



Chapter 1: Introduction

1.1: Preamble

Any business that is involved with the extraction of natural resources is always environmentally sensitive. Particularly more so in the timber businesses that have been widely viewed with unjustified prejudices as environmentally irresponsible, contributing to mass destruction of forests, the depletion of the earth's ozone layer and global warming, amongst others.

As a result, both timber producers and consumers are faced with increasing pressures from governments, green lobby groups and the western markets that are more responsive to such lobby pressures.

Certain markets in the west are already demanding for timber product Certification schemes and are willing to pay a premium as direct incentives. However, there is not one certification scheme that is commonly recognized and accepted worldwide. Markets in Europe and the United States have their own preferred certification schemes, which are supported by their own national consumer organizations and environmental lobby groups with formidable powers of influence and boycott.

The Asian markets are relatively less responsive to such pressures, and are reluctant to pay any premium. To add to this lethargy, there are as many different certification schemes and protocols as there are producers and consumers. The choice of a suitable scheme is still a continuing debate among governments, organizations and industry. However, the trend is moving towards certified assurances. Major players in this industry can not afford to ignore this trend, and getting ready for certification therefore has become an essential strategy for continued market share, profits and survival.

In the midst of this, wood products from natural forests are competing with industries producing wood substitute materials or panel products using non-forest materials. Consumer tendencies are leaning towards these substitute products either to by-pass green lobby pressures or are simply looking for cheaper alternatives. These tendencies will have significant impact on traditional wood product market shares.

Timber producers are also increasingly facing problems from syndicated price wars. Tariff reduction and trade barrier removal from regional groupings such as ASEAN,

AFTA and APEC, and the recent developments in WTO policies and treaties all point towards an industry that must be responsive to regional and global challenges.

Thus far, the timber products from our Company, SL International Limited operating out of Cambodia, have been largely exported to the East and South-east Asian markets that are relatively free from such pressures. However, with the impending onslaught of multiple effects from green lobby, regional and global tariff reduction/removal and substitute competition, these traditional markets will increasingly come under threat and the prospect of expansion into new markets being severely restricted.

Our company recognizes the need to strike a balance between sustainable economic benefits and environmental concerns. The Company is mindful of the fact that the path towards sustainable Forest Management is complex and difficult. It is dependant upon certain basic external criteria such as local conditions, institutional structure, levels of awareness, governmental commitments, legislative framework and political will, as well as internal criteria such as the quality and consistency of management. These fundamental requirements are even more critical in the current Cambodian situation.

Within this context, there are already institutions at work addressing these fundamental requirements both at the international, national as well as local levels. This is reflected in the current forestry reforms addressing external criteria initiated by the International Monetary Fund (IMF), World Bank (WB) and the Asian Development Bank (ADB). One of the key objectives in this reform process is to "Establish a concession management and control system that will provide a context for, and encouragement to, applications by the Cambodian timber industry for international forest management certification" (Department of forestry and wildlife Aug 2000: 1).

The need for such initiatives was brought to light largely due to gross inadequacies and incompetence existing within the government compounded by widespread corruption, lack of transparency, and ineffective enforcement mechanism. The resultant business environment is hampered by unclear jurisdiction, inconsistent government policies and unpredictable practices.

In spite of the on-going reform processes, it is commonly perceived that these fundamental criteria are still inadequate for any meaningful forest certification schemes to be introduced in Cambodia. The evolving processes leading to adequate congenial conditions are likely to take a long time. While the external criteria are beyond the Company's scopes to address, the next best things to do in the short term would be to pursue excelling in internal criteria of quality management that are within the Company's control and capable to be implemented with sufficient degree of confidence.

Extensive research had already been carried out in other countries on the importance of quality management and its implementation. Quality gurus such as Dr. Deming, Feigenbaum, Juran, Crosby, Ishikawa and others have advocated quality management as an essential ingredient that will contribute to the success of an organization. Their focus

centered on continuous improvement that involved every aspects of the organization, from its culture to the methods or ways of doing things right the first time that will delight the customers. All these quality approaches had been well documented and publicized.

Recent studies have indeed established that there is a direct link between quality and profitability (Evans and Lindsay, 1993). In the long run, one of the most important factor affecting a company's performance will be its' comparative quality in its' product and services. While quality may not yield an immediate effect on the return on investment (ROI), nevertheless, it influences the industry through its relationship to the market share on which its does have a positive effect. Many reports and surveys had shown performance, as measured by profit margin and return on investment has improved for firms that adopted quality management. Firms with more advanced quality management system usually demonstrated stronger and more consistent improvement. (Hiam, 1993).

Towards this end, the introduction of a Quality Management System (QMS) in our Company instead of a Product Quality Guarantee would be one of the most appropriate assurances for our consumers. It will provide the framework to satisfy simultaneously the twin desirable goals of a management system that can be eventually audited/certified to comply with the requirements of internationally recognized quality standards and provide an avenue to develop and improve the business competitiveness edge. Consistent quality management systems in planning, implementation, monitoring and continuous improvements are key contributing factors to the achievement of sustainable forest management (Cambodia Timber Industry Association, 2001). One of the most commonly accepted international standards dealing with quality systems that can be externally audited and used for quality assurance purposes is the International Standards Organisation (ISO) 9000 series. In this regard, the ISO 9001 for quality assurance in design, development, production, installation and servicing is the logical choice to be adopted.

Given the limited time before the implementation of the Asia Free Trade Area (AFTA) agreement in 2003, it is crucial to have in place the framework for introducing a quality management system for the forest operations not only to ensure quality and efficiency, but also to provide certified assurance of products from a quality process for AFTA and beyond.

1.1.1: The Organisation

SL International Limited manages two forest timber concessions in Cambodia covering an approximate area of about 800,000 hectares. The Company operates an integrated timber based business producing logs from her upstream forest operations to supply her downstream timber processing factories primarily for the production of sawn lumber, veneer and plywood. Only a small portion of the products is sold locally with most being exported to the overseas markets in Japan, China, Taiwan, Korea and the Philippines. The up-stream operations follow principal guidelines in sustainable forest management, the

criteria recommended by the International Tropical Timber Organisation (ITTO), the Forest Concession Management Manual and the Cambodian Forestry Code of Practice.

The core business of our company is in timber. Our inherent traditional organisational culture favoring centralized hierarchical control together with the need for economies of scale and efficiency in mass production necessitate mechanistic type structures that emphasize specialization of tasks and responsibilities. The functional organization structure is thus more representative of the current system where tasks are well defined and segregated into specialized activities by designated work groups controlled by their respective operational functions. The organization structure is simple to understand, has clear lines of control, and permits employees to develop and excel in their specific expertise. The organization chart below shows the different functional departments. The two key business activities are the up-stream forest logging operations and the down-stream sawmill and veneer/plywood mill operations. These are supported by each of the other functional departments such as the Procurement and Services Department, the Administration/HR Department, the Accounts Department, the Marketing Department and the Security Department. The route of workflow was also instrumental in shaping of the workforce according to their specialized functions.

Figure 1: The Organization Structure Chart

1.1.2: The Business Process

Figure 2: Business Process Flow-Chart

1.2: Statement of the problems

There are still on going pressures from conservationist lobby groups and other sectors on the Cambodian government to impose further restrictions on forestry activities. Coupled with the onslaught of globalization effects and their challenges ahead for timber products, there is the need for the forestry industry to seek measures to redress their reputation, credibility, responsibility, competitiveness and acceptance in the market place.

Multi-tiered levels of reviews and approval procedures are a unique feature to the forestry business operations in Cambodia. This is reflective of the current highly bureaucratic administrative system superimposed by over regulative compliance requirements that have contributed to great complexity in the business process.

The main streams of the business processes of this company are within the up-stream Forest Operations Department, the downstream Mill Operations Department and the Marketing Department, with other functional departments supporting their activities. By virtual of their distinctive operational activities and functions, they are specialists in their own field. Each is designated with their individual operational responsibilities and

hence faced with unique sets of criteria that will directly affect their part of the operations.

The up-stream Forest Operations Department for example, has to comply with stringent forestry regulations tuned towards sustainable forest management practices such as on tree species permitted to be harvested, minimum diameter cutting sizes, harvesting volume quota, silviculture rules, environment and social considerations, etc. These restrictions compound the problems already inherent within the natural resource, constricting further the choice of desired output. The weather patterns also limit harvesting periods and affect log delivery schedules.

The downstream Mill Operations Department is restrained by limitations of installed machinery and processing technology that limits choices of input log diameter sizes and species mix. The degree and frequency of occurrence of defects in logs such as knots, resin canals, splits, discoloration, sap rot, eccentric forms, etc all have direct effects on the recovery/production output volume and the quality of the output product.

The output products being timber based semi-finished products or construction based materials confines the clientele base to timber wholesalers, trading houses and other timber based downstream manufacturers. The products behave like most primary commodity that is highly susceptible to market forces and changing consumer preferences. In this "wholesale" business, 30% of the customers purchase 80% of the products, and most of the sales are repeat transactions. Being a generic product, it is difficult to differentiate the product from the competitors'. There is little avenue for influencing market demand or the selling price. The traditional approach has been to offer acceptable consistency of quality, lower cost through more efficient operations and production, and dependability for regular supply to manipulate profit margins and market share.

There are also concerns for other factors such as seasonal demand patterns based on construction requirements, logistics, customers' preferences for particular products/species, import/export regulations, product quality, delivery volume sizes and schedules, and prices.

The current organization structure requires each functional department to identify their own objectives and goals in order to contribute towards the achievement of the organization's overall objectives. While departmental heads, line managers and section supervisors do demonstrate adequate awareness of such two-tier objectives, they are sometimes reluctant to sacrifice the lesser objectives of their own workgroups for the betterment of the organization's strategic objectives, particularly when such sacrifices are not evident or acknowledged. This conflict is most evident within and between the two key activities, i.e., the up-stream forest operations and the down-stream factory operations.

Due to a distinct weather pattern in Cambodia of a wet and dry season, the forest operations must realize maximum log productions during the dry season, build up

sufficient stocks for the factories year-round operations that are not significantly affected by the weather. Striking the optimum balance between budget allocation and maximum production is invariably what every operation manager will do. However, the up-stream operation manager should also be aware of the cost effects for the down-stream operations due to bottle-necks and large inventories, log quality deterioration due to aging, necessitated by his group's maximized operations. The factories, on the other hand, requires fresh logs supplied regularly and in time in order to achieve higher recovery rates, low rejects, thereby achieving higher out-puts, higher qualities and values at the lowest costs in their finished timber products.

One of the possible measures to address these challenges ahead is in the introduction of a Quality Management System (QMS) that can be externally audited to comply with the requirements of internationally recognized quality standards such as from the ISO 9000 series.

In addition to being a means to provide third party certified assurance of quality management standards as well as the assurance of products from a quality process, the introduction of QMS will bring about more efficient management of the supply chain, quicker accesses to up-to-date reliable information for better decision making, and an avenue for better monitoring and control of performance amongst others. These all can contribute to increase the firm's efficiency and further lower production costs.

1.3: Objectives of the research project:

This research project is conducted to identify and prepare a suitable framework for the Company to implement a quality management system that will be in line with the standards necessary for eventual certification to ISO 9001. This will then provide future options to move towards other certification schemes such as ISO14000 series, etc. The results of which will allow the organization to be better prepared for the challenges ahead as well as to create an avenue for honing its business competitive edge.

1.4: Scope and limitations of the research

At the Company level, the scope of a Quality Management System (QMS) should encompass the whole business processes of the entire up-stream forest operations; from concept and objectives, planning, implementation, and delivery of logs to the down-stream wood processing factories, on to the marketing and distribution of the final principal products to the consumer.

However following the certification standards guidelines to the ISO 9000 series, the vast scope and complexity of the Company's business process would be required to be segregated into at least two management systems, namely the ISO9001 for the upstream management operations and the ISO9002 for the downstream manufacturing operations.

ISO 9002 is for a management system that does not carry out design and development. Otherwise, all other requirements are identical to ISO9001. As there are currently no

Companies from any industries in Cambodia holding ISO 9001 certified management systems, and very few others in the natural forest management arena else where in the world, this research study will focus only along the broader requirements of ISO 9001 for the forest management system in Cambodia.

The research is also confined to a limited sample size of employees in one logging company in Cambodia. The generalizations of the findings should therefore be applicable only to the organization being studied and care has to be taken to extrapolate its findings to other forest management organizations in Cambodia. The main intention of this research is to be as comprehensive and thorough as possible, in identifying and documenting the unique business processes that the organization has adopted to operate its forestry business in Cambodia.

For the purpose of conducting this research, the researcher had sought and obtained prior permission from the Company's Vice president. The Company granted permission for the research based on two conditions. Firstly, the research undertaken will be purely for academic purpose use only and findings from the research should not be revealed to any third party or any organization without the prior permission from the company. Secondly, the findings from the study upon completion would be shared with the company only and not with any third party without the prior permission from the company.

1.5: Contributions of the research

The research conducted will provide the company's management with a comprehensive understanding of the business process, concept and how it relates to the quality management system documentation.

It will identify and ensure that operating procedures are developed, issued and maintained to implement quality policies and objectives in such a way that adequate and continuous control is exercised over all activities affecting the operations. In particular, the study will identify and develop the framework for a model from the unique business processes of the up-stream forest management operations of our Company until the delivery of the logs to the company's own wood processing mills. The processes include:

- Identifying, completing and documenting all operating procedures pertaining to the forest management process, i.e. defining concepts and objectives, resource assessment and appraisal, forest planning, implementation, monitoring and continuous improvement.
- Identifying, completing and documenting all operating procedures pertaining to the supporting processes, i.e. budget, procurement (of supplies and services), out sourcing, contract review, internal monitoring and audit, corrective action and records retention.
- Identifying and defining key activities within each process or management unit, assignment of duties and responsibilities, developing job manuals, and lines of reporting.

- Initiate developing of a comprehensive quality management system that will be in line with the requirements for eventual certification to ISO 9001 standards.

The documented procedures and support documents will be the guidelines to maintain quality and consistency of the management system. It clarifies the management structure and processes, permitting critical path analysis and other efficiency studies to be carried out for further productivity improvements.

The research will also provide management with an insight into their employees' perceptions towards the introduction of QMS as well as a profound knowledge of factors that will influence the successful implementation of QMS into the organization.

Specifically, through the use of a quantitative data analysis computer software, Statistical Package for the Social Sciences Release 11.0 for Windows (SPSS Release 11), the research data gathered will be submitted to test the following hypotheses:

- 1) Female employees perceive a greater need for introducing QMS than Male employees.
- 2) The employees' perception towards the need for implementing QMS will vary depending on the division they are working at.
- 3) Their level of acceptance for QMS will vary according to their job position. In other words, there will be significant differences in their perception for the need to introduce QMS amongst Managers, Executives, Supervisors and Non-Executives.
- 4) There will be a relationship between welcoming the introduction of QMS and the length of working experience of employees. In other words, these two factors will not be independent.
- 5) The six main human factors that has been widely expounded by the Quality Gurus to significantly affect successful QMS implementation of Leadership style, Management Commitment, Empowerment, Motivation, Teamwork and Quality Culture will significantly explain the variance in the need for implementing QMS.
- 6) There will be a relationship between the employees' job position held and the length of period they have worked with the company.
- 7) There will be a relationship between the employee's job position and their academic qualifications attained.

The first five hypotheses were particularly formulated to seek answers to some of the issues that lay ahead related to successful QMS implementation. For example, if women perceived the need for QMS more than men, management would need to consider specific measures to set right the misconceptions amongst the men first before introducing QMS. Likewise, if employees at different levels have different perceptions on the need for QMS, further information has to be gathered as to what needs to be done to address the concerns of these groups. Hypotheses 5 will of course offer insights into how much the six chosen independent variables will influence the successful implementation for QMS into the organization.

The last 2 hypotheses were included to address some employees' concern that were raised during interviews conducted on career advancement prospects within the organization; an

important consideration that will ultimately affect their long term commitment to the organization.

Chapter 2: Literature Review

2.1 : The concept of quality

The word “quality” is derived from the Latin word, “qualitas” meaning “of what”. Ancient writers seem to have used the word in the sense of “nature”. While managers have shown interest in the concept of quality, many have been frustrated by its elusiveness. There are many diverse and often conflicting definitions in professional books, journals, and news media. Despite common themes such as continuous improvement, customer focus, and excellence, different people emphasize different things. According to Bounds, Yorks, Adams, and Ranney (1994), for example in a 1991 public television special, “Quality or Else”, executives, managers, workers, academics and others defined quality variously as follows :

- A pragmatic system of continual improvement, a way to successfully organize man and machines
- The meaning of excellence
- The unyielding and continuing effort by everyone in an organisation to understand, meet, and exceed the needs of its customers
- The best product that you can produce with the materials that you have to work with
- Continuous good product which a customer can trust
- Producing a product or service that meets the needs or expectations of the customer
- Not only satisfying customers, but delighting them, innovating, creating

Different companies, and even different people within the same company, will often disagree on the definition of quality. Sometimes the disagreements are merely due to semantics. Sometimes they are the result of focusing on different dimensions of quality. Other times, the differences are more profound, implying conflicting courses of action and approaches to management.

The concept of quality has often been defined, from a transcendent view as “innate excellence”, according to Garvin (1988). This view implies that high quality is something timeless and enduring, an essence that transcends or rises above individual tastes or styles. It often regards quality as an unanalyzable property that people learn to recognize through experience, just as Plato argued that beauty can be understood only after exposure to a series of objects that display its characteristics. Pirsig (1974), which shares the similar view writes : “Quality is neither mind or matter, but a third entity independent of the two Even though Quality cannot be defined, you know what it is.”

Others who advocate a transcendent view of quality define it with examples, listing the “best” in categories such as the best hamburger, the best national park, the best 200, (Passell and Ross, 1975). Edwards (1983), views the “quintessence” of products as

diverse as the Volkswagen Beetle, Crayola crayons, Swiss Army Knives, and Hershey's chocolate kisses, and suggest that what they have in common is that "they each exhibit a rare and mysterious capacity to be just exactly what they ought to be".

The transcendent view of quality essentially tells a manager, "you will know what quality is when you see it" but it does not inform managers how to pursue excellence. Certainly the notion of excellence is an important and inspirational component of quality. The definition of quality must be more pragmatic, more objective, and more tangible. It must inform managers about how to make improvements. There are at least three views of quality that provide these insights : product-based, manufacturing-based, and user-based views of quality. In order to understand these views and how it influences management practices, we need to look at the evolution of the quality approaches.

2.2 : The evolution of quality approaches

The modern approaches to quality have emerged gradually, developing through a steady evolution rather than heralded by dramatic breakthroughs. In tracing back into history, the evolution of quality activities can be divided into four distinct "quality eras". Garvin (1988) mentions that the four eras are as follows:

2.2.1: The Inspection Era

Until the nineteenth century, skilled craftsmen manufactured goods in small volume. They handcrafted and fit together to form a unique product that was only informally inspected. Due to population growth and continued industrialization this brought about production in larger volume. The first step in the development occurring in the quality field, operator quality control was inherent in the manufacturing process up to the end of the nineteenth century. Under this system, one worker or at least a very small number of workers, was responsible for the manufacture of the entire product, and therefore each worker totally control the quality of the product produced personally.

With the development of large-scale production during World War I, large numbers of workers were grouped and reported to a production foreman. As a result, full-time inspectors became necessary. In early 1900, Frederick W. Taylor, the father of "Scientific management" gave his view on the role of inspector. He wrote : "The inspector is responsible for the quality of the work, and both the workmen and the speed bosses (who see that the proper cutting tools are used, that the work is properly driven, and the cuts are started in the right part of the piece) must see that the work is finished to suit him. This man can of course, do his work best if he is a master of the art of finishing work both well and quickly"(Gitlow and Gitlow, 1984: 15).

Inspection activities were linked more formally to quality control by G.S. Radford in 1922. In his book, *The Control of Quality in Manufacturing*, was the first treatment of quality as a distinct management responsibility and also as an independent function. Under this concept, the reasoning expounded by Radford was that some waste was an

inevitable outgrowth of high-yield production. Entire production lines existed whose sole functions were to fix products that were defective the first time through. He also suggested some lasting quality principles, such as getting designers involved early, closely coordinating various departments, and achieving the quality improvement results of increased output and lower costs. Using this notion, quality meant simply that products conformed to specifications, i.e. certain tolerances of design engineers.

Through the 1920s, however, quality control was most often limited to inspection and focused on activities such as counting, grading and rework, which is antithetical to our understanding of quality management today, which emphasized on prevention to avoid defects. Inspection departments and quality professionals were not required to troubleshoot, to understand and address the causes of poor quality, until the 1930s, with the creation of statistical quality control.

2.2.2: The Statistical Quality Control Era

In 1931, Walter A. Shewhart gave quality a scientific footing with the publication of his book, *Economic Control of Quality of Manufactured Product*. Working as part of a larger group at Bell Telephone Laboratories, his book gave a precise and measurable definition of manufacturing control, developed powerful techniques for monitoring and evaluating day-to-day production, and suggested a variety of ways of improving quality. Inspectors were provided with a few statistical tools, such as sampling and control charts. The most significant contribution of Shewhart was that he suggested sampling inspection rather than hundred percent inspection. As a result of his contribution, inspection costs fell, quality improved, and with fewer defects to correct, employees became more productive.

At this point, let us discuss Shewhart's view of quality in terms of three categories of definitions: produced-based, manufacturing-based, and user-based definitions that were previously mentioned as follows:

- Product-Based

Emphasizing a product-based view of quality argued that the quality of a manufactured product may be described in terms of a set of characteristics. For example, measurement of capacity, inductance, and resistance may be used to define quality of a relay. According to Shewhart's view, the quality characteristic of a product can be translated into specific components and physical dimensions that can be produced. Differences in quality (characteristic) reflect differences in the quality of an attribute, the product possesses. The problem of this view is that if we would to go for higher quality in the product, this would mean higher costs. Since quality reflects the quantity of attributes contained by a product, and because attributes are costly to produce, higher quality would lead to higher cost. This is true only when we consider the quality of a design of a product, but not quality of conformity.

- Manufacturing-Based

The manufacturing-based view of quality focuses on manufacturing and engineering practices, emphasizes conformance to specified requirements, and relies on statistical analysis to measure quality. From this notion, quality means conforming to specifications. It means less defect rates, less rework, less non-conforming items. Hence, in this situation, higher quality of conformity means less costs of poor quality, which contradicts the notion that higher quality necessarily, corresponds to higher cost.

Traditional specifications used in the manufacturing-based approach to quality tends to define conformity in terms of upper and lower specification limits. It assumes that a product just barely meeting specifications (just within the tolerance limit) is just as “good” as one right in the middle, but one just outside the limit is “bad”. Shewhart suggests that the overall quality of a relay can be further expressed in terms of whether it meets engineering specifications for product-based characteristics (qualities), such as capacity, inductance, and resistance. He also suggested that the fraction of non-conforming items produced by a manufacturing process can be studied statistically to assess quality. The Knowledge obtained from statistical studies can be used to improve the control of quality, thus ensuring that a larger fraction of the products conform to specification. By stabilizing and reducing variation in the process, managers can ensure that product quality is always within specification. With such improvement, it would mean fewer defects, less scrap, less re-work, and consequently, less cost.

The assumptions of the views expounded by the manufacturing-based approach was questioned by Genichi Taguchi and suggested that the degree of “badness” or “loss” in fact increases gradually as the deviation from the target value increases. Taguchi stated that there is increasing loss, for the producers, the customer, and society, associated with increasing variability, or deviation from the target value (the mean between the upper and lower limits). The concepts of “acceptable quality levels”(AQL) has always been used by the Western culture for design specifications and it was assumed as a rule of thumb that 1% level of defects is acceptable. If a product contains 100 parts or components, the reliability of the product will only by 60 percent : The reliability of the product = $(0.99)^{100} = 0.60$

In today’s concept, in order to provide superior value to customers through superior “quality”, manufacturers must continuously improve their systems and processes to meet the target value. Managers in recent years had began to realize that the manufacturing-based approach to be too limiting because it is internally focused, concerned more with engineering and production control than with the customer’s perception of quality. Managers are now increasingly adopting a broader concept of quality, conceived in terms of the product’s user.

- User-Based or Customer-Based.

The user-based or customer-based perspective does not abandon manufacturing quality as a strategic objective, but provides a context for it. As noted by Bounds, Yorks, Adams and Ranney,(1994), Shewhart says, “the broader concept of economic control naturally includes the problem of continually shifting the standards expressed in terms of measurable properties to meet best the shifting economic value of these particular physical characteristics depending upon shifting human wants. This view is popular with people in marketing, which presumes that quality rests in “the eye of the beholder”, the user of the product rather than an engineer’s specified standards. By satisfying customer requirements, managers will make optimum strategic decision and will achieve a better focus for their continuous improvement efforts in organizational systems and processes to better serve customers. The closer the match between the product and the customer needs, the higher the customer satisfaction which increases the likelihood that the customer will continue to purchase.

According to Shewhart, the closer the match, the smaller the discrepancy between the product and the customer’s needs, the higher the quality. He hinted at this more subjective approach, but did not fully explore its implications. This user-based or customer-based approach was largely ignored in favour of Shewhart’s approach to statistical quality control. It is now being fully realised that the customers’ concept of quality is important in determining whether or not to purchase the produce. Hence, if there is a match between the customer’s perception of quality and the product itself, it would therefore effect the purchasing decision of the customer.

2.2.3: The Quality Assurance Era

During the quality assurance era, the concept of quality in the United States evolved from a narrow, manufacturing-based discipline to one with severe implications for management throughout a firm. Statistics and manufacturing control remained important, but coordination with other areas, such as design, engineering, planning, and service activities, also became important to quality. The quality assurance era brought a more proactive approach and some new tools. During this time, two US consultants, Joseph Juran and Edwards Deming, introduced statistical quality control techniques to the Japanese to aid them in their rebuilding efforts. A significant part of their educational activity was focused on upper management, rather than quality specialists alone. With the support of top management, the Japanese integrated quality throughout their organizations and developed a culture of continuous improvement (sometimes referred to by the Japanese term Kaizen).

