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ABSTRACT

Quality trends in construction projects have advanced from quality assurance to quality management under the ISO 9000 standards. Having achieved ISO 9000 certification and established a systematic approach to operations, the journey towards Total Quality Management (TQM) seems to weigh significantly on the ability of an organization to translate, integrate and institutionalize TQM behaviour into its business culture. More importantly, there is a need for organizational-wide management and a need to provide alignment of processes and people in the TQM environment. The Japanese concept of *Hoshin Kanri,* a form of policy management which prescribes a participative way of quality management, offers such leverage. *Hoshin Kanri* is a system for translating an organization's vision and objectives into actionable and measurable strategies throughout the company, and is also a means by which TQM can be institutionalized. The concept of *Hoshin Kanri* provides a powerful tool for deploying the strategic direction of the organization. This paper presents the essential steps in deploying the *Hoshin Kanri* form of policy management using a construction firm as a case study. A framework for implementing *Hoshin Kanri* in the construction industry is also recommended for the first time.
Keywords: TQM, *Hoshin Kanri,* Quality, Strategy, Construction

INTRODUCTION

Quality remains the strategically critical dimension it has been for over 25 years. Customers now expect quality products and services, along with continuous improvement in them (Gruska, 2000). The construction industry is no exception. Quality trends in construction projects seem to be advancing from Quality Assurance (QA) under ISO 9000 to quality management (Low and Teo, 2003). As such, many construction firms are embarking on the journey of Total Quality Management

(TQM) in some way or another. Having achieved ISO 9000 certification and establishing a systematic approach to their operations, the journey of TQM seem to weigh heavily on the ability of the organization to translate, integrate and institutionalize TQM behavior into the business culture. *Hoshin Kanri*, a form of policy management, seems to offer such leverage.

TQM is a structured and systematic process for creating organization-wide participation in planning and implementing continuous improvement in quality (Shortell et al., 1995). TQM is a set of systematic activities, carried out by the entire organization, to effectively and efficiently achieve company objectives; so as to provide products and services with a level of quality that satisfies customers, at the appropriate time and price.

The origins of modern TQM began with Walter Shewhart in the 1920s, and found recognizable expression in the post-Second World War Japan through quality gurus like Deming and Juran, and others like Ishikawa, Crosby and Feigenbaum. Low and Teo (2004) report that their approaches may vary, but generally focus on statistical techniques for process control, involvement of employees in the decision-making process, and orientation to customer needs.

In 1950, the Union of Japanese Scientists and Engineers (JUSE) established the Deming Prize to recognize companies that implemented new approaches to quality management methods known as Total Quality Control (TQC). One of the top quality awards in the world today, the Deming Prize, is given annually to companies that achieve an ever increasing rigorous level of quality. TQC that had been developed in Japan was subsequently re-exported back to the United States in the 1980s and had contributed to the revitalization of industries in the United States. While the term TQC had been used in Japan, it appears to be translated as TQM in the West. To follow an internationally-accepted practice, Japan changed the name from TQC to TQM.

TQM is the most common quality tool and program adopted by many companies. According to George and Weimerskirch (1998), the key idea of TQM is the "total" aspects of quality management. Essentially, TQM is a quality concept which emphasizes continuous refinement to the "total" aspects of a company's business. In TQM, quality is pervasive in all aspects of works, and the successful implementation of TQM is not relying on how well the company follows the program, but how well the company can maintain, sustain and improve the quality in response to rapid changes in the business environment.

TQM focuses externally on meeting customer requirements exactly, while internally it focuses on management commitment, employee training and education. Its main objective is to embed quality into processes, and thus into products and services.

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TQM stresses the involvement of everyone inside an organization and related persons outside the organization, such as customers and suppliers. TQM uses statistical process control (Amsden et al., 1986) as its main tool to ensure the firm's quality. However, TQM entails much more than just statistical tools. It requires top management commitment, leadership, training and teamwork. These are the key factors in the successful implementation of TQM.

Low and Teo (2004) studied how TQM can successfully be implemented in construction firms and provided a framework for implementing TQM in construction. Low and Teo (2004) concluded that implementing TQM requires a major organizational change that would transform the culture, processes, strategic priorities, and beliefs of an organization. Moreover, top management must educate its employees on the need for TQM and communicate clearly that TQM is not an additional burden. The following factors as identified by Low and Teo (2004) highlighted the important considerations for TQM implementation: an understanding of TQM requirements, strategic review of education and implementation plans, provision of ample budget and resources, teamwork, training, and timely feedback (Low and Teo, 2004).

