TRAINING TOURISM PLANNERS; CASE STUDY OF THE TOURISM PLANNING PROGRAMME AT UNIVERSITI TEKNOLOGI MALAYSIA

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Abstract

This paper attempts to present a case study of the only postgraduate taught course in tourism planning in Malaysia. It will summarise thefundamentals of the programme including the course content and teaching methods. More importantly,it will discuss the problems encountered in an attempt to improve the marketability of the programme and subsequently highlight measures being taken to remedy this situation.

1.0 Introduction

The M.Sc. Tourism Planning prgramme offered by Univerisit Teknologi Malaysia started in 1998 and had produced two batches of graduates. It is conducted jointly by the Department of Urban and Regional Planning, Faculty of Built Environment and the Faculty of Management and Human Resource. Whilst purists may disagree, the term training rather than eduction is considered more appropriate to reflect the objectives and nature of the programme.

2.0 Nature of the Construction Industry

The Faculty of Built Environemnt's staff comprise of professionals/specialists such as town planners, architects, landscape. A total of approximately 1.4 million people were employed in 1994. Among them were those under 'direct' employment as well as others within the various consulting professions and trades (DOE 1995). The industry remains one of the most lucrative sectors for UK professional firms, with those in the engineering, architecture and surveying discipline alone employing a total of 150,000 trained staff. During the 1995/96 fiscal periods, these firms had earned a total of £5.7 billion in national and £1 billion in overseas fee income. In Malaysia, the construction industry alone peaked to a sizeable gross output of approximately RM42 billion for the year 1997 despite recording a drop of 19.2% in the following year (Tsun Hao 1999). In 1997, it employed a total of 9.2% of the total workforce in the country and contributed 4.8% of the nation's Gross Domestic Product.

In spite of these impressive statistics, the construction industry has always earned a reputation for being a highly volatile industry due to its high proportion of company failures (Harvey & Ashworth 1997). This situation had been blamed on a number of factors, not least due to the risks in undertaking the more complex and unpredictable processes of construction as opposed to the linear, mechanised and predictable operations of, say, a vehicle or electronics production line. Some of the most unique characteristics of the construction industry and the ensuing problems and merits emanating from them, are described as the following:

2.1 Fragmented Industry

The industry is led by the traditional design and construction procurement system. Under this system, accountability for 'design', which is largely separated from the actual construction, is in the hands of a team of client-selected design

consultants and is largely separated from that of the actual construction or contracting work. This conventionally architect-led team is divided into specialists and consultants of whose qualifications and fairly well defined roles are controlled and protected by their respective professional institutions (Mohsini and Davidson 1992). The typical project delivery stage, consisting of both design and construction phases, is characterised by the variety of traditional contracts, organisational structures, specialisation and the shifting and retreat of legal responsibilities by project participants (Pocock et al 1996). The Industry is fragmented not only in terms of the numbers & sizes of contracting firms but also in the diversity of the related professions and trades within its supply chains (DoE 1995). As such, these help form the 'multi-industry' character of the construction process (Birrel 1986). In addition, the different project participants undergo training and gain experience under separate education and professional systems. They also have different value systems and mode of operations (Mcdonagh 1995) thus making communication between them more difficult.

There are several causes leading to the fragmentation of the construction industry. One of them is attributed to the ease of commercial ventures by construction firms owing to low business entry and exit barriers (Barnard 1981). Labour intensive construction firms operate with fairly low fixed capital investment due to the reliance on sub-contracting and plant hire, as opposed to the actual purchases of plants by contractors. Such low level capital investment is attributed to the advancement of payments for initial construction works, which is made well before the 'product' is fully completed, as means of enabling contractors to maintain viable 'cash flow' in the course of business (Dowd 1996). The method of plant hiring, as opposed to plant ownership, also provides the contractor with a flexible capital that can be invested in the money market whenever required. Furthermore, the traditional construction 'product' is normally manufactured and assembled on site. As such, this discards the need for large premises during construction operations.