According to Bounds, et al (1994), the quality assurance era focused on four main elements in the approach to understand quality. These four main elements are:

(i) Costs of Quality. Until the 1950s, managers assumed it was important to improve quality because defects were costly but had no idea how costly defects were and how much they should improved. There was no yardstick for measuring the costs of quality then. The concept of costs of quality was made clearer through Joseph Juran's Quality

Handbook published in 1951. Juran divided the costs of achieving a given level of quality into avoidable and unavoidable costs. Juran pointed out that unavoidable costs were those related to preventing defects. These include inspection, sampling, sorting, and other quality control initiatives. Avoidable costs were related to defects and product failures and these include scrapped materials, labor hours required for rework and repair, complaint processing, and financial losses resulting from unhappy customers. With Juran's cost of quality concept, managers could calculate when additional expenditures on prevention were justified. Juran's cost on quality approach also illustrated the important principle that early decisions, such as in engineering design, affected the quality costs incurred later on, in both the factory and the field.

(ii) Total Quality Control. In 1956, the work of Armand Feigenbaum extended the concept of costs of quality by suggesting that high-quality products were more likely to be produced through total quality control than when manufacturing works in isolation. He emphasized that to provide genuine effectiveness, control must start with the design of the product and end only when the product has been placed in the hands of a customer who remains satisfied and the first principle is to recognize that quality is the responsibility of everybody. Feigenbaum's work reinforced Juran's emphasis on managerial responsibility and both acknowledged that statistical methods and manufacturing control were still important. However, they also felt that total quality control would require new management skills to deal with areas such as new product development and vendor selection. Managers would be required to be actively involved in activities such as quality planning and coordinating cross-functional teamwork.

(iii) Reliability Engineering. At the same time, while the concept of total quality control was emerging, another branch of the quality discipline, reliability engineering, was developing with particular emphasis on probability theory and statistics. Further driven by the postwar growth of the aerospace and electronics industries, reliability engineering sought to assure acceptable product performance over time. Engineers developed mathematical models for predicting equipment performance over time for different products under different operating conditions. Increasing testing did not necessarily help companies improve to meet reliability objectives, so, in addition to prediction, improvement programs were initiated in engineering and manufacturing. Engineers attempted to improve reliability and reduce failure rates over time through a variety of techniques, including :

- failure mode and effect analysis (FMEA), a method for systematically reviewing the ways a product could fail and proposing alternative;
- individual component analysis, a way of analyzing failure of key components and seeking to correct the weakest;
- "derating" - the requirement that parts be used below their specified stress levels;
- "redundancy" - the practice of using parallel systems as backups in the event that important components fail.
- monitoring of field failures, with laboratory testing and analysis of failed parts.

(iv) Zero Defects. Both total quality control and reliability engineering aimed to prevent defects and emphasized engineering skills and attention to quality throughout the design process. By contrast, zero defects focused on management expectations and human relations. The zero defects approach originated in 1961-1962 at the Martin Company, which was building Pershing missiles for the U.S. Army. Rather than rely on massive inspection to achieve high quality, as it had previously done, Martin embarked on an ambitious scheme to deliver a defect-free missile. The employees were offered incentives to lower defect rates, to build the missile exactly right the first time, with no hardware problems, no document errors, and all the equipment set up and fully operational within ten days after delivery. The program focused on workers' motivation and awareness, with the goal to promote a constant, conscious desire to do a job (any job) right the first time. The zero defects program heavily focused on philosophy, motivation, and awareness, and lean on specific proposals and problem-solving techniques. This approach to quality improvement which focused on getting everyone to "do it right the first time" was highlighted in the writings of Philip B. Crosby who authored the popular books, *Quality Is Free* (1979) and *Quality Without Tears* (1984).

The quality assurance era significantly expanded the involvement of all the other operational functions into management through total quality control, and inspired managers to pursue perfection actively. However, the approaches to achieving quality remained largely defensive. Controlling quality still meant acting on defects. Quality was something that could hurt a company if ignored, rather than a positive characteristic necessary in obtaining competitive advantage. This view began to change in the 1970s 1980s, when managers started to recognize the strategic importance of quality.

2.2.4: The Strategic Quality Management Era

The contemporary era, commonly referred to "the Strategic Quality Management era", incorporates elements of each of the preceding eras, particularly the contributions of earlier quality gurus such as Shewhart, Deming, Juran, and Feigenbaum. There are dramatic differences between the earlier eras and the present one, because for the first time, top managers began to view quality positively as a source for competitive advantage, and to address it in their strategic planning processes, which were focused on increasing customer value.

The increase in consumer sophistication, rise in consumer protection groups/advocates and a rising tide of multimillion-dollar product liability suits for defective products amongst other developments were catching the attention of top managers. They began to see a link between loss in profitability and poor quality. As quality started to attract the attention of top managers, it affected management throughout the organization. Quality was not just for the inspectors or people in the quality assurance department to worry about. This era marks the emergence of a new paradigm for management.

As companies came to recognize the broad scope of quality, the concept of Total Quality (TQ) emerged. According to Evans and Lindsay (1999), a definition of total quality was

endorsed in 1992 by the chairs and CEOs of nine major U.S. corporations in cooperation with deans of business and engineering departments of major universities, and recognized consultants. Their definition was: "Total Quality is a people-focused management system that aims at

continual increase in customer satisfaction at continually lower real cost. TQ is a total system approach (not a separate area or program) and an integral part of high-level strategy; it works horizontally across functions and departments, involves all employees, top to bottom, and extends backward and forward to include the supply chain and the customer chain. TQ stresses learning and adaptation to continual change as keys to organizational success. The foundation of total quality is philosophical : the scientific method. TQ includes systems, methods, and tools. The systems permit change; the philosophy stays the same. TQ is anchored in values that stress the dignity of the individual and the power of community action". Similarly, Procter and Gamble sees TQ as "...the unyielding and continually improving effort by everyone in an organization to understand, meet, and exceed the expectations of customers".

The term total quality management (TQM), has been commonly used in the present era to denote the system of managing for total quality. This term was actually developed within the U.S. Department of Defense and was later renamed Total Quality Leadership. TQM is a total, company-wide effort – through full involvement of the entire workforce and focused on continuous improvement – that companies use to achieve customer satisfaction. TQM is both a comprehensive managerial philosophy and a collection of tools and approaches for its implementation. There is no consensus on what constitutes TQM, almost every organization defines it differently or calls it something other than TQM. Japanese writers (e.g., Ishikawa, 1985, and Imai, 1986) often use Feigenbaum's term "Total Quality Control" (TQC) and the Japanese term for their approach, "Company-Wide Quality Control" (CWQC), to label approaches to management that are essentially similar to what American managers call "Total Quality Management."

Managers in the current era of Strategic Quality Management regard Total Quality Management as something more than a "program," and specifically stipulated that the word "total" should convey the message explicitly that all employees, throughout every function and level of an organization, pursue quality. The word, "quality" means excellence in every aspect of the organization. "Management" refers to achieving quality results through a quality management process. This begins with strategic management processes and extends through product design, manufacturing, marketing, finance, and so on. Accordingly, TQM is as much about the quality process as it is about quality results or quality products. It begins with people, particularly managers.

Evans and Lindsay (1999), pointed out that while its roots are in American management theories and practices, TQM attempts to reconfigure these into a whole approach to management that is more than the simple sum of its parts. These parts may have existed before the Strategic Quality Management era and the popularity of TQM. However, they were not usefully configured into an integrated approach that is focused on the themes of the emerging paradigm. This holistic approach makes TQM fundamentally different from past traditions of management. TQM may yet be regarded as a passing fad. However, the

underlying themes of management being addressed by those who are striving to define and move to a new paradigm are not fads. These themes include the importance of understanding customer needs, formulating strategies to provide value to customers, and continuously improving organizational systems to provide that value.

The most recent concept on total quality is Six Sigma. This approach to total quality management was the work of Harry and Schroeder who authored the book, *Six Sigma, Break through Management Strategy Revolutionizing the World's Top Corporations* (2000). According to Harry and Schroeder (2000), Six Sigma is first and foremost a business process that enables companies to increase profits by streamlining operations, improving quality, and eliminating defects or mistakes in everything a company does, from filling out purchase order to manufacturing airplane engines. While traditional quality programs have focused on detection and correcting defects, Six Sigma encompasses something broader. It provides specific methods to re-create the process itself so that defects are never produced in the first place. The principles of Six Sigma apply to any business of any size. It applies to far more than just industrial processes – it applies to engineering, product design, and any commercial process, from processing mortgage application, to credit card transactions, to customer service call centers. By attacking "variation" during the design of products and services, it is possible for any organization to achieve unprecedented profitability. It is a philosophy of managing that focuses on eliminating defects through practices that emphasizes understanding, measuring and improving processes; beyond quality excellence to total business excellence. Six Sigma can be seen as a statistical concept that measures a process in terms of defects – at the six sigma level, there will only be a maximum of 3.4 defects per million opportunities.

Harry and Schroeder (2000), argued that Six Sigma forces businesses to let go of bad habits. Bureaucracy became delayed. Those employees closest to the actual work and to the customer become motivated to meet or exceed consumer requirements. By questioning the speed with which products are produced and services are rendered, people begin to think about new systems that can be put into place to produce a higher-quality product or service in a shorter amount of time. As those closest to the work discover more effective and profitable way of working, they are able to inform senior management what changes need to be made, and as result, push those higher in the organization to re-examine the ways in which to do business. The foundation of Six Sigma uses metrics to calculate the success of everything an organization does. Enthusiastic speeches, colourful posters, and corporate mandates will not produce quantum change – only measuring the things a company value can do this. The logic is that without measuring a company's processes – and its changes to these processes – it is impossible to know where you are or where you are going. Six Sigma tells us :

- we don't know what we don't know
- we can't do what we don't know
- we won't know until we measure
- we don't measure what we don't value
- we don't value what we don't measure

The concept and the practical aspects of quality will continue to pose as challenges to organizations today as they struggle to integrate quality into their management efforts. The quality movement has resulted in many successes, but also in many failures. When a quality initiative fails, it is generally because of poor management, not the soundness of the principles. All of the rhetoric about quality has led some people to criticize its value and impact. Skeptics will continue to sound off, but the principles of quality will remain the foundation for high-performance management systems. Tom Engibous, president and chief executive officer of Texas Instruments commented on the present and future importance of quality in the October 1997 , 13th Annual Quality Forum by saying that : "Quality will have to be everywhere, integrated into all aspects of a winning organization. Quality professionals, meanwhile will need to acquire the business and functional skills in design, manufacturing, and marketing to better contribute to their organization's long-term success. Embracing quality at that level and to that degree is the only way to compete successfully in the digital age." The quest for quality will continue because it is a global revolution affecting every facet of business. For the 1990s and beyond, quality must remain the focus for businesses as the edge for strategic advantages and to distinguishing themselves from other competitors in the global marketplace.

2.3: The Quality Gurus

A Quality Guru is someone whose concepts and approaches to Quality (within manufacturing, the service industries, and probably life in general) had made a major impact on the way consumers and industrialists alike both think and act. It has been generally accepted that Gurus are charismatic individuals whose vision, leadership, and drive easily transfer to those in their surroundings and they have different focal points, or areas of concentration and expertise. The main contributors in developing the concept of quality management comes from the following persons:

2.3.1: W. Edward Deming

Dr. Deming spent his early career in the United States which he developed the work of the statistician Walter Shewhart and applied it to routine clerical operations. While working in Japan in the early 1950s', Deming pushed Senior Management to become actively involved in their company's quality improvement programs. Gitlow, Oppenheim and Oppenheim (1995) explained that Deming's ideas on quality require that managers transform themselves in order to achieve the following objectives:

? Improve and innovate the system of interdependent stakeholders of an organization over the long term to allow all people to experience joy in their work and pride in the outcome.

? Optimize the system of interdependent stakeholders of an organization over the long term so that everybody wins; and not optimize one shareholder group's welfare at the expenses of another stakeholder group's welfare. Stakeholder includes employees,

customers, suppliers and subcontractors, regulators, investors, the community, and competitors.

? Improve and innovate the condition of Society. Society includes local, regional, national, and international system - for example, the entire educational system (public and private primary and secondary schools and universities), the environment, public health, and the economic and social well-being of communities and countries.

In Dr. Deming's work, "The aim (purpose of the transformation) will be to unleash the power of human resource contained in intrinsic motivation. Intrinsic motivation is the motivation an individual experiences from the sheer joy of an endeavor. In place of competition for high ratings, high grades, to be number 1, there will be competition between people, divisions, companies, governments, countries. The result will in time be greater innovation, science, applied science, technology, expanded market, greater service, greater material reward for everyone. There will be joy in work, joy in learning. Anyone that enjoys his work is a pleasure to work with. Every one will win; not loser". (Gitlow, et. al 1995: 29).

Dr. Deming has developed his ideas on quality into a theory of management that helps individuals learn through the acquisition of process knowledge gained from experience coordinated by theory. He calls his theory "a system of profound knowledge". An explanation of the system of profound knowledge can be found in his last book, *The New Economics for Industry, Government, and Education*. Here, he discussed the system of profound knowledge extensively in his famous four-day seminars on management.

The system of profound knowledge could be regarded as an appropriate theory for leadership in any culture or society. In the application of this theory to a particular society or culture, it requires a focus on issues that are unique to that society or culture. For example, in the Western world, managers frequently operate using the following paradigms (a paradigm being a filter through which an individual or group interprets data about conditions and circumstances, often without realizing it) :

- rewards and punishments are often considered as the most important motivators for people and organizations.
- winners and losers are necessary in most interactions between people and between organizations.
- results are achieved by focusing on productivity (as opposed to quality).
- rational decision can be made based on guesswork and opinion, using only visible figures.
- construction, execution, and control of plans is solely the function of management.
- organizations can be improved in the long term by fighting fires.
- superiors are your most important customers.
- competition is a necessary aspect of personal and organizational life.

It was argued by Gitlow, et. al (1995) that western leaders are often lost in the new economic age if they were to manage in the context of the preceding paradigm because of

the dynamic changes that took place in today's market place. Hence, they generally have no idea of how to manage their organizations because they don't know the new paradigms required for success in today's market place. Managers today therefore require a new perspective from which they can understand the new paradigms of Total Quality Management (TQM). That perspective is called the "14 Points for Management".

The system of profound knowledge expounded by Dr. Deming helps to generate an interrelated set of 14 points for leadership in the Western world. These 14 points provide guidelines for the shifts in thinking required for organizational success in the 21st century. They form a highly interactive system of management. Dr. Deming's theory of quality management has laid down the foundation for Total Quality Management (TQM). This new perspective, like all other approaches to management has one overriding element-change-resulting in a considerable impact, not only on the organization, but also on the individual members, irrespective of their position in the organization. Changes require leadership, and much of the change is at the top of the organization.

Dr. Deming "14 Points for Management" are summarized below:

1. Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business and to provide jobs.
2. Adopt the new philosophy, We are in a new economic age. Western Management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.
3. Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
4. End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item on a long-term relationship of loyalty and trust.
5. Improve constantly and forever the system of production and service to improve quality and productivity, and thus constantly decrease costs.
6. Institute training on the job.
7. Institute leadership. The aim of leadership should be to help people and machines and gadgets to do a better job. Leadership of management is in need of overhaul, as well as leadership of production workers.
8. Drive out fear so that everyone may work effectively for the company.
9. Break down barriers between departments. People in research, design, sales, and production must work as a team to foresee problems of production and in use that may be encountered with the product or service.
10. Eliminate slogans, exhortations, and targets for the work force that ask for zero defects and new levels of productivity.
11. (a) Eliminate work standards (quotas) on the factory floor. Substitute leadership
(b) Eliminate management by objective. Eliminate management by numbers and numerical goals. Substitute leadership.
12. Remove barriers that rob the hourly workers of his right to pride of workmanship. The responsibility of supervisors must be changed from stressing sheer numbers to quality. Remove barriers that rob people in management and engineering of their right to

pride of workmanship. This means inter alia, abolishment of the annual merit rating and of management by objective.

13. Encourage education and self-improvement for everyone.

14. Put every body in the company to work to accomplish the transformation.

Deming's philosophy is prone to put quality in human terms. According to Deming, the quality of products and services is created by the people for the people. Quality is a human bond and a contract that can make a harmonious and mutually beneficial business relationship. Effective motivation of individuals is needed to keep this human bond strong and vibrant.

“Organization for quality” means two things: First, the consideration of quality goals and responsibilities for the entire company, and secondly, setting up of sub-units of the organization to be in charge of process improvement. Deming's message to managers, if internalized, will enable them to pursue the never-ending improvement of a process through the acquisition of process knowledge in an environment created by living his Fourteen Points.

The final goal of quality improvement, Deming argued is to meet the external customer's requirement. However, an organization as a system can be viewed as a linkage of processes run by a series of internal suppliers. The output of this network is the product or service to an external customer. The internal customer may be the next person “up the line”. In the traditional organization, the sense of customer follows the chain of command in reverse. Each employee works for his boss, resulting in work that satisfies the boss in achieving his targets, goals, specifications and quotas, but does not necessarily satisfy the customer or end-user. Each employee will try to satisfy her/ his internal customer without respect to departments or organizational hierarchies. Processes and output will be optimized and waste and rework are reduced, breaking down barriers between departments and employees.

According to Deming, top management has to provide leadership and acknowledgement, stop focusing on the judgement of results from processes, and start focusing on the improvement of the processes that created the results. It was Deming's belief that people can be taught the diagnostic skills and behavior that help a group accomplish its tasks and maintain effective relationships among its members. He stated that a skilled member or leader, therefore, has to have diagnostic skills in order to be aware that a given function is needed in a group, and he or she must be sufficiently adaptable to provide the diverse types of behavior needed for different conditions. Two of Deming's 14 Points deals directly with the issue of respect for people. “Drive out fear” in Point 8 and “remove barriers that rob employees of their pride of work”, in Point 12 are principles of fundamental respect for people. In fact, Deming rightly points out that workers do not need motivation, because they are naturally motivated and want to do a good job. When employees do not do their jobs, it is usually because of built-in barriers or de-motivators in the system. Employees must be given the power and authority to do it right for themselves. The fundamental principle according to Deming is respect for people. Dr. Deming also focus and stress on the importance of quality leadership in cultivating a

quality culture in an organization. Leadership, by Deming's definition, involves transforming the roles of both the manager and the production supervisor - from the role of a cop to that of a coach. It is the responsibility of management to discover the barriers that prevent workers from taking pride in what they do. Through quality leadership, Deming believes that the workers know exactly what these barriers are : an emphasis on numbers, not quality, turning out the product quickly rather than properly; a deaf ear to their suggestions; too much time and efforts spent on rework; poor tools; problems with incoming materials. The job of the leader is to lead, to help people do their jobs better. Deming said, "The aim of leadership should be to help people, machines and gadgets to do a better job." (Deming,1982: 82).

The new style of management as advocated by Deming (1993) allows leadership to change and develop a new basis for understanding the interrelationships between themselves and their environment. The environment includes people, system and organizations. It is not easy to move from the prevailing style of western leadership to the new style of leadership. The 14 points for management follow naturally from the system of profound knowledge. They are a vehicle to understand the relationship between the prevailing style and the new style of Western management. They provide a window for managers operating in the prevailing paradigm to compare and contrast their business practices with the business practices in the new style of management.

In emphasizing the importance of continuous improvement, Deming suggests a procedure to assist in the establishment and long-term existence of a quality organization, a cycle which he called the Deming Cycle (see Figure 3). It consists of four stages as follows:

- PLAN - The process of improvement should be carefully planned for the steps of actions to be taken
- DO - Putting the plan into effect
- CHECK - Collection of data to quantify the outcome of the action taken in Do Stage, analysis of results, feedback and review
- ACT - Institutionalization of process improvement requires more than just selecting a strategy.

Figure 3: The Deming (PDCA) Cycle in improving the performance chart.

A cycle for solving problems in the continuous improvement work presented by Deming. He speaks of PDCA Cycle short for "PLAN-DO-CHECK-ACT" but he often refers to this cycle as the "Shewhart-Cycle" after Walter Shewhart ,(Gitlow, et. al, 1995: 26).

2.3.2: Armand V. Feigenbaum

Feigenbaum coined the term, "Total Quality Control" from an article he published in 1956 in the Harvard Business Review. In 1961, he published a textbook that has since

become an industry standard and classic of the same name, "Total Quality Control". Feigenbaum's fundamental premise is that quality is organization wide, not limited to design and production; all functions, line and staff are responsible. According to his approach, the system of quality development, maintenance, and improvement, organizational group efforts enhancing this process, the efficiency and economical levels of production and service providing total customer satisfaction is "Total Quality Control" (Feigenbaum, 1991).

The argument puts forward by Feigenbaum for total quality control is that it is to provide a product and service into which quality is designed , built, marketed, and maintained at the most economical costs which allow for full customer satisfaction. In his own words, the definition of " total quality control is an effective system for integrating the quality-development, quality-maintenance, and quality-improvement efforts of the various groups in an organization so as to enable marketing, engineering, production, and service at the most economical levels which allow for full customer satisfaction"(Feigenbaum,1991: 6).

Feigenbaum also pointed out very strongly that total quality control provides the fundamental basis of positive quality motivation for all company employees and representatives, from top management through assembly workers, office personnel, dealers, and service people. And a powerful total quality control capability is one of the principal company strengths for achieving vastly improved total productivity.

In Feigenbaum's argument, quality is a customer determination, not an engineer's determination, or a marketing determination or a general management determination. It is purely based upon the customer's actual experience with the product or service, measured against his or her requirements which could be stated or unstated, conscious or merely sensed, technically operational or entirely subjective. It is also always representing a moving target in a competitive market. Feigenbaum views that Product and Service quality can be defined as the total composite product and service characteristics of marketing, engineering, manufacture, and maintenance through which the product and service in use will meet the expectations of the customer.

The purpose of most quality measurements according to Feigenbaum is to determine and evaluate the degree or level to which the product or service approaches this total composite. Some other terms, such as reliability, serviceability, and maintainability, have sometimes been used as definitions for product quality. These terms he argued are in fact individual characteristics which made up the composite of product and service quality. Feigenbaum also stressed the importance of "control" in an industry. According to him, control in industrial terminology can be defined as a process for delegating responsibility and authority for a management activity while retaining the means of assuming satisfactory results.

The procedure, is for meeting the industrial quality goal and is therefore termed quality "control", just as the procedures for meeting production and cost goals are termed, production "control", and cost "control". According to Feigenbaum (1991: 10), there are

normally four steps in such control and they are as follows:

- **Setting Standards.** Determining the required cost-quality, performance-quality, safety-quality, and reliability-quality standards for the product.
- **Appraising conformance.** Comparing the conformance of the manufactured product, or the offered service, to these standards.
- **Acting when necessary.** Correcting problems and their causes throughout the full range of those marketing, design, engineering, production, and maintenance factors which influence user satisfaction.
- **Planning for improvements.** Developing a continuing effort to improve the cost, performance, safety, and reliability standards.

Effective control is today a central requirement for successful management. Where this control has failed, it has been a principal cause of increases in company expenses and reductions in company income. Similarly, its failure has also been a principal contributor to the product-liability, safety, and recall developments which have added new dimensions to the problem of management. Feigenbaum emphasized that in the quality field, it is essential to reaffirm the basic principles of “control”. These principles, he mentioned, are those of control in the positive, self-steering sense of establishing the preventively oriented control standards; evaluating product performance and conformance results against these standards; and then assuring the necessary adjustment actions throughout the entire marketing, design engineering, production, and maintenance cycle.

2.3.3: Joseph M. Juran

Juran’s concept on quality management has been very much influenced by that of Deming. His *Quality Control/ Handbook* published in 1951 has become the literary bible in the USA and Japan. Like Deming, Juran also emphasizes managerial responsibility for improvement to meet customers’ need, but he does not use the term “system” to describe this managerial responsibility. Instead, he uses the term “macro processes” to refer to cross-functional systems which encompass the “micro processes” within functions. (Juran, 1992).

Juran’s Trilogy is an approach to cross-functional management that encompasses three managerial processes: planning, control, and improvement (see Table 1) below :

The Trilogy of Juran can be summarized as follows :

? Quality planning

This is the activity of developing the products and processes required to meet customers’ needs. It involves a series of universal steps which can be abbreviated as follows:

- Establish quality goals.
- Identify the customers - those who will be impacted by the efforts to meet the goals.
- Determine the customers’ needs.

- Develop product features that respond to customers' needs.
- Develop processes that are able to produce those product features.
- Establish process controls, and transfer the resulting plans to the operating forces.

? Quality Control

This process consists of the following steps:

- Evaluate actual quality performance
- Compare actual performance to quality goals
- Act on the difference

? Quality Improvement

This process is the means of raising quality performance to unprecedented levels ("breakthroughs"). The methodology consists of a series of universal steps:

- Establish the infrastructure needed to secure annual quality improvement
- Identify the specific needs for improvement - the improvement projects
- For each project establish a project team with clear responsibility for bringing the project to a successful conclusion.
- Provide the resources, motivation, and training needed by the teams to:

1. Diagnose the causes
2. Stimulate establishment of remedies
3. Establish controls to hold the gains

In order to accomplish quality improvement depicted in the Trilogy, Juran suggests the following:

- Top Managers are responsible for designing for quality by making quality planning (goal setting) a part of business planning.
- Quality goals or quality improvement projects should be deployed down through the hierarchy by breaking them into sub-goals ("bite-size" or micro projects) at lower levels.
- In the case of macro processes that have no ownership and cannot be broken into pieces and deployed, top managers should form quality councils that establish and oversee project teams in order to improve macro processes.

