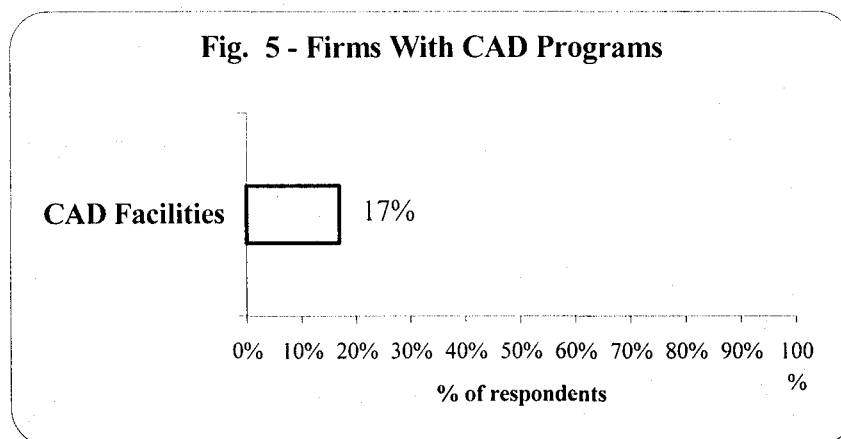
#### IT/CAD Utilisation

The survey asked a number of questions in relation to general computing facilities and software programs used. For the purposes of this paper, however, focus is place on the results pertaining to the level of CAD usage and the electronic (i.e. computer-to-computer) transfer of project information.

The use of email/internet facilities provides a good gauge of the general level of IT usage by firms. Figure 4 shows that the majority of respondents had email and access to the internet (73%). However, only 20% of firms had a web-site. This is surprising given the prolific use of the internet as a business and marketing tool and the relative ease and low cost of establishing a web-site.



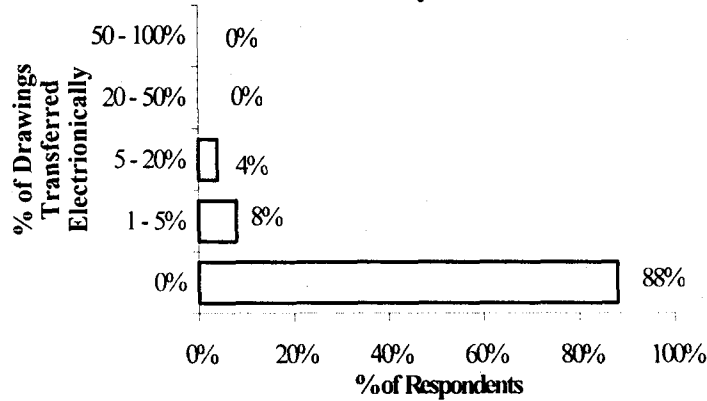
Of particular interest though was the number of firms with CAD programs, the level of CAD usage and the level of electronic (computer-to-computer) transfer of project information.



Only 17% of respondent firms have CAD facilities (Figure 5). TurboCad and AutoCad were the most commonly used programs amongst this group. No firm indicated the use of software that could be classified as true 3D object-oriented CAD.

Firms were asked to indicate the level of electronic transfer of drawings and, not surprisingly, the figures were very low. Figure 6 shows that 88% of firms do not transfer drawings by this means at all and that no firm transfers more than 20% of drawings in this form. Quite clearly, the majority of the firms are not positioning themselves to be even a player (let alone a key player) in the virtual project team of the new millennium.

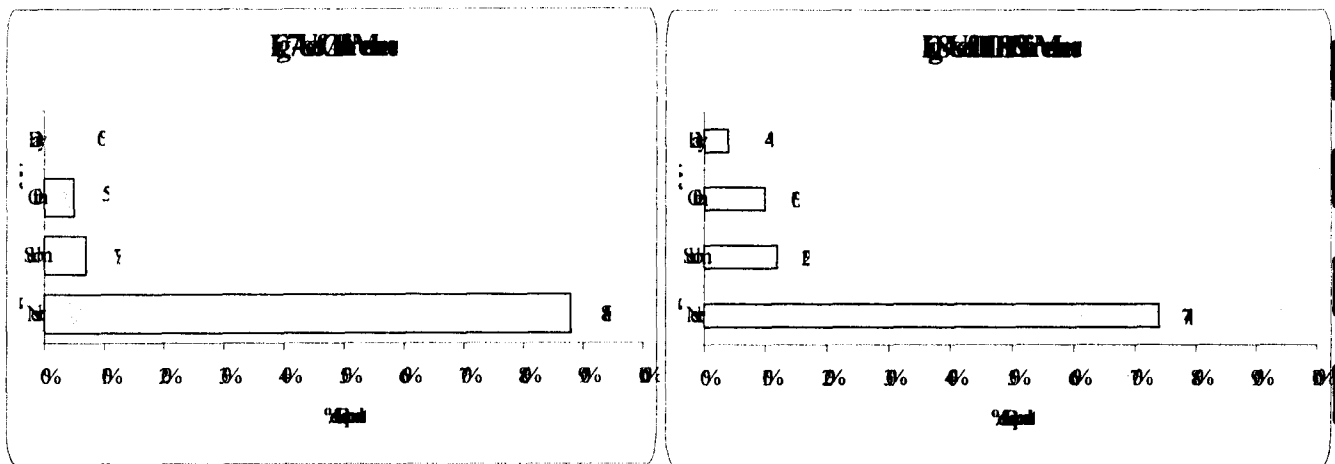
**Fig 6 - Drawing Documentation Transferred Electronically**



#### Electronic Measurement

The level of electronic measurement of quantities was found to be extremely low and clearly indicates that firms are still clinging to the very traditional "scale rule and roll of drawings" approach. This is despite the advanced level of automated quantities able to be generated by CAD systems and the increasing compatibility and transferability of information amongst different CAD systems.

Figure 7 shows that only 12% of firms use CAD for measurement. Only 5% use CAD for measurement on a regular basis and no firm uses such on a daily basis.



Even the use of digitisers, a measurement tool that has been available commercially for well over a decade with proven time-saving performance, is extremely low. Figure 8 shows that 74% of firms never use digitisers and that only 4% use them on a regular basis and, even then, only amongst a few staff members. Due to developments in automated quantities generation with CAD systems, digitisers are actually considered to be obsolete by many in the industry. It seems that their use has never been widely embraced by the profession. This aversion to key technological tools that could drastically improve the productivity rate of staff is intriguing. The

cost and time associated with acquiring, learning and evolving with this technology is acknowledged but the potential productivity improvements can far outweigh these costs. Perhaps even more importantly though, the gaining of expertise in the use of CAD will enable firms to strategically position themselves in the virtual project team and obtain increased competitive market advantage.

### Attitudes to The Future

The survey included a number of questions seeking views on future directions in terms of IT. Table 1 details the questions asked and the answers provided. The dominant response for each question is highlighted in bold.

<b>TABLE 1: Future Directions</b>					
	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
1. The role of the QS as an independent consultant will expand in the future	19%	<b>58%</b>	9%	14%	1%
2. Future QSs will mainly be employed as part of a professional team in multi-disciplinary practices providing integrated "in-house" services	1%	38%	15%	<b>43%</b>	2%
3. The QS will be a key player in the construction industry in <b>10</b> years time	11%	<b>58%</b>	14%	17%	0%
4. The impact of IT on the construction industry will be minimal in the next <b>5</b> years	0%	7%	5%	<b>59%</b>	28%
5. The impact of IT on the construction industry will be minimal in the next <b>10</b> years	2%	4%	2%	<b>53%</b>	38%
6. Further advances in computing and IT generally will see the end of the technical QS measurer	4%	23%	14%	<b>49%</b>	10%
7. IT advances will lead to fewer but more highly skilled QSs	6%	<b>53%</b>	14%	23%	4%
8. CAD networking facilities and knowledge will be essential for the QS in 5 years time	14%	<b>51%</b>	21%	15%	0%
9. The QS profession should be actively involved in utilising, developing and promoting the use of CAD automated quantities	17%	<b>62%</b>	14%	7%	0%
10. Only larger practices have the resources to take advantage of IT	9%	36%	15%	<b>37%</b>	4%
11. Greater use of IT will enable the QS profession to provide better service to clients	28%	<b>57%</b>	9%	6%	0%
12. The QS is well placed to take advantage of the changes in the construction industry which will flow from the increased use of IT	21%	<b>54%</b>	10%	15%	0%

The replies to these questions generally appear to be at odds with the CAD/IT utilisation results. Whilst practitioners overwhelmingly believe that IT will have a dramatic impact on the industry over the next 10 years, that CAD expertise will quickly become essential and that the use of this technology will provide tremendous benefits for firms, it appears that few firms are actually doing anything about it.

The first three questions sought opinions on the role of the QS in the new millennium. There are indications that projects will be increasingly procured by multi-disciplinary practices with a blurring of traditional professional boundaries as participants work closer together in a team format aided by electronic "virtual" communication and information/data sharing/distribution amongst the project team. This raises genuine questions about the future role of the QS as an independent consultant particularly if the aversion to the use of technology identified earlier in the survey continues. Despite this and the low level of CAD/IT usage, 77% felt that their role as an independent consultant would expand, only 39% felt they were likely to become part of multi-disciplinary practices and over 69% felt that the QS would be a key player in the industry in 10 years time. However, the aversion to becoming linked electronically with the project team appears to belie this positive outlook.

Less than 7% of firms felt that IT would have a minimal impact on the construction industry over the next decade. 59% felt that IT developments would lead to the demise of the technical QS measurer. 59% also felt that IT advances would lead to fewer but more highly skilled QSs. 65% agreed that CAD networking facilities and knowledge would be essential for the QS in 5 years time. An even larger number, 79%, felt that the QS profession should be actively involved in utilising, developing and promoting the use of CAD automated quantities. Finally, 85% of firms felt that greater use of IT will enable them to provide better service for their clients and 75% felt that they were well placed to take advantage of the changes in the construction industry that will take place as a result of increased use of IT.

This positive and progressive outlook is clearly at odds with what the majority of firms are actually doing in terms of IT and CAD utilisation. It appears that most firms recognise the inevitable evolution of IT usage in the industry and what they need to do to be in a position of strength in the next 5 years but very few are actually doing something about it. This reactive "wait-and-see" approach will leave firms in danger of being phased out as a key participant in the construction process by competitors and other construction professionals (project managers in particular) more amenable to the use of CAD and IT generally.

### **Suggested Strategies For The Profession**

It is clear that QS firms, and indeed all construction professionals, need to utilise and gain expertise in CAD/IT now. Clients are increasingly demanding high levels of IT capabilities from their professionals with CAD facilities and the ability to transfer/receive all documentation electronically increasingly necessary. The following are some strategies that the profession could adopt to assist the transition into this area.

#### **Training/Development**

Training and development for practitioners in CAD utilisation is essential. This is often perceived as being time-consuming and costly but, as indicated earlier, the learning time-frame can be very short. This can be further reduced if practitioners view this area as important personal professional development and invest their own time in learning CAD rather than relying solely

on their employers. QS associations and universities have a key role to play here by conducting CAD training programs that are appropriate for the QS.

Continuing Professional Development is a requirement of most professional bodies these days and, for most QSs, gaining expertise in CAD will probably be the most valuable professional development activity that they could undertake. As an academic teaching QS students, the author has found that young QS practitioners/students are realising this and view development of their CAD expertise as a tremendous investment in their future.

#### Active Involvement in CAD Development

Rather than resisting the move towards automated quantities, the profession should be actively involved in their development to ensure that the quantities which CAD systems produce are in a form better suited to the QS's purposes. CAD systems are still designer-focused and the automated quantities component of most systems are prepared with little, if any, input from appropriate professionals such as QSs. The common-sense, skill and expertise of a cost expert is needed to ensure that the quantities generated are in an appropriate form that can be manipulated into an effective cost management system.

The profession needs to pool together resources ideally on an international scale to collaborate with CAD software organisations and the design professions in terms of automated quantities development. A collaborative team approach comprising quantity surveyors, CAD and 3D modeling experts, and designers may well see automated quantities evolve in a form that will enable the QS to have integral involvement in the virtual project team.

#### Conclusion

The time to act is now. There are tremendous opportunities and benefits to be gained including huge productivity improvements and more professional "value-adding" services.

The conservative approach indicated by the survey results cannot continue. Automated quantities generation, rather than being a threat, provides tremendous opportunity for the profession to lift itself above an often perceived technical role to a much higher professional plane. QS practitioners will be able to provide a wider range of higher value-added services both domestically and internationally. The key to achieving this lies in embracing and evolving with CAD. Continued resistance to this area may well lead to the demise of the independent QS consultancy practice as other professionals more amenable to this technology take over the cost management role.

#### Acknowledgements

The author would like to thank the Pacific Association of Quantity Surveyors, the Australian Institute of Quantity Surveyors and his colleagues in the Construction Economics Unit at the University of Technology Sydney (namely Dr. Craig Langston, Rick Best and Gerard DeValence) for their assistance with the research connected with this paper.

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# Quality Management : An Essential Tool for the Survival of the Quantity Surveying Profession

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## **Abstract**

The quantity surveying profession, internationally, has generally reacted to the current fierce competition for work by undercutting fees and cutting back on services to help offset the loss of income. This approach is contrary to the credo and direction of the global commercial environment and is undermining the profession's hard won recognition as a relevant and valuable contributor to the construction industry.

The requirements of the global environment suggest successful quantity surveying firms of the future will provide services that truly fulfil client needs and will be delivering these services in ways that exceed client expectations; the firms will be innovative and creative; they will be flexible in adapting their services, will anticipate and interpret industry directions and will create and promote new quantity surveying services to satisfy emerging needs; they will make seemingly unworkable projects work and will create profit for themselves and for others in situations that suggest no profit is possible. To achieve this vision, the quantity surveying profession will need to reinvent itself and its "core" services. This will require individual quantity surveying firms to have the knowledge, skill and desire to fully embrace quality and quality management in the form of ISO 9001:2000 and ISO 9004:2000 (the new ISO standards due to be released in November 2000).

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## **Introduction**

This paper considers the situation of the quantity surveying profession as it moves to position itself more fully in the global commercial environment and suggests the survival of the profession is dependent on it embracing the principles of quality and quality management. The paper also explains why the principles of quality are sound, suggests a four point approach to building the knowledge, skill and desire to implement quality management in an organisation and refers to the new ISO 9000:2000 family of standards due for release in November 2000.

## **The Global Commercial Environment**

We live and work in a global commercial environment that has evolved over the last 40 years. It is a consumer-driven and customer-focused environment. It expects more for less, promotes aggressive "competition" as the way forward and thrives on products and services that are new and novel. Our own *Pacific Association of Quantity Surveyors* is a response to its influence.

Many industries around the world have found massive change is required to operate successfully in this environment, for it offers little compassion to those that do not meet its evolving needs. It has required organisations to adopt flexible structures to gain and maintain competitive advantage. Now, the environment has evolved to the state where these "organisations need to be in an almost constant state of flux to improve their ways of working

and business processes" (Turner, 1999: 2). This is the future that faces the quantity surveying profession.

### Positioning of the Quantity Surveying Profession

The quantity surveying profession is in a difficult and unenviable situation as it moves to position itself more fully in the global environment. It comes from an ultra-conservative background and carries traditional values that sit badly with the culture of the new environment. Additionally, it is perhaps the most conservative of all groups in an industry that has been one of the slowest to understand or accept the new rules. In other words, the profession is disadvantaged by being a late starter and is weakly positioned to gain competitive advantage as the construction industry begins to respond more fully to the environment. Three of the problems that currently confront the profession are:

- a) The profession, like other construction industry groups, has so far employed a general competitive strategy of fee undercutting and made reductions in service levels in an attempt at least to partly compensate for the associated loss of income. But, this strategy offers "less for less" rather than "more for less" as is now demanded and can only provide short-term survival in the environment.
- b) Members of the profession are moving into new service areas. The Australian Institute of Quantity Surveyors recognises this in its *National Competency Standards for Quantity Surveyors – Construction Economists* (AIQS, 1998). The Competency Standards refer to "core" quantity surveying services and newer "specialist" areas, such as:
- c)
  - project value management
  - project management
  - project risk management
  - quality assurance
  - arbitration/ expert witness
  - tax depreciation
  - special property assessments (sales tax, stamp duty, land tax, capital gains tax, local authority rates assessments)
  - energy and maintenance audits
  - asset registers
  - occupational health and safety reports.