One of the effects of fragmentation is the creation of 'gaps' in the responsibilities of participants within the projects (Pocock et. al 1996). This factor is further aggravated by the rise in the number of parties involved as project complexity and size increases. One of the effects of this is the escalation in the number of litigation cases. Due to this, participants tend to limit as much legally risky undertakings as possible. O'Brien (1997) suggested that the industry's unique characteristics allow fragmentation to occur in the following ways:

1 Spatial

It is important to note that the product of the construction industry is location specific with minimal movement between areas. As such, firms tend to concentrate initially within one geographic area through localised operations.

2 Temporal

The industry is project-driven. As such, an organisation is set up temporarily throughout the tenure of a project by a myriad of participants in order to oversee the successful conclusion of its design, management and construction. Such feature will only give rise to short-term and reactive procurement strategies (Cox and Townsend 1997) that may not be favourable to the client. In the long run, these strategies can precipitate unnecessary costs, time overruns, claims and the lost of competitive advantages.

3 Organisational.

This type of fragmentation takes shape in many ways. Primarily, it is dependent upon the level of specialisation of project participants, factors due to localisation of the construction process and matters relating to project economics (O'Brien 1996). Barnard (1981) had argued that specialisation in the type and extent of construction work and through specialist sub-contracting trades can actually serve the industry with more flexible and mobile resources. This will allow construction operations to be moved at ease from site to site and from firm to firm.

2.2 Adversarial Culture

As a consequence to the many forms of fragmentation, we now have an industry within which the parties involved are less trusting of each other and more self interested in approach (Harding 1996). One reason for this is the role of the traditional 'design-bid-construct' framework in preventing designers and contractors from interacting and communicating effectively (Pocock et al 1996). Very often, it creates an atmosphere

of misunderstanding between participants. This scenario is reflected by Macumber (1989) who had remarked that "...while the architect makes erudite speeches on aesthetic and design, the contractor may communicate mostly in profanities!".

Even though the construction industry's present procurement systems involve the creation of temporary multi-organisations (Davidson and Mohsini 1987), the client's task of integrating these disparate enterprises into a cohesive unit through the process of 'organisational design' (Mohsini and Davidson 1986) will always be daunting prospect. This is due to the fact that such a process promotes the primacy of a project's temporal objectives over the participating firms' internal objectives. Increasingly adversarial relationships, which are the results of these competing objectives, have weakened the industry's position in its consultative process. Hence, the industry is unable to lobby those in the higher places of influence and authority more effectively (Kwakye 1997). Furthermore, this predicament may also lead to the negative impact of culture clash between participants on a project (ASCE 1991).

The potential for the conflict of interest is further augmented at the point of project interaction as the more privileged contracting party passes down potential risks to others in the next layer of the supply chain in order to limit its very own exposure. This is particularly apparent in the conduct between main contractors and nominated sub-contractors in traditional contracts. Such disposition is manifested in the often-laborious clauses imposed by some clients through amended forms of contracts or in choosing alternative procurement strategies. Unfortunately, only passing consideration is given to determining which party is best qualified to manage the risks concerned (FCEC 1995). As a result, the industry has achieved negative reputation for its predatory relationships. In addition, other perceived images such as a deliverer of unsatisfactory product, disreputable employers with unreliable workforce, operator of archaic methods and provider of poor career prospects (Baldry 1997) further reduce its standing in the eyes of the public and potential investors.

2.3 The Multi-Interface Industry

The present decade saw a number of significant changes in the nature of contracting work. Firstly, general contractors are placing greater emphasis on the aspects of management and co-ordination of specialist designers and work contractors (RICS 1991). Secondly, firms have achieved greater market prominence through the offering of enhanced knowledge and competency in providing products or services and the reduction of risks through the process of specialisation (Gray and Bennet 1994). In welcoming both changes, there are however grave concerns that these changes will not only result in an industry structure with many interfaces and increasing points of tension and conflicts, but also, project enterprises with diverging goals and directions.