Juran also stresses the importance of continuously working on quality improvements in his book "Managerial Breakthrough" published in 1964. With his definition of quality, "fitness for use", Juran adopted a similar view to that of Deming and Feigenbaum which highlights the importance of being close to the customer.

The approach of Juran to improvement which is very similar to that of Deming stresses on the manager's responsibility for improving systems and processes that goes beyond

the traditional responsibility for achieving results or “getting things done through others.” According to Juran’s suggestion, the managers must act as leaders, first by setting the vision for those who work within the system, and then by providing and constantly improving the means by which they can achieve that vision. The key word spelled out by Juran in his approach is centered on managerial responsibility. It should be the Senior Management’s responsibility to communicate and focus on “quality” in the organization. In other words, the initiative must first of all come from the top management and then cascade down the lower levels through an established communication system. At the same time, the need for continuous quality improvement must be highlighted by the top management to all employees of the organization.

2.3.4: Philip B. Crosby

Crosby is the author of the 1979 penetrating bestseller, “Quality is Free” and has written many books on the subject of quality. According to Crosby, quality as an international philosophical management objective can be summarized by the four absolutes of Quality Management:

- Quality is conformance to requirements
- Prevention is the system causing quality
- “Zero Defects” is the performance standard
- The price of non-conformance is the measurement of quality.

The explanations given by Crosby for the above-mentioned four absolutes of Quality Management is summarized as follows :

? By conformance to requirements, Crosby suggested that there is a common understanding for example, between the employees and suppliers concerning quality. This is because each person in the organization, including those suppliers they deal with, knows that management expects certain requirements and these requirements must be met. Hence, there is a common language.

? By prevention, Crosby views this as more of an orientation than a system requirement. The concept is to plan and prepare properly before doing something. Prevention, as a work ethic and practice, must be deliberately inserted into the operating culture of an organization if it is to have an effect. It comes from a lifestyle, which evolves from management principles and guidance, which in turn comes from an understanding of what it takes to make the business profitable and the company competitive.

? By “zero defects”, Crosby suggested that it is necessary to implement a performance standard. To cause that, management has to set their acceptable tolerance limits and make it clear that they value this sort of behavior, and to emphasize that it is important to achieve to within this tolerance level right the first time. Hence, it is the managerial responsibility to implement a quality culture in the organization to drive home their concept of “zero defects”.

? The price of non-conformance, according to Crosby points to the organizational excesses and losses in profitability as a result of doing things wrong. In Crosby’s words;

“Companies fail because management becomes arrogant, usually from a period of success, and forgets to listen to employees, suppliers, and customers; they fail because the resources of the company are squandered on things that are not necessary for the basic job; they fail because they do not innovate; and they fail because they are not consistent” (Crosby, 1995).

Crosby believes that the problems of poor quality and performance have been brought about by poor management, and particularly by the “quality professionals”. He urges that the “soft” or attitudinal part of quality must be addressed and that this must begin with management commitment and leadership and with the concept that all work is a process. Each process, he believes can be improved when it is managed by the above-mentioned four absolutes of quality management. Crosby also cautions that management should not view relationships and quality as an overhead expense not contributing directly to profitability. Instead relationships and quality are the key drivers of successful leadership.

1. Relationship : “The ecology of an organization is as delicate and vulnerable as that of a forest. Nothing happens without having an effect on something. The key to all these things within a company, as within a forest is relationships.” (Crosby, 1995)

2. Quality : “Quality is the result of a carefully constructed culture; it has to be the fabric of the organization - not part of the fabric, but the actual fabric. It is not hard for a modern management team to produce quality if they are willing to learn how to change and implement.” (Crosby, 1995)

It is the strong belief of Crosby, as highlighted in his book “Quality Without Tears” published in 1995, that quality will never cease to be a major problem until management believes that there is absolutely no reason why the company cannot deliver a nonconforming product or service to its customers. It is only when management respects the rights of all customers that quality will prevail.

2.3.5: Kauro Ishikawa

Ishikawa received both the Deming Prize, and the ASQ Shewart Medal for his outstanding contributions to the development of quality control theory, principles, techniques, QC activities, and of standardization activities for both the Japanese and the world industry that enhanced quality and productivity. He contributes to the philosophy of quality management, essentially as a moral concept of honesty and integrity in terms of providing quality to customers. According to Ishikawa, “when quality control is implemented, falsehood disappears from the company”. (Ishikawa, 1983)

His main emphasis on quality management, the Japanese way include the following:

- ? leadership by top management;
- ? education from top to bottom;
- ? action based on knowledge and data;

- ? teamwork, elimination of sectionalism;
- ? customer focus;
- ? prevention of defects by eliminating root causes;
- ? elimination of inspection;
- ? use statistical methods;
- ? long-term commitment.

Ishikawa strongly believed that ninety-five percent of a company's problems can be solved by using seven basic tools which can be easily understood by an engineer. These tools are: stratification (i.e. use of flow charts); Ishikawa diagrams (fishbone cause-and-effect charts); check lists; histograms; Pareto charts; scattergrams, and control charts. From a quality management perspective, Ishikawa's contribution can be summarized as follows:

- Opens fresh channels of communication, encouraging, cooperation, truthfulness, helpfulness, and honesty, thereby discovering potential failures easily.
- Trends, changes in consumer tastes, and customer attitudes should be reflected in Total quality control, product design and manufacturing; thus, products will be manufactured to customers preferences.
- See thing from customer's viewpoint.
- Presentations with facts and data – utilization of statistical methods.
- Problem solving through cross-function management
- "Knowledge is Power". Total Quality Control generates inquiry that can readily detect false, misleading, and inaccurate data or information.
- Societal issues are part of any total Quality Programs:

- ? Quality first – not short terms profits;
- ? Customer orientation – not product, production, or manufacturing emphasis;
- ? Participatory management – humanity as a management philosophy.

2.4 : Comparison of the common quality management principles.

Ghobadian and Speller, (1994) highlighted the common quality management principles discussed by these quality gurus. These principles are similar to those outlined by Flood (1993) and by ISO 9001: 2000 (1999) as depicted in TABLES 2, 3, 4, and 5. Ghobadian and Speller also made a comparison among the three most renowned American quality gurus' approaches based on three factors as shown in TABLE 6 which indicated three different aspects of quality principles, viz: process, people, and performance.

Table 2: Common Quality Management Principles

1. The Importance of controlling the process and not the product

2. The importance of not forgetting the human process. This is vital, if not more so, than the control of the technical process.
3. The top management is responsible for quality and not the workforce. It is management's responsibility to provide commitment, leadership, and the appropriate support to their technical and human process. Thus, it is imperative that management has a clear understanding of the process.
4. The management determines the climate and framework of operations within the organization. It is imperative that management fosters the participation of the workforce (and maybe other such as vendors and buyers) in quality improvement, and develops a "quality" culture by changing perception and attitudes towards quality.
5. The importance of education and training is emphasized in changing employee's belief and attitudes and enhancing their competencies in carrying their duties.
6. The emphasis is on the prevention of product defects, not inspection after the event, and on the reduction of the costs of quality to improve competitiveness.
7. The quality improvement is emphasized which will produce benefits over time, whether develop continuously or project by project. Quality is not a programme by a process, and not an instant cure.
8. There is a broad agreement that all aspects of activities should be examined for quality improvement, as these all contribute towards quality. Functional integration is considered an important ingredient of TQM.
9. Quality is company-wide activity.
Source: Ghobadian and Speller (1994)

Table 3: Ten (Main) Principles of TQM

1. There must be agreed requirements for both internal and external customers.
2. Customers' requirements must be met first time, every time.
3. Quality improvement will reduce waste and total costs.
4. There must be a focus on the prevention of problems, rather than an acceptance to cope in a fire-fighting manner.
5. Quality improvement will only result from planned management action.
6. Every job must add value.

7. Everybody must be involved from all levels and across all functions.
 8. There must be an emphasis on measurement to help to assess and to meet requirements and objectives.
 9. A culture of continuous improvement must be established (continuous includes the desirability of dramatic leaps forward as well as steady improvement).
 10. An emphasis should be placed on promoting creativity.
- Source: Robert L. Flood's Beyond TQM; John Wiley & Sons, 1993

Table 4: Quality Management Principles According to ISO 9001, 2000 (1999)

A quality management principle is a comprehensive and fundamental rule or belief, for leading and operating an organization, aimed at continually improving performance over the long term by focusing on customers while addressing the needs of all other stakeholders.

Principle 1 – Customer-Focused organization

Organization depends on their customer and therefore should understand current and future customer needs, meet customer requirements and strive to exceed customer expectations.

Principle 2 – Leadership

Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.

Principle 3 – Involvement of People

People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit.

Principle 4 – Process Approach

A desired result is achieved more efficiently when related resources and activities are managed as a process.

Principle 5 – System Approach to Management

Identifying, understanding and managing a system of interrelated processes for a given objective improves the organization's effectiveness and efficiency.

Principle 6 – Continual Improvement

Continual improvement should be a permanent objective of the organization.

Principle 7 – Factual Approach to Decision Making

Effective decisions are based on the analysis of data and information.

Principle 8 – Mutually Beneficial Supplier Relationships

An organization and its suppliers are interdependent, and a mutually beneficial relationship enhances the ability of both to create value.

Source: ISO TC176/SC2/WG15/N130 (1997/05/20)

Table 5: Quality Gurus Compared

Deming Juran Crosby

Definition of Quality A predictable degree of uniformity and dependability at low cost and suited to the market. Fitness for use. Conformance to requirements

Degree of senior management responsibility Responsible for 94% of quality problem.

Less than 20% of quality problems are due to workers. Responsible for quality

Performance standard/ motivation Quality has many 'scales'. Use statistics to measure performance in all areas, Critical of zero defects. Avoid campaigns "to do perfect work"

Zero defects

General approach Reduce variability by continuous improvement. Cease mass inspection.

General management approach to quality – especially 'human' elements. Prevention, not inspection.

Structure 14 points for management 10 steps to quality improvement 14 steps to quality improvement.

Statistical Process Control (SPC) Statistical methods of quality control must be used.

Recommends SPC but warns that it can lead to 'tool driven' approach. Reject statistically acceptable levels of quality.

Improvement basis Continuous to reduce variation. Eliminate goals without methods.

Project-by-project team approach. Set goals

Teamwork Employee participation in decision making. Break down barriers between departments. Team and quality circle approach A "process" not a programme.

Improvement goals.

Cost of quality

No optimum – continuous improvement Quality is not free – there is an optimum.

Quality improvement teams, quality council.

Purchasing and goods received Inspection too late – allow defects to enter system through AQL's. Statistical evidence and control charts required. Problems are complex.

Carry out formal surveys. State requirements. Supplier is extension of business. Most faults due to purchasers themselves.

Vendor rating No – critical of most systems. Yes, but help suppliers improve. Yes and buyers. Quality audits useless.

Single source of supply Yes. No – can neglect to sharpen competitive edge.

Source: Oakland (1993), page 293

Table 6: Comparison on The American Gurus Quality Approach

Guru Definition Emphasis Dominator Factor

Deming

Juran

Crosby
Customer – led

Customer – led

Supply – led

Process

People

Performance
Control of variation

Fitness for purpose/use

Conformance requirements/zero defects

Source : Ghobadian and Speller (1994)

In examining the approach of Deming, Juran and Crosby towards quality management, it could be seen that all of them are advocates of the need for a greater commitment to quality in the workplace. However, each of them holds a different view of what causes the quality vacuum. For example, Crosby tends to locate the roots of the problem within the firm itself. Juran and Deming on the other hand, seem to trace company-based problems back to the values found in the general society. Although different gurus have various approaches towards quality, nevertheless, they all seem to build on a solid base of common held expectations and assumptions. This can be summarized as follows:

- ? Requires a very strong top-management commitment
- ? Believes quality management will save, not cost, money
- ? Emphasize the quality responsibility on the managers and the systems, not on the workers.
- ? Stress on continuous improvement
- ? Views quality from customers-oriented approach
- ? Assumes a shift from an old to a new corporate culture
- ? Builds a strong management/worker problem-solving team.

From the quality gurus and other quality management approaches, it is often highlighted that the critical success factors in Quality Management System implementation in any organizations would consist of the following factors: employee participation, top management commitment, team -work, and continuous improvement. However, it should

also be emphasized that the organizational culture played an important role in determining the success or failure of implementing a Quality Management System in an organization. In fact, one of the greatest obstacles faced by organizations attempting to implement a quality management system is the barrier of culture.

2.5: Quality Management

Quality management is a way to continuously improve performance at every level of an operation in every functional area of an organization using all available human and capital resources. Improvement is addressed towards satisfying broad goals such as cost, quality, market share, schedule, and growth. Quality management combines fundamental management techniques, existing and innovative improvement efforts, and specialized technical skills in a structure focused on continuously improving all processes. It demands commitment, discipline, and an on going effort. Quality management relies on people and involves everyone. It is both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization, all the processes within the organization, and the degree to which present and future needs of the customers are met.

A Quality management program must :

- Require dedication, commitment, and participation from top management.
- Build and sustain a culture committed to continuous improvement
- Focus on satisfying customer needs and expectations
- Involve every individual in improving his/her own work processes
- Create functional teamwork and constructive working relationship-recognize people as the most important resource.
- Employ the best available management practices, techniques, and tools.

2.6: An overview of the ISO Standards

The ISO standards represent an international consensus on what makes good management, with the aim of ensuring that the organisation can deliver the products and services that meets the clients' quality requirements. It's not about the quality of the products, as today's consumers also want to know that what they are purchasing are also safe and ecologically friendly. For example, the ISO 9000 lays down the quality requirements your quality system must meet but does not dictate how they should be met. It is up to the individual organization to devise their own plan and strategy which ultimately permits for more flexibility across the strata of businesses with their own unique characteristics.

2.6.1: The ISO 9000 series

The first guidelines for quality management were introduced initially in the defense equipment industry followed by aerospace, aviation and nuclear energy industries, after the occurrence of various serious accidents due to the lack of quality control.

For the manufacturing industries, the first well-structured quality assurance standard was documented in the 1980's by British Standards Institute (BSI) as BS 5750. The main principles of BS 5750 quality system are:

- Defined organization and job responsibility
- Clearly defined procedures
- Controlled documentation
- Easily traceable records
- Monitoring and feedback systems
- Corrective and preventive actions
- Clear systems of communications

These principles are meant to achieve three objectives, viz..

1. to prevent non-conformity
2. to have documented systematic methods, standards, and procedures to assure quality, to identify problems, and to take corrective actions.
3. to provide feedback both internally and externally.

In 1987, the equivalence to BS 5750 was adopted by the International Standards Organisation (ISO) as ISO 9000: a quality management series that included the core series of ISO 9000, ISO 9001, ISO 9002, ISO 9003 and ISO 9004.

ISO 9004 is the standard giving guidance on the elements of quality management and a quality system. ISO 9000 consists of the three quality assurance models – ISO 9001, ISO 9002, and ISO 9003. The difference among them is the scope that each covers.

- ISO 9001 sets out the requirements for an organization whose business can range all the way from design and development, to production, installation and servicing.
- ISO 9002 is for an organization that does not carry out design and development. Otherwise, all other requirements are similar to the ISO 9001.
- ISO 9003 is for the organization whose business processes do not include design control, purchasing or servicing. It basically uses inspection and testing to ensure that finished products and services meet specified requirements.

Since its on-set, ISO 9000 series has become the accepted basis of quality system requirements for product conformity assessment in the global marketplace. The standards are also the basis for third party quality system registration programs in many countries.

In addition, the quality standards are being used in two-party contractual situations between supplier and customer companies.

The first revision of ISO 9000 series was made in 1994 with only minor changes to the core series, with improvement in terminology and language, as well as the generic nature. Currently, the quality system contains twenty elements of management, which are:

- 1 Management Responsibility
- 2 Quality System
- 3 Contract Review
- 4 Design Control
- 5 Documentation and Data Control
- 6 Purchasing
- 7 Control of Customer-Supplied product
- 8 Product Identification and Traceability
- 9 Process Control
- 10 Inspection and Testing
- 11 Control of Inspection, Measuring & Test equipment
- 12 Inspection and Test status
- 13 Control of Non-Conforming Product
- 14 Corrective and Preventive Action
- 15 Handling, Storage, Packaging, Preservation, and Delivery
- 16 Control of Quality Records
- 17 Internal Quality Audits
- 18 Training
- 19 Servicing
- 20 Statistical techniques

The ISO 9000 quality system focuses on the following aspects:

- Management systems standard, not Quality Assurance (QA) or Quality Control (QC) standards
- How Quality Management System (QMS) assures quality
- Collect related data to improve price and quality related characteristics
- Certifies QMS but not products

The road map for the ISO 9000 implementation is detailed in the documentation, and it comprises:

- Quality Policy (Level I)
- Quality Manual (Level II)
- Operating Procedures (Level III)
- Work Instructions
- Feedback Mechanisms
- Documentation : all activities, processes , and procedures

The ISO documentation is characterized such that operations are thoroughly documented, so an outside critic or new person can understand what has to be done. It clearly states each person's role in assuring quality and require one to "say what you do : do what you say".

Since the introduction of ISO 9000: series, ten's of thousands of organizations throughout the world have embarked on the quality system either voluntarily or as demanded. It has formed the structural basis for the implementation of quality management in the 1990's, which emphasized, among other things, quality-culture with motivated employees for excellent corporate performance.

The most recent development regarding ISO 9000 quality management system is the revision version of year 2000. Under ISO protocols, all standards are to be reviewed at least once every five years to determine whether they should be confirmed, revised or withdrawn. Customer needs are the force driving the revision of these standards.

In 1997, ISO/TC 176 conducted a large global survey of 1120 users and customers to better understand their needs. As a result, several major improvements over the current ISO 9001 Quality System are proposed, among which are;

- To have a common structure based on a Plan-Do-Check-Act process model.
- To consolidate ISO 9001, ISO 9002 and ISO 9003 standards into a single revised ISO 9001 standard.
- To develop the revised ISO 9001 and ISO 9004 standards as a "Consistent Pair" of standards, where the revised ISO 9004 is intended to lead beyond ISO 9001 towards the development of a comprehensive QMS.
- To group the twenty elements in the current ISO 9001 into four major clause viz.

- Management responsibility
- Resource Management
- Process Management (revised to Product and Service Realization)
- Measurement, Analysis and Improvement

? to have increased compatibility with the ISO 14000 series of Environmental Management System Standards

The process-based model of ISO 9001: 2000 is shown in Figure 4 and Tables 7, and 8.

Figure 4 - Quality Management Process Model

ISO/CD2 9001 : 2000

QUALITY MANAGEMENT SYSTEM
CONTINUAL IMPROVEMENT

(Source : ISO/CD2 9004: 2000, ISO/TC 176/SC2/N)

Table 7: 9000 REVISION : 1994 (ALIGNMENT OF CLAUSES)

Quality system requirements ISO 9000 ISO 9002 ISO 9003

Management responsibility 4.1 4.1 4.1

Quality system 4.2 4.2 4.2

Contract review 4.3 4.3 4.3

Design control 4.4 NA NA

Documentation and data control 4.5 4.5 4.5

Purchasing 4.6 4.6 4.6

Control of customer supplied product 4.7 4.7 4.7

Product Identification and traceability 4.8 4.8 4.8

Process control 4.9 4.9 4.9

Inspection and testing 4.10 4.10 4.10

Control of inspection, measuring and test equipment 4.11 4.11 4.11

Inspection and test status 4.12 4.12 4.12

Control of non-conforming product 4.13 4.13 4.13

Corrective and preventive action 4.14 4.14 4.14

Handling, storage, packing preservation & delivery 4.15 4.15 4.15

Control of quality records 4.16 4.16 4.16

Internal quality audits 4.17 4.17 4.17

Training 4.18 4.18 4.18

Servicing 4.19 4.19 4.19

Statistical Techniques 4.20 4.20 4.20

ALL THREE STANDARDS NOW HAVE IDENTICAL CLAUSE NUMBERING

Table 8: ISO 9001 : 2000 Quality Management System Elements

4. QUALITY MANAGEMENT SYSTEM

- 4.1 General Requirements
- 4.2 Documentation Requirements
 - 4.2.1 Quality Manual
 - 4.2.2 Control of Documents
 - 4.2.3 Control of Quality records

5. MANAGEMENT RESPONSIBILITY

- 5.1 Management Commitment
- 5.2 Customer Focus
- 5.3 Quality Policy
- 5.4 Planning
 - 5.4.1 Quality Objective
 - 5.4.2 Quality Management System planning
- 5.5 Responsibility, Authority and Communication
 - 5.5.1 Responsibility and authority
 - 5.5.2 Management representative
 - 5.5.3 Internal Communication

5.6 Management Review

6. RESOURCE MANAGEMENT

- 6.1 Provision of Resources
- 6.2 Human Resources
- 6.3 Infrastructure
- 6.4 Work environment

7.0 PRODUCT REALIZATION

- 7.1 Planning of product realization
- 7.2 Customer related processes
- 7.3 Design and Development
- 7.4 Purchasing
- 7.5 Production and Service provision
- 7.6 Control of monitoring and Measuring devices

8.0 MEASUREMENT, ANALYSIS AND IMPROVEMENT

- 8.1 General Requirements
- 8.2 Monitoring and Measurement

- 8.2.1 Customer Satisfaction
- 8.2.2 Internal Audit
- 8.2.3 Monitoring and Measurement of Processes
- 8.2.4 Monitoring and Measurement of Product

- 8.3 Control of Non-Conforming data
- 8.4 Analysis of Data
- 8.5 Improvement

Source : Document ISO/TC 176/ SC 2/N 376 (2001)

2.6.2: The ISO 14000 series

Like the ISO 9000 series, it is another family of standards but this series deals with environmental management. It deals with what an organization does to minimize harmful effects on the environment caused by its activities. The ISO 14004 and ISO 14001 are both environmental management systems (EMS). Having an EMS makes possible a structured approach to setting environmental objectives and targets, achieving these then demonstrating that they have been achieved.

- ISO 14004 provides guidelines on the elements of an EMS and its implementation. It also discuss the principle issues involved.

- ISO 14001 specifies the requirements for such an EMS system. Objective evidence that can be audited is needed to demonstrate that the EMS is operating effectively in conformance with the standards.

2.7: Human Factors in QMS Implementation

Dr. Deming as well as almost all of the other quality gurus and quality specialists expounds on the importance of the human aspect when considering the implementation of QMS in an organization. Claus Moller (1996) identified five types of quality within any organization: Personal quality, Team quality, Product quality, Service quality, Company quality, and demonstrated that high personal quality and team quality are prerequisites of product quality, service quality and total company quality. According to him, each quality has two dimensions: “hard” which is technical and “soft” which is emotional. The latter he referred to as the human side of quality that relates to emotional aspects, such as psychological climate, management styles, attitudes towards people, ethics and team spirit. These are closely linked to corporate culture that tackles the question of motivation, internal communication, creativity, enthusiasm, job satisfaction, flexibility, cooperation etc.

The major human factors that affect QMS implementations are summarized as follows: -

2.7.1: Leadership Style

Deming (1986) believed that “profound knowledge” is a prerequisite for effective leadership which visionalizes and creates new aspects to life within an organization. The leadership role should include coaching, facilitation, counseling, risk taking, visiting, involvement and most of all, transformation.

The development of Deming’s theory on “Profound knowledge” in an organization will lead to leadership and empowerment. There are seven major elements to be considered with reference to “profound knowledge”, viz.

- Knowledge of variation
- Ability to distinguish between special and common causes.
- Knowledge of the system and the theory of optimization
- Knowledge of human psychology
- Use of theory
- Customer-sense
- Respect for people

The decision whether to emphasize QMS in an organization depends very much on the Chief Executive Officer’s vision. Its subsequent implementation and effect in turn, is dependent on his managerial leadership styles. Top management must have the wisdom to see beyond the present into the future for the continual growth of the company.

Deming (1986) advised us to “eliminate management by objectives; eliminate management by numbers, numerical goals; substitute leadership”. The leadership style is crucial in influencing the organization’s working environment, which is closely related to quality and productivity. Effective leaders inspire members to continue the "quality" journey by motivating them to perform a better job.

Dale and Cooper (1994) examined some of the common mistakes which senior management had made in relation to implement a quality system. The mistakes included:

- Failing to commit sufficient time
- Failing to become personally involve in planning for its introduction and implementation.
- Under- estimating the resources needed to start and develop QMS.
- Not establishing an effective infrastructure.
- Not committing sufficient resources to education and training.
- Treating output and cost targets as the main business priorities.
- Failure to exemplify leadership and team spirit
- Insufficient understanding hence misinterpreting QMS principles
- Misconception on “Quality”
- Failure to utilize statistical measurements for management by fact.

2.7.2: Management Commitment

The managers and executives are the main driving forces to ensure that policies and systems are implemented with the appropriate allocation of resources and priorities.

Without proper

planning, implementation and review, many QMS efforts would fail. Deming (1986) found that senior management were responsible for more than 80% (later revised to 96%) of quality problems encountered in an organization. They must take action to accomplish the transformation.

Heath (1994) suggested management to demonstrate its conviction and commitment to QMS implementation to the entire organization through a set of visible steps that can be placed into three major phases :

Phase 1 : Lead Cultural Change, with actions to :-

- Develop and publish a vision statement
- Identify key processes that helps to achieve its vision
- Characterize key processes and identify measurements
- Lead at least one key process improvement effort in order to model the behavior of change.

Phase 2 : Expand Cultural Change, with actions to :-

- Train workforce to use process improvement tools
- Select process improvement opportunities
- Activate teams and individual improvement efforts based on high leverage opportunities
- Reward and reinforce measurable process improvement results.

Phase 3 : Sustain Cultural Change, through four steps :-

- Solicit ideas for continuous improvement efforts
- Seek ideas for new process improvement effort
- Communicate the status of process improvement
- Provide feedback on the ideas received.

