

# Proposed Model for a Sustainable Engineering Consulting Firm

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**Abstract** This paper outlines the needed attributes for a successful sustainable engineering consulting firm. The challenges of the service industry to meet competitiveness requirements especially in the face of impending trade liberalisation under AFAS (ASEAN Framework Agreement on Services) and WTO will be elaborated. It also outlines an organised system on how to meet the demand of clients on economical design in shorter time with better quality products which are safer, easier to build and lower in maintenance and operational costs. Finally, this paper will present a proposed model of engineering consulting firm that will meet the demand and challenges for engineering consulting work in the region.

**Keywords:** Sustainable consultancy firm, ownership, Quality Management System, mission.

## Introduction

The sustainability of a small and medium-sized engineering consultancy firm is seldom achieved due to many factors. One of the most common factors is that these firms often rely on the reputation of owners or partners (persons instead of a company) to secure projects. Once the owners or senior partners of the firm retire or pass away, the firm usually closes down or slowly fades away. Failure to have a structured system of ownership and knowledge management system are the main reasons for non-sustainability. The knowledge and experience gained over the years are often not retained for sustainability.

This paper proposes a model to achieve a sustainable engineering consulting firm. This includes the policy and system of automatic ownership for engineers working in the firm to ensure continuity. The importance and implementation of Quality Management Systems (QMS) in the firm are discussed. Finally, steps that can be taken for continuous capacity building to compete in the open market in a liberalised world are highlighted.

## The Attributes of a Sustainable Engineering Consulting Firm

A sustainable engineering consulting firm should possess the following criteria :-

- a) **Vision:** A firm needs a clear vision to attain and sustain a respectable reputation for quality services, technical excellence, reliability, professionalism, good morals, code of ethics, safety, etc. The vision can include creating specialist engineering consulting firms of different disciplines under an umbrella firm (group) to provide a “One-Stop” agency for engineering consulting services.
- b) **Mission:** A motto or direction that the firm can work towards, such as “To deliver services of high Quality (Q), Speed (S) and Value-Adding ( $Va$ ) =  $QSVa$ ”.
- c) **Action Plan:** A vision or mission will only stay as “words on a paper” if there is no action plan to implement it. The details of the action plan are discussed in the following sections of this paper. One important point that the management of the firm should always remember is to ‘closely follow-up’ once a direction is set or instruction is given, so that the necessary actions are carried out in a timely manner by all personnel involved.

## Ownership

It is very common for the owners or partners of firms especially those of small to medium size, to continue as owners of the firm until they pass away or retire at very old age (e.g. 70 to 80 years old). There seldom exists a system or strategy in a firm to groom experienced in-house engineers to slowly take over ownership. This is one of the main reasons why many experienced engineers leave these firms to join other firms or form their own companies. This has resulted in the fragmentation of consultancy firms. On the whole, many countries are not short of capability but due to the fragmented nature of engineering consulting firms as discussed above, capacity and capability to deliver quality and timely engineering consultancy services for large and complex projects is a real challenge to many firms including the larger ones. Under-servicing a project, especially during the construction boom period is expected if a sustainable system is not in place.

In order to achieve sustainability, a proper policy should be in place to groom experienced engineers to take over ownership and also to help in the transition of ownership. Some key points to note are:-

- 1) There shall be an ownership/partnership agreement agreed and signed by all shareholders and partners in a firm. This agreement forms the basis of all policies and regulations to follow and prevents misunderstandings or disputes.
- 2) All shareholders shall retire when reaching a pre-set age (e.g. 60 years old). The retired shareholders shall offer to sell all his shares in the firm to the remaining shareholders or new shareholders. The new shareholders should preferably be promoted from in-house engineers. The remaining or new shareholders will decide whether the retiree is allowed to hold some shares in the firm if his service is still needed in a capacity deemed fit by the remaining shareholders. This is very important to ensure continuity.

- 3) When engineers working in a firm are promoted to a post involving some management of the firm (e.g. directors, managers, associates, etc.), they shall be made partners and given shares in the firm. This will act as an anchoring force to retain them and also to motivate them to excel further. Their increase in shared value will result in higher productivity and efficiency. This will benefit both the individual and the firm.
- 4) A firm could further be strengthened by upgrading it to an institution without conventional ownership. The ownership is held by trust and senior staff share a big majority of the profit generated by the firm.

### **Quality Management System of a Firm**

Dr. W. Edwards Deming, an American statistician, who once led the quality movement in Japan and later in America, stated that most quality problems are “in the process, not the person”. After more than 60 years in practice, he concluded the **96/4** rule in which he believes 96% of the problems were built into the way work was done (the system of the firm, hence under the control of management) and only a very small 4% of the problems were really the fault of individuals (George et al. 2004). He also highlighted that managers should change their attitude from finding “who is to blame” to improving the system of the firm.