Research has shown that each member of the building team tends to possess different sets of criteria for project success (Naoum 1989, Sanvido et al 1992). At the same time, clients and consultants also have opposing viewpoints as to what they believe to be the real problems compounding the construction industry with each able to identify issues directly impacting on their very own performances. For example, clients are inclined to cite adversarial culture and low productivity as the main problems of the industry while consultants normally consider low and dis-continuous demand and profitability as the more pressing ones (Cox and Townsend 1996).

Such divergence in perception will ultimately lead to the increase in too many non value-added costs (CIB 1996), reduced work efficiency and further encourage the 'fragmentation or disintegration' of the industry. Not surprisingly, the quality of construction 'product' leaves a lot to be desired.

2.4 Low Productivity

The 'one-off' and discontinuous nature of design and construction activities has a significant impact on the construction industry. Essentially, such feature can curtail productivity normally achieved by capitalising on the natural progression of project participants' 'learning curve' process. This process is usually found in repetitive and continuous projects or tasks (Duff et al 1987) and through the use standard components, methods as well

as mechanised operations (Hillebrandt 1985). Repetition and continuity are essential in reducing waste, effort and time. Consequently, cost savings can be made without sacrificing the quality and value of the completed project (Ashworth 1996). Despite the general recognition of the 'learning' process's contribution towards construction productivity improvements (United Nations 1965), little effort is done in implementing the concept of 'learning' into the practical stages of design and construction.

The industry also lacks many factors that motivate its operatives in producing high quality work. Since it is first and foremost a low wage industry, it does not usually attract the best talents from the society at any level. As such, the industry lags behind in terms of innovation and efficiency (Ashworth 1996). There also exist within the industry the lack of research and development into new materials, designs and techniques as well as the poor management and supervision of various building processes (Harvey and Ashworth 1997). Low productivity can also be attributed to the management's planning merely for production's sake rather than as a productive process (Stinchcombe 1959).

2.5 Customisation of Product and Process

The 'one-off' nature of construction projects also hinders efficiency, growth and lower operational costs that can be achieved through the 'economies of scale'. However, such characteristic may be necessary in view of the demand for unique and customised facilities and product lines, as opposed to standardised ones, in as diverse a market as construction. In addition, the industry also operates dispersively by geographic area (Hillebrandt 1985, Barnard 1991). This further adds to the uniqueness of the construction product and process as they are made to conform to the prevailing environment. The customisation of building and constructed facilities resulted in the transient nature of the industry in which a large number of disciplines and resources are assembled from a diverse background for only the tenure of a particular project. Such feature allows construction firms to facilitate close local control and supervision of their operations. However, the way in which these are co-ordinated and integrated will affect the efficiency and effectiveness of the construction process as recognised by Gray (1996). Though many building components are manufactured off-site under factory conditions, they are still required to be manually assembled and installed on site. Unlike the fully mechanised manufacturing industry, construction is very a labour intensive industry.

2.6 The Construction Industry and the National Economy

"The demand for most buildings is 'derived demand', that is, it depends on the demand for goods and services that can be produced from the building or on the utility offered by the building. Thus the construction industry exists at the interface between, on one hand, the supply of existing buildings, each with its own physical and location characteristics, and on the other, the general condition of demand prevailing in the economy" (Raftery 1991)

Referring to the above extract, it is hardly surprising to acknowledge the government's use of the construction industry, to a certain extent, as an economic, rather than industry, regulator (Schendel et al 1976). This is done by the way of stimulating or depressing construction workload through the creation of fiscal policies that provide for incentives such as the provision of grants, taxation relief, subsidies as well as many other forms of benefits. The government can also achieve its objectives by imposing prescriptive measures through legislative acts. This may include changes in town planning regulations and many other legal provisions in favour of property developments both locally and nationally. Such steps are necessary to entice potential developers or factory owners, for example, to an area of high unemployment.