2.7.3: Participation

All the employees have to be made aware of the implications of a QMS implementation. This awareness can only be brought about through the clear and sincere communication from the management. This process takes time as resistance to new ideas is generally founded in the fear for change. The organizational vision should emphasize the desirability of change and the need for employees' participation in implementing and shaping the transformation.

Heath (1994) recommended five ground rules that can encourage employee participation in QMS programs such as the Employee Suggestion Scheme (ESS) :

1. Be progressive – regularly ask employees for suggestions
2. Remove fear – focus on fixing processes, not fixing people
3. Make it easy to participate – simplify paper work, review and procedures
4. Respond quickly – respond to feedbacks within a specific short period of time
5. Reward with recognition – let everyone know the value of contribution that makes a difference.

Only through the participation of every employee in the organization that the QMS would work towards the objective; just as Ford Motor Company's Jacques Nasser (1989) advised their top management to "teach employees to think like shareholders". Corrective measures for non-compliance as well as improvement actions have to be acted upon accordingly by all the employees themselves for the sustainability of the quality system.

In promoting employee participation, some drawbacks should be noted and avoided Heath (1994) :

- No process focus- or no accountability
- No metrics – no quantitative evidence to indicate when implemented ideas had improved the process
- No meaningful reward – or rewards awarded are not based on measurable process improvement. Programs might reward the wrong attribute, such as quantity rather than quality.
- Finger pointing – people suggesting how everyone else except themselves can improve.

2.7.4: Empowerment

Empowerment of employees means not only giving authority but also information, knowledge and rewards for performance. Heath (1994) also mentions about providing sufficient training in process improvement tools as well as enough time to apply them. Empowerment also means that employees must feel comfortable of accepting authority when it is offered. Without providing the tools and establishing a supportive environment, empowerment is ineffective. The management must regularly review the team progress, give support, guidance, remove barriers, and reward improvements.

Abdul Shukor (1998) concluded that "empowering, employees to succeed" is a major factor in encouraging a Total Quality Culture. In this aspect, it has to be realized that there could be employees who fear to be empowered; for fear of failure as well as fear of success, which usually comes with the pressure of added expectation. Top management's understanding, trust, and communication are crucial in helping to overcome the fear of empowerment (European Quality, 1999).

In a similar tone, Hugget (1999) advised the management to help employees regain their personal sense of control in the face of cultural change and empowerment, through dialogues, improving competency, fixing pieces and showing where the organization is heading.

As the employees get better equipped with the necessary knowledge through better training and experience in their specific job functions, there is the need for them to utilize their expertise without the need for supervision. With employee empowerment, the supervisors can afford more time to focus their attention on other more pressing issues.

2.7.5: Motivation

Several people-related factors could be considered in motivating staff in the implementation of QMS. Groth (1995) pointed out that :

- people like to do well
- people like to feel well about what they do
- people only want to do things consistent with their personal values
- people respond well to realistic expectations
- people like goals
- people like reward

An understanding of the motivation theories by experts such as Maslow and Herzberg as well as Douglas Mc Gregor's Theory X and Theory Y are useful in adopting the appropriate. The management must ensure that hygiene factors such as working conditions and remuneration are adequately addressed, and work on the motivators like employee involvement and empowerment.

The employees can be motivated not only through monetary terms, but also through other means such as the recognition of their contribution, opportunity for presentation of their achievements and their pride of work.

2.7.6: Teamwork

The implementation of the QMS itself requires teamwork from the management staff as well as the operative staff members from across all functions in the operation. It is a group effort that can derive synergistic benefits only through effective teamwork. Successful types of Teams includes Quality Management Council (QMC), Quality Improvement Teams (QIT), and Quality Control Circles (QCC).

The management should also be aware of the various social behaviors that may be displayed at the workplace. These behaviors, such as mounting (bulging), grooming (compliment) and manipulative (hidden agenda), together with different behavior styles of Relator, Socialize, Thinker and Director, as described by Forsha (1992) could affect team spirit and the working atmosphere. Understanding these behaviors and styles as forms of communication allows one to better understand and accommodate others in their teamwork.

To encourage teamwork for quality improvement, the team members have to be properly developed from an early stage. This process should be started as early as the selection stage of suitable candidates to join the company. White and Macomber (1999) argued that quality improvement and equal opportunities for all employees could be harmonized through the proper development, documentation, and validation of the firm's employee selection tests.

In the organization where workers are trade union members, effective communication is vital to maintain constant mutual understanding, cooperation, and teamwork.

2.7.7: Quality Culture

Ed Schein (1994) of MIT defined organization culture as “a pattern of basic assumptions invented, discovered or developed by a given group as it learns to cope with its problems of external adaptation and internal integration that had worked well enough to be considered valid, and to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.”

Hildebrand et al (1991) used Johnson & Scholes' model of influence to review the culture elements, of which the special character of employees forms one of the major factors in determining the total culture of the organization.

Figure 5: Model of Influence On Organization Culture

The implementation of QMS is a way to transform to the desired quality culture in an organization. The desirable behaviors, including the manners and ways of working or providing services, form an essential part of the quality culture which needs to be exemplified by the top management, walked the talk by all managers, and become a habit among all the employees.

The development of desirable quality culture involves the creation of a vision and its realization requires a paradigm shift at the individual level. The required paradigm shift towards desired quality culture is summarized as follows:

Required paradigm shift in Quality Culture :

From To

Assigning responsibility for quality to others.

Doing things over to take it right

One-time fix

Assumes you know your customer's requirement

Internal organization driven
Management by control
Many layers of management
Competitive relation
Directive decision making
Low risk-taking
Power over staff
Reacting to change
Rules-bound and slow
Rewards reflect time in job and whom you know Quality is everybody's responsibility
Doing the right things the first time
Continuous process improvement
Listen to customers to determine their requirement
Customer-driven
Common vision leadership
Flat organization
Cooperative relations
Consensus decision making
Innovation
Empowered staff
Pro-active change
Flexible and fast
Rewards reflect real contributions

In practice, establishing a quality culture is a matter of analysis and diagnosis followed by the application of appropriate reinforcement. Because traditional culture has evolved over the years and is usually deeply rooted, it is difficult to change. Dale and Cooper (1994) remarked that in order to change we must lay the foundation for change as follows :

- Understand the history behind the traditional culture
- Assess the cultural elements and climate
- Don't tamper with systems, improve them
- Don't impose cultural change, let employees be involved
- Be prepared to listen and observe
- Large-scale change takes time
- Live the new culture

It has to be highlighted that before implementing any change, it is very important to first assess the prevailing cultural elements within the organization. The list below shows some of the cultural elements that will likely affect the success of QMS implementation into an organization and management has to be aware of these elements.

- Quality beliefs and values
- Management style
- Maturity of organization

- Cohesiveness and cooperation
- Openness and trust
- Quality climate
- Recognition/reward
- Support of employees
- Participation and actions
- Staff commitment • Consistency on performance
- Competence in quality tools
- Consistent communication
- Level of job security
- Sense of belonging
- Sense of urgency
- Degree of social interaction
- Degree of innovation
- Respect for people
- Enforcement of policies

These elements could be used as a guide when implementing change. It is critical that management looks into these cultural elements first before implementing QMS in the organization to ensure that the employees are prepared for the change. Any change that comes about should not be viewed as a "cultural shock" among the employees but it should be accepted by all from the bottom to the top level of the organization, as only in this way can any change be really successful.

2.8: Forest Operations

The up-stream forest management and operations are highly regulated through a series of legislative and regulatory requirements, technical standards and executive directives with multi-tier appraisal and approval procedures. A clear understanding of the underlying principles for these regulatory requirements is of paramount importance, so that operational processes and practices can be suitably geared for compliance.

Supplementary to internal and external compliance requirements, this project will also review the requirements of ISO 9001. While this project is geared for the development of an in-house QMS, the extended objectives are to eventually embark upon certifiable standards such as the ISO series and forest certification schemes. In this respect, the ISO 9001 20-Point Criteria (or elements of management) can be used for bench-marking.

The objectives of this literature review were to reassess both external and internal compliance requirements, to relate current work practices to these requirements and to identify areas that need strengthening and refinement to meet the levels of compliance expected.

2.9: Forestry Planning Requirements and Practices

The Forest Operations Department and the Camp Operation Units manage all the design, planning, implementation and monitoring/evaluation activities of the concession areas.

Figure 6: Forest operations department structure and supporting sections;

Traditionally, the management processes go through a complex system of guidelines, criteria, instructions and directives, with most of the key elements already well documented. However, there are still much ambiguity within this system that needs to be stream-lined and brought into a clearer documented process in order to achieve a level of consistency and quality that can be assessed and certified.

The major work processes in the forest department can be separated into the three phases;

Phase 1 - Pre-Harvesting Operations: Design & Planning-

- Strategic Level Planning for 25 years (SFMP)
- Compartment Level Planning for 5 years (MTMP)
- Annual Logging Plans (ALP) with DBHP

Phase 2 - Harvesting-in-Progress: Operation/Implementation

- Infrastructure Construction
- Harvesting Operations (felling/skidding)
- Log Tracking & Delivery

Phase 3 - Post-Harvesting Management: Monitoring/Evaluation

- Operational Records
- Post harvesting Inspection /Assessments
- Yield Plots/CFI
- Silvicultural Treatment Plots
- Forest Rehabilitation
- Review of Compartment Plans and Master Plan (as and when necessary)

2.9.1: Main Components :

The main tasks components are :

Strategic Level Planning - Sustainable Forest Management Plan (SFMP):

- 25 Years cutting cycle for whole concession and schedule on 1:250,000 scale
- 4 to 5 Compartment of 5 Coupes each

- Logistics & major access road network
- Locations of major facilities
- Environmental considerations
- Community considerations
- Low intensity sampling/1% forest inventory
- Estimated Available Yield (EAY)
- Forest Typing verification
- Forest Zonation (Operable/inoperable, Protection, Community)
- Environmental & Social Impact Assessment – Participatory Rural Appraisal
- Equipment, manpower and other resource allocations
- Geo-Physical Aspects (forest, soil type & terrain)
- Ecological Aspect (including flora & fauna)
- Climatic and Water Quality

Compartment Level Planning - Medium Term Management Plan (MTMP)

4 to 5 years coupes per compartment & schedules on 1:100,000 scale maps

Detailed forest zoning

Survey of Main and Secondary road networks

Locations of log yard

Medium intensity inventory 1 to 5% using systematic plot sampling

Estimated Annual Cut (EAC)

Demarcation of Compartment boundary

Social survey/community involvement

Annual Operation Plan (ALP):

Coupe description, location, size on 1:50,000 scale maps

Harvesting blocks of 100 hectares average (max 150 has.)

Feeder haul roads

Snig track & log landings

Protected bufferzone markings

Local community dialogue/agreement

100% Tree Marking/Inventory within operable area

Annual allowable cut (AAC)

Detailed Block Harvesting Plan (DBHP)

Location of marked trees and residue trees on 1:5,000 scale grid map

Location of log landings, alignment of main skid trails

Location of temporary culverts or stream-bed crossings

Special zoning areas

Implementations (Logging Operations)

Infrastructure construction
Harvesting operations (felling/skidding)
Log scaling for log inventory & royalty assessment
Trucking/logyard/logpond activities
Post harvesting/forest rehabilitation
Product documentation

Final Product Delivery & Documentation :

Product documentation
Royalty Assessment
Transportation permits
Transportation
Product delivery to factory/consignee

2.9.2: Planning, Implementation & Product Delivery Criteria and Guidelines :

Instructions and Regulations :

Company Instructions :

- Species desirable
- Minimum Merchantable sizes and log grades
- Operational schedules
- Budget allocation

Government Regulation, Forestry Laws, Decrees, Guidelines, etc.

- National Forest Policy (draft on going)
- Forest Law (draft on going)
- Decrees and Sub-decrees (existing and on going)
- Codes of Practice (implemented)
- Forest Concession Management Manual (implemented)
- ESIA/SMA Guidelines (implemented)
- Other executive directives issued by the Government, relevant Ministry and/or Forestry Department

Other Considerations

- Environmental requirements (ESIA findings/recommendations)
- Community consultations (right of access, traditional usage)
- Other landuse priorities (conservation, agriculture, etc.)

2.9.3: Work Schedules :

Table 9: Main Items - Principal Plans :

Main Items Prepared by Schedules Approved by
SFMP Planning Unit, FOD
Under the ONF consultancy/
supervision Within 12 months from issue of the Forest Concession Management Planning
Manual DFW/MAFF/MoE/
CoM
MTMP Planning Unit, FOD Immediately after the approval of SFMP DFW/MAFF
ALP Planning Unit, FOD Within 12 months from approval of MTMP or 6 months before
commencement of next coupe operations DFW

All related activities will be scheduled simultaneously during the process of preparation of above items as necessary.

2.9.4: Procedure Requirements :

Figure 7: Flow-Chart of Planning Procedure

2.10: Quality Management in Forest Operations

The attainment of desired quality requires the commitment and participation of all members of the organisation, whereas the responsibility for quality management belongs to top management. Quality management includes strategic planning, allocation of resources and maintaining activities for quality, such as quality planning, operations and evaluations.

The quality system is driven by policies of the organisation, which is implemented by clear procedures providing details for enacting those policies. The system should only be as comprehensive as needed to meet the quality objectives.

Quality manual is the main document used in drawing up and implementing a quality management system (QMS) where policies and objectives are established. Operating procedures are identified, documented, issued and maintained to implement quality policies and objectives in such a way that adequate and continuous control can be exercised over all activities affecting quality.

The support documents consists of work instructions, user manuals, drawings, specifications, inspection reports, inspection criteria etc. They are an extension to the operating procedures in providing detailed instructions/requirements in carrying out specific tasks.

The documented structure provides guidance for coordinated actions of the people, the machines and information of the company.

Figure 8: Documentation Structure

Quality management has been shown to be particularly effective in obtaining commitment. This may be due to the systematic and apparent objectivity, obtaining documentation and other supporting manuals to clarify objectives, technical and regulatory requirements, procedures, and their linkages during implementation. These standards can be externally justified and are not seen as a local management invention. Commitment is reinforced by inbuilt feedback mechanism, which inform staff and management of quality levels desired.

A QMS implemented in forest operations with well planned and documented work processes, practices and procedures that will consistently meet and satisfy the levels of compliance or quality levels desired will undoubtedly be one of the key essential company's management prerequisite necessary for the achievement of sustainable forest management practices.

2.10.1: QMS mission statement and goals

To guide this project, the QMS mission statement for the forest operations have been formulated as the need for:

"Clear, consistent, responsible and responsive management policies, process, procedures and practices that optimize sustainable production and timely delivery of acceptable products at competitive costs within legal and ethical business standards".

The goals for the forest operations are:

- To manage the forest on a sustainable basis
- To realize maximum benefits at minimal costs
- Good responsible corporate citizen

2.11: Summary of Literature review

The review of literature indicates that quality management establishes and implements strategies and policies concerning quality and quality assurance. It is a way to continuously improve performance at every level of operation, in every functional area of an organization, using all available human and capita resources. Improvement is addressed towards satisfying broad goals such as cost, quality, market share, schedule and growth. Quality management combines fundamental management techniques,

existing and innovative improvement efforts, and specialized technical skills in a structure focused on continuously improving all processes. It demands commitment and discipline, and an ongoing effort. Quality management relies on people and involves everyone. It is considered to be both a philosophy and as a set of guiding principles that represent the foundation of a continuously improving organization, all the processes within the organization, and the degree to which present and future needs of the customers are met.

Historically, quality management has a long tradition and has evolved through various stages from early inspection of product and service quality. The overall objective of quality management is to achieve full customer satisfaction with superior quality of products and service. Customers on the global marketplace render the task more demanding and complicated but also more rewarding.

The theories on quality as expounded by the quality gurus such as Deming, Juran, Feigenbaum, Crosby, Ishikawa and others has had a decisive impact on the approaches to quality management in the present era. It has contributed to the development of standardization of quality systems, which is accepted in the international arena, for example ISO 9000. The following are a selection of definitions of quality which have been coined by the various quality gurus which have profound influence on the ISO standard:

- Fitness for purpose or use (Juran)
- The total composite product and service characteristics of marketing, engineering, manufacture and maintenance through which the product and service in use will meet the expectation by the customer. (Feigenbaum)
- Conformance to requirements. (Crosby)

These three definitions are complementary, since each emphasizes a particular point which is only implicit with others. Juran's is a brief definition. The ISO description elaborates on Juran's 'fitness for use'. It emphasizes the totality of quality consideration which together satisfy all needs, whether these are expressed or taken for granted. Feigenbaum's definition reveals those criteria of need, fitness and expectations are being addressed in the definitions; they are the customer's. He also names the key divisions of the business enterprise, each of which has a critical role to play in the achievement of quality. Both ISO and Feigenbaum stress that the definition applies to a manufactured product and to a delivered service.

Crosby's definition on the other hand, implies that the customer's requirements can be documented, conformance to the requirements investigated independently, and hence measured.

All of the quality gurus have highlighted that in order for a quality management programme to be successful in any organization, the programme must:

- Require dedication, commitment, and participation from top leadership.
- Build and sustain a culture committed to continuous improvement
- Focus on satisfying customer needs and expectations
- Involve every individual in improving his/her work processes
- Create teamwork and constructive working relationships
- Recognize people as the most important resource
- Employ the best available management practices, techniques, and tools.

In reality however, quality management is very difficult to implement correctly, as role models are sparse, and much of the discipline is still new. It was pointed-out by Brocka (1992) that for every successful implementation, such as Motorola, there are twenty or more disasters. It may also worth noting that the “disputes” which break out among various “disciples” of one quality management master versus another, have lent a divisive, even faddish look to quality management practice to the observer. Quality management is a means of empowering employees, but it also empowers the managers. It has no room for managers who manage by directive, attendance, standard, operating plan, or other means of management by power of fear.

The major theories on quality that was reviewed in the literature stressed on continuous improvement as an important factor in organization. The goal of Quality Management is focused on continuous improvement, but the threshold of employee motivation and empowerment must be passed through first.

Managers have recognized the strategic importance of quality. They have attempted to make a shift to strategic quality management or Total Quality Management, or whatever term one chooses. But many have failed because they have tried to do so with a less than comprehensive approach. Merely piecing together various elements from past quality eras into a patchwork of quality programme just exhibits the lack of knowledge, vision and managerial leadership.

The drive to lead a strategic quality management effort must require a customer-focused vision, personal commitment to continuous improvement, and a cultural transformation to integrate the efforts of the entire organization towards the leader’s vision.

It draws the best elements, for example human relations, design for quality, learning through study of variation, total quality integration, cross-functional teamwork from all of the foregoing quality eras, and combines them into an approach tailored to meet the organization’s competitive challenges and opportunities. Only top managers can successfully lead this kind of approach to quality.

Quality has evolved from a discipline relegated to inspectors and technical experts to strategic focus and a process-oriented approach to management that commands the attention of all employees; from top to the bottom of the organization, from the CEOs and presidents to the front-line workers. The popular terminology used today is “Total Quality Management” which conveys the comprehensive nature of this approach, with emphasis on the word “total” and a broad definition of “quality”. Labeling this new

approach or whatever term one chooses may imply uniformity in all the approaches that goes by the same name or label. In reality, this is not true as “TQM” approaches vary from one organization to another, and similar approaches often bear different names.

Bounds et al (1994) remarked that no one model from the strategic quality management era would work for every organization. First, in the strategic Quality Management era, we are participating in the emergence of a new paradigm. Our understanding of the new paradigm is continuing to evolve. We are currently in a stage of experimentation, with organizations shifting and managers inventing and testing approaches to management to help define a new paradigm. Second, every organization faces unique circumstances and must vary its approach accordingly. Each organization must develop its own specific approach to suit its own internal and external circumstances.

The successful implementation of a quality management programme hence requires a personal transformation, particularly for the leaders, through knowledge and understanding of the new paradigm and skill in role modeling newly acquired behaviors, methods, and techniques for the rest of the organization. It should be stressed that it is the leader that will play the major role in determining the success or failure. It is also evident that in order to create the desired quality culture that is ready to sustain the quality transformation within the organization, it must involve every employee; and senior management must take the lead and initiative to support and be the role model in reinforcing the new quality culture. At the same time, it is essential that appropriate measures be in place to raise or obtain continual employees' commitment to the quality culture to ensure the long term success of the quality management system in the organization.

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51

Chapter 3: The Research Survey

The up-stream forest operations of the company primarily involve three divisions: the Central head

office, the Chhlong Operations, and the Koh Kong Operations. The Central head office or headquarters does the bulk of the forest planning for the two forest concessions. The Chhlong

Operations operate in the Chhlong forest concession whilst the Koh Kong operates in the other

concession. Both Camp operations have their own management teams and operate independent of

each other but have near identical set of activities, equipment, manpower and log volume production

output in similar forest type conditions. In essence, they are like two independent similarly sized

forest management companies operating in Cambodia. This presented the advantage where the information gathered from the research survey could be cross checked and compared to identify the optimal work practice or process that should be adopted as the "standardized process" for the company's operations.

3.1: The Research Methodology

The research methodology adopted the qualitative approach, deploying a combination of observations, individual interviews, critical incident analysis, and group self-analysis to assist the survey participants in defining and documenting their respective work task, procedures, and work requirements etc. The aim was to identify the optimal work process/system that would be necessary for implementing QMS into the company. A questionnaire was also designed to quantitatively assess the perceptions of the employees on the need for implementing QMS and gauging some of the main human factors that could influence successful QMS implementation.

3.1.1: Observations.

Careful observation is the starting point of any analysis. Initial observations should concentrate on achieving a relatively unfocused, preliminary impression of what is happening. This involves attending meetings and observing people in their own work activities. These observations are guided by general questions such as : How are people organized or arranged in the work setting? How do they respond to one another?. Who does which task? What is that demographic composition of the group (gender, race, nationality, etc..)? How is the work space organized? As the observer becomes more familiar with the setting, observations become more focused on phenomena of the particular interest. Because previous experience may blind an insider to the importance of certain habitual artifacts, often the observation of an outsider will provide more useful data. It is important to record observations, as a written record of observations, or field notes, provides the basis for future analysis.

3.1.2: Individual Interviews.

Through individual interviews, the manager is asked to describe his work, how he uses the current system, what he needs from the system, how he would like the system improved, etc.

Information

gathered through interviews with insiders supplements the observational data. Skilled "critical questioning" is an effective means of bringing assumptions to the surface. It is concerned not so much with eliciting information as with prompting reflective analysis (Brookfield, 1987).

Critical

questioning invites individuals to examine their actions and explore the collective assumptions and values they share. The key to critical questioning is framing questions that are insightful, specific to particular events or actions, and yet must be easily understood. For example, the interviewer might ask the respondent "to think back over the past few weeks. Has there been a particular time when you felt you were being especially effective in meeting your work unit's objectives? Tell me about it."

3.1.3: Critical incident analysis.

Another method of gaining insight into the business process requirements is through critical incident analysis. It prompts respondents to identify an incident that for some reason was of particular significance to them. The researcher provides a set of instructions on what kind of incident is to be identified, and respondents are then asked to write a paragraph or two describing the incident: For example, the instructions might read as follows : "Think back over the past three months in your work.

52

Identify an event in which you felt caught in a particularly difficult dilemma between the demands being placed on you by management and the priorities of performing your job. Write down, in no more than half a page, a brief description of the incident. Be sure your description includes the following details : (1) when and where it occurred, (2) who was involved (roles and job titles rather than personal identities may be given), (3) the exact nature of the dilemma, (4) how you resolved it, and (5) your reasoning for resolving it this way."

3.1.4: Group Self-analysis.

A group interview or group discussion can require the participants to diagnose where they had failed or had been particularly successful in accomplishing a particular task. After introducing the participants to the concept of quality through conformance to requirements as underlying

assumptions, and illustrating for them some specific dimensions, they can be given a set of instructions for analyzing themselves. Such types of analyses are particularly suitable for identifying faulty or obsolete processes and to determine which of the processes require attention.

3.1.5: Questionnaires.

A well-constructed questionnaire can be a valuable tool for measuring beliefs, values, and ideologies, especially if supplemented by interviews and participant observation methods. The resulting statistical profile can be used as a baseline measure against which changes in perceptions can be monitored through subsequent application of the questionnaire. The consciousness-rating impact of the survey process can also be used to facilitate the change process. During feedback sessions, participants provide those conducting the survey assessment additional insight into the organizational culture by examining more critically the perceptions implied by the data. They also begin the process of "unfreezing" some of their thinking patterns by becoming more aware of how these perceptions impact their work behaviour in the organization.

3.2: The Questionnaire Design

The questionnaire was specifically designed to study two issues. The first is to examine the employee's perception on the need for introducing a Quality Management System to their organization. Secondly, to examine the organizational qualities of Leadership Style, Commitment, Empowerment, Motivation, Teamwork and Quality Culture; of which are major human factors that have been shown in many studies to affect successful QMS implementations into an organization.

The development of the questionnaire itself was also being guided by a number of studies on similar subjects which were developed by Robson, (1994), Morden, (1993), Leedy, (1993), Hackman and Oldham (1980), Howell and Avolio (1998), Stodhill, (1974), Sim et al. (1987) and Crosby P. (1995).

The questionnaire was also guided by well recognized tests on organizational behaviour developed by Alport et al.(1960) and Reddin's (1992) Management Style Diagnostic Test. These tests were particularly useful in helping the researcher to frame and select specific questions in the questionnaire.

As there was a need to measure concepts, it was desirable to use multiple-item measures.

