

A Proposed Model for a Sustainable Engineering Consulting Firm

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Abstract. In Malaysia and many developing countries, the sustainability of a small and medium sized engineering consultancy firm is seldom achieved after the owners retire or pass away. The lack of a proper system to groom experienced engineers in a firm to take over the ownership is one of the main causes. The sustainability of the firm also relies heavily on the quality of works (services) produced and this can only be achieved with a proper implementation of a Quality Management System (QMS) for planning, analysis, design, checking, review and research and development. With a proper system, elementary errors experienced even by some large and long established consulting firms could be prevented. This paper proposes a model of a sustainable engineering consulting firm with continuous capacity building to compete in the open liberalised market .

Keywords: Sustainable Consultant, ownership, Quality Management System, vision, mission, action plan.

Introduction

In Malaysia and many developing countries, the sustainability of a small and medium size 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 and carry out quality work. Once the owners or senior partners of the firm retire or pass away, the firm usually closes down or slowly fades away. Failure to groom successors due to a lack of strategies to retain good experienced engineers is the main reason. In view of this, the knowledge and experience gained over the years are not retained for the benefit of the construction industry specifically and the country as a whole. The lack of a proper system to ensure quality of services and deliverables has also contributed to the difficulty of achieving a sustainable engineering consulting firm. This is because if the clients are not satisfied with the services provided, they will not engage the firm again.

This paper proposes a model to achieve a sustainable engineering consulting firm. This includes the policy and system of ownership by engineers working in the company 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 scope of the paper focuses on the engineering consulting firms related to the construction industry; however the model proposed can be extended to other industries with some adjustments.

The Essence of a Good Engineering Consulting Firm/Group

A good engineering consulting firm/group should possess the following criteria :-

- a) **Vision:** a firm needs a clear vision to attain and sustain a respectable reputation for quality service, 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 company (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) = QS Va ”. QS Va is adopted in the Authors’ firm.
- 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 fashion by all personnel involved.

Ownership/Partnership

It is very common for the owners or partners of firms especially those of small to medium size, to continue as owners of the company 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 engineers in-house 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 sustainable consultancy, a proper policy should be in place to groom experienced engineers to take over ownership and also help in the transition of ownership. Some of 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 policy 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 company (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, increase their shared value will result in higher productivity and efficiency. This will benefit both the individual and the company.

The 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 company, hence under the control of management) and only 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 overall system of the company.

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 life.

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 service.

In the Authors’ opinion, the quality management principles (MS ISO 9000:2000) are very important and should be practised by engineering consultancy services. With the implementation of Quality Management Systems (QMS), the performance of a company will surely improve. Some of the key principles that are important for a sustainable engineering consulting firm are discussed in the following sections.

Customer focus

It is important to understand the current and future clients’ needs, and to meet and exceed their expectations by providing high quality service. For engineering consultancy in the construction industry, this means providing services with emphasis on safety, innovativeness, construction-friendly and economical solutions. An effective method to gauge the satisfaction level of a client is to send a simple evaluation form to them

at least once a year. An example of a client evaluation form is shown in Figure 1. From the client feedback, the firm can analyse, review and carry out necessary corrective, preventive and improving actions.

ISO/Form-17/Rev1/01/03

GUE & PARTNERS SDN BHD
(Geotechnical Consultants)

FORM FOR EVALUATION BY CLIENT

A) CLIENT'S INFORMATION

A1. Name of Company : _____

A2. Name of Evaluator : _____

A3. Designation in Company : _____

B) PROJECT INFORMATION

B1. Project No. : _____

B2. Project Title : _____

C) CLIENT'S EVALUATION OF GUE & PARTNERS SDN BHD (G&P)

Please fill in grade (A to E) where
A = Excellent ; B = Good ; C = Average ; D = Fair ; E = Poor