The government's inclination in using the industry as an economic regulator is also partly attributed to the localised and 'in-situ' nature of the construction materials manufacturing and assembly processes as well as the 'monolithic' feature of its labour operations. These effectively dampen the threat of imported materials and labour (Hillebrandt 1985).

The factors mentioned so far are considered a crucial part of the government-of-the-day's strategies in pursuing essential macro-economic

objectives that are important in boosting the local and national economy (Harvey and Ashworth 1997). Typically, the government will always attempt to influence and achieve:

1. An acceptable level of employment of resources, particularly people,
2. A rise in the standard of living through the increase in the amount of goods and services produced and consumed,
3. The control of inflation, and,
4. The ability to pay its way abroad by balancing payments.

These can be done, firstly, by the government acting on the private sector demands through the introduction of monetary policies and measures such as controlling interest rates, credit availability and the supply of money in order to manipulate the need for construction (Dowd 1996). Secondly, it can also employ the use of the 'multiplier effect', particularly upon employment, which arises from the government's own construction programmes purchasing power (Barnard 1981). Ultimately, changes in the industry will have significant knock-on effects on other activities and industries within a market economy. Reducing construction activity affects the level of income and demand on other sectors, thus resulting in reduced investment in its products. In retrospect, the construction industry and its related activities serve as an important indicator as to the degree of prosperity attained by a country.

These interventions by the government, however, will result in the undesirable 'stop-go' effect on the growth of the construction industry. At the strategic level, this effect will be more damaging to the construction sector than having lower but steady workload (Harvey and Ashworth 1997). However, such steps are considered necessary for any government to engage with in order to maintain economic equilibrium, especially when the government's balance of payment is in the deficit. On the other hand, the nature of this 'stop-go' phenomenon also drew severe criticisms from the industry as this makes all forms of property and construction forecasting and planning extremely difficult. In addition, it can also bring about severe fluctuations in contractors' level of workload. Naturally, such prospects inhibit long-term investments in all sectors of the construction industry (Ashworth 1996).

These rapid fluctuations and the level of uncertainty within the cyclic construction and property environment can cause many problems. In particular, it influences the activities of construction firms by making tender forecasting more complex due to the involvement of a large number of environmental variables and prevailing conditions such as market conditions and the economic climate. Consequently, this can impede the successful implementation of the contractors' 'cost-plus-mark-up' policies (Ashworth and Skitmore 1982). Such circumstances are especially true during the economic recession since anticipated real costs of construction will have to be reconciled with artificially depressed construction costs (Ashworth 1996). The reverse is true as the demand for property and construction rally in the period of economic upturn. During this period, the contractor's bid for tender will have to be adjusted in accordance to the inflated tender indices. Therefore, building pricing does not even correlate with the actual construction performance and on-site productivity of labour, plant or material (Ferry and Brandon 1991). All these add to the many variable factors, risks and uncertainties for contractors to contend with when assessing and eventually forecasting the cost of a particular construction scheme. The matter is further complicated by the fact that contractors often attempt to reconcile the 'deterministic' costing process, which is based on the general assumption that the exact amount and cost of construction resources used can be firmly determined, with 'socially acceptable pricing' in justifying their bid for a particular project. The latter is regarded as the price society is willing to pay for a particular type of constructed facility and as such, it is market-driven.

The strong degree of fluctuations in the demand for construction also resulted in the rapid growth of sub-contracting as contractors find employing a large and permanent workforce highly uneconomic. Consequently, it also promotes further redistribution of risks within construction contracts and is partly manifested in the recent changes to building and construction procurement structure.