Although many TQM studies have been completed, the key to successful TQM program is not fully understood (Weintraub, 1993). According to Rivers and Bae (1999), successful implementation of TQM requires a matching of organizational information system infrastructure and other management systems so that they are aligned with the new TQM environment. Powell (1995) suggested that tacit resources such as organizational culture, commitment, empowerment and business processes drive TQM success.

Sahney (1992) pointed out key concepts to implementation of TQM, which included: top management leadership, creating a corporate framework for quality, transforming corporate culture, a collaborative approach to process improvement, integration with the process, etc. However, for TQM to be successful, management processes must be aligned and integrated within a TQM environment. For example, the bureaucratic system must be transformed, strategies must be aligned, and information systems must be integrated to ensure the success of TQM.

Some studies showed that it is important for top management to take a leadership role and showed a strong commitment at the time of implementing TQM (Lee and Dale 1997; Rivers and Bae, 1999; Weintraub, 1993). Weintraub (1993) also pointed out that the quality management process will be successful only when it becomes integrated with the activities of every employee.

The notion of process alignment and people involvement is related to organizational performance. Core processes and people are two key points of implementing TQM.

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From the process management point of view, structure, strategy and IT should be aligned and aggregated together with the TQM environment to improve organizational performance. Top management commitment and people empowerment should also be combined along with TQM to influence organizational performance.

In summary, in order to harness the full benefits of TQM, there appears to be a need for organization-wide management, and a need to provide alignment of processes and people in the TQM environment. Most conventional accounts of TQM typically focus on organizational culture and employee empowerment rather than management procedures. For this purpose, this study aims to show that *Hoshin Kanri* can provide this very means by which the overall control system and TQM can be deployed.

Hoshin Kanri, as a technique for strategic quality management, provides an appropriate tool for declaration of the strategic vision for the business while integrating goals and targets in a single holistic model (Witcher and Butterworth, 1999, 2000, 2001).

Most reported applications of *Hoshin Kanri* have originated from companies based in Japan or in overseas divisions of Japanese companies, although there have been some successful examples of Western businesses applying the technique. Witcher and Butterworth (1999, 2000, and 2001) reported the findings on *Hoshin Kanri* in Xerox, Japanese-owned UK subsidiaries and Hewlett Packard respectively. The management framework provided in *Hoshin Kanri* offers much potential for organizations in the construction industry.

This study describes the application of *Hoshin Kanri* - an organizing framework for strategic management that provides a planning, implementation and review process for managing change and to recommend an implementation framework for construction organizations.

CONCEPT OF *HOSHIN KANRI*

Hoshin Kanri is a planning system developed in Japan as a derivative of Management by Objectives, and has operated as a management system in many Japanese firms since the 1960s. In the West, *Hoshin Kanri* is being referred to as "Policy Deployment", "Management by Policy" or simply "Policy Control". The various names for this approach are but approximate translations of the Japanese phrase, and none of them capture the subtleties of the original meaning without being misleading. It is for this reason that the original phrase *Hoshin Kanri* is adopted in this study.

Quality management practices were first introduced to the Union of Japanese Scientists and Engineers (JUSE) by Dr W. Edwards Deming in the 1950s and this led to the widespread use of the PDCA (Plan-Do-Check-Act) cycle and the "seven QC tools" for the management of operations for many industries and organizations.

The Deming Prize, and in particular the Deming Application Prize established by JUSE in 1951 has had immense influence in promoting the continued development of quality control/management in Japan. And amongst the Japanese companies which have won the Deming Prize, there laid one essential feature - *Hoshin Kanri*. In 1965, the Bridgestone Tire Corporation published a report that analyzed the planning techniques that were utilized by Deming Prize winning companies. The techniques that were used to incorporate strategy development into business operations were subsequently termed "*Hoshin Kanri*".

By 1975, *Hoshin Kanri* became widely used in Japan and soon filtered into the United States in the early 1980s through US companies (who had subsidiaries and divisions in Japan that were Deming Prize winners). Fuji-Xerox, Texas Instrument's Oita Plant and Hewlett-Packard were among the Deming Prize winners. Today, *Hoshin Kanri* is recognized and applied in most internationally focused Japanese-owned companies.