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However, these specialist services and others like them do not satisfy the environment's requirements for the new and novel. Essentially, practices moving into specialist areas are competing for market share in service areas that the profession has not developed. To be a relevant profession with competitive advantage, we need to develop new and novel "core" quantity surveying services that can resist competitive intrusion by other professions. In the long-term, a profusion of specialist services may weaken the profession as our members transfer allegiance to the main professional bodies that are more closely aligned with the specialist areas.

- c) Quantity surveyors are perhaps unique in the construction industry in that they have had to fight hard for recognition as relevant and valuable contributors. It has been the quantity surveyor's lot to be the excuse for cost problems on projects, whether true or not. This has created a perception of blame that has damaged our credibility and standing in the eyes of

other professions, clients and stakeholders. In all likelihood it is a situation that will get worse if the construction industry does not quickly move beyond fee undercutting as its main competitive strategy. Reduction in the levels of services across the construction industry does not bode well for good project outcomes and the fallout is likely to further reduce the standing of the quantity surveyor. By cutting back on our own levels of service too, we may well be "handing the hangman the rope".

In the global environment our real competitors are not other quantity surveying practices, but the other professions that will push us to the margins of the construction industry as they too find it harder and harder to make money. To survive, it is not enough that members of the profession "...simply become more aggressive fighting the 'enemy out there'..." (Senge, 1992: 21). There is a need for us to become a more proactive profession by "...seeing how we contribute to our own problems" (Senge, 1992: 21) and finding more flexible, innovative and productive ways of operating. The only way that we can do this effectively is by embracing the principles of quality and quality management and implementing them from a basis of knowledge, skill and desire.

### **Quality's Credibility Problem**

It has been expensive and frustrating for many (if not most) organisations that have implemented quality, particularly in the form of quality management systems to ISO 9000. Foley, one of the driving forces behind the quality movement in Australia, has conceded that the movement in Australia got it wrong; the cost to business was not taken into account, there has been confusion over the terminology used, the links between ISO 9000 and total quality management (TQM) have not been understood, the difficulty and slowness that can be associated with implementing procedures was not appreciated and it was not understood that changes in behaviour and culture are essential (Gome, 1996 & 1997). But, he is not saying quality is wrong, he is saying the approach to achieve the end benefit was wrong and due to a lack of maturity in our knowledge and understanding of quality. The world is still learning about quality and how to achieve it; still gaining knowledge of how to do it and how not to do it. Unfortunately, those who have found out how not to do it seem mostly to be saying quality does not work.

This confusion associated with quality can be put into an interesting context if we understand that "where there is no terminology there is no consciousness...a poverty stricken vocabulary for any subject is an immediate admission that the subject is inferior or depreciated in that society" (Johnson, 1993: 6). This sits well with quality. We are struggling with vocabulary and we are struggling to understand what quality is because we have little consciousness of it and how it is achieved. We have been trying to implement quality without understanding it, or purposely ignoring the theory and trying to short-cut the process; hardly an attitude of respect or appreciation for quality. Knowing this, we have still blamed quality for the problems that have resulted. Can we really be so contradictory? According to Festinger's (1959) *Theory of Cognitive Dissonance*, we can be and often are. Festinger explains that such a contradiction creates in people a dissonance or inconsistency that is expressed as a psychological discomfort. The discomfort drives people to reduce the contradiction in any way they can; even to avoid situations and ignore information that would actually increase the inconsistency within them. This is how we can implement quality so badly, knowing we have not followed the rules, and yet blame quality for it not working.

The principles of quality are not wrong; they are sound. The fact is that quality is not failing us, but we are failing quality. The organisations that will survive and profit in the future will be those

that recognise the benefits of quality, have gained the knowledge skill and desire to make it work and have developed an organisational culture that is accepting of quality and is accepting and comfortable with change.

### **Implementing Quality Management**

The four point approach shown below (Reid, 1999), is suggested as a logical approach to building the knowledge, skill and desire to implement quality management within an organisation. Covey (1990) recognises the importance of knowledge, skill and desire in forming habit and makes the association of habit with excellence. These concepts are particularly relevant and appropriate to quality.

#### *1. Establish the target benefits to be gained from implementation:*

It is important to achieve a level of desire appropriate to the outcomes anticipated. Many organisations implement ISO 9000 quality management systems only to gain a place on client tender lists. This practice generates poor enthusiasm for the task and creates mostly poor outcomes. Attractive (but realistic) target benefits are needed to generate the desire and enthusiasm to drive the implementation to a successful and effective conclusion.

Quality management considers substantial benefits to a company are possible by reducing wastes and errors in work methods and by identifying more effective ways to work. Typically, an organisation loses between 15% and 30% of its income in working ineffectively (Hellard, 1993; Munro-Faure, 1992; Stebbing, 1990). On a construction site, productivity can be as low as 50% (Atkin, 1994). However, Senge (1994) considers much higher levels of performance improvement are possible than these figures suggest. He describes the performance of the best organisations he has worked with as being only mediocre (against their true potential). A sobering thought when it is realised these organisations are considered to be the industry leaders.

Typical benefits proclaimed for quality management include reduced costs, increased sales, increased customer loyalty, increased competitiveness, increased profitability and improved employee morale (Munro-Faure, 1992). Of these, reduced costs and improved employee morale, are perhaps the two core benefits as they are totally internal and controllable by the organisation. The others are perhaps better regarded as "possible" benefits as they are dependent on external factors.

#### *2. Gain a wide understanding of quality concepts:*

To ensure the target benefits are achieved, it is important to implement a quality management approach that is as effective as possible. This means the approach must best suit your organisation's own unique circumstances and requirements. A much better and considered approach can be made from a strong and wide knowledge base that recognises the common philosophy that runs through all quality platforms, including ISO 9000 and TQM (Reid, 1995; Nelson, 1996; Foley et al, 1997).

#### *3. Understand the barriers to implementation:*

A good knowledge of quality concepts brings to our attention the numerous barriers to implementation that exist and allows us to consciously avoid them as much as possible in our implementation efforts.

The following nine barriers (Reid, 1999) have been compiled from a number of authors (Duncan et al, 1990; Griffith, 1990; Stebbing, 1990; Hellard, 1993; Johnson, 1993, Oakland, 1993, Thomas, 1995). The criticisms of high costs associated with ISO 9000 systems and the criticisms of the long time they can take to implement are not considered to be barriers, but rather outcomes of the barriers included in the list.

- Implementation driven only by the need to satisfy client requirements for a quality system (this is unlikely to motivate management to explore the benefits, treat the initiative seriously and commit the necessary resources to produce an effective system)
- Lack of top management commitment (the consistency and intensity of commitment has a significant bearing on success)
- Lack of employee participation and contribution (participation and contribution is necessary to gain employee commitment and support)
- Lack of management and employee training (training establishes a consistent level of knowledge about quality concepts and provides the skills and tools to support implementation)
- Underestimating the time and commitment required (a long-term perspective is required)
- Poor quality system design (resulting in uneconomic, bureaucratic and high paper generating systems)
- Inappropriate consultant involvement (customise packaged quality systems and training to suit your organisation's needs)
- Underestimating the importance and difficulty in culture change (change must be actively led and supported by top management)
- Management inability to manage the change (requires effective communicators who have ability to think long-term, lead by example, inspire confidence and tolerate ambiguity and change)

#### *4. Have a planned approach to implementation:*

A planned and fully considered approach is necessary to ensure the first three points are effectively communicated throughout the organisation and to provide a base against which progress can be measured. There is no one universal approach to implementation; differences in the size of an organisation, its complexity and its needs should taken into account when drawing up an implementation plan (Stebbing, 1990; Munro-Faure, 1992; CIDA, 1993).

### **The Way Forward and ISO 9000:2000**

The requirements of the global commercial environment suggest successful quantity surveying firms of the future will provide services that truly fulfil client needs and will be delivering these services in ways that exceed client expectations; the firms will be innovative and creative; they will be flexible in adapting their services, will anticipate and interpret industry directions and will create and promote new quantity surveying services to satisfy emerging needs; they will make seemingly unworkable projects work and will create profit for themselves and for others in situations that suggest no profit is possible. To achieve this vision will require an exceptional amount of work and effort and at the core of each successful firm will be an effective and

efficient quality management system to ISO 9000. Such a system is required to promote the discipline, culture change and structure that will assist the firms to survive and prosper.

The ISO 9000 quality management system of the future will be simple, slim, agile and robust, will focus on core business processes and will accommodate the rapid change required of organisations (Brown, 1999). Organisations are already moving to such systems, which can be stunning in their simplicity and effectiveness. The systems are set out to reflect the way the organisations actually work - the opposite of the older style manuals that have separate procedures for each of the 19 or 20 system elements of the ISO standard. Typically, such systems can be set up in 4-12 weeks, rather than the 1-2 years required for the older style systems (Brown, 1999). These systems reflect the direction of the new ISO 9000:2000 family of standards that are due for release in November 2000.

The new ISO 9000:2000 family will initially comprise three standards:

- ISO 9000:2000 – Quality Management Systems – Fundamentals and vocabulary
- ISO 9001:2000 – Quality Management Systems - Requirements
- ISO 9004:2000 – Quality Management Systems – Guidance for performance improvement

ISO 9001:2000 will be the sole replacement for all three of the present ISO 9001, 9002 and 9003 standards and will be the only new standard for certification purposes. ISO 9001: 2000 will comprise four main sections; Management Responsibility, Resource Management, Product and/or Service Realisation, and Measurement, Analysis and Improvement (ISO/ CD2 9001:2000). Features of ISO 9000:2000 include (Ketheeswaran and Ezrakhovich, 1999):

- Greater flexibility in its application than previously, allowing it to be more closely tailored to the needs of the relevant organisation and omitting irrelevant requirements
- Continual improvement has been emphasised to help stimulate its efficiency, increase its competitive advantage and better respond to customer needs and expectations
- A new process-oriented structure and a more logical sequence of the contents
- The measurement of customer satisfaction to provide key information for improvement
- Increased attention to resources such as communication and the workplace
- Terminology changes [simplified language and in plain English]
- Greater compatibility with ISO 14000

The new ISO 9001 and 9004 standards have been developed as a “consistent pair” of standards with similar structures, but different scopes, and they may be used together or as stand-alone documents (ISO/ CD2 9001:2000). The ISO 9001 standard covers the requirements for an organisation to demonstrate capability to meet customer requirements (ISO/ CD2 9004:2000). ISO 9004 is intended to lead beyond the requirements of ISO 9001 into the development of “broader and deeper business excellence” (Ketheeswaran and Ezrakhovich, 1999). ISO 9004 is based on the following eight quality management principles (ISO/ CD2 9004:2000) which are more reflective of a full TQM:

- *Customer-focused organisations* – organisations depend on their customers and therefore should understand current and future customer needs, meet customer requirements and strive to exceed customer expectations
- *Leadership* – leaders establish unity of purpose, direction and the internal achievement of the organisation. They create the environment in which people can become fully involved in achieving the organisation's objectives
- *Involvement of people* – people at all levels are the essence of an organisation and their full involvement enables their abilities to be used for the organisation's benefit

- *Process approach* – a desired result is achieved more efficiently where related resources and activities are managed as a process
- *Systems approach to management* – identifying, understanding and managing a system of interrelated processes for a given objective contributes to the effectiveness and efficiency of the organisation
- *Continual improvement* – continual improvement is a continual objective of the organisation
- *A factual approach to decision making* – effective decisions are based on a logical and intuitive analysis of data and information
- *Mutually beneficial supplier relationships* – mutually beneficial relationships between the organisation and its suppliers enhance the ability of both organisations to create value.

To operate effectively in the global commercial environment, both ISO 9001:2000 and ISO 9004:2000 will be essential.

### **Summary**

In the global commercial environment, the quantity surveying profession seems set to be pushed to the margins of the construction industry. The future of the profession will depend on the kind of future we envision for ourselves and how hard we are willing to fight to make it a reality.

This is not a situation that can be resolved solely by the professional associations. Quantity surveying firms and members will need to be actively involved. It is likely to be a difficult process, and will require the profession to reinvent itself and the core services it provides. To succeed in such an undertaking, it is essential the profession embraces quality management and effectively implements it in the form of ISO 9001:2000 and ISO 9004:2000.

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# **An Overview of the Australian Property and Construction Industry**

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## **INTRODUCTION**

The property and construction industry forms an integral part of the Australian economy currently contributing to approximately 7 per cent of the labour force and in the region of 6 per cent of the national product output. For the past 10 years both labour and output relative to the wider economy has reduced by approximately 1 percentage point although fluctuating erratically during this period. The instability can in part be linked to the industry size and its close links with the economy to generate demand. Government policies can seriously impact on performance by either direct policies (changes in public expenditure and property taxes etc.) and by indirect means (interest rates etc.). Accordingly the industry close association can be used by the government to manage the wider economy.

The private sector accounts for approximately half of the demand across the various property and construction sectors with the remaining public sector concentrated mainly in the engineering construction category. Under government contracts the private sector produces about 75 per cent of the public sector accounts.

Construction activity by value completed in the past 10 years has varied across the individual sectors with residential buildings and engineering construction recording an annual nominal growth of 12.9 per cent and 12 per cent respectively to that of 2.66 per cent for non-residential buildings. Compared to an annual inflation for the same period of 3.1 per cent the real decline in non-residential construction work can be in part explained by past oversupply demand for a particular class of building and the level of economic activity. The restructuring of the labour force towards the service industries is now creating renewed demand which will be discussed later in the report.

## **AUSTRALIAN RESIDENTIAL BUILDING MARKET**

In 1997/98 there were approximately 8 million occupied residential buildings in Australia compared to approximately 6.5 million in 1991 (ABS). The number of households in Australia has been growing at around 2.1 per cent per annum against a population growth rate of 1.18 per cent per annum (1988-1998). This reflects a long-term rise in the demand for housing as a result of changing demographics, life styles and wealth.

To a varying extent there has been a shift in emphasis in the housing stock away from separate houses to flats which have in the 5 years to 1996 increased by 2.8 per cent of the total housing stock. Demographic trends clearly show the movement in population are led by employment opportunities towards specific large urban areas with now over 40 per cent of the population now living in either Sydney or Melbourne. In addition the availability of land for housing in urban locations has been liberalised with town planning policies allowing higher housing densities and

rezoning of land for residential building use. In Sydney the supply of home units increased from 32 per cent of total housing commencements between 1986 and 1992 to 51 per cent since 1992.

An established Australian house index produced by the Australian Bureau of Statistic (ABS) shows that for the 10 years to June 1998 Australian house prices have compounded on average by 7.5 per cent per annum while the annual growth varied from 32.6 per cent in 1988/89 to 0.1 per cent in 1995/96. The variation to some extent relates to prevailing circumstances from high inflation and interest costs in 1988/89 to an over supply and economic uncertainty in 1995/96.

Housing prices in superior locations around Sydney foreshores have risen dramatically with typical units with high quality finishes and superior location averaging over \$1 million dollars. The Sydney market is very buoyant with average to above average properties in close proximity to the CBD all recording record increases in 1999.

Housing construction levels across Australia have averaged 135,000 dwellings per year since 1986 representing over a 2.0 per cent per annum increase in the housing stock. The public sector now accounts for less than 4.2 per cent from a high of 11.8 per cent in 1986 due mainly to successive governments policies of continuing to shift public housing responsibilities on to the private sector with the government providing financial aid to individuals where required. Private sector residential building approvals is demand driven and has in the past been related to economic prosperity demographics changes and the cost of finance.

#### **AUSTRALIAN RESIDENTIAL BUILDING MARKET - OUTLOOK**

Activity in the residential construction industry is highly cyclical. The Australian market has recently began to emerge from a cyclical downturn which started at the beginning of 1995. After falling to just over 7,700 approval per month in early 1996 the industry has recovered with approvals increasing through 1997-98 to a high of 151,413 (inclusive conversions) in March 1998 - a 15.7 per cent increase over the previous year.