This entails asking individual respondents to the questionnaire their positions in relation to a number of indicators that stand for one concept. In order not to "put off" respondents with a long list of statements to be completed in the questionnaire to the survey, it was decided to keep the whole questionnaire format short. Specifically, the whole questionnaire sheet to be handled by respondents has to fit into only 2 A4 sheets of paper. For measuring the concept for accepting QMS, the researcher has chosen 5 indicators and 4 indicators for each of the employees' perception on the organizational qualities. The procedure for analyzing such multiple measures was to aggregate each individual's response in relation to each question and to treat the overall measure as a scale in relation to which each unit of analysis has a score. The scaling procedure chosen was the Likert scaling, which is a popular approach to the creation of multiple item measures. With the Likert scaling, individuals were presented with a number of statements that appear to relate to a common concept; they then indicate their degree of agreement or disagreement on a one to five point range. The answer to each constituent question was 53 scored from 1 for strongly disagree to 5 for strongly agreeing with the statement or question. The individual scores for each concept was then added up to form an overall score for each respondent. The use of these multiple scales was chosen for the following reasons. First, a number of indicators are more likely to capture the totality of a broad concept like Commitment than a single question. Second, it presents the possibility to draw finer distinctions between respondents. For example, the commitment measure comprises four questions which were scored from 1 to 5, so that respondents' overall scores could vary between 4 and 20. If only one question was asked, the variation would be between 1 to 5 - a considerably narrow range of potential variation. Third, if a question was misunderstood by a respondent when only one question was asked, that respondent would not be appropriately classified; if a few questions were asked, a misunderstood question could be offset by

those which were properly understood.

The wording of some of the questions that go to make up the recording scale was also varied in such a

way that those respondents who say yes to everything described as (yeasayers) or no (naysayers) by

Bryman and Cramer (2001), do not end up with an extreme score and sabotage the study results. For

this purpose, questions 22(c) "The Organization is not interested in changes and improvement" for

assessing Quality Culture and question 26 "I am UNABLE to make my own decisions about how I do

my job" for assessing Empowerment were worded in the opposite direction. Whilst it would have

been possible to reverse the numbers of the scales of these two negatively worded questions, this

would have drawn the attention of the respondents and ruin the purpose for which these questions

were set up in the first place. It would be simpler to just reverse the scales when analyzing the data;

for example a 1 on the scale would be re-coded to 5, a 2 to 4, 4 to 2 and 5 to 1 during the analysis.

The questionnaire was also designed to be easily read, to the point and simple to understand. To this

effect, a pilot study was first carried out to pre-test the questionnaire. Based on the feedback,

appropriate modifications were made in terms of simplicity of language used and to clarify the

questions asked, before finalizing the questionnaire for distribution to the respondents being selected

for the purpose of this study.

The questionnaire was scheduled as follows :-

Section A : This section ask for information which are related to the respondent's background

such as age, gender and academic level. In addition, specific information pertaining to his or her job regarding the division currently working in, the present position, total working experience, and the length of service in present organization.

Section B : This section consist of a total of five statements, items 8 to 12 and would be used

to measure the individual respondents' perception on the need for the introduction of a Quality Management System (QMS) in the organization.

Section C : This section consists of a total of four statements, items 13 to 16 relating to the

Commitment of the individual respondent.

Section D: This section consists of a total of four statements, items 17 to 20 would be used to

measure the Leadership style of the superiors as perceived by the individual respondents. These items measure the superior's initiating structure and consideration for his/ her subordinates.

Section E : This section consists of four statements, items 21 to 22 to gauge the Quality Culture of the organization as perceived by the individual respondent.

Section F : This section consists of four statements to measure the Motivation level of the individual respondent towards quality in his/ her present job. The expectancy is measured by items 23 to 24.

Section G: This section consists of four statements to measure the level of Empowerment accorded to individual respondents in the organization. Items 25 to 28 measure this construct.

Section H : This last section consist of four statements, items 29 to 30 to gauge the individual respondent willingness to participate in Teamwork.

A sample questionnaire used for the study is shown in Appendix 1.

54

3.3: Sample Selection Procedures

According to Kerlinger (1985), when carrying out sample selection two criteria have to be met, firstly,

representatives and secondly, adequacy. In the case of representatives, Kerlinger (1985) pointed out

that the sample selected must represent the study population, that is each member in the study

population must have an equal chance of being selected into the sample from the study population. In

essence, the sample selection procedure must not purposely exclude a certain section of the study

population from being selected.

On the other hand, adequacy of the sample refers to the ability of the sample to make accurate

inferences about the characteristics or the parameters of the study population. In short, the sample size

should be large enough to allow the researcher to predict the population parameters within an

acceptable limit.

In the case of this research, the study population consists of all the staff falling into the managerial,

executive, supervisory and non-executive category in the company in which the study was carried out.

When compared to the overall workforce of the company, the number of employees placed into these

categories was relatively small. This was because the company under study is in the logging business

and a large proportion of their workforce consisted of skilled workers.

To ensure that the sample was representative of the upstream forest operation which represent the

study setting, the study sample was being selected randomly with equal sampling size from each of the three divisions involve in forestry management. In order to obtain proportionate sample sizes from employees in the managerial, executive, supervisory and non-executive categories, the study employed the stratified sampling technique and simple random procedures. To ensure adequacy, a minimal of forty-six percent of all the employees in each of the categories was selected to form the study sample from the list of all employees, which fall into the specified categories, kindly provided by the human resource department of the company under study. A total of 170 respondents in the upstream forest operation were chosen to constitute the sample for the study.

The representative samples chosen from each of the categories are given in TABLE 10 shown below :

Table 10: The number of respondents and categories used for the research.

ID	CATEGORY	NUMBER OF RESPONDENTS
01	Managers	20
02	Executives	30
03	Supervisors/ Foreman/ Mandors	40
04	Non-Executive Staff	80
TOTAL		170

3.4: Data Collection Procedures

The data for the study was collected through the structured questionnaire. This instrument was

selected because a questionnaire was the most convenient means to reach the target population sample

and also it was expected that the method would create the least inconvenience to the respondents of

the study. The questionnaire provided a win-win situation in that firstly, all the respondents were

literate and secondly, the respondents were allowed to answer the questionnaire at their own

55

convenience. And thirdly, by using this method, it permitted a larger number of

respondents working at different locations to participate in the sample population. The questionnaire was personally delivered to the respondents by the researcher. This was to ensure that the questionnaire reached the individual respondent and also the opportunity to clear any doubts or apprehension from the respondents as to the purpose of the study. The collection of the completed questionnaires from the respondents were made on a personal basis where ever possible, or through the kind assistance from the Human Resource Manager of the company under study. This method was chosen because it provides the "Backup" facility to subsequently clarify any portion of the questionnaire that might pose a problem to the respondents either by the researcher himself or with the assistance of the organization's HR manager. This ensured that more questionnaires were returned and that the returned questionnaires were "fully" completed. The respondents were given a fortnight to return the questionnaires and were assured that the answers given in their questionnaires would be treated in strict confidentiality. They were encouraged to complete all the items in the questionnaire honestly, and without fear of reprisal from the management.

3.5: Reliability Test of the Scales

The reliability of a measure indicates the extent to which the measure is without bias (error free) and hence offers consistent measurement across time and across the various items in the instrument. In other words, the reliability of a measure indicates the stability and consistency with which the instrument measures the concept and helps to assess the "goodness" of a measure. (Sekaran, 2000). In the study, the questionnaire used to measure the various concepts consisted of related statements. Recording of the respondents' statements was done on the Likert scale that ranges from 1 to 5 for each statement. In order to analyze a particular concept, the scores to the related statements or indicators were summated to form an index score or summated score. Hence, for each particular concept, there would be an absolute minimum and an absolute maximum summated score depending on the number of statements used. An important concern on using summated scales as a measurement instrument is its

reliability.

Sekaran (2000) emphasized that a questionnaire is considered reliable only if the results obtained under different circumstances, such as over time, over different population would give similar results.

In the study, in order to determine the reliability of the measurement, a reliability analysis has to be carried out.

For this purpose, the researcher used the Cronbach's alpha (α) method. This method was selected

because it is one of the most commonly used reliability coefficient employed in research studies. It is

a reliability coefficient that indicates how well the indicators in a set are positively correlated to one

another. Cronbach's alpha (α) is computed in terms of the average inter-correlation among the

indicators measuring the concept. The closer Cronbach's alpha (α) is to 1, the higher the internal

consistency reliability. This measurement also provides the statistics about inter-item correlation

which also suggests that by dropping certain "distorted" samples from the test, the test's reliability

could be improved.

56

3.6: Statistical Techniques and Data Analysis

In the research analysis, the data obtained from the questionnaire was processed with the aid of a

Computer software, the Statistical Package for the Social Sciences for windows (SPSS Release 11).

The data collected in the questionnaire include both nominal and interval data. Examples of nominal

data collected were the age, gender, job position, academic qualification, and length of working

experience of the respondents. The other measures on various concepts were gauged using the Likert

Scales. These scales were summated and treated as interval data.

The study employed the following statistical methods for data mining the information collected and

this included: descriptive statistics, t-tests, analysis of variance, cross-tabulations, Pearson-Product-

Movement Correlation, and multiple regression analysis.

The descriptive statistics will be used to describe the characteristics of the respondents. Crosstabulations

will be used to compare the respondents who differ in job position held, academic qualification, and past working experience.

T-tests will be employed to examine for significant differences in the mean scores for

indicators such

as gender of respondents and their perceptions for the need for introducing QMS.

The analysis of variance (ANOVA) will be used to test for comparisons of mean scores of indicators

involving more than two groups of respondents, such as those of job position held, length of working

experience, and the division they are working at.

The Pearson-Product-Movement correlation coefficients (r) will be employed to study the strengths

and nature of the association between the independent variables of Leadership Style, Commitment,

Empowerment, Motivation, Teamwork, Quality Culture and QMS.

The multiple regression analysis will be used to determine the amount of variance that can be

explained by the chosen predictor independent variables. The generated R squared Statistics (coefficient

of determination) will determine the goodness of fit of the predictor variables selected for this study as predictors of employees' perception for the need for introducing QMS to the organization. In addition, by interpreting the standardized beta (β) values, there is also the possibility

to determine the strength of each of the predictor variables in assessing the perceptions of employees

towards the need for introducing QMS into the organization.

3.7: Test of Significant Relationships

In the analysis, the testing of all hypotheses would require a critical value or significant level upon

which a decision to accept or reject the hypotheses could be made. This significant level will be

denoted by the letter " α ". In using this significant level, it will determine the risk that the researcher

will be willing to take in accepting or rejecting the hypotheses.

In most social research studies, a 95% confidence level is sufficient and accepted as statistically

significant. Hence the level of significance used for this research was set at $\alpha = 0.05$. A hypothesis

will therefore be considered as substantiated with α values of less than 0.05.

57

Chapter 4: Presentation of analysis and results

4.1: The Forestry Business process

Information gathered from the survey were then cross-referenced against data collected through the

following research instruments to identify the crucial processes that form the business process.

- Examining existing internal documents such as the forestry appraisal reports, company's standing instructions, specifications, operational reports, production records, log stock inventory,

and

company's operational instructions, guidelines and manuals.

- Examining existing external documents such as Cambodia National Forest Policy, forest laws, sub-decrees, regulations, forestry code of practice, and directives, and approved Master Plan by the Cambodia Ministry of Agriculture and Forestry and other documents that affect the flow of the management process.

- Discussions/Interview forest operations staff : forest operations manager, timber-camp manager,

forester, logging supervisors etc

- Discussions/Interview supporting units staff : purchasing supervisor, stock controller, internal

auditor, camp administration supervisor etc

- Examining existing control and monitoring mechanisms.

4.1.1: The Business Model

Using the ISO 9001 Quality Management System criteria as the structural framework guidelines, the

major work processes of the forest operations were systematically identified and documented. (See

Appendix 2: QMS Doc)

These were consolidated and presented in work process flow charts that shows the main operation

processes, sequentially documented procedures, and their linkage mechanisms in a comprehensive

working model of the upstream forest operations.

The major work processes flow charts for the forest operations were presented in the three operational

phases of planning, implementation and delivery. In each of the operational functions, the processes

chart were further refined where applicable into their specific planning process and flow, sectional

field work process and flow, and the documentation process and flow, incorporating where possible

the relevant components of the ISO 9001 elements of quality management requirements. (See

Appendix 2)

For the forest operations, three of the twenty elements of management criteria i.e. Control of

customer-supplied product, Servicing, and Statistical Techniques were not applicable to the business

process.

4.1.1.1: Planning

- Strategic Level Planning (SFMP) for 25 years QMS Doc. Planning-1

- Compartment level planning (MTMP) for 5 years QMS Doc. Planning-2

- Annual Logging plan (ALP) QMS Doc. Planning-3

58

4.1.1.2: Implementation

- Implementation of Logging operations QMS Doc.Implementation-1
- Infrastructure Construction QMS Doc.Implementation-2
- Harvesting Operations QMS Doc.Implementation-2
- Post Harvesting/Forest Rehabilitation QMS Doc.Implementation-2

4.1.1.3: Delivery

- Delivery of final product (logs to mills) QMS Doc.Delivery-1

4.1.2: Other Documentation

During the process of the qualitative research, attempts were also made to further define job tasks

through formulating and documenting job descriptions and their corresponding work instructions.

Although these were readily available from the employment contracts and company manuals, there is

the need to refine and customize the descriptions, and to relate the job tasks directly to the operational

work flow process. Some of the job descriptions and work instructions documented as examples are

presented in Appendix 3.

4.2: Analysis of data collected from the Questionnaires

Of the 170 questionnaires handled out, 25 questionnaires were not returned and 7 of the returned

questionnaires were deemed inconclusive/damaged because some were incomplete whilst others had

multiple markings for several scores on the same statements. The results were summarized in the pie

chart below:

4.2.1: Checking the Reliability of Measures - Cronbach's alpha (α)

The interitem consistency reliability or the Cronbach's alpha (α) reliability coefficients of the 7

independent and dependent variables were obtained and presented in Appendix 4.

The result indicates that the Cronbach's alpha (α) for the 5 item QMS measure is 0.7166. The closer

the reliability coefficient gets to 1.0, the better. As a rule of thumb, reliabilities measure of less than

0.6 are considered to be poor, those in the 0.7 range, acceptable, and those over 0.8 good. Cronbach's

alpha (α) for the other 6 independent variables ranged from 0.6466 to 0.8802. Hence the internal

consistency reliability of the measures used in this research can be considered to be good and valid for

interpretation use.

Figure 9: Pie Chart Showing Percentage of Questionnaires Returned

more than 2 years, 16 percent between 2 to 5 years and about 25 percent for more than 5 years. Their work experiences were about 36 percent for more than 5 years, 18 percent for between 5 to 10 years and a very high 46 percent with more than 10 years experience.

60

4.2.2.2: Descriptive

Descriptive statistics such as those of maximum, minimum, means, standard deviations and variances

were also generated for the interval scaled independent and dependent variables and presented in Appendix 6.

It should be noted that all the variables except QMS were measured using 4 indicators of a five point

scale each and summated on a 20 point scale. The five indicators for QMS were summated to a 25

point scale. From the results, it can be seen that the mean on motivation is rather low (9.93 on a 20

point scale), about average for those of Culture, Empowerment and Teamwork (11.06, 11.5 and 12.67

respectively on a 20 point scale). Commitment and Leadership Style are the factors perceived to

somewhat drive the need for implementing QMS with mean scores of 14.0 and 13.36 on a 20 point

scale.

The mean of 15.72 on a twenty five point scale for QMS indicates that most of the respondents are

favorable to the concept of introducing a quality management system into the organization. The

minimum of 9 indicates that there are none that completely disagree with QMS, and the maximum of

23 indicates there are some who strongly concur with the need for introducing QMS into the

organization.

4.2.3: Pearson Correlation Matrix

The Pearson correlation matrix for the 7 interval-scaled variables of Commitment, Leadership Style,

Culture, Empowerment, Motivation, Teamwork and QMS were obtained and presented in Appendix 7.

From the literature survey, one would have expected that all the 6 independent variables would be

negatively correlated to the need for introducing QMS. In other words, an increase in any one of the

human factors would decrease the need for implementing QMS. However, from the results, it can be

detected to be significant at the 0.01 level that only the Empowerment factor was negatively correlated at -0.222 to QMS and that of Leadership style to be positively correlated at 0.249 . That is, an increase in empowerment would decrease the need for implementing QMS and intensifying current Leadership Style would greater necessitate the need for implementing QMS. The other factors were not significant even at the 0.05 confidence level and hence ignored though it should be noted that the factors of Motivation and Culture were also negatively correlated to QMS. The factors of Commitment and Culture were also significant at the 0.01 level to be positively correlated at 0.390 to Leadership Style and at 0.364 to Motivation respectively whilst those of Leadership Style were negatively correlated at -0.323 to Culture and -0.257 to Motivation. That is, the results indicate that an increase in management Commitment will lead to greater acceptance of the Leadership Style of the current management and an improvement in the Organizational Culture would increase motivation amongst the employees. Also, a toning down of the current Leadership Style will improve the organizational Culture and increase motivation. At the 0.05 significant level, Empowerment was also positively correlated at 0.201 to Motivation. It is also pertinent to note that none of the correlation exceeded 0.39 for this study. If the correlations were higher, say 0.75 and above, then it might be necessary to question whether the correlated variables were indeed two different and distinct variables and would have brought doubt as to the validity of the measures. Clearly, the results indicate the widely held perception that the prevailing Management Leadership Style needs to change or improve. The indications are that through increasing commitment and the delegation of more authority down the line (empowerment), the organizational Culture could be enhanced and bring about greater motivation. The implementation of QMS is seen as a means to "regulate" and improve current leadership style.

61

4.2.4: Hypothesis Testing

4.2.4.1: Hypothesis 1 – Female employees perceive a greater need for introducing QMS than

male employees.

Hypothesis 1 can be stated in the null and alternate as follows:

H1o: There will be no difference between men and women in their perceived need for introducing QMS. Statistically expressed:

H1o is: $\mu_w = \mu_m$

where μ_w is the perceived need for QMS by women and μ_m is the perceived need for QMS by men.

H1A: Women will perceive a greater need for introducing QMS than men or statistically expressed as :

H1A is: $\mu_w > \mu_m$

The use of t-test will indicate if the perceived differences are significantly different for women than for men. The results of the t-tests are presented in Appendix 8. The results show that the means of 16.67 and 15.52 with standard deviations of 3.749 and 3.907 for the women and men on their perceived need is not significant (see independent samples test table showing t-test for Equality of Means where $p > 0.05$).

Hence, hypothesis 1 cannot be substantiated.

4.2.4.2: Hypothesis 2 - The employees' perception towards the need for implementing QMS will

vary depending on the division they are working at.

Hypothesis 2 can be stated in the null and alternate as follows:

H2o: The perception of individuals will be the same irrespective of the division they are working at or statistically expressed as;

H2o is: $\mu_1 = \mu_2 = \mu_3$

Where μ_1 , μ_2 , and μ_3 represents the means of their perception towards QMS of employees working in the Headquarters, Chhlong, and Koh Kong divisions respectively. Alternatively

H2A: The perception of individuals will not be the same depending on the division they are working at or statistically expressed as;

H2A is: $\mu_1 \neq \mu_2 \neq \mu_3$

As there are more than 2 groups (three different divisions), and their perceived need is measured on an interval scale, the use of ANOVA is appropriate to test this hypothesis. The results of the one way ANOVA test is presented in Appendix 9(a).

The F value generated is 0.756 and is not significant at the 0.05 level ($p > .05$). Hence, hypothesis 2 cannot be substantiated.

62

4.2.4.3: Hypothesis 3 - Their level of acceptance for QMS will vary according to their job position. In other words, there will be significant differences in their perception for the need to introduce QMS amongst Managers, Executives, Supervisors and Non-Executives.

Hypothesis 3 can be stated in the null and the alternate as follows:

H3o: There is no difference in the perception towards QMS at the four different job levels or statistically expressed as;

H3o is: $\mu_1 = \mu_2 = \mu_3 = \mu_4$

Where the four μ s represent the four means on the perception towards QMS

of employees at the four different job levels.

H3A: The perception towards QMS of members at the four different job levels will vary significantly or statistically expressed as;

H3A is: $\mu_1 . \mu_2 . \mu_3 . \mu_4$

The results of the one way ANOVA test is presented in Appendix 9(b) and do not indicate any significant differences in their perception amongst the four groups($F = 0.47$ and $? = 0.7$).

Hence, hypothesis 3 was not substantiated.

4.2.4.4: Hypothesis 4 - There will be a relationship between welcoming the introduction of QMS

and the length of working experience of employees. In other words, these two factors will not be independent.

Hypothesis 4 can be stated in the null and the alternate as follows:

H4o: There is no difference in the perception towards QMS amongst the three groups with different working experience intervals or statistically expressed as;

H4o is: $\mu_1 = \mu_2 = \mu_3$

Where the three μ s represent the three means on the perception towards QMS of employees at the three different work experience interval levels.

H4A: The perception towards QMS of members at the three different work experience levels will vary significantly or statistically expressed as;

H4A is: $\mu_1 . \mu_2 . \mu_3$

The results of the one way ANOVA test is presented in Appendix 9(c) and do not indicate any significant differences in their perception amongst the three groups($F = 1.14$ and $? = 0.323$).

Hence, hypothesis 4 was not substantiated.

63

4.2.4.5: Hypothesis 5 - The six main human factors that has been widely expounded by the

Quality Gurus to significantly affect successful QMS implementation of Leadership style, Management Commitment, Empowerment, Motivation, Teamwork and Quality Culture will significantly explain the variance in the need for implementing QMS.

Hypothesis 5 can be stated in the null and the alternate as follows:

H5o: The six independent variables will not significantly explain the variance in the need for implementing QMS.

H5A: The six independent variables will significantly explain the variance in the need for implementing QMS.

The multiple regression analysis was used to test this hypothesis. The results of regressing the six independent variables against QMS are presented in Appendix 10. The first table shows the six independent variables that were entered into the regression model. The "Model Summary" table gives $R = 0.336$ which is the correlation of the six independent variables with the dependent variable after all the inter-correlations among the six independent variables were taken into account, and produced the explained variance (R Square value) of 0.113. The ANOVA Table indicates the F value at 2.769 and

is significant at the 0.05 level ($p = 0.014$).

What the results indicate is that 11.3 percent of the variance in the need for implementing QMS has been significantly explained by the six independent variables of Teamwork, Empowerment, Commitment, Culture, Leadership style and Motivation. Hence, hypothesis 5 is substantiated.

The Beta values in the coefficients table indicates which among the six independent variables is the most important in explaining the variance. It can be seen that only the Beta values for Leadership Style at 0.227 and Empowerment at -0.197 are significant at the 0.05 level ($p = 0.02$ and 0.022 respectively). Similar to the results indicated by the Pearson correlation matrix earlier, the negative beta weight indicates that increasing empowerment will decrease the need for implementing QMS; and the positive beta weight for leadership style indicating any intensification of current Leadership Style would greater necessitate the need for implementing QMS.

4.2.4.6: Hypothesis 6 - There will be a relationship between the employees' job position held and the length of period they have worked with the company.

Hypothesis 6 can be stated in the null and the alternate as follows:

H6o: The level of job position held and the period of time worked for the company will be independent (i.e., will not be related).

H6A: There will be a relationship between the employees' job position held and the length of period they have worked with the company.

Since both variables involved are nominal, the chi-square (χ^2) test was chosen and the results presented in Appendix 11(a). The cross tabulation count shows the frequency of the employee's job position versus the length of period each category had worked in the company. The generated Pearson chi-

square (χ^2) value of 3.903 with 6 degrees of freedom, is not significant ($p = 0.69$). In other words, the level of job position held and the period of time worked for the company are not related. Hence, hypothesis 6 has not been substantiated.

4.2.4.7: Hypothesis 7 - There will be a relationship between the employee's job position and their academic qualifications attained.

Hypothesis 7 can be stated in the null and the alternate as follows:

H7o: The level of job position held and the level of academic qualifications held will be independent (i.e., will not be related).

H7A: There will be a relationship between the employees' job position held and their academic qualifications attained.

As in hypothesis 6, the chi-square (χ^2) test was chosen and the results presented in Appendix 11(b). The cross tabulation count displays the frequency of the employee's level of academic qualifications attained against the job position held in the company. The generated Pearson chi-square (χ^2) value of 75.122 with 6 degrees of freedom, is significant ($p < 0.001$). In other words, there is a significant relationship between the employee's level

of academic qualifications attained and the level of job position held in the company. Hence, hypothesis 7 is substantiated.

4.3: Other Research Findings

The study of the research project shows the followings;

- The concept of QMS is new to the employees. Job-wise, they are well aware of the changes required for improvements but were unable to conjure together their convictions for one reason or another and put them into practice. Most of the key personals interviewed initially were apprehensive, perceiving instead the interview survey as intrusive and management's "new" guise to appraise their knowledge and performance abilities. The timing of the survey has also a part to blame as it was conducted during the first quarter of the year where traditionally appraisals and reviews were held to ascertain the past year's performance to determine the coming year's bonuses.

The initial stages of QMS implementation are therefore likely to encounter difficulties. It is recommended to conduct pre-launch quality awareness campaigns prior to any implementation programmes.

- The successful implementation of a QMS will require participation and commitment not only from employees but also senior managers. The CEO has to be seen as the driver by providing leadership. Management commitment must be visible, by providing training, resource allocations and creating the environment.

- There was some existing documentation of work processes, but they were mostly ad hoc,

and have not been customised to the specific Cambodian operations. Support documents such as job descriptions, work instructions, user manuals, specifications, inspection criteria, drawings etc which are necessary for providing detailed instructions/requirements

in carrying out specific tasks were mostly available in the company's internal documents. There is no one standard quality manual to comply with.

- The forestry operational processes are exceptionally complex and cumbersome. They are

complicated because of the large numbers of legislative and regulative requirements that has to be fulfilled at each operational process.

65

Chapter 5: Conclusion and Recommendations

5.1: Conclusions

The main core of the research work was in the scanning of the internal and external environment to

ensure that all relevant technical and regulatory procedures were integrated into the work tasks, and

the subsequent identification, verification, analysis and documentation of the forest operations main

operational flow processes into flow charts.