Description	Grade
1. The professionalism of the G&P Project Team. (good code of ethics, safe design)	
2. The overall attitude of the G&P Project Team in handling the project. (keen to give professional advice, co-operate well with client and other consultants, able to accept criticism and advice etc.)	
3. The overall attention provided by the G&P project team in attending meetings, discussions, site visits, etc.	
4. The project deliverables (reports, drawings, BOQ or design etc.) submitted on time and according to schedule agreed.	
5. The overall quality of the project deliverables (reports, drawings, BOQ, tender, contract and design etc.) submitted.	
6. The technical knowledge and capability of the G&P project team in handling the design. (limited to Geotechnical works only)	
7. The contractual knowledge of the G&P project team in handling the contractual issues.	
8. The knowledge and capability of the G&P project team to handle construction stage of the project like site supervision, solving site issues, design changes etc. (limited to Geotechnical works only).	
9. Is our professional fee fairly priced (provide value for money services)?	
10. The overall grading for the professional service provided by Gue & Partners.	
Remarks / Suggestions :	
Signature :- _____	
Evaluator : _____ (Client's Representative)	Date : _____

Figure 1 : Sample form for evaluation by client (Gue & Partners, 2004)

Leadership

The management of a company must believe that by providing quality service, the growth and stability of the company will be enhanced and sustained. The management should create and maintain a conducive working environment in which all personnel in a company 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.

Involvement of people

Personnel at all levels are the essence of a company and their full involvement as a team will enable their abilities to be used to the fullest for their own and also the company’s benefits. One good example is the sharing of knowledge and experience through networked group learning which increases the efficiency of learning for all personnel. Lessons from internal or external sources are collected and assimilated into the operating system and work culture of a company.

Formation of Specialist Consulting Firms	Formation of Multi-Engineering Practice	Formation of Multi-Disciplinary Practice	Formation of Partnership
<p>Dam Consultants</p> <p>Geotechnical Consultants</p> <p>Highway Consultants</p> <p>Hydrology Consultants</p> <p>Infrastructure Consultants</p> <p>Marine Consultants</p> <p>M&E</p> <p>Architects</p> <p>Surveyors</p> <p>Structural</p> <p>Others</p>	<p>Multi - Engineering Practice</p>	<p>Multi - Disciplinary Practice</p>	<p>Developers</p> <p>Consultants</p> <p>Contractors</p> <p>Operators</p>

Figure 2 : Sample Group of Companies in the Construction Industry for Capacity Building

Systematic and factual approach to decision making

Identifying, understanding and managing interrelated processes as an overall system contributes to the company'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 company's overall performance should be a permanent feature of a company. For consultancy services, this includes technical competency and overall management of the company. 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 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).

From the case history above and many other case histories investigated by the Authors (Gue & Tan, 2004), many geotechnical failures are 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, conception, analysis, design and 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 eliminated.

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 the Authors' firm at www.gueandpartners.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, important in-coming and out-going information are essential to ensure quality and value-adding. The implementation of the QMS system of ISO9001:2000 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 company to stay competitive.

Capacity Building

With the liberalization of the world economy, exporting of engineering consultancy services overseas will benefit a company 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 or consortium. Figure 2 shows an example of a group of companies in the construction industry for capacity building. 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 consortium or group which these companies form must have shared values and unified visions, missions and action plans so as to integrate different companies towards a unified goal which is 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 a consortium or group.

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

major shareholders of the company. Each company will have a small portion of their shares owned by the consortium/group and vice versa. These individual companies should be able to be self sustained without any financial assistance as they should strive to be successful as a competitive specialist firm.

The consortium/group will act as a "one-stop" agency that will provide various disciplines of specialist engineering consulting services and other services required for large scale engineering projects. The size and overall capacity and capabilities of the consortium/group will enable it to secure large scale projects that require specialists from different disciplines. The main advantages of the consortium/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 continue to progress if a written policy on succession planning with ownership transition as well as quality management system and continued improvement through research and development are in place.

A sustainable engineering firm should also have a management system which incorporates efficient ways of doing work with proper checks and comprehensive reviews to prevent errors or omissions and to ensure value-adding in terms of innovativeness for safe, cost effective and easier to construct engineering projects or works.

A system should also be in place that distills experience and knowledge of seniors and partners of a firm into its operating procedures, checklists, master specifications etc.

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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