The demand for residential property in the medium and longer term is determined mainly by changes in the size and composition of the population, social and economic patterns. Forecasts of underlying housing demand prepared by the Indicative Planning Council for the Housing Industry (IPC) suggest the underlying demand for housing nationally is 138,000. New residential construction should rebound from the low of 1994-95 to reach equilibrium in 1997-98.

While the IPC forecast of underlying demand is focussed on demographics the housing affordability index is a guide to the economic affects on housing demand being a function of house prices, household income and interest rates.

The recent favourable climate has been the result of reductions in mortgage-interest rates, falling house prices in some regions (in real terms) and continued household disposable income growth. This has cushioned the impact of the excess supply of housing in the most recent downturn. The current localised improvement in housing prices particularly in Sydney and Melbourne has produced a slight fall in the house affordability index.

Although in the past housing activity had a close relationship with housing affordability there is current debate that the conventional approach has missing ingredients. These can be classified as:

- home buyers confidence
- the value of home ownership

It highlights an individual insecurity faced with high-unemployment levels (8.5%, May 1998) and uncertainty about job security in an increasingly short-term employment market. Also many potential buyers are cautious about buying a house and taking on a long-term mortgage commitment. The Australian Housing and Urban Research Institute (AHURI) reports that a relatively high 9.2 per cent are moving from home ownership to renting with 13.9 per cent going in the opposite direction. A shift in those 'falling' out of home ownership could have long term implications on house values especially with the reduced role of the public sector to provide low cost accommodation.

The residential market is dependent mainly on the government having a sustainable approach to immigration. A long term strategy for growth should ensure a buoyant market in the next decade.

## **AUSTRALIAN NON-RESIDENTIAL BUILDING MARKET**

The non-residential building sector embraces a large assortment of various types of building structures ranging from those used by business for economic activity (office, retail, etc.) to service (hospitals, schools, etc.) which are essential for the community. This broad band of building types provides a good indicator as to the level of investment and activity occurring in the economy. For 1997-98 the total non-residential building commenced was \$13.2 billion up 8.1 per cent on the previous year. Main impetus to growth in this period provided by the health (19 percent), retail (16 percent), entertainment and recreation (15 percent) and hotel (9 percent). this can be traced for the facility to complete hotels and associated facilities like airport, rail links for the 2000 Olympics. Also a sharp increase in the public health expenditure is observed in Queensland.

Non-residential public sector construction in the past has been relatively constant and it currently accounts for approximately 35 per cent (although much of the work is contracted out to the private sector). The volatility in the private sector is primarily driven by economic activity.

Buildings constructed for the community can be measured by the performance of services provided whilst those constructed for an economic activity can be measured by the level of income and capital returns. The Property Council of Australia total return index represents the benchmark for Australian commercial property performance. Whilst appraisal based the total return index combines both capital appreciation and income accumulation across the market sectors the total return index to December 1997 for Australian office, retail and industrial sectors is as follows.

The changes which have occurred in the retail industry are reflected in the impressive 10 years total returns from the Australian retail sector of an average 30 per cent per annum (compared to Australian CBD Office and East Australian Industrial of 7.4 and 15.7 per cent per annum respectively) due to consumers habits now including shopping as a leisure and recreation activity (retail theatre), and the mode of shopping with the escalation of large shopping centre attracting consumers away from the traditional shopping high street.

Renewed interest in the office sector has resurfaced from the speculative crash of the late 1980's. Vacancies in the major cities have fallen from the highs of 21.2 per cent in January 1993 to the current level of 11.8 per cent with a low of 6.7 per cent in Sydney and 9 per cent in Brisbane (1997/98). The strengthening markets have lead to new construction work primarily in the Sydney market using in some instances new financial methods of funding the developments (property development trusts).

The economic influences on the various sectors vary considerably. The retail sector can be seen to be linked to household expenditure, while office and industrial sectors are driven more directly by the prosperity of the economy.

### **AUSTRALIAN NON-RESIDENTIAL BUILDING MARKET - OUTLOOK**

Generally the demand for non-residential buildings has a strong local dimension relating to demographic changes and to the prevailing economic conditions. Stability of construction activity in the public sector is forecast to continue within the short term. For education this will include a rationalisation of existing schools to fund new schools in population growth areas. Likewise in health care public funding is forecast to remain constant with improve efficiency from hospital consolidation and new purpose built hospitals. In the long term the changing age of the population will increase health care expenditure on additional nursing homes and related facilities.

The fluctuation in the hotel, entertainment and recreation sector is also likely to continue as it includes large construction projects, including work associated with the Sydney Olympics. The general improvement in the economy is expected to improved profitability of the tourism sector as domestic tourism contributes about 70 per cent of the market with new construction in located in areas of high demand. An example of Sydney construction activity is illustrated in Figure 12.

**Figure 12: Examples of Sydney Hotel, Entertainment and Recreation Construction Projects**

Project	Type	Location	Project Cost (M)	Status
<b>Casino Entertainment Centre</b>	<b>Casino/hotel/ serviced apartments</b>	Darling Harbour	800	P
Finger Wharf	Hotel/residential/ Retail	Woolloomooloo	40	D
Forum/Grace Hotel	Hotel	Corner King and York Streets	30	P

Project	Type	Location	Project Cost (M)	Status
General Post Office	Refurbishment/ retail/hotel	Corner Martin Place and Pitt Street	700	P
Grace Bros Centre/George Hotel	Hotel/retail	Corner George Market and Pitt Streets	300	P
The Bennelong	Residential	1-7 Macquarie Street	40	P
Walsh Bay	Residential/retail/ hotel/entertainment	Near Sydney Harbour Bridge	277	M
M Mooted	D Design Stage	P Construction Stage	C Complete	

Office building activity is expected to remain positive in localised areas with overall improvement in 1997-98. On a national level the impact of staff reduction and rationalisation of office requirements of the Federal Government agencies is expected to increase vacancy levels in some regional and urban areas. Considerable regional variation can be seen in the performance of the office market with Perth and Sydney appearing to lead the other capital cities in the absorption of vacant office space. It is particularly evident in Sydney with four new office towers being constructed with completion dates prior to the Sydney Olympics 2000. These and other examples of office construction activity in Sydney are illustrated in Figure 13.

Figure 13: Examples of Sydney Commercial Office Construction Activity

Project	Type	Location	Project Cost (M)	Status
New Landmark Centre	Office/retail	338 George Street	125	P
State Office Block	Office	Macquarie and Hunter Streets	220	P
400 George Street	Office/retail	400 George Street	210	P

Project	Type	Location	Project Cost (M)	Status
Darling Park Stage II	Office/retail	Darling Harbour	240	P
General Post Office	Office/retail/ hotel	Corner Martin Place and Pitt Street	700	P
Angel Place	Office	357 George Street	100	M

M Mooted      D Design Stage      P Construction Stage      C Completed

The past growth of retail construction may slow down in the near future as a result of the current flat retail sales and new consumer habits. Current and planned retail construction work evolve around major upgrades to regional shopping centres to maintain market share. In many instances this will include the construction of cinema complexes and new leisure concept retail outlets. Figure 14 shows examples in Sydney.

Figure 14: Examples of Sydney Retail Construction Activity

Project	Type	Location	Project Cost (M)	Status
Darling Walk	Entertainment complex	Darling Harbour	70	C
Westfield/Grace Chatswood	Bros Extension to retail complex	Chatswood	150	P
Warringah Mall	Refurbishment of retail	Brookvale	140	P
Westfield Hornsby	Northgate Amalgamation and refurbishment of 2 shopping centres	Hornsby	200	D
Westfield Junction	Bondi Extension to retail	Bondi Junction	100	M

M Mooted      D Design Stage      P Construction Stage      C Completed

Industrial construction is expected to continue to improve from the 1993-94 cyclical low. The uncertainties in the industry are forecast to diminish and prospects are now for a gradual pick-up through 1997-98 in line with the national economy. Part of the growth is the relative new concept of 'Just in Time' retailing using up-to-date information technology which has created demand for large warehouse facilities.

**Figure 15: Examples of Sydney Industrial Construction Activity**

Project	Type	Location	Project Cost (M)	Status
Factory Units Moorebank	Factory units	30 Heathcote Road Moorebank	5	P
Riverside Corporate Park	Warehouse/office	North Ryde	67	P
Kings Park	Warehouse/office	Vardys and Valedictions Road Kings Park	45	P
Harbourside Business Park	Warehouse/office	13 Bennelong Road Homebush Bay	14	D
Park Hill Road	Warehouse/transport terminal	Park Hill Road Minchinbury	45	M
M Mooted	D Design Stage	P Construction Stage	C Completed	

**Commercial Sales Activity: 4<sup>th</sup> Quarter 1998**

**Sales Value - \$ million**

Region	Value	Number	Average	Maximum
CBD and Fringe	319.04	19	16.79	149.40
Eastern Suburbs	5.00	4	1.25	2.82
North Shore	190.26	23	8.27	78.25
Southern Suburbs	63.05	13	4.85	25.00
Western Suburbs	3.63	5	0.73	1.57
<b>Total</b>	<b>580.98</b>	<b>64</b>	<b>9.08</b>	<b>149.40</b>

Source: FPD Research



### Commercial Leasing Activity – 4<sup>th</sup> Quarter 1998

Region	Rental Value - \$		Net Lettable Area – sq m			Rent - \$ per sq m			
	Value	No	Ave	Area	Ave	Max	Ave	High	Low
CBD and Fringe	9,081,332	14	648,667	19,861	1,419	4,500	388	700	250
Eastern Suburbs	89,400	3	29,800	632	211	397	226	340	37
North Shore	1,043,500	5	208,700	2,771	554	1,087	357	508	232
Southern Suburbs	221,505	3	73,835	924	308	384	214	345	46
Western Suburbs	1,087,935	4	271,984	3,430	858	2,000	345	625	196
<b>Total</b>	<b>580.98</b>	<b>29</b>	<b>397,368</b>	<b>27,618</b>	<b>952</b>	<b>4,500</b>	<b>342</b>	<b>700</b>	<b>37</b>

Source FPD Research

### Industrial Sales Activity – 4<sup>th</sup> Quarter 1998

Region	Sales Value - \$ million			
	Value	Number	Average	Maximum
North Shore	71.10	12	5.93	30.00
Southern Suburbs	77.29	35	2.21	13.00
Western Suburbs	61.12	24	2.55	17.00
<b>Total</b>	<b>209.51</b>	<b>71</b>	<b>2.95</b>	<b>30.00</b>

Source: FPD Research

### Industrial Leasing Activity – 4<sup>th</sup> Quarter 1998

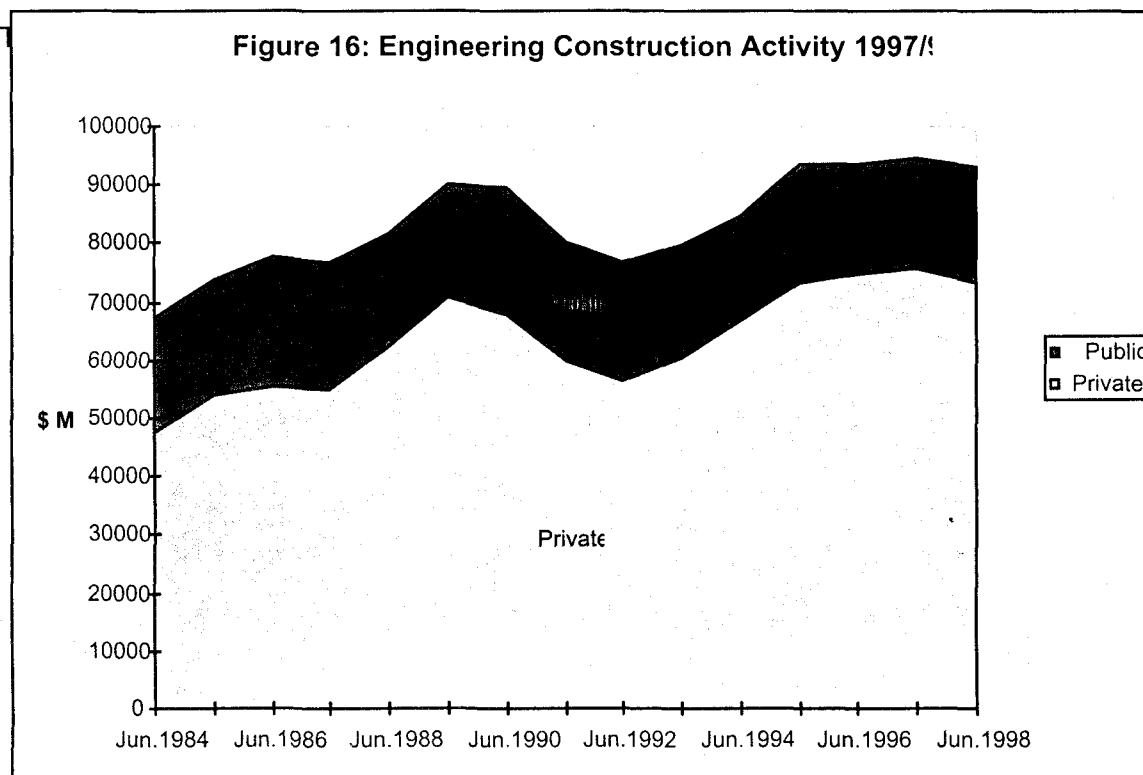
Region	Rental Value - \$		Net Lettable Area – sq m			Rent - \$ per sq m			
	Value	No	Ave	Area	Ave	Max	Average	High	Low
North Shore	1,668,710	9	185,412	11,428	1,270	2,714	132	232	84
Southern Suburbs	3,773,946	12	314,496	35,863	2,989	14,000	105	50	71
Western Suburbs	3,567,100	18	198,172	46,456	2,581	13,000	93	125	56
<b>Total</b>	<b>9,009,756</b>	<b>39</b>	<b>231,019</b>	<b>93,747</b>	<b>2,404</b>	<b>14,000</b>	<b>107</b>	<b>232</b>	<b>56</b>

Source FPD Research

## ENGINEERING CONSTRUCTION INDUSTRY

The engineering construction industry is an important if overlooked part of the Australian economy. Its contribution is recognised in major published projects often associated with a high political profile, like major new transport links. There is a drop of 1.2 percent of this activity in the year 1997/98 although for the past three out of four years the sector has been experiencing double digit growth with marked changes in the composition of construction activity.

The engineering construction sector is less vulnerable to short term changes in the economy than are other sectors of the property and construction industry. Such continuity originates from the longevity and scale of some of the projects which to some extent are divorced from changes in the cost of money and the welfare of the economy leading to stability in the sector. The private sector currently undertakes approximately 59 per cent a gradual increase from 44 per cent of the total 10 years ago.



Engineering construction can be divided into defined categories. Some 80 per cent of all engineering construction can be classed as infrastructure which includes transport, communication links and utilities servicing the community. The balance (about 20 per cent) is construction associated with mining and heavy industry.

The demand for engineering construction works has two components: new work (additions) and replacements including upgrades. The new work can come from population growth, new technology and changes in people's habits, while engineering construction work associated with replacements and upgrades can be due to deterioration and obsolescence.

The recent growth in the engineering construction has been focused on infrastructure projects primarily in the telecommunication and road construction both of which grew in 1995-96 by 15.5 and 26.9 per cent respectively due to substantial projects like the telecommunications cable roll out program in the cities and private sector funding of new road tollways which are commonly called 'Build-Own-Operate-Transfer' (BOOT) road projects reverting back to government after a specified repayment period. Since that time the growth in engineering construction has peaked with the private sector forecasts showing a decline and public sector projects remained steady mainly due to Olympics related infrastructure projects at their peak construction activity. Forecast beyond the year 2000 in the engineering construction sector will be a reduction in activity around Sydney region.

### **ENGINEERING CONSTRUCTION INDUSTRY - OUTLOOK**

New engineering construction can form the basis for improving the productivity of other sectors of the economy primarily from increased private sector engineering construction activity. These anticipated infrastructure projects and has formed the basis of the Government Construction Forecasting Committee (CFC) growth forecast of 10 per cent in 1998-99.

The road and rail category is expected to continue to provide the main growth element with private sector funding of new tollways and rail links, examples being the \$0.6 billion Sydney Eastern Distributor Motorway, the \$1.2 billion Melbourne City Link motorway and the New Sydney Southern Railway project (\$0.65 billion Sydney City-Airport-East Hills link).