The systematic formulation of the operational flow processes encountered large numbers of multiple

steps required in the approval process for most tasks. Indecisive, multiple layer endorsements and

approvals from different departmental sections are necessary, reflecting gross

inefficiency in the current bureaucratic administrative system within the approval authority. This also reflects the over regulative nature of the forest business. During the course of this research project in initiating the implementation of a Quality Management System, benefits have already been realised. The research studies and interviews conducted had initially generated both employee confusion and enthusiasm, as well as resentment especially amongst first line managers. The interest in their work tasks was viewed as an attempt by management to review their job scope, authority and hence comparative efficiency in their performance. However, through a series of workshop participation and discussions, their apprehension was arrested when they realised that the interest was not directed at any person or job, but at the need to derive the most efficient procedures and practices to effect their job tasks in their work process. Interest and confidence was restored and enhanced when they could see the benefits in better understanding the processes involved, the standards of performance required of them, and how their work relates to the overall business process. In being clearer how their work tasks fits into the overall business process, and the consequential effect that could arise as a result of their non or inefficient performance on their part, has brought about a closer sense of belonging and the commitment to a better corporate team spirit. Their having a better knowledge of the work flow process and procedures including available options clearly laid out ahead will increase efficiency through facilitating decentralisation of decision making. The other benefits of implementing this quality management system is envisaged to include:

- Improve marketing position through quality assurance
- Better control of operations
- Reduction in rework and redundancies
- Improve productivity through streamlined operations
- Improve morale through reduced complaints/confusion
- Consistent products and services
- Supplier quality assurance or quality control waiver
- Provides a working model that can easily adapt to accommodate any change in compliance requirements
- Available methods and documentation

- Meet stakeholder requirements.
- Forces discipline and commitment among both employees and management.
- Update quality procedures
- Emphasis on efficiency, effectiveness and competitive advantage

It was also noted that the current operating system will only enable the concerned/affected sector to be aware of process constriction, disruption or bottle neck whilst the next sector in the flow chain very often will not be aware of the problems developing and therefore unable to react to it in time. There is a need for effective vertical as well as lateral communication and co-ordination between controlling management units and the operating sections to address restrictions in the operational flow process.

66

Of the seven hypothesis tested in the data analysis, two were substantiated and five were not.

From the results of the multiple regression analysis, there is the indication that amongst the six human factors examined, Leadership Style and Empowerment are the most critical factors in explaining the need for implementing QMS into the organization. Therefore, whatever is done to address these two factors will facilitate the QMS implementation process.

It is also clear from the results that the employees' perception towards the need for implementing

QMS does not significantly differ by gender, operating division, job level or their length of working experience. That is, in general there are no particular sections of employees detected in this study who feel a strong need for implementing QMS. However, from the descriptive statistics (see Appendix 6)

where the mean for QMS is 15.72 on a 25 point maximum scale, the overall indication is that the

employees as a whole are favorable to the introduction of QMS.

The Pearson correlation matrix (see Appendix 7) clearly indicates that the employees are uncomfortable with the current management Leadership style. They perceive the prevailing leadership

style as a key deficiency in their current organizational culture and a major cause of demotivation in

their workplace. They would like a higher level of management commitment and decentralization of

management control so as to allow them greater authority in their workplace. They view the

introduction of QMS as a means to better regulate and control the prevailing leadership style.

Bearing in mind that the respondents in this survey were all from the management category, the Chief executive officer will be well advised to initiate commissioning an independent panel to identify and examine the gravity of the perceived deficiencies in the system. For the long-term interests of the organization, it is important to rectify the perceived deficiencies if they really do exist, or clear the misperceptions if this was really the case. Either way, an effort to address a perceived management problem will never go to waste. It exhibits senior management's concern and commitment to bring excellence and harmony to the workplace. It is however, disappointing to note that only 11.3 percent of the variance in the need for implementing QMS have been significantly explained by the six chosen independent human factors. In other words, there are other additional variables that are important in explaining the need for QMS that has not been explored by this study. So further research might be necessary to better explain more of the variance in QMS if the management wishes to pursue the matter further. Finally, in an attempt to address the employees' long term commitment to the organization, their concern that were frequently raised during interviews conducted over career development prospects and suspicion that the organization is moving towards being a "qualifications centered" organization was examined in hypothesis 6 and 7 (see Appendix 11). The results clearly show that there is a significant relationship between an employees' job level and formal qualifications attained. This dispels the long-term belief in the logging industry that work experience is more important than formal qualifications when vying for promotion prospects and confirms that the organization is moving towards being a learning organization. This is also confirmed in the descriptive statistics where there is a clear increase in the proportion of higher qualified personal recruited in the workforce in the last two years. Committed employees are therefore well advised to pursue further formal educational studies to excel themselves and at the same time improve their chances for job promotion prospects within the organization.

5.2: Recommendations

In implementing a practical quality management system, the essential requirements are: commitment,

communication and consistency. The top management should focus on the following activities in

order to successfully implement QMS into the organization :

5.2.1: Demonstrate Management Leadership

It takes management wisdom and vision to be committed in the introduction of a QMS.

Top Management leadership is crucial in allocating resources to facilitate the implementation, being responsible and be seen to be accountable for the specific QMS program. To be effective, QMS must apply to all and followed by all without exceptions. To demonstrate commitments, Top Management's hands-on involvement, personalised attention and interests, keeping abreast of progress and development, and offering advises, assistance, etc are essential.

5.2.2: Communicate Effectively

To be effective, communications must be a two way process. Various channels must be established for both lateral and vertical communications together with feedbacks are essential to convey the management expectations, initiatives and recognitions as well as the staff suggestions, progresses, achievements and successes. Feedbacks are key to motivation, employee satisfaction and behavioral modification.

In the working environment, employees, particularly new ones have to adapt to the desired quality culture through carefully structured induction programs, dialogues, monthly meetings, brain-storming sessions, familiarization courses and awareness campaigns.

To facilitate co-ordination, especially in minimising constriction in work-flows, there is the need for the development of better communications through a documented procedure that requires the affected section to inform the other affected sectors immediately so that necessary measures may be taken ahead of the anticipated problem.

5.2.3: Provide Continuous Training For Employees

Identify training needs of the departments and individuals and set out clear terms of reference to be determined and agreed by Management. Priorities should be accorded to line managers and supervisors before shop-floor workers. The training should be focused on :

- work flow control;
- quality control, inspection or test involved;
- quality specification and determine the overall standards;
- production control;
- documentation and its effective usage.

Scholarships or sponsorships for further formal education programmes should be looked into for upgrading skills of promising employees that are earmarked for further promotion. This is crucial to retain employee's long term commitment and morale in view of the organization's preference for better-educated managers.

68

5.2.4: Set up Quality Improvement Team

Team work is an effective mechanism for promoting change as people are more likely to take ownership of a solution or change they have been involved in. In managing the

quality transformation, the organization should look at setting up a dedicated team of QMS personnel headed by an independent, fully authorised Project Manager who possess Top Management's mandate to effectively implement QMS without fear or favour (even to the extent of criticising the Top Management!). The purpose of this team is to:

- improve a work process;
- select individual(s) with specialist knowledge about a part of the process to be team member(s);
- provides training on quality work process to employees;
- develop Quality Campaigns
- act as both implementor and co-ordinator for managing quality transformation.

5.2.5: Develop Commitment

The success of managing quality transformation comes from everyone working together with a genuine dedication to the goal and willingness to expend energy to achieve it.

Commitment can be fostered in the organization in a number of ways:

- encouraging team members to set high expectations for each other;
- encouraging and expecting everyone to contribute to their full capability;
- ensuring that individual objectives are not pursued at the expense of the team goals;
- ensuring that individual performance problems are resolved;
- ensuring that team members or individuals are recognized and rewarded for their contributions to quality success.

5.2.6: Consolidate Documentation

Documentation is one of the most important requirements for an effective QMS. It is therefore recommended to consolidate all information affecting the forest operations into a comprehensive reference manual.

Three important documents to include should consist of :

(i) Codes of practices

These contain quality plans or contract specific documents. It should also contain the design and set of drawings / specifications.

(ii) Quality Manuals

These set out the general quality policy and practices, and are the books by which the organization plans for quality. It can also be a useful aid for such purposes as training (e.g. complementary to works instruction), or marketing, especially if the consequences of modifications necessary to satisfy customer requirements are emphasized (e.g. costs of deviating from standards).

69

Additionally, they can provide :

- information from which the purchaser may derive confidence in the supplier's organization (useful for supplier / vendor appraisal);
- as indication of the responsibilities and inter-related activities of personnel and functional groups;
- a vehicle for auditing, reviewing and evaluating the management and / or quality control system.

(iii) Quality procedures and work instructions.

These are the lower level documents used on the work sites on a day-to-day basis. They are descriptions of the activities that individual functional units are required to

implement as prescribed through the elements of the quality system. Work instructions should be developed and maintained to achieve the following objectives :

- prescribe the performance of all work that would adversely be affected by lack of such instructions;
- written instructions should be created and brought to a satisfactory state and put into use;
- should be subjected to continuing evaluation for effectiveness and adjusted as necessary;
- should provide a basis for control, evaluation, and review;
- should also provide means for delineating work to be done and for delegating authority and responsibility.

5.2.7: Documentation Control

All changes to documentation should be in writing and processed in a manner in which would ensure prompt action at the specified effective point, indicating whether the modifications were :

- (i) Retrospective;
- (ii) Immediate or;
- (iii) To be carried out at some later point in time.

In order to implement an effective control of the documentation, the following methods can be adopted :

- management should maintain a record of changes as they are made;
- ensure that observance of the rule that notations written on copy documents do not authorize departure from the original;
- documents (including drawings) should be re-issued after a practical number of changes have been made;
- provision should be made for the prompt removal of obsolete documents from all points of issue and use.

70

5.3: Suggestions For Further Studies

As this research project focuses primarily on introducing a QMS to the up-stream forest operations, in order to be consistent to the overall business operations, a study for implementing QMS is also required to be conducted on the down-stream operations. In particular, the following areas could be examined:

5.3.1 Different perceptions on QMS between employees of upstream and downstream operations.

Further studies could be carried out to assist in identifying the specific issues faced by these two categories of employees who may need different approaches to understand and relate their contributions towards QMS implementation.

Perhaps pursuing ISO 9002 would be more suitable for the down stream operations.

5.3.2 The linkage role of supervisors

A further study on the role of supervisors as the linkage between the managers and the workers could also be carried out to investigate how the supervisors might enhance the integration of the total work force through the QMS implementation.

5.3.3 Employees' commitment

As commitment of employees to QMS is difficult to measure, further studies may have to be carried out to investigate how employees can be better committed to a QMS program. In particular, research can indicate whether it is reward and recognition, motivation, training or a learning organization that leads to better commitment.

5.3.4 Benchmarking

Further research can be done through an external consultant to investigate the level to which our in-house QMS implementation has complied with the required international standards of ISO 9001. A suitably qualified independent consultant will be more objective in the investigation and will therefore help to assess our internal QMS more thoroughly.

5.3.5 Other factors

In this research project, some other human related factors that might influence the outcome of the research was not elaborated. These factors include the psychological climate, management styles, the work ethics, ethnical background, and the inherent cultural practices and preferences of the employees. Such factors could be considered in any further similar studies.

71

5.4: Suggested Works Schedules For Implementing in-house QMS

The following schedules have been suggested to facilitate in the implementation of an in-house QMS for the up-stream forest operations:

Date Place Action By Activities

01/01/03 –

02/01/03

Chhlong Camp Forest Manager,
Senior Foresters

2 days in-house workshop
in understanding QMS and
the Company's business
process

09/01/03 -

13/01/03

Head office,
Phnom Penh

Ceo, Director,
Forest Manager
Senior Forester

To review and develop
documentation process

14/01/03 –

17/01/03

Chhlong Camp,
Koh Kong Camp,
Office

Director,
HR Manager

Conduct QMS awareness
campaign with Camp
Manager, Camp
Supervisor/Foreman,
Operators, Forest Manager
and Forester
19/01/03 Head Office,
Phnom Penh
Ceo, Director,
Forest Manager
Assign designated persons
to set up the QMS team
and training the team
20/01/03 –
31/02/03
Forest
Department,
Head Office,
Phnom Penh
Forest Manager,
Senior Forester,
Camp Operations
Co-ordinator
Compilation of QMS
documentation and
Consolidate into a Quality
Manual
01/03/03 Head Office,
Phnom Penh
Ceo, Directors Launch Ceremony, with
the Director demonstrating
the Company's
Commitment and
unfolding its Quality
Policy to the entire staff.
01/06/03 –
05/06/03
Chhlong Camp
Koh Kong Camp
Director,
Forest Manager,
Other Senior
Management
Staff
To conduct a preassessment
audit, using the

ISO 9001 Quality criteria
as a benchmark.

01/07/03-

01/12/03

Head Office,

Phnom Penh

Director,

Forest Manager,

Other Senior

Management

Staff

To engage external

consultant to

implement/certify

compliance to ISO 9001

standards.

72

4.5: Chronological sequence of research activities conducted

Place People Activities

05/01/02 –

07/01/02

Chhlong Camp

office, operations

site

Camp manager,

Senior Foresters

Visit to camp and preliminary
discussions on implementing QMS –

survey for ideas, attitudes etc

12/01/02 -

14/01/02

Koh Kong Camp Camp-in-charge,

Senior Forester

Visit to 2nd camp for more discussions

on QMS awareness/implementation

29/01/02 Head Office,

Phnom Penh

Forest Manager,

Senior Forester,

Camp Operations

Co-ordinator

Conduct QMS awareness survey.

Interview with concerned based in HQ

to identify/determine planning

procedure & practices

04/02/02 Head Office,

Phnom Penh
Forest Manager,
Senior Forester,
Camp Operations
Co-ordinator, HR
Manager

Group/individual discussions with
concerned based in HQ to
identify/determine work processes and
requirements & approvals required.

8/02/02 Head Office,
Phnom Penh

Forest Manager,
Senior Forester,
Camp Operations
Co-ordinator, HR
Manager

2nd Group discussions with concerned
based in HQ to identify/determine
work processes ,requirements,
approval procedures etc.

Questionnaires distributed out for
survey.

18/02/02 Head Office,
Phnom Penh

Forest Manager,
HR Manager

Discussions on employee
attitudes/concerns on QMS survey

27/02/02 Head Office,

Phnom Penh
Senior Forester,
Camp Operations
Co-ordinator

Verification/clarifications of work
flow processes, approval procedures.

12/03/02 Head Office,

Phnom Penh

HR Manager Consolidation of returned
Questionnaires.

09/02/02-

05/04/02

Head Office,

Phnom Penh

Camp Manager,
Camp Supervisor,

Foreman,
Operators, Forest
Manager and
Foresters, SEU,
LICU

Conduct interviews with concerned on
job tasks, work processes, instructions
& approval requirements etc.

15/04/02 Head Office,
Phnom Penh

Senior Forester,
Camp Operations
Co-ordinator

Verification/clarifications of work
flow processes, approval procedures.

27/04/02 Head Office,
Phnom Penh

Forest Manager,
HR Manager

Verification/Clarifications of
processes flow charts/ approval
procedures.

73

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74

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APPENDIX 1: SAMPLE QUESTIONNAIRE DESIGN

From : Jeffrey Han To : Selected respondent(s)

Date :

Please find attached a copy of Questionnaire for your kind completion. This study is

being conducted as part of the requirements for a Doctor of Philosophy programme in which I am currently pursuing at ST CLEMENTS

UNIVERSITY. As such, the purpose of this study is purely academic in nature and mainly for the purpose stated.

This questionnaire is designed to find out a few things about yourself and your job.

Please answer the questions

truthfully. There are no right or wrong answers. Most of the questions will require your response by using the Likert

Scale of between 1 to 5 where "5" means you strongly agree (SA), "4" means that you agree (A), "3" means you are undecided (U), "2" means you disagree (D) and "1" means you strongly disagree (SD) with the statement.

Please kindly complete and return the Questionnaire within 1 week after receipt.

Thanking you in advance for taking

time to participate in this study.

1) What was your age last birthday (in years)? _____ Years.

(Please indicate with an [X] to each questions below)

2) Gender Male Female

3) Highest academic qualifications achieved? Diploma & below Bachelors degree Postgraduate

4) Which division are you in? Head Quarters Chhlong Koh kong

5) What is your present position? Manager Executive Supervisor Non-Executive

6) Total working experience? Below 5 years 5 to 10 years above 10 years

7) Length of service in present organization? Below 2 years 2 to 5 years above 5 years

(Please indicate whether you (1) Strongly Disagree, (2) Disagree, (3) are Undecided, (4) Agree, or (5) Strongly

Disagree with each of the following statements. Please circle ONE answer only for each statement.

SD D U A SA

8) Our services sometimes encounter waivers, deviations, and other indications of their not conforming to requirements.

9) We have a "fix it when necessary" oriented organization

10) We are unclear what management wants from us concerning quality.

11) Management does not know what the price of non-conformance really amounts to.

12) Management believes that quality is a problem caused by something other than management action.

13) I am very committed to the success of my organization.

14) I am willing to put in a great deal of effort beyond that necessary expected of me to help my organization.

15) My job is very important to the organization.

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77

(Please indicate whether you (1) Strongly Disagree, (2) Disagree, (3) are Undecided, (4) Agree, or (5) Strongly

Disagree with each of the following statements. Please circle ONE answer only for each statement.

SD D U A SA

16) I would not leave this firm even if another employer could offer me a little more money.

17) Our management is understanding, friendly and approachable.

18) There is adequate feedback on my job performance.

19) The management keeps us informed of their plans and changes long before they happen.

20) The management accept ideas, suggestions and views from employees.

21) Our suggestions for improvement in our job tasks are taken seriously by the management.

22) The organization;

a) Emphasizes on the quality of information to help employees avoid repeating mistakes

b) Is concerned on minimization of defects and waste.

c) Is not interested in improvement and changes.

23) Working "smart" will definitely lead to higher productivity.

24) If you work hard and perform well in your job, you will;

a) Be given a bonus/pay rise.

b) Be given an opportunity to further develop your skills and abilities.

c) Get a feeling you have achieved something worthwhile.

25) I am allowed to do my job as I choose.

26) I am UNABLE to make my own decisions about how I do my job.

27) I do not have to consult my supervisor if I want to perform my work slightly differently.

28) People in my section are left to do their work as they please.

29) I like/enjoy

a) Working with my colleagues

b) Exchanging ideas with others on work challenges/problems.

c) Helping colleagues when needed to complete a job

30) We often work in teams to resolve work issues.

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1 2 3 4 5
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78

Appendix 2: Business Process Flow Charts

Table of Contents

Item No. Document No

- 1: Major Operational Flow Chart QMS Doc.
- 2: Strategic Level Planning (SFMP) for 25 years QMS Doc. Planning-1
- 3: Compartment level planning (MTMP) for 5 years QMS Doc. Planning-2
- 4: Annual Logging plan (ALP) QMS Doc. Planning-3
- 5: Implementation of Logging operations QMS Doc.Implementation-1
- 6: Infrastructure Construction QMS Doc.Implementation-2
- 7: Harvesting Operations QMS Doc.Implementation-2
- 8: Post Harvesting/Forest Rehabilitation QMS Doc.Implementation-2
- 9: Delivery of final product (logs to mills) QMS Doc.Delivery-1

QMS Doc.

REGULATORY PLANNING COMPANY'S GOALS

REQUIREMENTS FUNCTIONS & OBJECTIVES

SFMP

MTMP IMPLEMENTATION

ALP/DBHP

SUPPORTING INFRASTRUCTURE

ACTIVITIES CONSTRUCTION

Main, Secondary & Bridges/Culverts &

Feeder Roads Others

* Survey/traverse/alignment

demarcation

GIS / EDP * Forest Inventory HARVESTING

PROCESSING OPERATIONS

* Tree Marking/100% Inventory

Felling & Bucking Log Landing & Snig Skidding & Winching Minor Log

INFORMATIONS/ * Forest Typing Track Preparation Transport

DATA/REFERENCE

* Forest Zoning

Log Scaling & Log Documentation & Major Log

* Protected Bufferzone Marking Royalty Assessment Permit to Transport Transport

* ESIA POST HARVESTING

ACTIVITIES

* SMA

Conduct Blocks Forest Rehabilitation/ Forest Nursery Reforestation &

* Coordination & etc. FINAL PRODUCTS Cutover Assessment Natural Silviculture

Maintenance Plantation Dev.

DELIVERY

Products Documentation Barge Loading/ Unloading to Factory/

SFMP - Sustainable Forest Management Plan & Permit to Transport Rafting & Shipment

Consignee

MTMP- Medium Term Management Plan

ALP/DBHP - Annual Logging Plan/Detailed Block Harvesting Plan

GIS - Geographic Information System

EDP - Electronic Data Processing

ESIA- Environmental & Social Impact Assessment

SMA - Special Management Areas

Forest Operations Department

Major Harvesting Operational Flow Chart

QMS DOC. PLANNING - 1

Forest Operations - Major Work Process Flow-Chart

Compliance to Regulatory Requirements Company Goals & Objectives: Data/Infor

Sources & References

* Investment Agreement, Timber License * Manage forest resources on sustainable basis

* Base maps for forest type, land use, geology &

* Forest Law & Sub-Decree * Realize max. benefits at lowest costs soils, satellite photos

* Standards & Manual for SFMP * Good responsible corporate citizen * Biological -
flora/fauna species occurrences

* Forestry Code of Practice * Socio-economic - demographic, public health

Planning Process & Flow

Field Work Requirement

* 25 years cutting cycle * Environmental considerations * Forest typing verification

* Semi-detailed forest zoning * Community considerations * 1% forest inventory for

EAY

* 5 compartments of 5 coupes each * Low intensity inventory sampling * Forest zonation
(operable /inoperable /

* Logistics & major access road network * Estimated Available Yield (EAY)
protection/community)

* Location of major facilities * Environmental & Social Impact Assessment
(Participatory Rural Appraisal)

* Major road network reconnaissance

Sectional Field Work Process & Flow

Forest Inventory Works Forest Typing & Zonation Work ESIA/SMA

- * Secure approved plan and maps * Secure latest satellite photo interpretation * Secure approved plans and necessary references
- * Identify/establish reference point showing all forest types & other features * Organize multisectoral team to undertake the
- * Establish tie line * Organize technical team to undertake the Participatory Rural Appraisal over the area
- * Establish base line Rapid Rural Appraisal over the area * Identify SMA's with local participation
- * Establish transect line * Identify productive & non-productive area * Identify the possible impact on the environment
- * Identify/establish sample plots * Apply zoning criteria into production area/ & society in the area and/or its vicinities
- * Demarcate plot perimeter boundary protection/community * Introduce mitigating measure appropriately
- * Establish sub-plots * Verify on the ground exact location of the * Study further the actual impact to be evaluated
- * Enumerate & measure standing tree base forest types & indicate in the maps for future reference.

on plan * Compile all report & submit to HO * Assist the community in the preservation of the

* Record all information/observation identified SMA as necessary.

* Indicate location of plots in the map Major Road Network Reconnaissance work *

Compile reports for submission to HO

* Forester In-Charge compile all data/infor * Field reconnaissance work shall be

* Submit report to HO carried out during forest inventory works

Documentations Process & Flow

Reference Documents Working Documents Approval/Approved Documents

* Company's mission statement * Concession Inventory Work Plan * FOM/DFW (Work Plan)

* Company's goals & objectives - Field survey/transect notes *

* Investment & Timber License - Field inventory recording sheets *

Agreements - Working maps (Progress Status) *

* Forest laws & regulations - Existing/abandoned infrastructure *

* SFMP manual assessment report *

* Code of Practice * Forest Typing & Zonation Work Plan * FOM (Work plan)

* Base maps, forest type cover, - Delineation of all forest types map * FOM (Forest type map)

landuse & geo-physical - Zoning area maps * FOM (Forest zoning map)

* Biological (flora & fauna infor.) - Summary of actual distribution of * FOM / DFW

forest type/vegetation/landuse (Master distribution map)

Supporting Services Documents * ESIA & SMA Work Plan * FOM/DFW/MAFF/MoE (Work Plan)

* Payroll - ESIA field report * FOM (for review/compilation)

* Supply Requisition Order (SRO) - ESIA consolidated report * FOM/DFW/MAFF/MoE

* Job Assignment (security) - SMA field report * FOM (for review/compilation)

- * GIS Maps - SMA consolidated report * FOM/DFW/MAFF/MoE
- * EDP Processing Result - Minutes of dialogue & agreement * FOM/DFW/MAFF/MoE

Monitoring Documents

- * Working group assignment
- * Inspection/progress report
- * Work variations/adjustment
- * Final report of individual work

Strategic Level Planning (SFMP) for 25 years

Planning Parameters:

QMS DOC. PLANNING - 2

Forest Operations - Major Work Process Flow-Chart

Compliance to Regulatory Requirements Company Goals & Objectives: Data/Infor

Sources & References

- * Investment Agreement, Timber License * Manage forest resources on * Base maps for forest type, land use, geology &
- * Forest Law & Sub-Decree sustainable basis soils, satellite photos
- * Standards & Manual for SFMP * Realize max. benefits at lowest costs * Biological - flora/fauna species occurrences
- * Forestry Code of Practice * Good responsible corporate citizen * Socio-economic - demographic, public health
- * Approved SFMP

Planning Process & Flow

Field Work Requirement

- * 4-5 Coupes per compartment * Mitigation against adverse impact * Demarcation of compartment boundary
- * Detailed forest zoning * Medium intensity inventory (1-5%) * 5% Forest inventory for EAC
- * Operable/inoperable Area * Estimated Annual Cut (EAC) * Detailed forest zoning
- * Major/secondary access road network * Location of log yards * Survey of major & secondary road access
- * Social survey/community involvement

Sectional Field Work Process & Flow

Forest Inventory Works Detailed Forest Zonation Work Detailed ESIA/SMA

- * Secure approved plan and maps * Secure latest satellite photo interpretation * Secure approved plans and necessary references
- * Identify/establish reference point showing all forest types & other features * Organize multisectoral team to undertake the
- * Establish tie line * Organize technical team to undertake the Participatory Rural Appraisal of compartment.
- * Establish base line Rapid Rural Appraisal of compartment area * Identify SMA's with local participation
- * Establish transect line * Identify productive & non-productive area * Identify the possible impact of the environment
- * Establish sample plots & demarcate plot boundary * Apply zoning criteria into production area/ & society in the area and/or its vicinities.
- * Establish sub-plots protection/community) * Introduce mitigating measure

appropriately

* Enumerate & measure standing tree base on plan * Verify on the ground the exact location of * Study further the actual impact to be evaluated

* Record all information/observation forest types & indicate in the maps for future reference.