There is strong consensus among building contractors who would like to see more flexibility of approach in generating strategic decisions due to the volatile nature of the construction and property market. As such, newer forms of business

practices are emerging not only from traditional clients but also from within contracting firms as they strive to adapt to the changing market trends. For example, construction activities related to refurbishment and maintenance work on existing premises tend to become more popular with construction firms than new ones in a depressed economic climate. During this period, clients and developers shy away from making costly investments on new premises and concentrate solely on more manageable and affordable upgrading programmes for existing buildings. Such refurbishment and maintenance work can promote resilience and increase the rate of commercial survivability of contracting and consulting firms during pressing times (Barnard 1991).

2.7 High Risk Industry

Participants involved with the construction process are also exposed to the risks emanating from an increasingly claims-conscious industry as well as the changes in law and building regulations (Cornes 1994). Clients are naturally predisposed to accepting almost defect-free constructed facilities (Latham 1994). Unfortunately, the reality is often far from perfect. Unsatisfied with the presence of such defects, the clients will most likely assign the responsibility for their rectification on the shoulders of the design team and contractors without any cost to themselves. Contractors, for example, may want to transfer this obligation to sub-contractors in order to cover themselves against possible liability claims. Such situation can eventually lead to a vicious sequence of events involving claims and counter-claims between project participants as they attempt to limit their legal responsibilities. Highly likely, parties involved in contractual relationships may want to devise appropriate contracts to protect themselves from impending lawsuits. The disadvantage of this is that it contributes further to the atmosphere of segregation (Pocock et. al. 1996).

2.8 Low Quality of Product

This is one of the construction industry's most persistent problems. The European Council of Building Professionals (ECBP) had attributed this deficiency to the poor level of price-driven specifications and design, high incidences of defects and low durability of materials. It also blamed such predicament to the tendencies of the construction industry to endure extensive cost cutting and under-bidding exercises (Aspinall 1998).

2.9 The Rapid Development of IT within the Building Industry

In general this phenomenon bodes well for the industry as a whole for it could revolutionise the handling of design and construction information and assist in the management of projects. On the long run it could well contribute to the value-added qualities of project procurement processes. The relationship between the design team and the construction teams has long been a significant source of conflicts within the building industry. Though this problem may stem from the overall clientele strategic interests, project players such as the architect and contractor do contribute to a long list of pre-construction and on site problems. Most often, such predicaments occur due to factors such as the overlapping, mishandling and misunderstanding of information and the delay in statutory approvals of relevant segments of design and construction proposals. The role of information technology, particularly that of Computer-aided design (CAD) had been prominent in the communication of clear, prompt and accurate information between relevant parties, particularly for the purposes of decision-making processes. Despite these, the application of IT in the building industry is in many ways different to other more 'deterministic' industries such electronic and car manufacturing. Primarily, the industry revolves around parties possessing different backgrounds, corporate and project objectives, methods of communication and work culture. Therefore, the need for IT varies depending upon the context of a particular building project and the permutation of its related participants – akin to the situation where all players submit to the rules of a 'game' that is only peculiar to the existence of that particular project. This has effectively customised the use of the computer as unique expert or intelligent systems in assisting predictable, procedural and repetitive tasks such as costing, project documentation, structural and material calculation, project database formation and building specification.

Recent developments in IT also emphasised the

idea of design and construction as a collaborative effort between project participants. The Construction Industry Development Board (CIDB) of Singapore, for example, had introduced an information system called 'CONCERT' – an acronym for 'Computer Integrated Building Design Environment' as a platform to facilitate collaborative design activities based on the concept of sharing and the exchange of design information within a distributed environment. To enable this, design information must be modeled in a neutral format that could easily be shared between the varieties of building project disciplines. The key benefit from this is the creation of a generic environment affecting the simultaneous undertakings of all participating design consultants on any project, most notably architects and engineers, thereby ensuring that the design process develop into a more coherent and predictable enterprise so as to better assist in project decision making processes. The rate and amount of communication between project participants could be vastly enhanced through e-mail messages and electronic transaction and management of information.