Primarily the construction expenditure on the telecommunication network forming part of the rapidly changing market with new technology and market deregulation. The centre piece are two optical cable roll-out programs (at a cost of \$5 billion) in the major urban areas representing a major commitment to future technology. On completion of the optical cable roll-out there may be a drop in construction activity although it is forecast that there will be a requirement for expenditure on the installation for new equipment to take full advantage of the new technology.

Similarly the utility sector is in a state of change as a the consequence of the recent \$13.8 billion privatisation of the Victorian power stations including the electricity distribution grid and the New South Wales Government proposal to sell part of its electricity system. In addition if a national grid is formed new power sharing arrangements may delay construction of new power stations. As a consequence of the privatisation and rationalisation of the industry future construction activity is forecast to continue to fall in the real term.

Finally water supply, sewerage and drainage construction activity in 1997-98 was predominantly undertaken by the public sector. The short term forecast is for activity to remain relatively constant with a long term decline in public works as more services are privatised. This may be offset with increasing environmental concerns to provide a higher standard of effluent sewerage treatment and reduce drainage run-offs into river catchments and coastal areas.

## THE AUSTRALIAN ECONOMY

The Australian economy has slowed over the last 2 years with annual growth (Gross Domestic Product, seasonally adjusted) to 1997 of just 3.1 per cent below the high of 4.4 per cent in 1994 although not far from the 10 year average of 3.17 per cent. However the forecasts of the change in GDP Average for the years (1998 and 1999) are respectively 3.3 percent and 5.4 percent.

The recent subdued performance is in private consumption, housing and net export. Importantly there are indications that the aforementioned sectors are starting to recover leading to a broadening of the economic growth base over 1997-98 which will augment the robust growth currently enjoyed by financial, insurance, property and business services, alongside the mining sectors. The Australian Treasury forecast 3.5 per cent growth for 1997-98 on the confidence that the foundations are now in place for sustained growth in the economy rather than the past economic growth being at the expense of increased overseas borrowing's, causing a deterioration in Australia's balance of payment figures. Interestingly according to Bankers Trust Australia the recent currency turmoil in South-East Asia could conservatively reduce Australia's GDP growth by 0.25 percentage points.

An improvement in the balance of payments formed one of the cornerstone policies of the National/Liberal party's successful March 1996 election to government with the recommitment to provide a balanced budget by controlling public expenditure.

The slow down in the economy and the balancing of the government budget has affected the property and construction industry as follows:

- Confidence in long term investments against short term uncertainty with lower public expenditure
- Possible downsizing of the public sector leading to reduced demand for office space, etc
- Specific private sector developments in non-residential building market fuel by a buoyant stock market based on future economic performance
- Signs of an early improvement in the housing market

## Economic Indicators as at 21 December 1998

Country	Annual Change	%	Latest Figure	%	12 Months Earlier	Latest Change	%	Annual % Change	Latest Change	Latest 12 Months
China	9.7		5.0		3.0	-		(2.7)	-	7.2
Germany	2.7		11.8		13.0	0.0		0.7	(2.3)	(0.2)
HK	(5.2)		2.7		1.0	(0.2)		5.5	-	(2.6)
Indonesia	8.0		-		-	0.1		78.1	1.0	(1.7)
Japan	(3.5)		4.3		3.5	(0.1)		1.0		156.5
Malaysia	8.6		2.6		2.8	0.2		2.4	-	(4.9)
Phillipines	(1.2)		8.3		9.5	0.6		9.5	-	(4.0)
Singapore	(0.7)		-		-	(0.3)		(1.6)	2.8	14.3
S Korea	(6.8)		7.0		2.1	(0.3)		6.8	2.8	38.3
Taiwan	4.7		3.0		2.6	(0.1)		3.9	1.1	10.1
Thailand	5.5		0.9		1.1	(0.3)		4.7	2.9	9.5
USA	3.5		4.4		4.6	0.0		1.5	(61.3)	(209.8)
Australia	5.0		8.0		8.4	0.2		1.3	(1.1)	(14.7)

Source FPD Research

## POPULATION

During the past 10 years the Australian population grew annually on average by 1.3 per cent with the natural increase remaining in a narrow band of 125,954 to 141,586 people while net overseas migration ranged from 46,762 to 157,436 people. Immigration levels are determined by the strength of the Australian economy especially job growth and by Government policy. The preliminary figure for the year 1997 of net overseas migration is 95.8 thousands almost 10 thousand less than the previous years figure. The forecast of 1998 is further less by 6 thousands however the migration is expected to grow to 110 thousand on the year 2000.

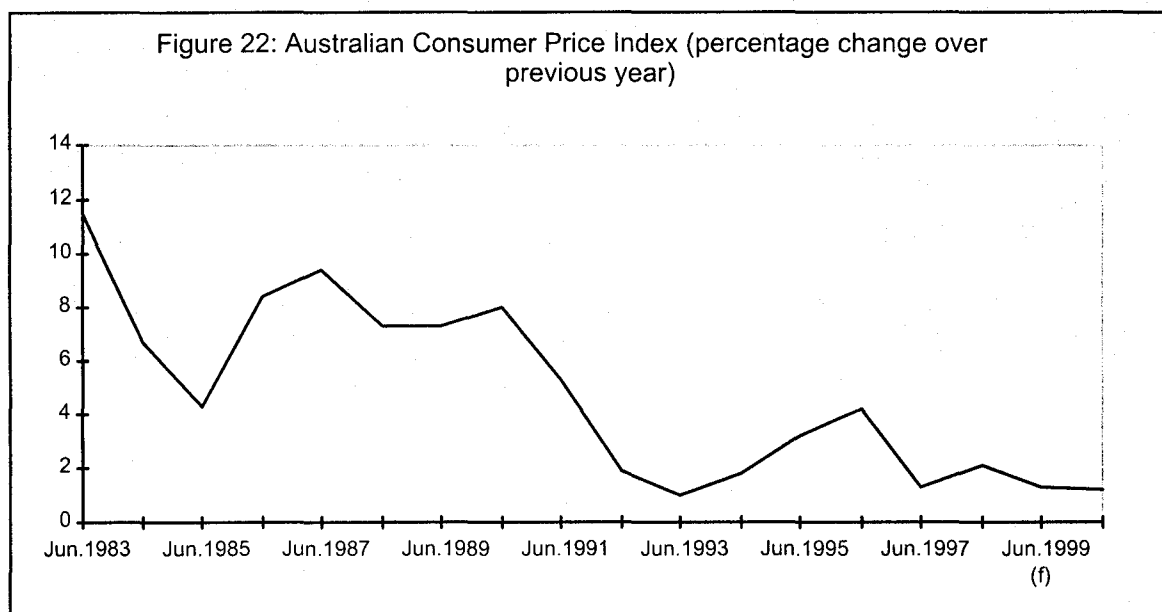
Overseas migration will most directly affect the main cities of entry (Sydney and Melbourne) but will ripple though to other cities via interstate migration.

The implication on the property and construction industry of an increased population is:

- New housing construction in specific locations
- Infrastructure improvements to accommodate demand.
- An increase in the work force stimulates economic growth and so demand for various non-residential buildings and engineering construction

## PRICES

Slowing economic growth of the recent past has been one of the key determinants in the easing of inflation. It now stands at average 1.5 per cent for the year 1997/98, with negative growth for the June quarter unlike the 8 to 9 per cent inflation experienced in 1987 and 1990.



Whilst current inflation is at the lowest level for 4 years the medium-term outlook is somewhat difficult to forecast given there are some concerns relating to recent wage growth together with an anticipated upturn in economic activity. Balanced against this is the Reserve Bank of Australia mandate to contain inflation to below 3 per cent. A long term low inflation environment is relatively new for the property and construction industry, the likely implications being:

- Less reliance on inflation for residential capital growth
- Less volatile business cycles creating increased certainty in non-residential market forecasts
- Reduced pressure for asset price inflation
- Restructuring of lease agreements to reflect industry growth rather than consumer inflation

## LABOUR FORCE

The labour market has shown only moderate growth in 1997-98 due to the general slowdown in the economy. For the year 1997 the labour market grew by only 0.58 per cent compared to the growth rate in 1995 of 4.49 per cent and the 10 year average of 1.84 per cent.

Prominent in the labour market has been the performance of the financial insurance and property business sector where annual growth for the past 10 year has been at 4.23 per cent. The labour market restructure is expected to continue over the next few years with the forecast of improvements in the wider economy starting to filter through to a larger sector of the work

force. Labour market movements have a direct influence on the property and construction industry the currently implications being:

- Reshaping of employment, creating new demand for space specifically for office accommodation to meet the continuing expansions of the financial, insurance and property business sector
- Improved economic activity creating additional non-residential demand
- Competition for labour during increased activity on construction site, fuelling wages growth
- Demand for skilled employees feeding a higher standard of living and the requirement for quality residential accommodation

## **FINANCIAL MARKETS**

The recent reductions in the official interest rates has lowered the rate for a variable housing loan to a low 7.6 per cent, a fall of over 2.1 per cent in the past year to June 1997. Low inflation and stagnant labour market provide the basis for the reductions in attempt to kick start the faltering economy.

A consensus of economists view that housing loans will remain at the low levels in the short term with a gradual upward movement as the economy improves and inflation comes under pressure.

A combination of forecast improvements in the economy the current low interest rates and the flow of funds from compulsory retirement savings into the share market has lifted the Australian All Ordinary Index to a record level (a 24% increase in the past 2 years). The All Industries, All Ordinaries indices and market capitalisation increase highlight the recent dynamic performance of the equity market.

The buoyant performance of the Australian share market is expected to continue although at a reduce rate. This and low interest rates are expected to affect the property and construction industry as follows:

- Available fund via the share market for all forms of property development
- Low housing loans should equate to increases in house prices
- Increased attractiveness of property investments relative to low income returns from high share prices

## **AUSTRALIAN CONSTRUCTION AND SOUTH-EAST ASIA**

Currently the export of Australian construction services is quite low. Engineering News Record does not list Australian contributions because they are virtually negligible. However the role of Australia at the base of South-East Asia provides an opportunity and can be significantly enhanced by the development of efficient systems for the construction process and information. The emerging trade blocks of United States, Europe and Japan, which exclude the very large population centres of China and Indonesia, provide an opportunity for Australian influence in the development of the industries in South-East Asia as Australian influence is reasonably well accepted in these countries because it is not particularly threatening.

South-East Asia has been experiencing rapid growth, with the associated need for their infrastructure to support that growth. Australian technologies should be adapted to meet the social, economic and environmental needs of all these citizens in our region. Technology

transfer will be a large factor in this process. Recognising that we can each learn from each other, industry leaders propose to develop construction and equipment strategies that help transfer infrastructure innovation. In the near term attention should be given to identifying existing technologies that best meet the needs of developing countries and conducting demonstration projects in cooperation with host countries. In the longer term research and demonstration activities that facilitate the transfer of innovative technologies throughout the region will significantly benefit us all.

## CONCLUSION

Activity in the Australian property and construction market industry forms an integral part of the economy with approximately 7 per cent of the work force and 6 per cent of the country's output. As all sectors of the industry are directly influenced by the economy the industry volatility forms an important barometer on the health of the economy. Currently with economic stability there is the initial positive signs of long term sustainable growth in the industry. For the year 1997/98 the value of construction activity was \$62 billion representing a recovery of 15 per cent from the slowdown of 1995-96 with the non-residential building sector accounting for the improvement generated mainly by private sector confidence in the economy.

Even the residential building market is improving although it is still recovering from the unsustainable construction levels of 170,000 new residential properties in 1994-95 compared to the current underlying demand of approximately 138,000. Based on current projections an equilibrium should be reached soon especially now as household disposable income has increased in the current economic environment of both low inflation and interest rates. Whilst in the past this would have lead to an universal increase in house prices, 'individuals' uncertainty relative to job security has created only localised price rises most evident in the major inner city areas due more to a change in consumer preferences rather than economic advancement.

The performance of the non-residential sector varies across the categories with those portraying strong signs of regional construction activity having close links to the economic output and changes in the employment labour force, namely the office and industrial sectors, while the value of new building work associated with social welfare remains relatively constant, although long term an older population will require additional health care facilities.

New engineering construction in the past has been dominated by the public sector. Now with the emergence of the private sector buying power stations and building new road toll ways the sector may be at an important cross roads with the gradual transfer of infrastructure and service supply responsibility to the private sector. The implications overall are still to be evaluated, however, increased volatility may be apparent especially from the deregulated categories, currently the telecommunication and power industry.

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supply responsibility to the private sector. The implications overall are still to be evaluated, however, increased volatility may be apparent especially from the deregulated categories, currently the telecommunication and power industry.

Despite the ongoing reforms in specific sectors of the property and construction industry, the economy is still the corner stone to the level of future industry activity. The current signs are positive with the Australian economy slowly resurfacing from a mild recession, with long term stability providing confidence for business and investors. The key factors are namely:

- Consistent economic growth in major world economies - OECD forecast growth for 1997 and 1998 are close to 3 per cent
- Signs of an improvement in Australia's domestic output - Federal government project 3.3 per cent growth in GDP from the 2.5 per cent of 1995-96
- A low inflation environment - currently at 2.1 per cent for the year to June 1998. The Reserve Bank of Australia is committed by monetary policies to contain inflation below 3 per cent
- Competitive interest rates - The variable bank housing loan is at 7.7 per cent

### Current State of the Construction Industry

	Construction investment			Construction firms			Construction sector employment	
	GDP in 1997 current price billion US\$	Construct investment in 1997 billion US\$	to GDP ratio	No of construct firms in 1997 *1	Construct investment per firm US\$1000	Employees per firm	No of employees in 1997 (1000 persons) *2	Construct investment per employee (\$)
Australia	378.3	38.4	10%	160,400	239	3	523	73,380
China	904.1	182.6	20%	67,533	2,704	5116	34,479	5,296
Hong Kong	171.0	16.9	10%	18,509	913	1,143	113	149,558
India	5.6	na	na	28,000	na	29	32,000	na
Indonesia	134.3	25.1	19%	41,705	602	29	1,199	20,939
Japan	3,883.70	574.4	15%	568,548	1,010	47	6,850	83,854
Korea	442.7	72.3	16%	43,421	1,665	16	2,020	35,792
Malaysia	93.6	27.2	29%	44,971	604	182	700	38,857
Philippines	33.4	3.9	12%	8,790	444	54	1,600	2,438
Singapore	919	144	16%	2,347	61,355	162	126	1,140,143
Sri Lanka	12.5	1.5	12%	1,627	922	263	263	5,705
Vietnam	26.9	2.8	10%	770	3,636	426	328	8,544

#### Notes:

1) Figure of number of construction firms for Korea is for 1996. Figures for Japan, Malaysia, and the Philippines are for 1998.

2) Indonesia's figures for the number of construction industry employees are for 1995. China's figures are for 1998.

## **REFORM AND OPENING UP POLICY**

### **IN**

## **SHANGHAI RECONSTRUCTION**

The aim of the theme is to introduce the scope, fast growth and future aspect of Shanghai reconstruction, introduce laws and regulations of construction market promulgated in recent years. The authors are come from the departments of construction cost management. Thus, the construction contracting and tendering system, contract administration and cost management forms in Shanghai is described.

During the last decade of the Century, Shanghai grew rapidly. Construction projects like the bamboo sprouts in spring in urban and rural area. The image of the city changes time by time towards a modern metropolis. Shanghai government authorities are endeavoring to reform its construction system and regulations to meet international practice. Up to now, the legislation is under transforming period and with China ' s characteristics. Like the task of building an international metropolis, the reform of construction administration system remains a long way to be forward.

### **1. A Grand Gathering of Unprecedented Scale in Investment Scope and Opening Up the Capital Market to the Outside World**

#### **1.1 The Role of Shanghai in China ' s Economy**

Shanghai is the biggest economic centre of China, an old industrial city. During past decades, Shanghai acted an important role in China ' s economy and had a high share on it: one third of national income, one sixth in agricultural and industrial output and one ninth in export value. But the total amount of economic value was comparatively low at the time.