Hoshin Kanri is an organizing framework for strategic management that provides a planning, implementation and review process for managing change. *Hoshin Kanri* as a systematic approach to organization-wide management was based on the idea that unity and organizational purpose could be managed. It is thus a means to pull together the forces within a company and to unite the minds internally, to perpetually improve its performance by adjusting quickly to change (Akao, 1991). Many sources locate *Hoshin Kanri* in the domain of TQM (Witcher and Butterworth, 2001).

The Japanese translation of *Hoshin Kanri* is as follows (Tennant and Roberts, 2000, 2001):
ho   =   method
shin   =   shiny metal showing direction
kanri =   planning

In essence, *Hoshin Kanri* is a system that points the organization in the right direction. It is a management compass; a management tool to align people, activities, and performance metrics with strategic priorities. In another words, Witcher and Butterworth (2001) surmised that *Hoshin Kanri* is a form of corporate-wide management approach that combines strategic management and operational management by linking the achievement of top management goals with daily management at the operations level.

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Hoshin Kanri has three alignment purposes (Shiba and Walden, 2001):
- It aims to align all the people throughout the company towards key company goals, using indirect rather than direct enforcement, creating a sense of urgency.
- It aims to align all jobs and tasks, whether routine work or improvement work, focusing and coordinating efforts and resources toward the key company goals in order to create breakthroughs.
- It aims to bring the company's goals and activities quickly and effectively into alignment with rapid societal or environmental changes.

Bechtell (1995) shows how *Hoshin Kanri* can be used to communicate direction, co-ordinate activity, and monitor progress and how it enables members of the organization to work together in the most creative way to define and achieve the strategic intent. In short, its governing principles can be summed up in two words: focus and alignment. However, *Hoshin Kanri* does not replace other management strategies; it is a type of strategic planning system that orchestrates continuous improvement and breakthroughs.

PRINCIPLES OF *HOSHIN KANRI*
The seven principles of *Hoshin Kanri,* as summarized by King (1989), are reviewed below:

Principle 1: Participation by all managers
All managers should participate and give their inputs in setting the five-year vision. The top management group will put together a vision, and send that down to the managers in the organization for comments.

Principle 2: Individual initiative and responsibility
Each manager will subsequently set personal goals or objectives (monthly and yearly targets). In *Hoshin Kanri*, the manager sits down by himself and decides what he thinks the target ought to be, and then gets together with others in the organization to align those targets. This system focuses on the individual developing his own ideas of what needs to be done, and then integrates them into these ideas. Goals are measured by the individual manager who sets them for himself.

Principle 3: Focus on root causes
The focus of *Hoshin Kanri* is to go beyond the "fix-it" mentality into the "continuous improvement" mentality, and to look for causes that inhibit enhancement. Each manager sets monthly targets, and evaluates the progress monthly with a focus on getting past symptoms to root causes. The five w's, the cause and effect diagram, and ongoing analysis are some of the tools that can make this possible.

Principle 4: No tie to performance appraisals
In the opinion of Dr W. Edwards Deming, performance appraisals in many companies are a lottery with results based on chance as well as effort, with no way of

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distinguishing between the two. In Japan where *Hoshin Kanri* is applied, companies want everyone to "buy in" so that it will be a team effort. If *Hoshin Kanri* is part of performance appraisals, there may be problems. For example, there may be a direct correlation between helping another employee and a drop in the helper's pay. Deming first observed such negative effects of performance appraisals in 1984 as a result of his work in large corporations in the United States. As such, when implementing *Hoshin Kanri*, there should be no tie to performance evaluations or other personnel measures.

The point of *Hoshin Kanri* is to encourage and facilitate constant improvement as pointed out by Stephen and Colin (1993). This involves some risk taking. Using the possibility of failure to encourage attempts at success will be important, as there will be many false-starts and some failures in the search for quality improvement. Few risks will be taken if people feel that their career development and advancement in the system is irrevocably tied to the ups and downs of improving performance.

Principle 5: Quality first
In genuine *Hoshin Kanri* in powerful TQM organizations, quality and process improvement are prerequisites for sustainable improvement in performance. Once achieved, standardizing the process will sustain the gains. It is important that the focus should be on quality and the planning process system and not on profits or targets as a priority. Good results will become a regular by-product if this principle is followed.

Principle 6: Catch-ball
Communication is the cornerstone of TQM commitment and culture building. The catch-ball principle is a communication idea in which parties communicate extensively, vertically and horizontally. It is a process of consensus building to develop understanding about what seems to be the right course of action for a particular policy. It is a vital element that requires constant communication to ensure the development of appropriate targets and means, and their deployment at all levels in the organization.