In addition, CONCERT is a common platform to accommodate standard CAD and analytical tools. This is made possible through an intelligent initiative that identifies and analyses building elements such as columns, beam and walls as real and parametric objects rather than 'primitive' objects or line drawings designated as mere 'layers' in a standard CAD interface. Such an environment could also be extended to include the tasks of assessing and checking building plans and structural analysis. While the former activity ensures closer collaboration between architects and local planners over the planning approval procedures, the latter enriches the architect-structural engineer liaison over structural and constructibility issues.

2.10 The Emphasis of Value over Cost

Although such trend is synonymous with the field of project costing, it has direct implications upon the design phase of the building procurement process. Strategically, it aims to improve design by eliminating foreseeable drawbacks at the tender stage. This could be done through eliminating potential tendencies towards over-specification and incomplete design that are often the norms within the traditional procurement formats. Design efforts are therefore directed towards substantially reducing the period of project construction and on-site variation orders by means of promoting constructibility 'knowledge' between designer and constructors during the conceptual phase of the project inception.

3.0 Conclusion

It is imperative for all major players within the building industry, most notably that of the design team, to understanding that the industry is itself undergoing a number of structural changes towards becoming a more integrated and holistic enterprise. The strive towards a 'whole-life' perception of building processes and the emphasis of value over cost are by no means an indication of such conviction. Therefore, the architect's concerns must not be limited towards the outright realisation of a mere physical existence of buildings. Rather, the profession must also embrace the totality of modern building procurement processes under the conditions arising from the aforementioned external parameters. Ironically, such a dictum could be easily adhered to due to the fact that architects have always maintained the traditional ability in comprehending and overseeing projects in its entirety more than any other building profession. However, such a holistic disposition would need to include the adoption of new strategic approaches towards building design and the overall review of the role of architects in practice. These must be seen as necessary in order to allow for greater flexibility for the profession in complying with the demands of the temporal project organisations, the information technology revolution, more predictable construction techniques and the highly litigious environment within the building industry.

REFERENCES

1. ASCE (1991) 'Constructibility and constructibility Programs: White Paper'. **Journal of Construction, Engineering and Management,** ASCE, 117(1). p.67.

2. Ashworth, A., Skitmore, R.M. (1982). **Accuracy in Estimating.** Occassional Paper No.27, CIOB.

3. Ashworth, A. (1996), The Shift from Cost to

Value', **Working Commission 55: Building Economics. International Symposium Zagreb 96.** CIB Publication.

4. Aspinall, W. (1998). 'Competitiveness in the construction Industry'. **Construction Management (CM).** June. CIOB. p.14.

5. Baldry, D. (1997). **'Building the Image: A Study of the Performance Factor'.** Construction Papers No. 72. CIOB. London.

6. Barnard, R.H. (1981) **Survival or Success: Developing an Appropriate Respomse to a Fluctuating Demand for the Building Firm'.** Occasional Paper No.25. The Chartered Inst. of Building. Berkshire.

7. Birrel, G.S. (1986). 'Features of Construction Contracts to Expedite Construction Work, Reduce Owner's Financial Risks and Expenditures'. Volume 8, **Translating Research Into Practice, CIB 86. Advancing Building Technology, Proceedings of the 10th Triennal Congress of the Int. Council of Building Research, Studies and Documentation,.** Washington D.C.

8. CIB (1996) **Towards a 30% Productivity improvement in Construction: A Report by WG11 of CIB.** Thomas Telford. London. p.14

9. Cox, A. & Townsend, M. (1996) 'A Survey of Best Practice in The UK Construction Industry'. **Working Paper No.1/96,** Centre For Strategic Procurement Management, University of Birmingham.

10. Cox, A. & Townsend, M. (1997).'Latham as Half-Way House: A Relational Competence Approach to Better Practice in Construction Procurement'. **Engineering, Construction and Architectural Management. 4(2).** June 1997. Blackwell Science, London

11. Davidson, C.H.; Mohsini, R.A. (1987). 'Building Procurement: A Strategic Organization and Management Decision'. In: Lansley, P.R. and Harlow, P.A. Eds. **Managing Construction Worldwide Volume 1.** E & F.N. London.pp.28-43.