Since the economic policy was changed and the reform and opening up to the outside world was accepted in 1979, many provinces in inner mainland growth rapidly, and the share of Shanghai had dropped downwards. But in 90 ' s, after the development of Pudong New Area and restructuring of industry, Shanghai economy is booming up, full with dynamic activity and vitality. The first industry is going on the way towards modern suburb and environmental conserved agriculture, the secondary industry is turning on the way of high-tech bases while six backbone industry departments are formed: automobile, steel, power station machinery, housekeeping electrical equipment, computer and communication facilities and petrochemical industry. The tertiary industry growing rapidly in financing and banking, stock market, whole sale and retain sale, travel service and hotels, and real estate properties and its total output in GDP runs more quicker than the amount of firstly and secondary industry and the share of it attached from 18.6 in 1978 up to 47.8 % in 1998.

## **1. A Grand Gathering of Unprecedented Scale in Investment Scope and Opening Up the Capital Market to the Outside World (cont ' d)**

### **1.1 The Role of Shanghai in China ' s Economy (con ' t)**

In 1998, the total GDP value of Shanghai is 368.8 billion Yuan (US\$ 444 billion), and 28.2 thousand Yuan (US\$ 3390 )per capita, standing in the first position in Mainland China.

### **1.2 Huge Investment Scale in Shanghai**

In 1990 the central government decided Pudong developing, which enhanced economic development in both sides, east and west bank of Huangpu River. In recent years, though economic crisis had happened in South-East Asia, the economic growth has not dropped down after central government took a series policies: enlargement of domestic demand, active monetary policy, enhancement of infrastructure investment, etc. The total investment in Shanghai remains unchanged during these three years: 197.5 billion Yuan( US\$ 23.8 billion )in 1996, 197.8 billion Yuan(US\$ 23.9 billion)in 1997 and 196.7 billion Yuan(US\$ 23.7 billion)in 1998. In general it is three times compares with the years at the beginning of 90 ' s and shared 7.8% to 8.5% to national total capital investment. Though the investment on real estates projects dropped down, but the investment on infrastructure projects in recent years are greatly increased and attaches 41.3 and 53.1 billion Yuan (US\$ 5 billion to 6.4 billion) about seven to nine times to the beginning of 90 ' s. Many jumbo projects are completed or under construction, including Pudong New Airport, Inner and Outer Ring Viaduct Road, Light Railway Oriental Pearl Road north to south. The second stage of Shanghai Metro Subway extends 18 kilometres from east to west of the city, and will connect two airports: Hongqiao International Airport and Pudong International Airport in future. Rehabilitation of rivers and lakes and other environmental improvement projects, has been commenced and under construction. Some other huge projects such as ports and wharves are under planning. In total, Shanghai is changing towards an international metropolis and greatly improvements in environment, both natural and investment.

Shanghai government authorities decided the policy of "Serving inner part of whole China and opening up to the outside world" . Many big projects are come from central departments and inner provinces. A new financial district is formed in Lujiazui Development Zone, Pudong, where all big China banks have their own office buildings, many foreign banks and insurance companies are coming to rent their offices. Up to 1998, there are 76 Chinese and foreign banks with more than 500 branches, 8 insurance companies with 33 branches, and 43 stock agencies located in Pudong. An skyscraper building Jinmao Building, at the height of 430 metres and 88 stories, is put into use this year. Many central and provincial famous companies are moving their head offices to Shanghai.

## **1. A Grand Gathering of Unprecedented Scale in Investment Scope and Opening Up the Capital Market to the Outside World (cont ' d)**

### **1.3 Shanghai is highly appreciated by the international investors.**

Huge domestic investments attracts investors from foreign countries and Hong Kong, Macau and Taiwan. Foreign investment amount is still growing upwards since 80 ' s for two decades and attaches 37 billion to 40 billion Yuan (US\$ 4.5 billion to 4.8 billion) in recent two years and has 18% to total investment of the whole city. Many property developers from Singapore and Hong Kong joins the redevelopment of old downtown areas in Shanghai. Many international big enterprises come Shanghai to establish factories and commercial projects. General Motor, Sharp, AT&T, Sony, NEC, Dupont has projects in Shanghai. Volkswagen came in 80 ' s and formed a big automobile city in Shanghai, and made a lot profits there. They decided reinvesting new factories manufacturing new styles to compete with General Motor. In this September, an international economic and investment conference will be held in Pudong where 500 big-name corporations will come and discuss there.. Pudong New Airport will put into use after three years duration under construction, with total investment at 15 billion Yuan ( 1.9 billion) and 20 million travelers per year. The Conference will be operated in a new global meeting hall located close to Oriental Pearl TV Tower. Within 500 bigs, 92 consortiums had invested in Pudong Area with total amount over US\$ 4 billion.

Shanghai looks forward in absorbing more international investment in future.

## **2. Shanghai Government Authorities are Enhancing to Forward the Reform of Construction Administration System**

Meantime when the investment scope was enlarged and the market opened to the outside, Shanghai government authorities were enhancing to forward the reform of administration and management system in construction.

### **2.1 Legislation of Construction Industry and Construction Market**

November, 1997, the Standing Committee of Supreme People ' s Congress of China declared " Construction Law, PRC " . The aim of the Law is enhancing the supervision of construction activities, keeping the construction market in order, ensuring construction quality and safety, pushing the growth of construction industry. It declared the construction permission regulation, the rules entering construction market, and tendering procedure, construction site management, safety supervision, quality control of the construction activities in China and put into practice since 1998. Before that, Shanghai local congress promulgated " The Construction Market Administration Rules in Shanghai " . The ordinance is based upon the separate regulations in construction contracting, competition and tendering in design and construction, construction quality and safety, and the construction firms coming from out side to Shanghai. Its involvement includes the regulations in the activities in contracting, the registration of projects, construction permissions, and consulting, supervising, and agencies in construction, etc. into a perfect local law together with the detailed implement regulations in these fields.

## **2. Shanghai Government Authorities are Enhancing to Forward the Reform of Construction Administration System (cont ' d)**

### **2.1 Legislation of Construction Industry and Construction Market (cont ' d)**

Many of these detail regulations is based in order to looking after the practice of government and state owned projects, and the parties joining the market keeping the benefit of the real investors in preventing loss their money, ensuring the projects completed on time and with good quality. The approval of foreign investment project is simpler than local government investments, but still have some necessary procedures in their market activities.

### **2.2 Tendering procedures**

Shanghai started tendering procedures since 1985 after a Government ' s regulation signed by Mayor. The main measures is similar to most countries based on market economy system. After ten years practice, a set of formal tendering system is set up with Chinese characteristics and local conventions.

At the very beginning, the substance and procedures in tendering is formed. There are different tendering methods: open tender, invitation and negotiation. The authority regulates different measures. For an example, open tender consists the following steps: project registration, tender application, tendering documentation, basic estimating, call for tender, prequalification of tenderers, site visit, return tender, opening tenders, assessment, decision towards contract awarding.

First of all, there is the registration of project. Shanghai Tendering Administration Office is established in charge of the affairs and supervising on the employer for their procurement activities, approving the application on the methods of tendering and forms of contract, guides the activities of tendering and the method of assessment, especially in open tender, decision and acceptance of tender, and supervising the procedures.

Chinese government had promulgated a Standard Form of Construction Contract and General Conditions through Ministry of Construction and the Bureau of Commercial Affairs. Up to now, a series of measures on contract administration has been taken. The original documents is too simple and Shanghai administration authorities and cost consultant firms has extended many special conditions and forms to the contract. In May of this year, the Supreme Congress has declared new edition of " Law of Contract PRC " . It is more perfect than original one and merging Sino-foreign Joint Venture and Cooperative Firms Contract Law into its involvement. Then government establishments are drafting new edition of the Standard Form of Construction Contract now. Meanwhile, many cost consultants are providing post contract services of Quantity Surveying for clients.

In order to enhance the supervision on tendering procedure, Shanghai has established Construction Exchange Market. Board of Directors, Board of Supervisors, and the officers under the leader of President are elected or appointed. Big electronic screen shows the transactions under tendering and contract granted.

## **2. Shanghai Government Authorities are Enhancing to Forward the Reform of Construction Administration System (cont ' d)**

### **2.3 Administration on Foreign Investment Projects**

Shanghai extended a system for foreign investors entering Shanghai called "One Door Service" when the Prime Minister Zhu was on his Mayor of Shanghai Position. Foreign investors could do all government approval within one office building where Municipal Planning Commission, Construction Commission, Customer Office and other environmental protection, epidemic prevention station, public utilities companies, and Waste Disposal Bureau as well as Public Traffic Bureau. The procedures of foreign projects is quicker and easier than local one. Of course, industrial guide and urban plan approval environment assessment and approval as well as government firm registration approval should be taken. But the following steps in construction fields: project registration, design assignment, construction tendering, contract registration and construction permission, etc. will be registered or approved by the construction authorities. The object of these measures is protecting the benefit of investors and guiding the construction behavior. Foreign investors could assign capable agents in contracting to do so.

Many High-tech parks and industrial parks were established for investors. In 80 ' s, there were Hong Qiao, Minghang and Caohejing parks. In 90 ' s now, there are Lujiazui, Jinqiao, Waigaoqiao and Zhangjiang Parks. More parks and zones are developed in districts and counties level. Many preferential and services are provided by these development companies.

In construction stage, quality supervision registration, site supervision assignment, safety inspection, interim inspection, project hand over final inspection and quality class grading and the construction project municipal archives ' records will be taken by local authorities.

## **3. Construction Cost Administration**

China had established an overall construction administration system since 50 ' s from the very top of the central government to provincial and municipal and county level. That is Construction Cost Norm System from the Standard and Norm Department of Ministry of Construction to such as Construction Norm Administration Station in Shanghai. After the construction market is opened, the construction cost may be fixed in contract after competition and signed by employer and contractor. Though the name remains unchanged, but the function is transferring to the costing and the norms are kept in its cost structure and level. The way of reform is long and complicate.

### **3.1 Cost structure**

In China, construction cost of a project is defined as the total cost from the very beginning to the completion. Compared with international practice, the involvement is the same, but the sequence is different. It is because of the Norm System and Planned Economic System. The cost structure in China is as follows:

### 3. Construction Cost Administration (cont ' d)

#### 3.1 Cost structure (cont ' d)

- (1) Construction and installation cost, includes direct cost, other direct cost, comprehensive indirect overheads and construction profit together with preliminaries, norms compiling fee, construction quality supervision fee, and administration fee as well as taxation;
- (2) Equipment, tools and instruments cost;
- (3) Other construction cost, consists of all other fees and expenses excluding above costs, includes land acquisition cost, resettlement cost, employer office fee, land and soil surveying fee, design fee, infrastructures within the site block, enlargement for public utilities capacities fee, consultant cost, interest cost during construction stage, and contingencies. They are all important but cannot calculated under Norm system. So it is put in the third section to the project budget.

#### 3.2 Costing Procedures

From the start of the project till completion, is called the project total duration. In the duration, construction cost should be controlled step by step. When the project extends, the total cost is more and more clearly controlled till the final account. Following is the steps in Shanghai:

- (1) **Concept estimate.** It is calculated in the prefeasibility study and project proposal stage. There is method of order-of-magnitudes such as the capacity in beds in hotel and hospital construction, unit products in manufacturing projects, tons and length in bridges and roads and /or cost per square floor metres.
- (2) **Investment cost estimate.** It is used in feasibility stage and will be used for design scopes to control the total project cost after its approval.
- (3) **Design rough budget.** It is based upon the preliminary design and forms a part of it. In China, most projects has two stages in design, that is preliminary design stage and construction layout stage. All the main technical way and financial scopes will be fixed in preliminary design stage. Preliminary design is based upon and controlled by approved feasibility report. After the design is approved, it is the main official document in project construction and the rough budget could not be overrun.
- (4) **Design budget.** It is called "construction layout design budget", simplified as "design budget". In China, the construction layout is prepared by design institutes and its budget is compiled based on the construction norm. The object of design budget is for the control of total project budget not exceeded and the "base estimate" of construction cost in order to control it in tendering stage. Many investors are combined the design budget with base estimate though the time scale is different each other.

### 3. Construction Cost Administration (cont ' d)

#### 3.2 Costing Procedures

- (5) **Contract cost.** The construction cost after offer and acceptance in tendering and fixed in contract is called "contract cost". Cost terms in contract is the most important part in contract other than contract objective. Not only the total amount will be defined in contract documents, but also the structure of cost, its adjustments and payment method. In market economic system, contract cost has law effected bounds between employer and contractor.
- (6) **Variations and adjustments.** When design variations happens, the contract cost will be adjusted and the amounts should be agreed by both sides other than the fluctuation terms and claims approvals.
- (7) **Final account.** Closed to the completion and hand over, the final account will be agreed by both sides. Since the adjustments is often happened in Shanghai, certifying in cost is usually happened in Shanghai, the disputes in final account is often occurred. Many cost consultants are required to mitigate them and fix the final account.
- (8) **Project auditing.** After the project is completed, the government will take final inspection and assessment. Big projects will be inspected and assessed on its technical achievements, quality and economic effects by a panel organized by government. So the final investment of the total project will be fixed through project auditing. Value for money will be assessed for the project.

#### 3.3 Cost Basis and 93 Norm Series

According previous rules, the rough budget, budget, final account, cost audit should be done based on the unit rates of Construction Norm together with official fee rates, adjustment coefficients, and the regulations declared by government authorities. The Measurement Method is very important in calculation of cost. Design drawings, preambles, specifications, standard should be used to guide the cost. Now the contract terms are becoming more and more important role in costing.

Now the construction norm in Shanghai is called 93 Norm Series. It includes: building norm, civil engineering norm, building repairs and renovation norm, decoration and refurbishment norm, public lines and plumb norm, hydraulic works norm, gardening norm, civil defense works norm, etc. Their unit price, fee rates. Cost element prices are printed in the Norms. It is a huge system, with big involvement. Every norm in the system has its own subjects. When we are valuating a project, different Norms and cost regulation should be used in costing. So the Norm system is very complicate.

For an example, in 93 Building Norm, there are 18 parts including earth works, piling, masonry works, scaffolding, concrete and reinforcement concrete, etc. with about 2000 items are published in the Norm. 93 Norm is different from those of previous norms in use, because it is more guiding and referential bases than before, together with monthly material market price and some items such as preliminaries are used it.



### **3. Construction Cost Administration (cont ' d)**

#### **3.3 Cost Basis and 93 Norm Series(cont ' d)**

Now the Construction Commission of Shanghai Municipality decided to compile a new construction cost norm series. The object is going forward to market economy system and close to international practice, enhancing its information effect. In our experience, norm system will be useful in foreign and domestic projects in future because the market mechanic will be growth gradually and for some unit price in variations where the original quoting cannot cover the item, the norm rates is easier and beneficial to both sides than negotiation.

### **4. Construction Cost Professionals and Cost Consultant Firms in Shanghai**

#### **4.1 Estimating and Budgeting Technicians**

In old days, the construction cost estimators were separated in construction companies, designed institutes and development companies, and less trained. Continuous education system was established and managed in recent years and 4753 certificates are issue in total at the moment.

#### **4.2 Cost Engineers**

China had started to establish cost engineer system as a reform step in personnel system in construction fields, the same level as certified architect, certified structure engineer as the professionals going into construction administration activities. Now after the paper examination and interviewing qualification, 868 cost engineers are approved by the Ministry of Personnel of China and certification will be taken in recent future.

Before that, Shanghai had established a quasi-professional construction cost auditor for five years, taught them to serve for the public interest, obedience on rules of conduct and continuos educated them for their knowledge and capabilities. Now 1601 certificates are issued to authorize them the power to sign the final account cost audit.

#### **4.3 Quantity Surveyors**

Shanghai Construction Commission and Senior Education Bureau had approved a project for quantity surveying course in Shanghai. There are more a hundred students graduated or under graduation in the course and only 18 graduates had chartered as ARICS, member of Royal Institute. A few of them are now working abroad such as in UK and Singapore. Most of them are working for Chinese and foreign QS companies to provide professional services. Their capabilities and achievements are highly appreciated by the clients and local counterparts.