Kondo (1998) opines that through catch-ball, discussion takes place among the people at various levels of organization, and thus deepens their understanding of the policies and enables them to think about the "necessities" and "possibilities" aspects of the proposed targets. Through this process, companies are more likely to be able to effect a qualitative change in top-down mandatory targets, turning them into bottom-up voluntary targets (Kondo, 1998).

Catch-ball can be linked to the broader Japanese concept of *nemawashi,* an informal and intensive form of consultation ahead of formal decisions (Witcher and Butterworth, 2001). It can also be compared to the Japanese consensus building method, known as the *ringi* system of decision making, which is reputedly employed

by over 80% of all Japanese industries (Tennant and Roberts, 2001). The *ringi* system is characterized as a bottom-up method of decision making, which even when originating at the top management level, has to have unanimous approval of everyone in the system (Irving, 1989). *Ringi* allows individuals to communicate a level of dissatisfaction, without actually halting the course of the decision, by signing under protest. It can be concluded that the *ringi* system has many similarities to the process of catchball, and in fact, reinforces the potential value of *Hoshin Kanri*.

Principle 7: Focus on process
Outcomes follow processes. To achieve process gains, everyone with goals should review them monthly and ask "what is helping them develop this process and how our process for changing the process is working?" The focus of *Hoshin Kanri* is on the process and assessment of why what one does was helpful or unhelpful in moving one towards the target.

In designing a process for development of goals, it is important that each of the principles set out above are adhered to. King (1989) describes, in Table 1, the common problems that may occur during planning and how the various *Hoshin Kanri* principles may be used to rectify the situations.

HOSHIN KANRI'S ROLE IN TQM

Hoshin Kanri is a successful TQM system that contains uniform business practices, utilizes cross-functional management, and applies the PDCA cycle in its daily business practices.

Witcher and Butterworth (2001) opine that conventional accounts of TQM and Japanese total quality control (TQC) typically focus on organizational culture and employee empowerment rather than management procedures. This applies most to *Hoshin Kanri* and the part played by policy in daily management.

In a review of management innovation and their transfer from Japan, Lillrank (1995) observed that for "linking strategy to operational improvements (and) for providing the indirect means of motivation (that) includes setting annual improvement targets, (and) their breakdown to specific targets for each unit… in the West this was not understood and (it was) therefore overlooked (Lillrank,1995, p.980)". There is an implication that because of the culturally induced blind spot, *Hoshin Kanri* may have become such a part of the Japanese organizational structure that it simply passes unnoticed.

Although TQM provides a common language and approach to general management and daily work, it is not a competitive-based corporate strategy; this is based on a competitive difference, which is too difficult for a competitor to imitate. Thus, Porter

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(1996) concluded that TQM is primarily about operational effectiveness because it can be copied. Stalk *et al.* (1992) opined that *Hoshin Kanri* takes TQM further as a competitive weapon. It can provide the necessary external focus for breakthrough change, and makes internal processes across the organization respond quickly and in a concerted way. The separation of breakthrough and continuous improvement in *Hoshin Kanri* turns TQM into an effective core capability, like in the case of Hewlett-Packard (Stalk *et al.,* 1992).

Witcher and Butterworth (2000) stated that *Hoshin Kanri* is based on TQM, and in particular, it addresses the primary task of strategic management according to the PDCA principles. Corporations see *Hoshin Kanri* as a necessary extension to TQM. TQM provides the discipline in terms of accountability and resource use that gives the review process a powerful and realistic expectation of what is to be achieved; while *Hoshin Kanri* is used as an organizing framework for review (Witcher and Butterworth, 2001). It enables management to have a clear idea of where the organization progress stood in strategic and operational terms.

ESSENTIAL STEPS OF *HOSHIN KANRI*

Hoshin Kanri is a systems approach to the management of change in critical business processes using a step-by-step planning, execution and auditing phase in its simplest form. In its more detailed form, it includes a long range plan (five-year vision), a one-year plan, deployment to departments, execution, monthly audits, and the president's annual audit.

The success of its deployment does depend on having a clear set of objectives articulated by the Chief Executive/Company President. *Hoshin Kanri* can then be applied to translate the strategic intent into required day-to-day actions and behaviours. The main objectives of *Hoshin Kanri* are summarised by Tennant and Roberts (2000) as:

- To identify important areas of opportunity for the organization to change and improve.
- To determine the most cost effective actions throughout the organization to achieve these changes.
- To create a detailed implementation plan.
- To provide a review mechanism to identify corrective actions and learning.