12. DoE (1996) **The State of the Construction Industry.** Consultative Committee on Construction Industry Statistics. Issue 5, February.

13. DoE (1995) **Housing and Construction Statisitics.** HMSO. London

14. Dowd, V.G. (1996) 'The Effect of Economic Cycles on the Development and Use of Alternative Procurement Systems in the UK Construction Industry During the Period 1965-1995'.. In: Hibberd, P.,Jaggar, D. and Morledge, R. Eds. **Journal of Construction Procurement.** The International Procurement Research Group. Glamorgan. pp.11-29.

15. Duff, A.R.; Pilcher, R. and Leach, W.A. (1987) 'Factors affecting productivity improvement through repetition'. In: Lansley, P.R. and Harlow, P.A. Eds. **Managing Construction Worldwide Volume 2.** E & F.N. London. pp.634-646.

16. FCEC (1995). **Competition, Quality and Value. Fed. of Civil Engineering Contractors,** London.

17. Gray, C.,Hughes W.,Bennet J. (1994) **The Successful Management of Design.** CSSC Univ. of Reading, London,

18. Gray, C. (1996) **Value for Money: Helping the UK Afford the Buildings It Likes.** Reading Construction Forum, Reading.

19. Harding , C. (1996) Falling Out Over Unity. **Building,** 10 May.

20. Harvey, R.C., Ashworth, A. (1997) **The Construction Industry of Great Britain, 2nd Ed,** Butterworth-Heinemann, Oxford. p.66

21. Hillebrandt, P.M. (1985) **Economic Theory and The Construction Industry (2nd Ed).** Macmillan. London.

22. Kwakye, A.A. (1997). **Construction Project Administration in Practice.** Longman. Essex.

23. Macumber, J.D. (1989). 'You can manage

construction risks'. **Harvard Business Review.** March/April.

24. McDonagh (1995). 'Foreword'. In: Brandon, P.B.a nd Betts, M. Eds. **Integrated Construction Information.** E&FN Spon. London.

25. O'Brien, M.J. (1996). 'A Strategy for Achieving Data Integration in Construction'. **International Journal of Construction Information Technology.** 4(1). pp21-34.

26. O'Brien, M.J. (1997). 'Integration at the limit:construction systems'. **The International Journal of Construction Information Technology.** 5, 1. The University of Salford. pp.89-98

27. Pocock, J.B.,Hyun, C.T., Liu, L.Y.,Kim, M.K. (1996). 'Relationship between Project Interaction and Performance Indicators'. **Journal of Construction Engineering and Management.** June 1996. ASCE. New York.

28. Raftery, J. (1991). **Principles of Building Economics.** BSP Professional Books. Oxford.

29. RIBA (1992). **Phase 1: Strategic Overview, Strategic Study of the Profession.** RIBA Publications. London.

30. Sanvido, V., Grobler, K., Guvenis, M., Coyle, M. (1992). 'Critical factors for construction projects'. **Journal of Construction Engineering and Management.** ASCE. New York.

31. Schendel, D. et al (1976). 'Corporate Turnaround strategies-a Study of Profit Decline and Recovery'. **Journal of General Management. 3** Spring, pp 3-11.

32. Stinchcombe, A. (1959). 'Bureaucratic and craft administration of production: A comparative study.**' Adminstrative Science Quarterly. 4.** p.168-187.

33. Tsun Hao (1999) The Role of Construction for Economic Recovery – The Malaysian Experience, **Master Builders,** 3rd Quarter 1999, pp. 81-91

34. United Nations Committee on Housing, Building and Planning (1965) **'Effect of Repetition on Building Operations and Processes on Site'.** ST/ECE/HOU/14. United Nations. New York.