#### **4. Construction Cost Professionals and Cost Consultant Firms in Shanghai (cont ' d)**

##### **4.4 Cost Consultant Firms**

Shanghai has approved 131 firms in construction cost advise services. Within them, only 20 firms are certified by Ministry of Construction in the Grade A. Shanghai Construction Commission appointed 6 of them capable to associate the foreign cost consultant companies coming Shanghai for their professional job. But in fact, it is at the beginning stage and only a few firms are capable in modern cost administration services for clients.

Above is a brief introduction to the Shanghai construction administration system. Welcome to our counterparts visit Shanghai and talking on our mutual interested topics.

Thank you for your attention and any question we are happy to reply.

PROCEEDINGS

3<sup>rd</sup> Pacific Association  
of Quantity Surveyors  
Congress

Quantity Surveying In The New Millennium  
- Challenges and Opportunities

*Conference Session 6*

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# **An Overview of Investment in Construction and Civil Engineering Projects With Limited Financial Resources Based on the South African Experience**

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## **1. THE CONSTRUCTION INDUSTRY FOR INVESTORS**

This paper does not represent a mathematical and overwhelming statistical presentation of economic and statistical aspects. It is rather an exposition of the basic concepts and structures required to develop a procedure and motivation by which cost aspects and investment in construction-related projects may be evaluated, especially where limited financial resources are available.

South Africa went through various economic cycles during the nineties. In an environment of continuous inflationary trends, which to a large extent evade effective control, it becomes necessary to create cost-effective planning and investment evaluation structures. These structures can be applied to the assessment of process costs, products, services related to the construction industry and more specifically, to construction projects, on a "low fluctuation" basis through all phases of economic growth and decline.

The construction industry is dependent on capital inputs to complete much needed infrastructure and buildings. It is not far-fetched to state that "no investment, no construction" rules the construction market. Not only will careful planning and cost estimating, together with accurate feasibility studies be vital, but also the acquisition of investment capital weighed against risk and profitability on an appropriate scale of economic growth, to ascertain the investment-potential of the construction industry or a specific project.

Decreased investment in the construction industry leads to lower growth and increased risk for investors who are willing to enter an already depressed market. Equilibrium should be found on the total scale of the economy, between investment and profitability on one side, and risk and inflation on the other. A norm against which investment potential, inherent in the economy at any given time can be measured, should be achieved in order to evaluate the prognosis for the construction industry.

It is an unfortunate fact that there exists a direct link between general economic cycles and the cycle of recession/boom periods in the construction industry. Taking this into account and in an effort to soften the effects of peaks and troughs of economic cycles in the construction industry, a basis should be sought on which confident investment decision-making related to construction projects may be made.

Demand for construction is increasing, as was prevalent in the Reconstruction and Development Programme of the South African government, and in general government policies

and community demand. However, the ever-increasing cost of construction, worsened by a constant shortage of essential, "affordable" funds, (loan or equity), tends to slow down the delivery process.

The contribution of the construction industry towards socio-economic upliftment is dependent on the willingness by investors and financiers to invest in this industry. This will also have an effect on the stimulation of growth in the industry.

"The rising costs of materials and labor are compounded by the facts that money is becoming more costly to borrow, and the materials required and skills needed to produce higher technology products are becoming more sophisticated and costly." (Stewart, 1982:2)

This is unfortunately not the ideal situation if the effects of inflation are to be controlled, if economic growth is to be stimulated, and if profitable investment in the construction industry is to be activated.

## **2. INFLUENCES ON DECISION-MAKING FOR INVESTMENT**

Decision-making processes associated with investment in construction- and civil engineering projects are complex owing to the quantitative and qualitative factors surrounding various financing options. Quantitative aspects should be analysed by means of discounted cash flow analyses, based on time value of investments to ascertain the relative costs of each option by establishing discount rates within the parameters of sensitivity analyses.

Qualitative aspects should be analysed by evaluating all non-quantifiable factors flowing from favourable investment options which should be weighed against each other to reach final decisions on investment procurement in construction development.

Net present value analyses are important to determine the most cost-effective financing options. This information can be used to take informed decisions as to the best method of financing for construction- and civil engineering projects, with the objective of placing the construction industry in a stable development position in the national economy.

The construction industry in South Africa is in a vulnerable profit and loss situation. It therefore became important to be aware of the most cost-efficient routes to promoting investment in construction projects, while the financial resources for such investment are becoming less and less. Construction companies will have to operate more cost-efficient and more competitive if they are to survive within the economic hierarchy. Various financing options are available, but not all these are appropriate to the construction industry.

The financing of construction- and civil engineering projects through investments by developers and other investors involves successful allocation of funds, which depends on such financing options. Sources of finance, various financing options and the effects of those options, present a complex combination of factors which should be fully analysed for each individual investment proposal to ensure optimisation of resources.

Correct decisions will become more important as economic markets expand and monetary risks increase. Links between the construction industry, economic-, political and monetary conditions, should be monitored continuously. This process may have to be adapted as economic markets

and conditions change, using basic models to measure the potential for successful investment planning for construction projects.

Greater pressure is placed on investors and the risks attached to investing in the construction industry in a developing country are numerous.

## **RISK ASSESSMENT AND SENSITIVITY ANALYSIS**

Risk is described as being related primarily to the possibility of loss. Investors in a new project are often faced with the risk that the project might fail, leaving the developers very little to show for their investment, except the losses with which they have to cope. The risk bearing becomes a serious negative factor when financial constraints become a reality, especially in Third World countries and so-called developing countries.

During periods of risk and uncertainty in South Africa there was a reluctance within the public sector to invest in construction projects, whereas the private investor merely scaled down on less profitable investments, but still took the risk to invest in economically risky and politically uncertain periods.

An interesting statement was once made that a high return can only be expected when the risk of losing the investment is also high. Uncertainty, however, which is a feeling experienced by all investors, could influence the decision to invest in the construction industry negatively. Due to the fact that the future is unpredictable to a large extent, investors feel uncertain about worldwide economic developments. We all realise that if major global economic markets "tumble", investment markets around the globe are affected. If the American dollar gains against other currencies, economic outlooks become grim. Interest rates in South Africa may increase while the local currency (Rand) loses value. It becomes a vicious cycle that may result in "market negativity" and even a withdrawal of investments at the earliest warning signs of economic slumps.

The remarks made in the previous paragraph are nothing unfamiliar amongst economists and within financial markets. It affects the daily life and living standards of total populations. This includes investors as well. A reluctance to invest may be experienced during economic downswings, even though the effect of the downswing may be small.

The effects of uncertainty are difficult to measure. It is mainly linked to inflation. Inflation is the main cause for the erosion of the value of money. It is difficult to predict inflation over the short term, and even more difficult over the long term, e.g. the life span of a building. Investors may make use of the speculative assumption that continuing rising land values will be reflected in rising rents and hence rising benefits, so as to make a decision to invest in property. A downturn in demand, on the other hand, will have the reverse effect with falling values in the property market. This may result in the sum of the benefits being lower than the costs for the project, and the project becoming less feasible.

Investing and construction organisations can be in various financial positions. Under each scenario the company will be making an assessed profit for which it will be liable for tax. A few scenarios will be analysed.

- The organisation is in a debt situation.

It is assumed that the after tax marginal cost of borrowing is higher than the opportunity cost of capital. For this scenario 20% is used as the marginal cost of borrowing (therefor the discount rate). This is more or less in line with construction project costs. The marginal income tax rate for companies in South Africa was set at 35% at the end of the survey period. Therefor the cost of borrowing after tax will be

$$\begin{aligned} r_n &= r \times (1-t) \\ &= 20 \times (1-0,35) \\ &= 13,00\% \end{aligned}$$

or, taking the inflation rate at the time of decision-making into account (if the inflation rate is 7,5% and the borrowing rate is 28%)

$$\begin{aligned} r_n &= \left[ \frac{(1+0,28)}{(1+0,075)} - 1 \right] \times (1-0,35) \\ &= 19,07 \times (1-0,35) \\ &= 12,4\% \end{aligned}$$

- The organisation has cash surplus funds which can not be put to use in other areas but construction investment

In this situation the discount rate used is the opportunity cost of surplus capital. The opportunity cost and discount rate will be the return on a risk-free investment. The return on government bonds is used as return on a risk-free investment. It can be assumed that government bonds yield about 15% per annum, which should be used as the discount rate in this scenario.

- The organisation has cash surplus funds and has many investment opportunities besides construction projects.

The result of this scenario is that there may be a better use for the capital elsewhere. It is assumed that the opportunity cost of other investments is 20%, and this will be used as the discount rate.

## PROS AND CONS: SCENARIO OBJECTIVES

An analysis of survey responses (Heckroodt, 1998) demonstrates similarities between the pros and cons associated with each investment project. The following framework could be implemented as a basic norm for planning and evaluation of investment objectives:

- The overall objective of the investment, as well as the influencing factors that will play a role in the specific project scenario should be specified
- These factors exerting an influence should be ranked according to their influencing importance
- Attributes to be evaluated in all aspects of the investment portfolio must be defined
- Decision-making criteria must be recorded in detail

- Alternative projects should be identified
- All alternatives should be carefully considered and investigated
  - Determine at least three scenarios for each project: most profitable, reasonably profitable and not viable
  - Determine the relation between the three scenarios, as well as the critical aspects that could swing a scenario from being most profitable to not being viable at all
  - For each scenario the following evaluation route should be applied:
    - ◆ Apply a priority weight to each attribute or influencing factor of the scenario, between 0 and 10.
    - ◆ Determine the discount rate to be used in the calculations as discussed in Chapters 3 and 4.
    - ◆ Determine the time-value of money by means of the NPV, BCR or discounted payback period methods
    - ◆ Compile the attributes of each scenario in a simple formula

$$S_1R = \frac{\{(E_A + E_B + E_C + \dots E_Z) - (D_A + D_B + D_C + \dots D_Z)\}}{\{A_{MAX} - A_{MIN}\}}$$

where

$S_1R$  = rating of scenario 1

$E$  = Encouraging factor weighting according to weighting scale (refer to Chapter 4, table 8)

$D$  = Deterrent factor weighting according to weighting scale (table 8)

$A_{MAX}$  = Maximum attribute weight

$A_{MIN}$  = Minimum attribute weight

- ◆ Select the project the investor is going to use by using the
  - # weighted score achieved by the project
  - # relation between scenarios, as well as the critical aspects that could swing a scenario from being most profitable to not being viable at all.
- A final selection must be made
- The source of funding must be stated
- Cash flows for each year must be determined
- Implement the decision
- Control the investment portfolio closely and evaluate regularly in terms of rate of return versus expected rate of return, and act correctively where needed.

Proper control, based on this simple set of criteria and formula, developed from a study of the survey responses, based on discounted cash flow analyses and net present value calculations, will contribute to viable investment decision-making and may increase confidence in investment in construction projects.



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# Unprecedented Depression of Japanese Economy and Changing Circumstances of Quantity Surveying (Summary)

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## 1)Unprecedent Depression

Length, Increasing unemployment rate, Low interest rate ,etc.

Serious especially in Finance, Real estate, and Construction

## 2)Prevailing Restructuring and Crisis in some Corporations

Increasing layoff or discharge

Changing Governing Policies

## 3)Changing Attitudes of Workers

From Group-oriented to Individual-oriented Mind

Destruction of Japanese Systems?

## 4)Open Market and Acceptance of Global Standards?

Transparency of Cost, Tendering, Procurement

Evaluation of Corporations, Accreditation in Education, etc.

## 5)International Standardization of Professions

Architects and first class Kenchikushi

(Integrated National License of Architecture and Building

Engineering including Quantity Surveying)

Movements to establish Professional Engineers

6) Integrated Education of Architecture-Building Related Specialists

No Professional Accreditation Systems at present

Accreditation of Architecture and Engineering

(Structural, Building Services, Construction Engineering)

Accreditation of Quantity Surveying?

Can be a Part of Integrated Accreditation?

7) APEC Engineers and Quantity Surveying

APEC Engineers and First Class Kenchikushi

The Former Excluding and the Latter Including Quantity Surveying

PAQS Accreditation? -- Differences of Education Systems

8) Privatization(?) of National Licenses including Quantity Surveying

Within 2000, It will be Privatized as a part of deregulation

Professional Quantity Surveyors?

See the paper presented First PAQS Conference in Singapore in 1997

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# The Future Outlook for Building Maintenance Stock and Quantity Surveyor Market in Japan

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## Keywords

Service life span, Maintenance management plan, Social building stock

## ABSTRACT

The object of this paper is to analyze the level of maintenance of Japanese building stock as well as the service life span of office buildings constructed during the last two decades. Based on the above analysis, this paper aims to identify what action is recommended in order to improve the Japanese building stock in the future.

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## 1. Introduction

During the last two decades there has been a growing awareness in Japan of the importance of considering the service life span of buildings and of the need to increase maintenance and repair cost of the existing building stock.

It is pointed out by various information sources that the current status of the need to Japanese buildings has the following characteristics: -

- 1) Average service life span of Japanese buildings is often shorter than in other western countries.
- 2) Increased maintenance and repair costs for existing building stocks at macro level, is required.

In this paper, first, the above characteristics and the current status of Japanese buildings are examined and then a suggested strategy for necessary corrective measures is proposed.

## 2. Service life span of office buildings

The average service life span of office buildings with the reinforced concrete structure in central Tokyo is around 35 years.

This service life span is determined by physical building conditions, as well as obsolescence factors, such as economic, functional, technological, social and legal factors. It is recognized that in the past decade a number of Japanese office buildings have been demolished due to lack of adaptability to meet social and environmental changes, even without any physical deterioration of the buildings.

In the USA, it is said that the average service life span of office buildings is around 45 years or more. This however may be reducing as the high level of interest rates during the '70's and early '80's caused future costs to be discounted so heavily, that long life spans were almost irrelevant to the USA over this period.

However, Japan enjoyed relatively low and stable interest rates during the last two decades, so when life cycle cost calculations are to be made, the life span of buildings should have been a very important issue to Japanese building owners.

The relatively short service life of Japanese buildings compared with western countries is attributable to the following building characteristics:

1) Level of flexibility due to construction cost limit.

After World War-, with rapid economic growth, many industries were geared to a mass-production system, where buildings were treated in the same manner as other durable consumer goods, such as cars, or electrical goods (TV, washing machines, etc.). Owners wished to obtain the lowest possible construction cost and thus maximize their initial return. This rationalization was emphasized for building design, and therefore buildings were constructed as quickies and economically as possible. Further, buildings were designed to minimum space standard and minimum story heights, thus limiting their adaptability to accommodate future functional changes.

2) Building owners' short term interests

Another reason for the short service life span of buildings is that owners expected to get their investment returns over a short term as they have tend to have very short viewpoints for capital building investment.

As noted, the rate of interest has been kept at a fairly low level, and with the rapid rise of property values associated with the very high cost of land, these factors have also affected owners' investment decisions to rebuild remarkably.

**3. The future maintenance cost of building stock**

The current stock of buildings in Japan amounts to 8 billion square meters in terms of overall floor area and about 60 million individual buildings in total. It is estimated that the cost of maintaining this stock will be 7.9 trillion-yen (the actual market base), which is 14.4 % of the total current construction investment.

In the USA and Western European countries, the proportion of the actual maintenance market is about 28 % of the total construction market.

There have been signs of a shift in the Japanese construction market from replacement and new construction to conservation, due to the current economic recession and a lack of funds available for new construction work.

In any case, maintenance work of the existing stock of buildings has to be done in order to permit them to perform their function properly and to keep buildings in good condition.

It is likely that the rate of new building construction investment in Japan will decrease over the next decade and the proportion of existing building stock will be increased accordingly. This is likely to increase the rate of the maintenance cost for the existing building stock up to a similar proportion to those of the present European construction market, i. e. closer to 28% from the present 14.4%.

It is estimated by the Economic Planning Agency in Japan that the overall amount of investment in maintenance work (including renovation and repair work) required to keep the building stock in good condition will be 20 trillion yen by the year 2000.

Japan may well experience a maintenance crisis to keep the stock of buildings functioning at that time.

Considering the need for increases in the cost of maintaining the building stock, it is critical to keep the running costs as low as possible.

The higher costs in Japan may be due to the following reasons: -

1) Lack of maintainability

Maintainability is not often fully taken into account at the building design stage, as a result, maintenance work cannot be done adequately as for example there is not enough room or satisfactory access is provided.