* Indicate location of plots in the map * Compile all report & submit to HO * Assist the community in the preservation of the

* Forester In-Charge compile all data/infor identified SMA as necessary.

* Submit report to HO * Compile reports for submission to HO

Survey of Major & Secondary Road Access Demarcate Compartment Boundary

Protected Bufferzone / SMA Demarcation

* Secure copy of maps showing location of * Secure maps showing the compartment *

Secure maps with identified SMA/bufferzone

Existing & proposed road access boundary & identify location in the ground * Locate & demarcate in the ground following

* Conduct road traverse survey and make correction * Conduct close traverse survey on the the prescribed guidelines using blue paint along

& deviation as necessary perimeter boundary by marking single red boundary lines.

* Mark all rentis along survey line using double yellow bar line painted along brush line.

* Plug-in all markings in the map for future ref.

bars for major & single bar for secondary roads * Install & mark corners with placards/boards * Prepare report & submit to HO

* Submit report of accomplishment to HO * Submit report of compliance to HO

Documentations Process & Flow

Reference Documents Working Documents Approval/Approved Documents

* Approved SFMP * Compartment Inventory Work Plan * FOM/DFW (Work plan)

* Code of Practice - Field survey/transect notes *

* SFMP manual - Field inventory recording sheets *

* Forest laws & regulations - Working maps (Progress Status) *

* 5% Inventory guidelines - Infrastructure *

* Base maps, forest type cover, * Detailed Forest Zonation Work Plan * FOM (Work plan)

landuse & geo-physical - Detailed zoning area map * FOM (Forest zoning map)

* Biological (flora & fauna infor.) * Detailed ESIA & SMA Work Plan *

FOM/DFW/MAFF/MoE (Work plan)

- ESIA field report * FOM (For review/compilation)

Supporting Services Documents - ESIA consolidated report * FOM/DFW/MAFF/MoE

* Payroll - SMA field report * FOM (For review/compilation)

* Supply Requisition Order (SRO) - SMA consolidated report * FOM/DFW/MAFF/MoE

* Job Assignment (security) - Minutes of dialogue & agreement *

FOM/DFW/MAFF/MoE

* GIS Maps * Major & Secondary Road Work Plan * FOM (Work plan)

* EDP Processing Result - Proposed major road alignment * FOM/DFW/MPWT (Plan approval)

- Proposed road profile & design * FOM/DFW/MPWT (Plan approval)

Monitoring Documents

- * Working group assignment
- * Inspection/progress report
- * Work variations/adjustment
- * Final report of individual work

Compartment Level Planning (MTMP) for 5 years

Planning Parameters:

QMS DOC. PLANNING - 3

Forest Operations - Major Work Process Flow-Chart

Compliance to Regulatory Requirements Company Goals & Objectives: Data/Infor Sources & References

- * Investment Agreement, Timber License * Manage forest resources on * Base maps for forest type, land use, geology &
- * Forest Law & Sub-Decree sustainable basis soils, satellite photos
- * Standards & Manual for SFMP * Realize max. benefits at lowest costs * Biological - flora/fauna species occurrences
- * Forestry Code of Practice * Good responsible corporate citizen * Socio-economic - demographic, public health
- * Approved SFMP & MTMP

Planning Process & Flow

Field Work Requirement

- * Blocks of approx. 100 ha (max. 150 ha.) * Detailed Block Harvesting Plan(DBHP) *

Demarcation of coupe & block boundary

- * Feeder haul roads * 100 % Inventory & tree marking * Survey/layout of secondary/feeder road
- * Snig-tracks and log landings * Annual Allowable Cut (AAC) * Survey skid track & log landing markings
- * Protected buffer zones * Cutting Permit * Marking of protected bufferzones
- * Local community dialogues/agreement * 100% inventory & tree marking for the determination of AAC

Sectional Field Work Process & Flow * Consolidate all DBHP requirement

100% Tree Marking Coupe/Block/Bufferzone Demarcation Road/Bridge

Survey/Alignment

- * Secure block harvesting maps 1:10,000 * Secure coupe/block maps with bufferzone areas * Secure map reference
- * Locate & establish baseline * Locate on the ground * Identify ground reference point
- * Establish transect line perpendicular * Demarcate all boundary by painting orange for * Preliminary layout

to the baseline at equal interval of 50 blocks, yellow for coupe & blue for bufferzone *

Traverse install markings stations

- * Measure all trees 10cm. DBH & up along * Establish all corners with markers and placards * Re-checking of traverse/corrections

the transect line at 25 meters bothsides for future reference. * Map plotting/profile leveling

from the center. * Survey perimeter boundary * Identify Road class design base on usage

- * Mark consecutively trees to be cut base on * Plot in the working maps * Report preparation & submission

MDL at DBH & up * Submit report to Forester in-Charge
 * Trees below MDL at DBH shall be marked * Compile all data/information Log
 Landing & Snig Track Layout
 as residue consecutively. * Submit report to HO * Secure copy of block harvesting map
 * Record all informations gathered in * Assess log landing & tree locations
 the field for submission to HO. Post Harvesting & Forest Rehabilitation * Assess the
 terrain condition of blocks
 * Submit monthly report to HO. * Block cutover assessment * Layout an area of 40 x 50
 meters rectangle
 * Identification of forest rehabilitation works * Establish road linkage to existing road
 * Identification of natural silviculture activities * Layout/traverse the propose snig track
 * Forest nursery development/maintenance by marking following the guidelines.

Documentations Process & Flow
 Reference Documents Working Documents Approval/Approved Documents
 * Approved MTMP * 100% TM/Inventory Work Plan * FOM/DFW (Work Plan)
 * Code of Practice - Field survey/transect notes *
 * SFMP manual - Field inventory recording sheets *
 * Forest laws & regulations - Tree locator maps by blocks *
 * 100% Inventory guidelines * DBHP Manual/Instructions * FOM/DFW (Work plan)
 * Base maps, forest type cover, - Field demarcation survey notes/data *
 landuse & geo-physical - Individual block harvesting maps *
 * Biological (flora & fauna infor.) - Snig track alignment report/maps *
 * Engineering Spec's - Log landing layout map & *
 - Bufferzone marking maps * FOM/DFW (Cutting Permit)

Supporting Services Documents * Road/Bridge/Culverts Manual & Instructions *
 FOM/DFW/MPW (Work plan)
 * Payroll - Field survey notes/data *
 * Supply Requisition Order (SRO) - Alignment plan *
 * Job Assignment (security) - Road profile *
 * GIS Maps - Design * FOM/DFW/MPW (Implementation)
 * EDP Processing Result * Detailed ESIA & SMA Work Plan * FOM/DFW/MAFF/MoE
 (Work plan)
 - ESIA field report * FOM (for review/compilation)

Monitoring Documents - ESIA consolidated report * FOM/DFW/MAFF/MoE
 * Working Group Assignment - SMA field report * FOM (for review/compilation)
 * Inspection/Progress Report - SMA consolidated report * FOM/DFW/MAFF/MoE
 * Work Variations/Adjustment - Minutes of dialogue & agreement *
 FOM/DFW/MAFF/MoE
 * Final Report of Individual Work

Annual Logging Plan (ALP)
 Planning Parameters:
 QMS DOC. IMPLEMENTATION - 1
 Forest Operations - Major/Sectional Work Process Flow-Chart
 Compliance to Regulatory Requirements Company Goals & Objectives: Data/Infor
 Sources & References
 * Investment Agreement, Timber License * Manage forest resources on sustainable *

Approved SFMP

* Forest Law & Sub-Decree basis * Approved MTMP

* Standards & Manual for SFMP * Realize max. benefits at lowest costs * Approved ALP/DBHP

* Forestry Code of Practice * Good responsible corporate citizen * Cutting Permit & Load Book

Process & Flow-Chart

Infrastructure Construction Harvesting Operations Trucking/Logyard/Pond Activities

For Roads, Bridges and Culverts: Felling & Bucking/Skidding & Winching: (Keo Sema to Chhlong Camp)

* Approved plan/design/profile * Approved Plan * Transportation Permit

* Survey/cruise/alignment * Cutting Permit * Issue transit bill bearing all informations on

* Bridge site assessment/survey * Tree marking report loaded logs

* Checking/traversing/corrections/approval * Assign block to harvesting team *

Coordinate at provincial boundary

* Site preparation & clearing * Blocks & bufferzone verification checkpoints

* Preparation of tools/equipment & materials * Snig track & log landing construction *

Transit bill receipt

* Construction works following approved plan * Felling & bucking activities *

Compilation of volume/pieces "out"

* Stability checking/final inspection * Skidding & winching activities * Logyard/pond activities

* Submission of reports to FOM/DFW * Daily production report

* Inspection/monitoring Inspection/Monitoring Activities

Trucking * Post harvesting inspection /report * Regular check-up by individual foreman (Log Landing to Keo Sema Camp) must be carried out in all harvesting activities

* Schedule the trucking activity Log Scaling for Assessment * All observations by the foreman must be

* Prepare log landing access road (Keo Sema Camp) forwarded to the Production Supervisor

* Log preparation/trimmings at landings * Request DFW supervision * Checking & monitoring of skidding

* Issue transit bills * Log sorting, grading/species class/ operations must be carried out by

* Trucking volume report re-trimming and marking camp SEU prior to block closure.

* Measurement of diameter & length/ * Any observation of camp SEU must be

Log Documentation/Royalty Assessment recording forwarded to the Production Supervisor

* Copy of the approved Master Plan * Segregation & filing for correction or confirmation.

* Copy of approved ALP * Loglist preparation with DFW * SEU camp must submit a monthly report

* Copy of cutting permit & load book representative of harvesting blocks status/closure to

* Copy of loglist * CFO report for block harvesting HO/DFW

* CFO report on log scaling * Submit to Chhlong camp for EDP

* CFO report from coupe/blocks & volume computation. Post Harvesting & Forest

Rehabilitation

- * HO letter request for royalty payments * Submission to DFW for royalty * Blocks cutover assessment report/maps
- * DFW issue order of payment assessment * Field implementation of identified forest
- * HO to prepare cheque for payment * Royalty payment & other fees rehabilitation works.
- * DFW will receive the cheque payment then * CFO Hammer Marking (3x) * Apply the necessary silvicultural practices
- forward to National Bank for confirmation * Request & issuance of transport permit * Maintenance of forest nursery & trial planting
- * National Bank will issue notice to DFW * Log quality(grading) report
- * DFW will issue official receipt of payment * Compilation of volume/pieces "in" Daily Production Reporting
- * DFW will issue mission order * All daily report of activities must be for 4th hammer mark. Log Landing & Snig Track Preparation submitted to its individual foreman
- * CFO compliance report on 4th * Approved DBHP & maps * Foreman must consolidate the daily report
- hammer marking * Ground location of log landings and submit to production supervisor for
- * Request transportation permit for trucking * Clear the layout area max. of 40 x 50 m. proper recording.
- within concession crossing another province. * Construct good drainage per guidelines * Production Supervisor must submit report
- * Locate traverse layout of snig tracks to Chhlong camp on daily/weekly/monthly
- * Allow passage of tractor along survey line basis depending on camp procedure. without scrapping or earth moving.
- * Maximize the usage of snig tracks
- Documentation Process & Flow-Chart
- Reference Documents Working Documents Approval/Approved Documents
- * Approved SFMP * CFO scaling supervision * DFW (Mission Order)
- * Approved ALP * Scaling procedures/manual * FOM/DFW
- * Approved DBHP * Loglist * FOM/DFW (CFO Report)
- * Cutting Permit & Load Book * CFO report from blocks * DFW/CFO (Report)
- * Forest Laws & Regulations * 3 Hammer marking report * CFO/DFW (Mission Order)
- * Letter request for royalty payments * FOM
- Supporting Services Documents * Statement of payment issuance * DFW
- * Payroll * Cheque for payment * FOM/DFW (Official Receipt)
- * Supply Requisition Order (SRO) * Permit to transport inside concession * DFW (Transport Permit)
- * EDP Processing Result * 4th Hammer marking report * CFO/DFW (Mission Order)
- * Job Assignment * Permit to transport outside concession * DFW (Transport Permit)
- Implementation of Logging Operations
- Log Documentation / Royalty Assessment
- QMS DOC. IMPLEMENTATION - 2
- Forest Operations - Documentation Process Flow-Chart

Reference Documents Working Documents Approval/Approved Documents

- * Approved ALP * Field Survey Manual/Instruction * FOM/DFW (Work plan)
- * Code of Practice - Field Survey Notes/data * FOM (review/checking)
- * Engineering Spec's & Design - Alignment Plan * FOM/DFW/MPWT (approved)
- * Forest laws & regulations - Profile * FOM/DFW/MPWT (approved)
- * SFMP manual - Design * FOM/DFW/MPWT (approved)

Supporting Services Documents Monitoring Documents Contractor (As Necessary)

- * Payroll * Construction Crew Assignment * Contract Agreement
- * Supply Requisition Order (SRO) * Inspection/Progress Report * Contract Progress Report

- * Job Assignment (security) * Work Variations/Re-Works * Inspection Report
- * GIS Maps * Certificate of Completion * Certificate of Completion
- * Equipment R & M report * Payment Claims/Invoice

Reference Documents Working Documents Approval/Approved Documents

- * Approved ALP * Detailed Block Harvesting Plan * FOM/DFW (Work Plan)
- * Cutting Permit - Block harvesting maps with snig *
- * Code of Practice track locations & log landing *
- * Forest laws & regulations - Summary/list of trees to be cut *
marked in the map/locator *

- * Daily felling & skidding report *

Supporting Services Documents * Monthly felling & skidding report * FOM (for review & recod)

- * Payroll * Monthly production stock report * FOM (for review & recod)
- * Supply Requisition Order (SRO) * Monthly block status report * FOM/DFW (review/closure)
- * Job Assignment (security) * Monthly contractors report * FOM (approval for payment)
- * GIS Maps
- * EDP Processing Result
- * Equipment R & M report Monitoring Documents Contractor (As Necessary)
- * Working group assignment * Contract Agreement
- * Inspection/progress report * Contract Progress Report
- * Infrastructure variations * Inspection Report
- * Final report of individual work * Certificate of Completion
- * LICU report * Payment Claims/Invoice
- * Annual stock take

Reference Documents Working Documents Approval/Approved Documents

- * Block Status Report * Silvicultural practices manual * FOM/DFW
- * Block Closure & instructions
- * Silvicultural Practices Plan * FOM (Work plan)

Supporting Services Documents - Enrichment/gap planting *

- * Payroll - Timber Stand Improvement *
- * Supply Requisition Order (SRO) * Nursery & Plantation Dev. Plan * FOM (Work plan)
- * Job Assignment (security)
- * GIS Maps
- * EDP Processing Result Monitoring Documents Contractor (As Necessary)
- * Equipment R & M report * Working group assignment * Contract Agreement

- * Inspection/progress report * Contract Progress Report
- * Infrastructure variations * Inspection Report
- * Updating of field accomplishment * Certificate of Completion
- * Payment Claims/Invoice
- Infrastructure Construction
- Harvesting Operations
- Post Harvesting/Forest Rehabilitation
- QMS DOC. DELIVERY - 1
- Forest Operations - Major Work Process Flow-Chart
- Compliance to Regulatory Requirements Company Goals & Objectives: Data/Infor Sources & References
- * Investment Agreement, Timber License * Manage forest resources on * Approved SFMP
- * Forest Law & Sub-Decree sustainable basis * Approved MTMP
- * Standards & Manual for SFMP * Realize max. benefits at lowest costs * Approved ALP/DBHP
- * Forestry Code of Practice * Good responsible corporate citizen * Cutting Permit & Load Book
- Process & Flow-Chart
- Documentation Transportation Unloading to Destination/Factory
- * Loglist preparation * Barge/tug preparation * Supervise unloading at destination
- * DFW/CFO production report * Loading/rafting * Checking the quality of logs
- * Processing of royalty payments * DFW checking/verification along * Check scale
- * Processing of permit to transport Mekong River * LDN receipt
- * Approved permit to transport * Arrival to final destination * Final acceptance of consignee
- * LDN issuance
- Sectional Work Process & Flow-Chart
- Logyard/pond Activities (Chhlong) Transportation Permit Transportation/Shipment
- * Spread out log at logyard / sorting * HO letter request for permit to transport * Original copy of transport permit
- * Re-checking all log details/info a. Official Receipt of payment * Copy of loglist for shipment
- * Segregation by priority/buyer demand/ b. CFO report for volume to be shipped * Copy of CFO reports
- factory requirements c. Copy of loglist
- * Compilation of volume for transport * DFW will issue permit to transport
- * Loglist preparation * Secure copy of log list for shipment
- * CFO report & hammer marking (1) for checkpoint presentation
- * Request for permit to transport
- * Issuance of permit to transport by DFW
- Documentations Process & Flow
- Reference Documents Working Documents Approval/Approved Documents
- * Transportation Permit * Log landing stock report *
- * Official Receipt * Transit bill (landing to Keo Sema) *
- * Daily trucking report (Keo Sema Camp) *

Supporting Services Documents * Transit bill (Keo Sema to Chhlong) *

* Payroll * Daily trucking arrival report (Chhlong) *

* Supply Requisition Order (SRO) * Loglist for shipment to Factory *

* EDP Processing Result * Factory acceptance report/loglist * FOM

* Job Assignment

Contractor (As Necessary)

* Contract Agreement

* Contract Progress Report

* Inspection Report

* Certificate of Completion

* Payment Claims/Invoice

Delivery of Final Product (logs to mills) Processes & Flow

86

Appendix 3: Samples of Job Descriptions & Work Instructions

Table of Contents

Item No. Document No

1. Skidding Tractor Operator QMS/Doc.3-1

2. Tree Feller QMS/Doc.3-2

3. Skidding Hookman QMS/Doc.3-3

4. Log Debarker QMS/Doc.3-4

5. Log Grader QMS/Doc.3-5

87

Job Title : Skidding Tractor Operator

Document No. QMS/Doc.3-1

—
A. Objective

To deliver felled merchantable logs from felling sites to forest log landings by skidding and

winching operations and avoidance of damage to logs, forest ground and residue trees.

Normally,

he works as a member of the Felling/Skidding Production Team.

B. Superior

He works under the direct supervision of the Skidding or Production Foreman.

C. Equipment Used

Tractor CAT D6DLS equipped with dozer blade, winch, wire rope, hook and shackle.

Tractor

Operator must wear safety helmet and hand gloves during working hours.

D. Relevant Manuals, Guidelines

Forestry Codes of Practice

E. Working Instructions

1. To locate the felled marked trees with tree feller and do reconnaissance of skidding routes

and general terrain in the assigned block.

2. To construct log landings adjacent to the logging road for temporary storage of skidded logs before transportation out.

3. To construct shortest skid trails from log landings to felling sites following the Detailed Block Harvesting Plan. Any deviation from the planned routes must have prior approval from the Planning Unit obtained through the foreman.
4. To minimize damage to residue trees and environment while skidding from harvesting blocks to log landings by avoiding downhill skidding, skidding over stream-bed. If skidding over stream-bed is unavoidable, he must first obtain permission from his foreman who shall decide on a suitable stream-bed temporary crossing (with cording or similar protection).
5. To avoid entering or crossing buffer zones & adjacent blocks.
6. At log landings, he shall spread out the logs for easy debarking, grading, marking, chemical treatment and stacking.
7. He shall routinely check the tractor before the day's work commences, and to immediately report any malfunction of the tractor to the foreman for arrangement of maintenance and/or repair.

88

Job Title : Tree Feller

Documents No. QMS/Doc.3-2

–
A. Objective

To fell marked trees in approved harvesting blocks assigned to him in a most efficient and safe manner with minimum adverse impact on surrounding trees and environment. Normally, he works as a member of the Felling/Skidding Production Team.

B. Superior

He works under the direct supervision of the Skidding or Production Foreman.

C. Equipment Used

Stihl Chainsaw 070 or 084, with appropriate accessories. Tree feller must wear safety helmet during working hours.

D. Relevant Manuals, Guidelines

Forestry Codes of Practice

E. Working Instruction

1. To locate the trees marked to be cut and fell merchantable trees free of visible defects and in accordance with prescribed guidelines.
2. To determine the directional felling of tree as to ensure his safe retreat, less residue stand damage and that the fallen trees can be easily prepared to be skidded out.
3. For trees with buttresses, tree feller must commence cut immediately above the buttress. All trees without buttress must be felled about 0.3 meter above the ground.
4. If the marked tree is intertwined to other nearby trees by vines, these must first be cut so that

the falling tree will not pull the other trees or their branches down.

5. After felling, the fallen tree should be trimmed of any remaining buttress and the crown of branches.

6. To follow the instructions given to him by his foreman.

89

Job Title : Skidding Hookman

Document No. QMS/Doc.3-3

–

A. Objective

To secure the steel wire rope of the skidding tractors to the logs to be skidded out to the log

landing. Normally, he works as a member of the Felling/Skidding Production Team.

B. Superior

He works under the direct supervision of the Skidding or Production Foreman.

C. Equipment Used

Hook and shackle attached to the end of steel wire rope of winch drum of tractor.

Hookman must

wear safety helmet and hand gloves during working hours.

D. Working Instruction

1. To use hook and shackle to secure logs for winching and skidding out by the skidding tractor.

2. To assist to remove any obstacle, fallen branches, etc. before skidding/winching. He shall

communicate effectively with the tractor operator by sign language.

3. Along the skid trail, he shall ensure that logs are not entangled or obstructed for smooth

skidding.

4. At forest log landing, he shall unfasten the steel wire rope from the log by releasing the hook

and the shackle, and assist the tractor operator to stack the logs in orderly manner for easy

removal and trucking out.

5. To assist the tractor operator in general checking of the tractor, winch and wire-rope prior to

skidding.

90

Job Title : Log Debarker

Document No. QMS/Doc.3-4

–

A. Objective

To debark the skidded logs to prevent deterioration due to attack by insects and larvae borers

causing defects such as pin holes, shotholes, as well as to prepare log measurement under

bark,

and to mark the Log's Production number & Origin (Coupe/Block number)

B. Superior

He works under the direct supervision of the Skidding or Production Foreman.

C. Equipment Used

Debarker sandaks, S-Hook, paint and brush. Debarker must wear safety helmet during working hours.

D. Working Instruction

1. At the forest log landing, the debarker shall use the debarking tools to strip off the bark of the

logs either whole, or mid-log according to species. The tractor operator shall assist to turn over the log for debarking of the underside.

2. Then spraying of fungicide/insecticide follows, according to Work Instructions for Chemical

Treatment/Spraying.

3. To affix S-hook onto the logs to minimize end splits.

4. To paint the tractor number, coupe/block number and log production number onto the ends of the log.

5. To assist the tractor operator to keep a daily tally of logs skidded.

91

Job Title : Log Grader

Document No. QMS/Doc.3-5

A. Objective

To grade logs for conformity to quality according to existing guidelines, instructions and approved log

specifications. Normally, the Log Grader is also the Chief Scaler.

B. Superior

He works under the direct supervision of the Log Yard Supervisor or Production Supervisor.

C. Equipment Used

Log measuring tapes, paintbrush and aluminum paint and lumber crayon. Log Grader must wear

safety boots and safety helmet during working hours.

D. Relevant Manuals, Guidelines

SL Log Grading Rules

E. Working Instruction

1. To make sure that all logs at log landings are properly graded prior to transporting from

log landings to log yard and/or log pond based on quality control procedures.

2. Identify log species and paint species code on the log before scaling.

3. To grade and reject non-conforming logs based on Log Grading guidelines and approve

log specification. He shall paint « X » on those reject logs which shall be stacked separately. LICU (Log Inventory Control Unit) personnel will verify, record and affix red tags to non-conforming logs for further management decision.

4. To communicate directly with the tree feller in order to reduce non-conformity, and if the

problem persists, he shall alert the foreman.

5. To paint mark trimming point(s) of the graded log to be trimmed by Log Trimmer in order to achieve the minimum log quality specification.

6. At the logpond, he shall inspect, re-grade and segregate all logs based on priority classes

needed for systematic and timely removal for barging out to the processing plant.