Failure to have a proper system in a firm could lead to flaws in the design and construction of an engineering project. Some of the flaws have led to the collapse of structures and loss of lives.

It is sad to note that some of the flaws are elementary errors (New Civil Engineer International, March 2004). This could happen to small, medium and large firms, if there is no structured system to accumulate experience and skills gained over the years. Size and years of life of a firm have little relationship with quality and value-added services.

Quality Management System (QMS) with value-added services is one of the main attributes of a sustainable firm.

#### *Customer focus*

It is important to understand the current and future clients’ needs, and to meet and exceed their expectations by providing high quality services. For engineering consultancy in the construction industry, this means providing services with emphasis on safety, innovativeness, construction-friendly and economical solutions.

#### *Structured Knowledge Management and Training*

The management of a firm must believe that by providing quality services, the growth and stability of the firm will be enhanced and sustained. The management should create and maintain a conducive working environment in which all personnel in a firm can become fully involved in achieving the organisation’s objectives, mission and vision. A conducive environment includes but is not limited to providing sufficient guidance from experienced engineers to junior staff, structured training programmes (internal colloquia, forums and external courses, workshops, seminars and conferences), and rewards for quality work, contributions to R&D, etc.

Personnel at all levels are the essence of a firm and their full involvement as a team will enable their abilities to be used to the fullest for their own and also the firm’s benefits. One good example is to have structured knowledge management system that systematically retains distilled knowledge with templates for use in the service. These templates are made available readily for use through the intranet. Lessons from internal or external sources are collected and assimilated into the operating system and work culture of a firm.

#### *Systematic and factual approach to decision making*

Identifying, understanding and managing interrelated processes as an overall system contributes to the firm’s effectiveness and efficiency in achieving its objectives. Effective decisions shall be based on analysis of data and information instead of gut feelings. This approach is very important when carrying out planning, analysis and design.

#### *Continual improvement*

Continual improvement of the firm's overall performance should be a permanent feature of a firm. For consultancy services, this includes technical competency and overall management of the firm. Also, it includes carrying out in house research and development (R&D) such as development of engineering computer programmes to assist in analysis and design, updating master specifications, checklists and operating procedures for either design or supervision of various construction works, risk management, technical manuals, etc. Staff should also be encouraged to publish technical papers to share their experiences with the engineering fraternity. All engineering consulting firms should be aware that without providing innovative services through R&D, these firms will be likely to lose out in the long-term.

#### *Check and Review*

In the court case on the blowout of a compressed air section of a London Docklands Light Railway (DLR) tunnel during construction in 1998, the judge stated that it was the result of an “elementary error, indeed a blunder” by the contractor. The contractor faced a total bill of one million British Pounds and they are mounting a civil case against the consultant (New Civil Engineer International, March 2004).