2) Corrective maintenance orientation

Building maintenance tends to be carried out as corrective maintenance and this is done only where some failure has occurred. Preventive maintenance programs are rarely considered.

3) Building owner's requirements

Japanese building owners usually expect a certain number of maintenance people to stand-by within the building at all times in order to service any emergency case or a tenant's sudden requirements. This often requires maintenance men to be present not only during normal working hours, but also through the night shift and at holiday time involving overtime work. The maintenance work involves cleaning, mechanical & electrical services equipment, maintenance & operating staff, repair men and guards.

#### **4. Towards establishment of the future stock management system**

Now 50 years after World War II, it is the general perception of the Japanese people that buildings should be capable of longer service life times, should be able to adapt to functional changes in order to meet obsolescence, and should cost less maintain and heat and cool.

With the current changes in Japanese society, such as becoming an aging society, emphasis on energy conservation, decreasing the availability of funds for building maintenance, people need to change their attitudes. They cannot rebuild as they used to do during last two decades, and they cannot afford to keep buildings with requiring expensive maintenance.

Therefore, the following points are essential to incorporate into new buildings.

- 1) Build long service life buildings, which can be achieved by not only designing for durability against physical deterioration, but also to accommodate functional obsolescence.
- 2) Minimize maintenance costs by improving maintainability of buildings.
- 3) Save energy and operating costs.

The owners need to take a different approach. They have gained benefit in the past through very short development cycle, that is a short flow cycle. However, they really need to review and restructure their new stock management policy and how they can survive within a conserving society. Therefore, a stock management system needs to be developed.

In order to establish criteria for a new stock management system, the following points should be taken into account when owner build new building:

1. Conserve quality buildings.

It is important to keep up the maintenance of quality buildings.

2. Establish building investment criteria from a long-term viewpoint.

At the macro level, although the income flow from property is fairly high, the investment in maintenance is not high as compared with western countries.

The main target of building owners should be basically shifted to the following points:

- 1) Reduce overall life cycle cost
- 2) Improve life of building
- 3) Improve adaptability for obsolescence
- 4) Improve maintainability

In order to evaluate these factors for each project, life cycle cost analysis and value engineering are very useful tools to employ to get optimum solutions.

## 5. Conclusion

Although until recently the "Scrap & Build" concept prevailed in the Japanese building production system, it seems that it is time to change to towards long service life buildings as part of the social stock.

Owners are realizing that they cannot afford to keep such buildings which are built during last two decades. Therefore, it is a very important issue to minimize future building maintenance costs in Japan and it is suggested to establish the following points: -

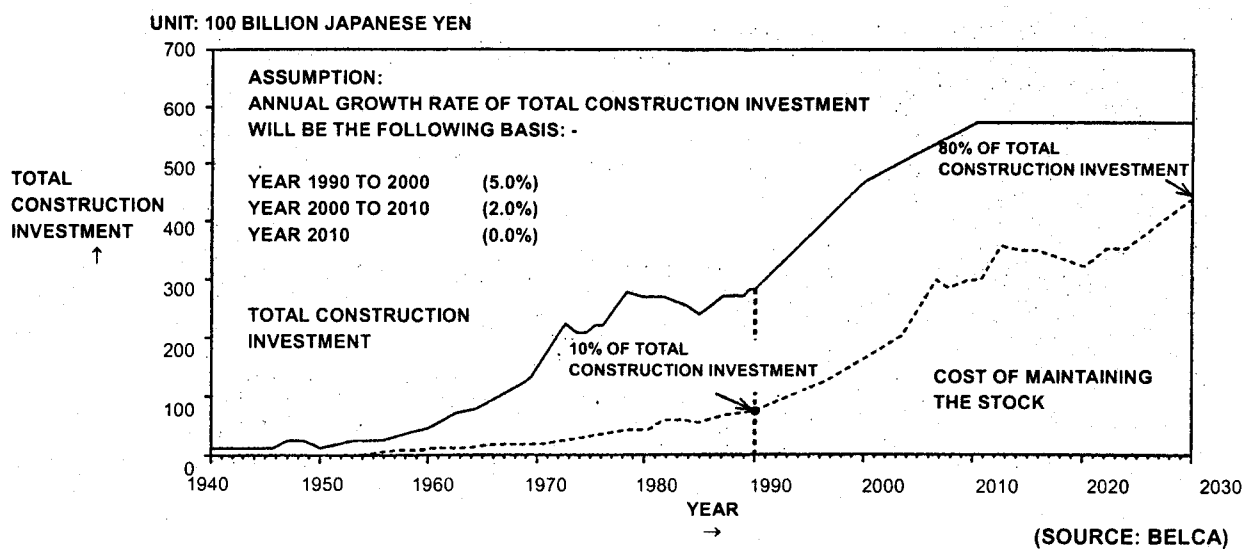
An essential element in life cycle costing appraisal is to determine the life of the investment. The result of producing buildings of short life span, may actually increase life cycle costs in the long run. It is essential therefore to set up design guidelines in order to obtain durable buildings in terms of physical condition, as well as meeting criteria for social and functional changes.

Maintenance costs for the existing stock of buildings may increase considerably in the near future and this may affect the overall national construction investment budget. It is therefore essential to make maintenance cost reduction studies, especially for maintenance free systems. It is also important to set up optimum maintenance management plans in order to support building owners in making the appropriate maintenance investment decisions.

An energy management plan is also necessary in conjunction with the building maintenance management plan, to establish the energy efficiency of buildings.

Established criteria are also required for keeping existing buildings in good condition as part of the country's social capital stock.

## TREND OF MAINTENANCE MARKET



(Reference)

1. BELCA Report, The size of maintenance market, 1994



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## Partnering, a Cultural Myth?

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### Introduction

Partnering is defined as "a management approach used by two or more organisations to achieve specific business objectives by maximizing the effectiveness of both parties. The approach is based upon mutual objectives, an agreed method of problem resolution, and an active search for continuous measurable improvements" (Reading Construction Forum 1995) and "draws heavily upon lessons learned from Japanese manufacturing" (Davey et al 1999:16)

According to the European Construction Institute (1997), partnering is a recognised method of improving communication mechanisms and technologies, responding to innovative construction projects, creating a less stressful working environment and reducing transaction costs resulting from uncertainty, competition and information asymmetry.

This paper examines some examples of the partnering approaches undertaken in UK and Hong Kong and summarises the findings and lessons from recent research in this area.

### Partnering in the construction industry

Partnering is increasingly being used for construction projects in the UK since the Latham Report (1994) was published which recommended partnering as a means of improving inter-firm relations. Subsequent research to identify and develop opportunities for partnering has mainly targeted large construction companies and clients involved in large-scale projects. Examples are the major clients such as NatWest Bank and Marks and Spencer in UK (Bennett et al 1996). Much of the success in the partnering approach have been attributed to national culture in the case of the Japanese companies, for instance, the arrangements of the Big Six in the Japanese construction industry (Bennett et al 1987). Other countries, such as UK and USA, have advocated the benefits thus urging large companies to ensure that they are at the forefront of changes to improve productivity (Egan 1998).

The adoption of the partnering approach is believed to achieve a range of client objectives including equality, training and employment for local people and services for tenants (Davey et al 1998). Its extension to relationships with subcontractors is alleged to help large contractors to achieve more compliant bids, less confrontation and lower tendering costs from their subcontractors (Mathews et al 1996).

The benefits of a partnering system appears to have the following benefits (Stephenson 1996:119):

- Form a basis of the use of relatively inexpensive, quickly formulated preventive methods of dispute resolution
- Encourage conducting business with minimal destructive conflict
- Help break down obstacles to good working relations

- Provide a marketing tool to assist competent planning, design, and construction firms reduce the potential for debilitating competition
- Reduce destructive conflict
- Assist to reach agreement on common goals and objectives
- Help achieve project intent, and specified quality
- encourage healthy, ethical customer and supplier relationships
- add value to all elements of the process and the product
- improve communication
- provide project condition measurement and feedback

There are basically two types of partnering in the West: project partnering, where the parties come together for the duration of the projects; and strategic partnering where the parties develop a longer term relationship over a series of projects for which contracts are usually negotiated. Project partnering is recommended for public sector clients who have to use market testing to comply with procurement regulations (such as those in the European Community), usually through the competitive tendering process (Loraine 1994).

Project partnering has been used / explored by the government in certain public projects in Hong Kong. These projects have been carried out without consciously bearing the label of *partnering*. In this respect, it is similar to the observations of the Japanese companies by the West, i.e. Japanese have adopted the partnering approach without concern of its being so labelled by others. Partnering may then be argued as a term assigned to phenomena observed in the "East"; hence, the elements of *partnering* must be examined more carefully to understand the nature of partnering.

The first 'labelled' partnering project in Hong Kong started in 1994. The client, Hospital Authority is a public client owning 44 hospitals and 49 specialist outpatient clinics comprising well over 3,000,000 square meters of building. Several of the new hospital construction projects ranging from HK\$500m to \$2,000m have adopted partnering approach with strong support from the top management. The first partnering project in the private sector started in 1995 for the Inflight Supply Facility Warehouse at Chap Lap Kok. Wong (1997) suggested partnering does reduce the adversarial attitudes and improve the relationship among the parties when compared with non-partnering projects. He concluded that the factors contribute to the success of project partnering in Hong Kong are to have a competent project team, good leadership and effective project organizational relationship. However, certain preconditions for success were mentioned in Wong's findings (1997):

- commencement of partnering at an early stage
- getting people to participate
- identify difficult personnel early
- trust
- openness
- equal status for participants
- provide a non-threatening environment

As there is limited data support for quantitative benefits (as in cost effectiveness), the benefits of partnering presently seen in Hong Kong is enhanced understanding (Wong, 1997). The mentioned preconditions and success factors all concern people. So it would be fair to say that people management is an important issue for partnering.

At present, partnering agreement has been well developed in U.S. with government projects. It has been client-led for the majority of the projects using partnering agreement. The benefits of partnering have been viewed from the reduction of number of disputes, reduction in value of claims, saving in time, saving in cost and improvement in quality (Lau 1999a). It is more from a project approach rather than from a business approach. Strategic partnering is to develop long-term relationship upon a series of projects from a business approach. Yet there is not much say about how this long-term relationship can be established and there is no research covering the aspect of long-term impact on a firm.

Partnering can be examined from the perspectives of its *nature* and its *process*. The *nature* of the partnering arrangement is an examination of the elements of partnering (the partnering culture). There are six postulated elements (Bennett et al 1996, Liu 1999a): (1) empowerment (2) trust (3) fairness (4) mutual benefits (5) commitment (6) respect. Hence, a partnering relationship may exist with or without formal organisational structure and contract. Subcontracting arrangements in the 1960's in Hong Kong in many occasions had worked on the basis of informal contracts. Trust between the main and sub contractors was immense. This was akin to the observations of the Japanese construction industry as reported in Bennett et al (1987). The West has attributed the observed phenomena to the "Confucian culture in the East."

The *process* is a structural description of the partnering arrangement, such as the equity stake between the partners, the power structure, the organisational structure of the partnering arrangement, and the procurement path of the project. Partnering can either be *client-led* or *contractor-led*. It has proven success when used in U.S. when it is client-led (Lau 1999a). Client-led means that the project is *initiated by the client to form a partnering agreement with the relevant parties on project basis*. Contractor-led may refer to a case where *the contractor submit a partnering agreement proposal supplementing their tender*. To be successful in the case where it is contractor-led it still relies heavily on the support of the client, as the client remain as the eventual payer of all services including that of professional consultants provided for a project. Bennett and Jayes (1995) state that partnering arrangements formed on the basis of personal friendships have a high potential of failure, so it will be more appropriate to view relationship on a firm basis.

Besides the 'labelled' partnering project mentioned above, another form of implicit partnering arrangement seen in Hong Kong is an integrated development model. This arrangement is basically between the client (as part developer) and the contractor (as part developer). There are mutual benefits foreseen by both parties. The agreement itself is believed to have led to cooperation, enhanced understanding and positive relationship. Examples of such partnering projects are the Housing Authority's "Private Sector Participation Scheme" (PSPS), where private developers are invited by the Hong Kong SAR government to participate in the development of public housing estates. These estates are then available for sale, rental, as the case may be, and the private developer is allowed equity stake in the development. Another example in the Hong Kong SAR is the development of the Convention and Exhibition Centre phase 1. The Trade Development Council of the government jointly develop the piece of land with a private developer, where the private developer has the hotel development rights above the Convention Centre (Moss 1994). Examples in the UK are the Heathrow Airport/Paddington Station rail link project (Thatcher 1997) and the Beefeater Restaurants (Tulip 1997).

Partnering is therefore an agreement to put the client and contractor relationship to a *single position* where they *share the goals* among themselves. All parties involved in the project are to

establish a working relationship that encompasses trust (both contractual trust and moral trust), such that the other elements mentioned above can be fulfilled.

### **The Cultural Perspective**

Culture can be viewed from two aspects: the national culture and the organizational culture. National culture relates to the functioning of societies, of groups within these societies, and of individuals within those groups. An organization is a social system of a different nature. It is about how its members think, feel and act (Hofstede 1991). Therefore organizational or corporate culture may mean a soft, holistic concept with presumed hard consequences that a firm is destined to achieve.

Confucian dynamism is regarded as the cultural base of the East. Confucianism is not a religion but a set of pragmatic rules for daily life derived from Chinese history. The key principles (Hofstede 1991) are:

1. The stability of society is based on unequal relationships between people.
2. The family is the prototype of all social organizations.
3. Virtuous behaviour towards others consists of not treating others as one would not like to be treated oneself.
4. Virtue with regard to one's tasks in life consists of trying acquiring skills and education, working hard, not spending more than necessary, being patient, and preserving.

Whether these key principles will make partnering more successful in the East than in the West is still a myth. The partnering concept has been well developed in US, UK and Australia in the past 10-20 years. The partnering relationship does exist in the East in some forms, although not as structured in literature as that in the West. 'Quanxi' in the Chinese context may be regarded as one of the cultural elements in partnering (strategic) and trustworthiness as another as one of the important virtue of the Chinese society (Lau, 1999b). It would be to our interest to find out whether a high-trust culture would enhance or hamper the development of partnering in the East. Culture and society have a huge impact on how business is carried out in the East. This is particularly obvious in Japan as many literatures nowadays describe trust, respect, honesty, long-term relationship as qualities of Japanese culture (Europe Construction Institute, 1991). The essence is how firms can establish better relationships with their clients by understanding the clients' needs and hence tailoring their operations to fulfill client's requirements. Partnering and near-partnering relationships are mentioned, as the term partnering may not be explicitly spelt out in contracting, particularly in small firms or for small projects. The findings of the Europe Construction Institute (1991) indicates that the majority case for having such relationships is when the owner is responsible for initiating the partnering arrangement (within these arrangements, 68% of the cases contract through negotiations and 32% through bidding).

If we view partnering from the relationship perspective, the three key elements are trust, long-term commitment, and shared vision (ECI, 1991). The essential elements for forming partnering relationships from both client and contractor perspectives in the findings of ECI (1991) reinforce the view. These are:

- Relationship must be based on trust
  - Selection of team personnel
  - Risk of failing to work together
  - Changing attitudes from adversarial to cooperative
- In continuing partnering relationships, the major factors are:

- Changing contractor's and owner's attitudes from adversarial/exploitative to cooperative
- Trust relationship with partner
- Long-term workload commitment
- Cost effectiveness
- Selection/reassignment of team personnel

The partnering arrangements developed in the US firstly come from institutional organizations of which we can classify them as large firms. Those developed in the European community are mainly large corporations and are also large firms. The large firms need formalised arrangement whereas small firms would not have the resources to comply. This does not mean that partnering relationship does not exist in small firms, but rather it is in a different form, even if small firms do not call it as partnering. The focus is on a lean, efficient project group that maximizes short-term execution benefits (ECI, 1991). When long-term benefits are perceived, quite many small firms are willing to cut cost for the first project to maintain continuing business relationship for the future.