92

APPENDIX 4: Results from Reliability Analysis

Reliability : QMS

RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients

N of Cases = 138.0 N of Items = 5

Alpha = .7166

Reliability : Commitment

RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients

N of Cases = 138.0 N of Items = 4

Alpha = .6466

Reliability : Leadership Style

RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients

N of Cases = 138.0 N of Items = 4

Alpha = .8802

Reliability : Quality Culture

RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients

N of Cases = 138.0 N of Items = 4

Alpha = .7336

93

Appendix 4(cont.) : Results from Reliability Analysis

Reliability : Motivation

RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients

N of Cases = 138.0 N of Items = 4

Alpha = .6618

Reliability : Empowerment

RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients

N of Cases = 138.0 N of Items = 4

Alpha = .8588

Reliability : Teamwork

RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients

N of Cases = 138.0 N of Items = 4

Alpha = .7037

94

Appendix 5: Frequency Statistics

Age

2 1.4 1.4 1.4
4 2.9 2.9 4.3
4 2.9 2.9 7.2
4 2.9 2.9 10.1
2 1.4 1.4 11.6
6 4.3 4.3 15.9
3 2.2 2.2 18.1
7 5.1 5.1 23.2
6 4.3 4.3 27.5
1 .7 .7 28.3
9 6.5 6.5 34.8
4 2.9 2.9 37.7
1 .7 .7 38.4
2 1.4 1.4 39.9
2 1.4 1.4 41.3
7 5.1 5.1 46.4
4 2.9 2.9 49.3
2 1.4 1.4 50.7
4 2.9 2.9 53.6
5 3.6 3.6 57.2
11 8.0 8.0 65.2
1 .7 .7 65.9
2 1.4 1.4 67.4
1 .7 .7 68.1
5 3.6 3.6 71.7
6 4.3 4.3 76.1
2 1.4 1.4 77.5
7 5.1 5.1 82.6
7 5.1 5.1 87.7
3 2.2 2.2 89.9
3 2.2 2.2 92.0
3 2.2 2.2 94.2
4 2.9 2.9 97.1
3 2.2 2.2 99.3
1 .7 .7 100.0
138 100.0 100.0
18
19
21

23
25
26
27
28
29
30
31
32
33
34
35
37
38
39
40
42
43
45
46
47
48
50
51
52
53
54
55
57
61
62
63

Total

Valid

Frequency Percent Valid Percent

Cumulative

Percent

Gender

114 82.6 82.6 82.6

24 17.4 17.4 100.0

138 100.0 100.0

male

female

Total

Valid

Frequency Percent Valid Percent

Cumulative
 Percent
 95
 Appendix 5(Cont.): Frequency Statistics
 Qualifications
 95 68.8 68.8 68.8
 35 25.4 25.4 94.2
 8 5.8 5.8 100.0
 138 100.0 100.0
 diploma & below
 bachelors degree
 postgraduate
 Total
 Valid
 Frequency Percent Valid Percent
 Cumulative
 Percent
 Division
 43 31.2 31.2 31.2
 50 36.2 36.2 67.4
 45 32.6 32.6 100.0
 138 100.0 100.0
 head quarters
 chhlong
 koh kong
 Total
 Valid
 Frequency Percent Valid Percent
 Cumulative
 Percent
 Position
 20 14.5 14.5 14.5
 26 18.8 18.8 33.3
 29 21.0 21.0 54.3
 63 45.7 45.7 100.0
 138 100.0 100.0
 manager
 executive
 supervisor
 non-executive
 Total
 Valid
 Frequency Percent Valid Percent
 Cumulative
 Percent
 Work Experience

50 36.2 36.2 36.2
25 18.1 18.1 54.3
63 45.7 45.7 100.0
138 100.0 100.0

<5 yrs

5 to 10 yrs

>10 yrs

Total

Valid

Frequency Percent Valid Percent

Cumulative

Percent

Years with Co.

82 59.4 59.4 59.4

22 15.9 15.9 75.4

34 24.6 24.6 100.0

138 100.0 100.0

<2 yrs

2 to 5 yrs

>5 yrs

Total

Valid

Frequency Percent Valid Percent

Cumulative

Percent

96

Appendix 6: Descriptive Statistics

Descriptive Statistics

138 7 20 14.00 3.061 9.372

138 6 20 13.36 4.097 16.785

138 5 19 11.06 3.273 10.712

138 4 20 11.50 3.908 15.274

138 4 18 9.93 2.913 8.485

138 7 19 12.67 2.849 8.119

138 9 23 15.72 3.891 15.139

138

Commitment

Leadership Style

Culture

Empowerment

Motivation

Teamwork

QMS

Valid N (listwise)

N Minimum Maximum Mean Std. Deviation Variance

Descriptive Statistics (Age Distribution)

N Minimum Maximum Mean Std. Deviation
Age 138 18 63 39.40 12.076
Valid N (listwise) 138
97

Appendix 7: Pearson Correlation Matrix
Correlations

1	.390**	-.073	-.134	-.013	-.044	.072
.	.000	.396	.117	.879	.612	.403
138	138	138	138	138	138	138
.390**	1	-.323**	-.112	-.257**	.029	.249**
.000	.000	.191	.002	.732	.003	
138	138	138	138	138	138	138
-.073	-.323**	1	.089	.364**	.038	-.120
.396	.000	.299	.000	.658	.160	
138	138	138	138	138	138	138
-.134	-.112	.089	1	.201*	.012	-.222**
.117	.191	.299	.018	.888	.009	
138	138	138	138	138	138	138
-.013	-.257**	.364**	.201*	1	.150	-.109
.879	.002	.000	.018	.080	.202	
138	138	138	138	138	138	138
-.044	.029	.038	.012	.150	1	.101
.612	.732	.658	.888	.080	.239	
138	138	138	138	138	138	138
.072	.249**	-.120	-.222**	-.109	.101	1
.403	.003	.160	.009	.202	.239	.
138	138	138	138	138	138	138

Pearson Correlation

Sig. (2-tailed)

N

Pearson Correlation

Sig. (2-tailed)

N

Pearson Correlation

Sig. (2-tailed)

N

Pearson Correlation

Sig. (2-tailed)

N

Pearson Correlation

Sig. (2-tailed)

N

Pearson Correlation

Sig. (2-tailed)

N

Pearson Correlation

Sig. (2-tailed)

N

Commitment

Leadership Style

Culture

Empowerment

Motivation

Teamwork

QMS

Commitment

Leadership

Style Culture

Empower

ment Motivation Teamwork QMS

Correlation is significant at the 0.01 level (2-tailed). **.

Correlation is significant at the 0.05 level (2-tailed). *.

98

Appendix 8: T-Test Results

Group Statistics

114 15.52 3.907 .366

24 16.67 3.749 .765

Gender

male

female

QMS

N Mean Std. Deviation

Std. Error

Mean

Independent Samples Test

.353 .554 -1.319 136 .190 -1.15 .871 -2.873 .574

-1.355 34.349 .184 -1.15 .848 -2.872 .574

Equal variances

assumed

Equal variances

not assumed

QMS

F Sig.

Levene's Test for

Equality of Variances

t df Sig. (2-tailed)

Mean

Difference

Std. Error

Difference Lower Upper

95% Confidence

Interval of the

Difference

t-test for Equality of Means

99

Appendix 9: Oneway ANOVA Results

a) Division and QMS

ANOVA

QMS

22.977 2 11.489 .756 .471

2051.001 135 15.193

2073.978 137

Between Groups

Within Groups

Total

Sum of

Squares df Mean Square F Sig.

b) Job Position and QMS

ANOVA

QMS

21.511 3 7.170 .468 .705

2052.467 134 15.317

2073.978 137

Between Groups

Within Groups

Total

Sum of

Squares df Mean Square F Sig.

c) Length of Work Experience and QMS

ANOVA

QMS

34.441 2 17.220 1.140 .323

2039.537 135 15.108

2073.978 137

Between Groups

Within Groups

Total

Sum of

Squares df Mean Square F Sig.

100

Appendix 10: Regression Results

Variables Entered/Removedb

Teamwork,

Empower

ment,

Culture,

Commitm

ent,

Motivation,
Leadershi
p Style
a

. Enter
Model

1
Variables

Entered
Variables

Removed Method

All requested variables entered. a.

Dependent Variable: QMS b.

Model Summary

.336a .113 .072 3.748

Model

1

R R Square

Adjusted

R Square

Std. Error of
the Estimate

Predictors: (Constant), Teamwork, Empowerment,
Culture, Commitment, Motivation, Leadership Style

a.

ANOVA b

233.463 6 38.910 2.769 .014a

1840.515 131 14.050

2073.978 137

Regression

Residual

Total

Model

1

Sum of

Squares df Mean Square F Sig.

Predictors: (Constant), Teamwork, Empowerment, Culture, Commitment,
Motivation, Leadership Style

a.

Dependent Variable: QMS b.

Coefficients a

14.738 2.817 5.232 .000

-5.28E-02 .115 -.042 -.457 .648

.216 .092 .227 2.355 .020

-3.63E-02 .109 -.031 -.334 .739

-.196 .084 -.197 -2.324 .022

-2.04E-02 .124 -.015 -.165 .869
.134 .114 .098 1.174 .243

(Constant)
Commitment
Leadership Style
Culture
Empowerment
Motivation
Teamwork
Model

1
B Std. Error
Unstandardized
Coefficients
Beta
Standardized
Coefficients

t Sig.
Dependent Variable: QMS a.
101

Appendix 11: CrossTabs Results

a) Position vs years with Company

Case Processing Summary

138 100.0% 0 .0% 138 100.0% Position * Years with Co.

N Percent N Percent N Percent

Valid Missing Total

Cases

Position * Years with Co. Crosstabulation

Count

9 3 8 20

17 4 5 26

16 5 8 29

40 10 13 63

82 22 34 138

manager

executive

supervisor

non-executive

Position

Total

<2 yrs 2 to 5 yrs >5 yrs

Years with Co.

Total

Chi-Square Tests

3.903a 6 .690

3.699 6 .717

1.611 1 .204

138

Pearson Chi-Square

Likelihood Ratio

Linear-by-Linear

Association

N of Valid Cases

Value df

Asymp. Sig.

(2-sided)

4 cells (33.3%) have expected count less than 5. The minimum expected count is 3.19.

a.

102

Appendix 11(cont.): Cross Tabs results

b) Position vs Qualifications attained

Case Processing Summary

138 100.0% 0 .0% 138 100.0% Position * Qualifications

N Percent N Percent N Percent

Valid Missing Total

Cases

Position * Qualifications Crosstabulation

Count

6 10 4 20

4 18 4 26

26 3 29

59 4 63

95 35 8 138

manager

executive

supervisor

non-executive

Position

Total

diploma &

below

bachelors

degree postgraduate

Qualifications

Total

Chi-Square Tests

75.122a 6 .000

79.081 6 .000

54.510 1 .000

138

Pearson Chi-Square

Likelihood Ratio
Linear-by-Linear
Association

N of Valid Cases

Value df

Asymp. Sig.

(2-sided)

4 cells (33.3%) have expected count less than 5. The
minimum expected count is 1.16.

a.

Appendix 12: SPSS Data file

103

ID

AGE

GENDER

QUAL

DIVISION

POSITION

EXPER

YEARS

QMS1

QMS2

QMS3

QMS4

QMS5

COMMIT1

COMMIT2

COMMIT3

COMMIT4

STYLE1

STYLE2

STYLE3

STYLE4

CULTURE1

CULTURE2

CULTURE3

CULTURE4

MOTI1

MOTI2

MOTI3

MOTI4

EMPOWER1

EMPOWER2

EMPOWER3

EMPOWER4

TEAMWK1

TEAMWK2
TEAMWK3
TEAMWK4
R2EMP
R4CULT
COMMIT
QMS
LEADSTY
CULTURE
EMPOWER
MOTI
TEAMWK

1 38 1 2 1 1 2 3 3 4 3 3 3 5 5 3 5 4 4 3 3 4 5 3 3 4 4 5 5 3 3 3 3 4 4 4 5 3 3 18 16 14 15 12
18 17
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13 17
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10 14
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15 16
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15 16
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14 17
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7 10
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13 43 2 1 1 4 3 1 3 4 5 5 4 5 4 2 4 4 5 5 4 2 5 3 2 3 2 3 3 3 4 3 3 3 4 3 4 2 4 15 21 18 14
11 11 14
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12 12 13
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10 10

18 63 2 2 1 3 3 2 2 3 4 3 5 4 5 4 4 5 3 4 3 4 3 3 3 1 2 3 2 1 4 3 2 1 2 1 3 2 3 17 17 15 13 8
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8 11
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7 16
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13 13 14
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8 11
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11 11 17
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10 10 10
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11 11 13
32 34 1 2 1 2 1 1 1 3 4 4 3 5 5 3 2 3 4 4 3 2 1 3 5 2 1 1 1 2 5 1 1 4 2 4 3 1 1 15 15 14 7 5 5
13

Appendix 12: SPSS Data file

104

ID

AGE

GENDER

QUAL

DIVISION

POSITION

EXPER

YEARS

QMS1

QMS2

QMS3

QMS4

QMS5

COMMIT1

COMMIT2

COMMIT3

COMMIT4

STYLE1

STYLE2

STYLE3

STYLE4

CULTURE1

CULTURE2

CULTURE3

CULTURE4

MOTI1

MOTI2

MOTI3

MOTI4

EMPOWER1

EMPOWER2

EMPOWER3

EMPOWER4

TEAMWK1

TEAMWK2

TEAMWK3

TEAMWK4

R2EMP

R4CULT

COMMIT

QMS

LEADSTY

CULTURE

EMPOWER

MOTI

TEAMWK

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9 9

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14 9

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14 13

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10 16

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12 8

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10 11 15

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13 14 9
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13 13 9
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10 14
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10 10
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14 12

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14 8

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13 13 8

Appendix 12: SPSS Data file

105

ID

AGE

GENDER

QUAL

DIVISION

POSITION

EXPER

YEARS

QMS1

QMS2

QMS3

QMS4

QMS5

COMMIT1

COMMIT2

COMMIT3

COMMIT4

STYLE1

STYLE2

STYLE3

STYLE4

CULTURE1

CULTURE2

CULTURE3

CULTURE4

MOTI1

MOTI2

MOTI3

MOTI4

EMPOWER1

EMPOWER2

EMPOWER3

EMPOWER4

TEAMWK1

TEAMWK2

TEAMWK3

TEAMWK4

R2EMP

R4CULT

COMMIT

QMS
LEADSTY
CULTURE
EMPOWER
MOTI
TEAMWK

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9 16
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12 11
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10 13
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7 10
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15 9 15
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10 13
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4 12
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8 12
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15 7 10
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13 12
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7 12
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9 10
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13 11
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10 11

Appendix 12: SPSS Data file

106

ID

AGE

GENDER

QUAL

DIVISION

POSITION

EXPER

YEARS

QMS1

QMS2

QMS3

QMS4

QMS5

COMMIT1

COMMIT2

COMMIT3

COMMIT4

STYLE1

STYLE2

STYLE3

STYLE4
CULTURE1
CULTURE2
CULTURE3
CULTURE4
MOTI1
MOTI2
MOTI3
MOTI4
EMPOWER1
EMPOWER2
EMPOWER3
EMPOWER4
TEAMWK1
TEAMWK2
TEAMWK3
TEAMWK4
R2EMP
R4CULT
COMMIT
QMS
LEADSTY
CULTURE
EMPOWER
MOTI
TEAMWK
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19 8 13
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12 5 11
99 62 1 1 3 1 3 1 3 1 2 2 1 4 5 4 4 4 4 2 3 2 3 4 3 3 3 3 2 4 2 4 5 3 3 2 3 4 3 17 9 13 12 17
11 11
100 57 1 2 3 1 3 2 2 4 2 5 5 2 3 2 2 2 2 3 2 3 3 2 4 2 4 3 4 4 1 4 4 4 2 4 3 5 2 9 18 9 10 17
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13 12 17
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13 14
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8 16
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18 6 17
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13 8 15
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12 7 9
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15 10 16
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13 10 15
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16 9 9
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16 13 17
128 52 2 1 3 3 3 3 2 5 5 5 5 4 4 1 3 2 1 2 1 4 5 5 1 2 4 2 3 2 2 2 3 4 4 2 3 4 5 12 22 6 19
11 11 13

Appendix 12: SPSS Data file

ID
AGE
GENDER
QUAL
DIVISION
POSITION
EXPER
YEARS
QMS1
QMS2
QMS3
QMS4
QMS5
COMMIT1
COMMIT2
COMMIT3
COMMIT4
STYLE1
STYLE2
STYLE3
STYLE4
CULTURE1
CULTURE2
CULTURE3
CULTURE4
MOTI1
MOTI2
MOTI3
MOTI4
EMPOWER1
EMPOWER2
EMPOWER3
EMPOWER4
TEAMWK1
TEAMWK2
TEAMWK3
TEAMWK4
R2EMP
R4CULT
COMMIT
QMS
LEADSTY
CULTURE
EMPOWER
MOTI
TEAMWK

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 136 43 1 1 3 4 3 3 2 5 5 4 5 3 2 3 3 3 3 3 2 1 1 5 3 2 2 1 3 4 2 1 2 2 2 2 2 1 11 21 12 5 8
 8 8
 137 23 1 1 3 3 1 1 1 5 5 5 5 2 1 3 2 2 3 3 2 3 1 2 4 3 1 1 1 3 5 1 1 2 3 3 4 1 2 8 21 10 8 6 6
 12
 138 27 1 1 3 3 2 1 2 5 4 4 5 5 2 5 5 5 5 5 5 2 3 3 4 3 3 5 5 3 3 2 2 3 3 4 3 3 2 17 20 20 10
 10 16 13

LEGEND

ID Respondent number

AGE Age of respondent

GENDER Sex of respondent: 1 = Male, 2 = Female

QUAL Highest qualifications attained: 1 = Diploma & Below, 2 = Bachelors Degree, 3 = Postgraduate

DIVISION Respondents' work division : 1 = Head Quarters, 2 = Chhlong, 3 = Koh Kong

POSITION Job Position of respondent: 1 = Manager, 2 = Executive, 3 = Supervisor, 4 = Non Executive

EXPER Total working experience: 1 = below 5 yrs, 2 = 5 to 10 yrs, 3 = above 10 yrs

YEARS Length of Service in present Organization: 1 = below 2 yrs, 2 = 2 to 5 yrs, 3 = above 5 yrs

QMS1 to 5 Scores on indicators for Quality Management System (QMS) statements 1 to 5

COMMIT1 to 4 Scores on indicators for Management Commitment statements 1 to 4

STYLE1 to 4 Scores on indicators for Leadership Style statements 1 to 4

CULTURE1 to 4 Scores on indicators for Quality Culture statements 1 to 4

MOTI1 to 4 Scores on indicators for Motivation statements 1 to 4

EMPOWER1 to 4 Scores on indicators for Empowerment statements 1 to 4

TEAMWK1 to 4 Scores on indicators for Teamwork statements 1 to 4

R2EMP Recoded scores of Empowerment statement 2: 5 = 1, 4 = 2, 3 = 3, 2 = 4, 1 = 5

R4CULT Recoded scores of Quality Culture statement 4: 5 = 1, 4 = 2, 3 = 3, 2 = 4, 1 = 5

QMS Sum of all 5 indicators for QMS

COMMIT Sum of all 4 indicators for Management Commitment

LEADSTY Sum of all 4 indicators for Management Leadership Style

CULTURE Sum of all 4 indicators for Quality Culture

EMPOWER Sum of all 4 indicators for Empowerment

MOTI Sum of all 4 indicators for Motivation

TEAMWK Sum of all 4 indicators for Teamwork

108

GLOSSARY

AAC Annual Allowable Cut – is the volume of timber allowed for extraction annually which is calculated from forest zoning, stratification, inventory and site classification.

ALP Annual Logging Plan – is the tactical harvest plan for the next years operation providing details on the harvesting activities to be conducted.

Business Process Refers to a flow of key processes that are driven by customer requirements and

business plans/ objectives with a resulting output of product or service.

CFI Continuous Forest Inventory – an essential component of sustainable forest management which is aimed to provide data and information that will enable DFW overtime, to monitor changes in forest stock at the national level.

CFO Competent Forest Officer – is a forester from DFW assigned to supervise and monitor licensee's harvesting operations for its compliance to governmental regulations.

CGFEW Construction Guidelines for Forest Engineering Works

Change

Management

In the study is taken to mean that in implementing a Quality Management System in the company, management needs to change the existing culture into a quality culture which fosters high commitment to employee involvement, open communication, sharing of ideas, trust, team work and continuous improvement.

Commitment is the degree to which the employees identify with, are involved with, and are

dedicated and loyal to their work, superior and the organization.

Communication refers to the formal and informal reporting system and the chain of command in the company.

COP Code of Practice – refers to technical guidance manual for timber harvesting issued by the DFW.

CP Cutting Permit – permit issued by DFW to licensee before harvesting operations can commence.

DBH Diameter Breast Height

Company/

Organization

in this study refers to the researcher's own organization where the research was carried out. This company is in the timber industry and is based in the Kingdom of Cambodia.

DBHP Detailed Block Harvesting Plan – focuses on operations within blocks of not greater than 150 hectares providing in-depth descriptions of how operations are to be executed.

DFW Department of Forestry & Wildlife

109

EAAAY Estimated Available Annual Yield – means estimated volume a forest is capable of

producing annually which serves as a basis for allocating forest areas into compartments.

EAC Estimated Allowable Cut

EDP Electronic Data Processing

Employees refer to all the management staff of the organization consisting of managers, executives, supervisors, foreman, and non-executive workers.

Empowerment refers to the extent in which an employee is being given the authority and responsibility to make decisions relating to his/ her work.

ESIA Environmental & Social Impact Assessment

F & B Felling & Bucking – felling down standing trees and cutting to desired length that usually occurs below the first of felled trees.

FCMP Forest Concession Management Plan – refers to the master plan or the 25 years strategic planning at the concession level.

Feedback refers to the extent to which the jobs allow employees to have information about

the effectiveness of their performance.

Forest Planning

Requirement

and Practices refers to the design, planning, implementation and monitoring/ evaluation activities of the forest concession areas by the Forest Operations Department and Camp Operation Units of the company.

Forest

Rehabilitation

Refers to enrichment/gap planting in opened areas to increase forest stocking & regeneration.

F-Roads Feeder Roads – short roads penetrating into the harvesting blocks to reduce skidding distance that connects to the Main or Secondary roads.

FTL Forest Timber License – issued by the government/MAFF/DFW for the management of concession area.

GIS Geographic Information System – is a computer assisted mapping tools.

HO Phnom Penh Head Office

IA Investment Agreement

ISO 9001 is one of the models in the ISO 9000 series for quality assurance in design/ development, production, installation and servicing.

ITTO International Tropical Timber Organization

110

Leadership style refers to how the management staff lead the company; is there a vision and

mission statement for the company and how do managers treat their subordinates.

LDN Log Delivery Note

LICU Log Inventory Control Unit.

LL Log Landings – place where the skidded logs are temporarily stockpiled in preparation for loading and hauling to logyard or log pond.

Locus of control refers to the beliefs individuals have about what happens to them, that is whether the outcomes stems from their own actions or from external causes beyond their control.

M & S Roads Main & Secondary Roads – those roads which traverse almost the whole extent of the licensed area and usually linking with public road system and crossing major waterways by bridges. These may be permanent or semi permanent in structures & design.

MAFF Ministry of Agriculture, Forestry & Fisheries

Major LT Major Log Transport – hauling of logs from satellite camps to main camps.

Management refers to the senior managers, middle managers, junior managers and executive staff of the company under study.

Management

Commitment

refers to whether the top management is wholeheartedly committed to the organizational or quality culture and how they initiate or implement an action for change.

MDL Minimum Diameter Limit – means the minimum diameter a certain tree species is allowed to cut.

Minor LT Minor Log Transport – hauling of logs from log landings to satellite camps.

MOE Ministry of Environment

Motivation in the study is defined as the forces that satisfy the employees drives or desires

such as to induce the employees to act in the desired manner.

MPWT Ministry of Public Works & Transportation

MTMP Medium Term Management Plan – means the working plan covering all forest management activities over the next five years period of operations.

Participation means that every employee, from the top level down to the bottom level is involved in enhancing and sustaining a quality culture in the company. In short, it should be a company-wide affair, not just confined to a minority group.

111

Quality means conformance to both external and internal customer needs for the whole organization.

Quality Culture refers to the accepted norms, values, beliefs and the way they value customers of

the company that is widely accepted by the employees of the company under study. This organization culture is susceptible to change over time due to changes in both the external and internal environment.

Quality Gurus refers mainly to the pioneers of Quality Management Principles such as Deming,

Feigebaum, Juran, Crosby and Ishikawa.

Quality Manual is the main document used in drawing up and implementing a Quality System

where policies and objectives are established.

Quality System refers to the company's organizational structure, responsibilities, procedures, processes and resources for implementing Quality Management.

Quality

Management

is the involvement of all employees, both management and staff in every aspect of their work so as to satisfy customers, and other stakeholders.

Quality

Management

System (QMS)

is the system that manages quality-related matters. It mainly refers to the ISO 9001 Quality System, and should extend to include other Total Quality Management (TQM) principles such as customer-focus, team work and empowerment.

SEU Survey & Engineering Unit

SFMP Sustainable Forest Management Plan – means a plan for the management of forest resources for commercial production in sustainable basis while maintaining and protecting environmental and social values.

SI Sampling Intensity – refers to the ratio of the sample size to the total area and expressed in percentage.

Silviculture The art and practice of tending and caring of trees in its natural setting to hasten

the growth and ensure healthy residual stocking.

Skidding It is the process of dragging logs from the stump to log landing using tractors or wheel skidders.

SMA Special Management Area – refers to watershed and soil conservation areas, wildlife or biodiversity sanctuaries, seed sources, local community forest, ecotourism areas and historical or cultural areas.

SP Sampling Plot – is an area of 0.12th hectare for 1% SI and 1.0 hectare for 5% SI where trees are identified, enumerated measured and recorded.

ST Snig Track – route for skidders & tractors to follow during skidding operations.

SU Sampling Unit – refers to randomly selected units out of 100 units from equally divided forest types areas where sample plots are to be established.

112

Sustainable

Forest

Management

means the Management of forest resources for commercial production in a sustainable basis while maintaining and protecting environmental and social values.

Team work refers to all employees irrespective of their positions or rankings, collaborating,

co-operating and working together towards the same objective, that is to create a quality culture in the company.

TB Transit Bill – means a receipt of logs transported from any where inside concession area.

Total Quality

Management

(TQM)

is quality management that involves all employees and every aspect of their work in order to satisfy customers and other stakeholders. It is a similar concept to Quality Management.

Upstream forest

operations

refer to the system and processes of harvesting logs from the concession areas and its delivery to the factory of the company under study.

Winching It is the process of pulling the logs with wire ropes and chokers mounted in a winch attached to a skidders & tractors.