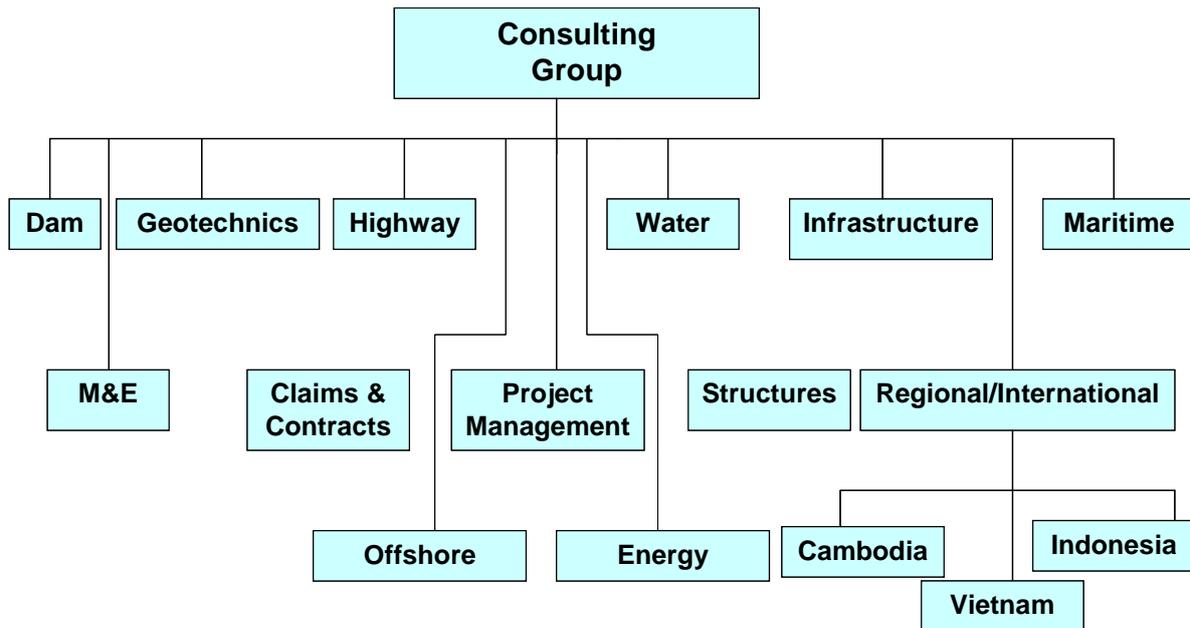


Figure 1: Engineering Specialist Firms within a Group

From the case history above and many other case histories investigated by the Authors (Gue & Tan, 2004), many geotechnical failures were due to improper or inadequate design. Therefore, it is very important for engineering consultancy firms to have a proper system to assure quality. In processes such as planning, conceptualising, analysis, design, construction and implementation, there shall be a regimental system to check and review all processes to prevent errors, ensure safety and incorporate value engineering in all work carried out. With two or more levels of quality assurance, the possibility of human error will be minimised.

In order to further ensure that all possible factors or parameters that could contribute to failures or defects in the processes listed above are adequately covered and are not missed out, written checklists should be used to complement and assist the persons carrying out the work, to check and review. Some samples of checklists for the design or construction of geotechnical works are available at the webpage of [www.gnpgroup.com.my](http://www.gnpgroup.com.my). Checking and reviewing the processes should include personnel not directly involved so that any irregularities or defects can be spotted and rectified.

#### *Systematic Process Tracking and Traceability*

In an engineering consulting firm, it is necessary to have a system to track the schedule and deliverables of each process (e.g. planning, analysis, design, reports, construction progress, records, etc.) to ensure compliance to clients' needs. Timely delivery of quality products or services is the key to success.

Proper filing and maintenance of records, documentation of important in-coming and out-going information are essential to ensure quality and value-added services. The implementation of the QMS system of ISO9001:2008 will ensure compliance to the requirements. With a proper filing and traceability system, any required information can be traced and extracted in a short time thus improving the efficiency of a firm to stay competitive.

#### *Training*

Structured training should be systematically introduced in a firm. It could start with a monthly colloquium to share experience and lessons learned, and later extend it to cover other training courses to share experience and expedite learning.

#### **Capacity/Knowledge Building**

With the liberalization of the world economy, exporting of engineering consultancy services overseas will benefit a firm and also the country as a whole. In order to export services, especially engineering consulting services, capacity and capability building to deliver quality services are essential.

In previous sections of the paper, the Authors have discussed in detail capability building and advancement of a firm that can be used for a group of companies.

For capacity building, this can be achieved by merging different engineering consulting or specialist firms of different disciplines (e.g. civil & structural, geotechnical, mechanical & electrical, marine, highway, water resources, etc.) into a group. Figure 1 shows an example of a group of specialist firms in an engineering consulting group. However, this

approach is not without potential intrinsic problems such as differences in the culture of companies, beliefs, values and ways of working. Therefore, to solve this problem, the group which these companies form must have shared values and unified vision, mission and action plans so as to integrate different companies towards a unified goal to consistently deliver speedy and high quality services. Another approach is to assemble partners in different disciplines who share the same vision, mission and values to form new specialist firms in the group.

Although each specialist firm follows the unified direction set by the group, it is still independent in the day to day running and management of the firm, as the working engineers in the firm shall own the majority of the shares in the firm. This is to ensure that the partners and engineers of each firm are motivated as they are the major shareholders of the firm.

The group will act as a “one-stop” centre that will provide various disciplines of specialist engineering consulting services in an integrated manner required for large scale engineering projects. The size and overall capacity and capabilities of the group will enable it to secure large scale projects that require specialists from different disciplines. The main advantage of the group of specialist firms is their specialist capability in each discipline to provide state-of-the-art innovative and safe engineering solutions that will benefit the client.

## **Conclusions**

A sustainable engineering consulting firm will prosper to be a competitive firm if it possesses the following attributes:-

1. A mission of delivering quality value-added engineering services with speed and efficiency
2. A structured organisation with ownership biased towards full time senior staff of a firm. The firm could be upgraded to an institution without shareholders but the senior staff could still enjoy the benefit of most of the profit generated by the firm.
3. A conducive organisation with ownership system will attract talented and passionate engineers to the specialist firms needed by the group.
4. A structured knowledge management and training system will provide conducive environment for young engineers to excel and become stars in the industry and also help to grow the firms.

Therefore the formula for success in an engineering consultancy firm is formed into automatic ownership friendly vehicle filled with talented engineers having passion for value-added services and willing to develop structured knowledge management and training.

In summary, a successful sustainable engineering consulting firm should possess a combination of good engineers along with continued excellent quality and value adding performance.

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