The potential for partnering relationships is ideal for small projects. Many of the cost associated with contracting methods such as bidding and overheads can be eliminated or reduced for small project execution. When accountability is not strongly emphasized as in a large and formal organization, a close personal relationship will help to enhance the partnering spirit. This does not mean that the client has to compromise for accepting work of lower quality standard. As long as the quality standard of the work satisfies the client's needs, there is no reason why an owner operating a number of small projects cannot develop a strategic partnering relationship with the same contractor.

### **Partnering culture and project performance**

Partnering involves the parties to a construction project working together in an environment of trust and openness to realise the project efficiently and without conflict, i.e. partnering embraces a high-trust culture. It aims to eliminate deceit, distrust, innuendoes and hidden agenda of the old construction process; instead it aims to promote open relationship of honesty, trust and synergy (Warne 1994). This requires a major change to the construction industry culture which is seen as based on adversary and fragmentation. Traditionally, most UK construction clients package their construction requirements into one-off projects and use competitive tendering to determine the award of the contract. This results in a short term and reactive procurement strategy which requires contractors to respond to fragmented demand (Cox and Townsend 1996). Therefore, it is expected that full benefits from partnering will take time to develop in an industry dominated by a focus on the short term (Mathews et al 1996).

Synergy is an important attribute of the partnering process. It recognises that a client, contractor and construction professionals working together can produce a higher quality product than each of them working separately on the same product. It acknowledges the merits of team working. Such team working can further expand to subcontractors and suppliers. A partnering relationship is only recommended where the management teams of all parties involved display a fundamental commitment to partnering and where companies share a common culture (Smircich 1985). While partnerships are an effective method of helping construction companies strengthen links with clients, diversify into new projects and enhance competitiveness, they are potentially undermined by the construction industry's existing macho and adversarial culture and its widespread use of short term, legalistic approaches to procurement and contracting (Davey et al 1999).

Since partnering is described as a long term commitment between two or more organisations for the purpose of achieving specific business objectives by maximising the effectiveness of each participant's resources (NEDO 1991), conditions conducive to partnering must be identified. These conditions include the fact that the owner must be willing to change, possesses the ability to transfer some of its responsibilities to the partnership, has a commitment from its executive ranks to the partnering, desires to focus on overall results rather than strictly a singular component (Baker1990).

Commitment, however, is goal-dependent (Liu 1999b). To achieve goal consensus then becomes a primary objective among the partners in the project organisation. How often are we clear about our project goals? Profit, while important as a project goal, has been examined in a number of instances to demonstrate that it is 'long term normal profit' and not short term project-based profit that affects business decisions. As goals are categorised into, for instance, strategic goals and operative goals, consensus and communication of goals have to be achieved both horizontally across and vertically down the organisation.

Partnering and analogous attempts to overcome the negative consequences of individualism and opportunistic behaviours and to invoke advantages flowing from collaborative working have met with some success. Commitment to such goals is known to enhance project performance and participant satisfaction, in order to acquire project success. However, the continuously shifting power structure of most construction project leads to changing goals and hierarchies, with their impositions on following participants, detracting from committed behaviours and hence, performance.

The determination of a goal for collective action becomes a standard by which the collective action of project participants is judged (Hall 1972), i.e. basis for project performance evaluation. However, the collectively determined, commonly based goal seldom remains constant over time because new considerations imposed from outside or within deflect the organisation from its original goal, not only changing the activities of the organisation, but also becoming part of the overall goal structure. As Hall (1972) points out, the important point is that the goal of any organisation is an abstraction distilled from the desires of members and pressures from the environment and internal system – so culture is fundamental in providing the values which dictate the desires.

As Liu and Fellows (1999) point out, the determination of goals for a project is much more problematic than envisaged. A complication is that the power structure of a project is likely to alter over the phases of project realisation such that any hierarchy of goals will vary. Awareness of such a situation will encourage those who exercise power early in a project to put in place governance provisions (by fixity of design, procedure controls, contracts etc.) to 'concrete' the goals etc. which they have established, thereby restricting the inputs of subsequent participants. Commonly, such goal setting actions, even if executed with the best intentions, lead to performance parameters for the subsequent participants and, as they may influence how a project is procured too, may not lead to 'best' performance (of either product or process).

Shifts in goals can also occur without a conscious decision on the part of organisation members – i.e. as a reaction to the external or internal pressures without a conscious reference to where the organisation is going. The project organisation is portrayed as a shifting multigoal coalition dependent on the power structure prevailing at the time (Newcombe 1994). According to Hall (1972), organisational goals change for three major reasons: (1) direct pressure from external

forces leading to a deflection from the original goals, (2) pressure from internal sources leading the organisation to emphasise different activities than those originally intended, (3) changed environmental and technological demands leading the organisation to redefine its goal. Etzioni (1964) emphasised "goal displacement"; i.e. a given set of goals may be altered drastically by changes in the power system of the organisation – new types of personnel and the development of new standards that supersede those of the past. Shifts in cultural values and their impact on the goals of organisations are obvious in the profit-making sector. For instance, while the official goal of profit making may remain, the operative goals shift as more energies are put into market research and as organisations redefine themselves as "young" organisations for the "now" generation – internal transformations have occurred to refocus the organisations' activities.

If the concept of goals is not used, organisational behaviour becomes a random occurrence, subject to whatever pressures and forces exist at any point in time. Georgopoulos and Tannenbaum (1957) argue that measures of effectiveness must be based on organisational means and ends, rather than relying on externally derived criteria. A consistent objective, congruent with projects and their participant organisations, is to achieve success through good or continuously improving performance to yield satisfaction, whether these be concerned with process, product or both; indeed, the inexorable and complex relationships between process and product – performance, success and participant satisfaction – are acknowledged and discussed widely. Achievements and their ratings are dependent upon goals. Diversity of goals, and hence, directed actions, generates disparate performances whilst congruence of goals yields focused performance.

It is postulated that goal setting for projects is a core issue such that until project goals are established appropriately and communicated, performances, success and satisfaction will remain impaired.

### **Some findings**

The following are some findings from recent research in the UK and Hong Kong:

Small and medium construction companies in UK are reluctant to work for main contractors but welcome opportunities to work with and form partnerships with blue chip companies and public sector clients. (Davey et al 1999).

Construction companies in UK involved in strategic partnerships are under pressure to demonstrate good performance (Davey et al 1999). Lamming (1993) is of the opinion that the intensity of the partnership relationship and the central philosophy of commitment can lead to a high level of pressure to perform whereby partners under pressure may be encouraged to take unnecessary risks to prove their worth.

Baxendale and Greaves (1997) believe that construction firms in the UK entering partnering with subcontractors may limit competition resulting in the remaining firms forming cartels.

The top three risk factors associated with partnering in the UK are (1) managers unwilling to relinquish control (2) partners become complacent and (3) increasing dependence on partner (Akintoye and Black 1999).

The partnering culture in Hong Kong is a 5-factor structure of (1) behaviour towards colleagues (mutual benefits), (2) empowerment in decision-making, (3) perception of conflict outcome

(fairness), (4) extent of trust and (5) conflict behaviour (empowerment in conflict resolution) (Liu 1999a).

Presence of the partnering elements (empowerment in decision-making and trust) in Hong Kong projects does not lead to an increase in perceived project performance (Liu 1999a). It is postulated that other parameters, like project complexity and situational constraints) have substantial moderating effects on the relationship of performance and the partnering culture.

### Discussion

Large construction companies in countries such as Japan and USA use partnership sourcing with suppliers, clients and even competitors as a strategic choice to improve their effectiveness, innovativeness and competitive edge. It is alleged that these relationships can create harmony that can lead to increase returns for all parties (Hamza et al 1999); however, the mechanisms for ensuring the alleged increased returns are not well investigated.

The material procurement services process is an important causal factor known to contribute to the effectiveness of the construction industry, hence, supply chain management should be given a high priority. This approach is taken in the manufacturing industry, such as the automotive industry where the adoption of the Japanese *lean supply* concepts throughout the supply chain has proved its success in terms of improved competitiveness. It has aims of building trust and cooperation, improving coordination, exchange market information, develop new products and streamlining material flow among all parties in the supply chain. The supply chain members in the construction industry can be clients, consultants, contractors, subcontractors or suppliers.

Emphases in partnering research studies have been on (1) commitment and (2) conflict-free collaboration. As discussed earlier, commitment is goal-dependent. Individuals perform goal-directed acts to achieve performance, and they do so with commitment when goals are specific and clear (Locke and Latham 1990). Project goals must then be communicated with specificity and clarity in mind. Conflict, on the other hand, is argued to be present in all situations. Conflict-free is only an ideal to be pursued, i.e. conflict is to be managed, not avoided, to provide positive results. The key issue in partnering to resolve conflict is *empowerment*. Empowerment is the delegation of authority and responsibility to the lowest possible level in the organisation where problem can take place. It is not an abrogation of responsibility, but a transfer of authority and accountability to individuals closest to the problem to make timely decisions. The purpose is for allowing problem to be resolved at its early stage before developing into conflict or disputes where collective accountability has to be acquired.

Harback et al (1994) have identified five pitfalls of partnering: (1) unfulfilled expectations (2) unfinished business in which some elements or process of the partnering are still in dispute (3) assumption that all parties involved in the partnering are willing to share personal beliefs and thoughts (4) one size fits all approach rather than seeing partnering as being specific to a project and (5) conflict between internal (relationship between various departments of the company) and external (relationship with other parties) partnering.

Hence, from the perspectives of *process* and *nature* of partnering, the adoption of the partnering process should concentrate on the management issues – e.g. management of human relationships, management of conflict and the goal-setting process. The nature of partnering is upkept by the focus on the creation and maintenance of an organisational culture conducive to partnering.



What is the primary goal of an organisation? – Profit? What is the source of conflict? – Protecting one's gain? It is argued that the partnering culture may enhance project performance subject to the mutual belief among the partners of *work assurance and payment assurance*. For it is long term normal profit that keeps the business going. Basic trust (and other partnering elements) alone may not drive nor sustain business in the long term. It must have contextual meaning attached to it. The emphasis of a claim-based quantity surveying (QS) expertise in contract administration may miss the point in such holistic approach to goal achievement in partnership. Quantity surveyors often describe our expertise in *protecting the client's interest*. Examination of the "HOW" (how to protect such interest) calls for more thorough understanding of the project goals and the deeper meaning of trust.

## Conclusions

Partnering is a process of teamwork between various parties. Construction industry depends on working together by various parties in the supply chain in order to enhance project performance. There is a need to investigate the types of partnering suitable for the present construction industry's supply chain and the strategic performance to be expected.

As mentioned previously, the Eastern Confucian type cultures might provide the underpinning base for partnering. The influence from the West, namely the procurement practices which are contract-based, claims-based and blame-apportioned-based could be detrimental to the implementation and maintenance of a partnering culture, whether it is existent or not, in the East.

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# Acknowledgement

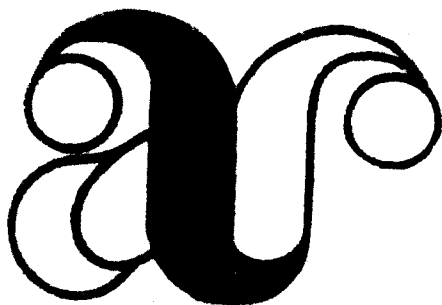
The organising committee would like to put on record its sincere appreciation to the Board of Quantity Surveyors Malaysia, the following Quantity Surveying Firms and the advertisers for their sponsorships towards the success of the 3<sup>rd</sup> PAQS congress :-

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*The Organising Committee would also like to express its utmost gratitude to all member association, PAQS Secretariat, the ISM Secretariat, the Panel of Speakers and all other individuals who have one way or another contributed towards the successful hosting of the 3<sup>rd</sup> PAQS Congress*

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# Abadi Ria Sdn Bhd

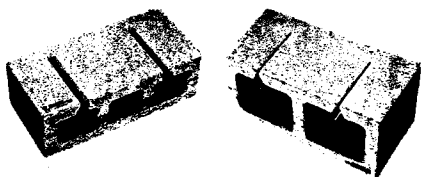
(Company No : 143889-W)

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CABLE JOINT CONTRACTOR

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## SOUNDBLOX®

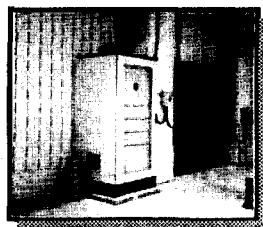
Sound-Absorbing Concrete Masonry Units



Hanger



Hall



Plant Room



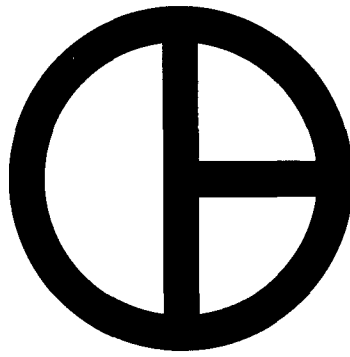
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Tel : 03-981 4643 Fax : 03-981 6648



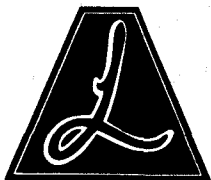
## **CABLECON SDN. BHD.** (31685)

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Off Jalan Kelang Lama  
58200 Kuala Lumpur

Tel : 03-7935102, 7935103, 7935104, 7935728  
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***E.S.S. ENGINEERING SDN. BHD.***

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Perak Darul Ridzuan, Malaysia.  
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Fax : 05-5263514



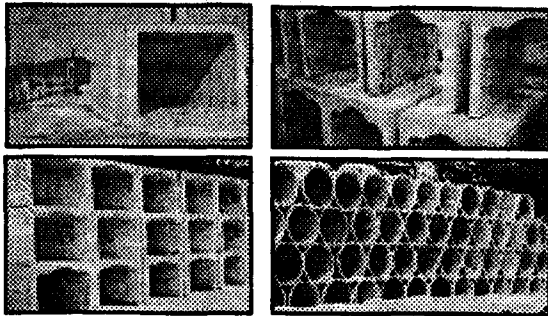
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Fax : 603-2429397

E-mail : vslma@po.jaring.my

## PANTECH EMCO SDN. BHD.

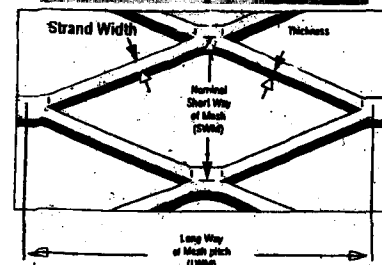
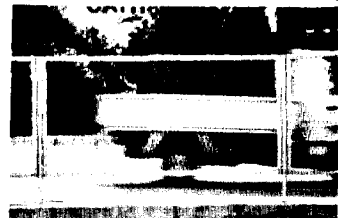
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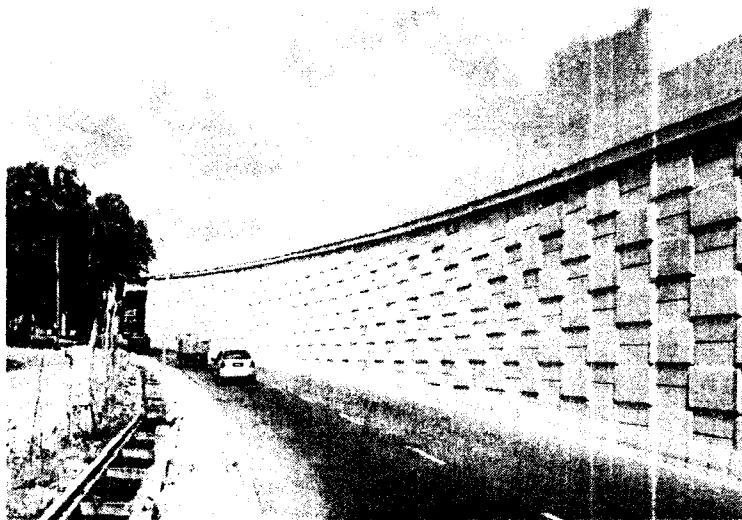
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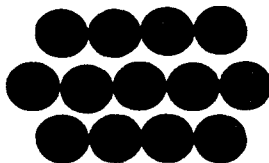
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We are known for the excellence of our management and operational capabilities, enabling us to consistently complete complex and large scale projects ahead of schedule to superior quality standards and cost targets.

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Making the quality of life better for all Malaysians  
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