The major steps of the Hoshin Kanri model summarized by King (1989) are presented below.

Step 1 – Five-year vision
This involves a draft plan by the president and executive group. This is normally an improvement plan based on internal and external obstacles, with revisions to the

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draft plan based on inputs from all managers. This enables top management to develop a revised vision they know will produce the desired action.

Step 2 - The one-year plan
This involves the selection of activities based on feasibility and likelihood of achieving desired results. Ideas are generated from the five-year vision, the environment, and ideas based on last year's performance. The tentative plans are rated against a selection of criteria and a decision made on the best action plans. In other words, annual *hoshins* are developed from mid-term plans. *Hoshins* are statements of desired outcome for the year, plus the means to accomplishing the desired outcomes and measuring the accomplishment (Shiba and Walden, 2001). Each *hoshin* ideally should include the five elements as shown below.
Hoshin = statement of desired outcome for next year
　　　　　　　　　　+ focused means
　　　　　　　　　　+ metrics to measure progress
　　　　　　　　　　+ target values for metrics
　　　　　　　　　　+ deadline date

Step 3 - Deployment to departments
Annual *hoshins* are then deployed or cascaded throughout the organization. In other words, a hierarchy of sub-goals and means of accomplishing and measuring them is developed, all in alignment with the annual *hoshins*. The deployment also includes the selection of optimum targets and means. It focuses on the identification of key implementation items and a consideration of how they can systematically accomplish the plan. The individual plans developed are evaluated using the same criteria that were used for the one-year plans.

Step 4 - Detailed implementation
This is the implementation of the deployment plans. The major focus is on contingency planning. The steps to accomplish the tasks are identified and arranged in order. Things that could go wrong at each stage are listed and appropriate countermeasures are selected. The aim here is to achieve a level of self-diagnosis, self-correction, and visual presentation of action.

Step 5 - Monthly diagnosis
This is the analysis of things that helped or hindered progress and the activities to benefit from this learning. It focuses attention on the process rather than the target and the root cause rather than the symptoms. Management problems are identified, and corrective actions are systematically developed and implemented. Some of the advantages of this audit process are that it is data driven, objective not subjective, and it focuses on the process.

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Step 6 - President's annual diagnosis
The president's yearly diagnosis analyses the *Hoshin Kanri* system and suggests improvements relating to the effectiveness of the system. Other considerations like the environmental changes that have occurred, the company's long term and mid-term plans are also factored in.

This is essentially the review of progress to develop activities that will continue to help each manager function at his full potential. The president's audit focuses on numerical targets, but the major emphasis is on the process that underlies the results. The job of the president is to make sure that management in each sector of the organization is capable. The annual audit provides that information in details.

When it is time to plan for the coming year, the data on which means were carried out and what was accomplished, are analyzed to surface the areas that need to be improved for the next cycle. Decisions are consequently made on appropriate actions.

APPLICATION IN CONSTRUCTION ORGANIZATIONS

Hoshin Kanri appears to be generic enough to be applied in construction organizations although no known literature has yet recognized the use of *Hoshin Kanri* in the construction industry or has found a quality management practice in a construction organization that fits the *Hoshin Kanri* model.

The following discussion seeks to draw application of *Hoshin Kanri* to the construction industry in order for the construction organization to have an organizing framework for strategic management in the four primary areas:
- To focus the construction organization attention on the corporate strategic direction, by setting few vital strategic priorities.
- Align these strategic priorities with organizational plans and programs.
- Integrate strategic intentions with daily management.
- To provide a structured review process for progress monitoring.

The approach taken is to analyze the quality practice in an established construction firm, known as CS Corporation, and to discuss how construction quality management can be improved with the aid of *Hoshin Kanri.* Thereafter, an implementation framework for *Hoshin Kanri* in a construction organization will be recommended.

CS Corporation operates as a leading multinational general contractor. It provides a comprehensive range of construction-related services at all levels, from assistance with the planning of facilities based on client strategies, through to design, construction, maintenance, renovation and management. CS Corporation, Singapore

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Office is the local office of CS Corporation back in Japan. Also housed in Singapore is the CS Corporation's International Division, which heads the operations of its international construction activities. At the top of the hierarchy are the Director of the International Division and his three Deputy Directors. Placed lower down in the ranks are the General Managers of the individual countries including the Singapore office as shown in Figure 1.

CS Corporation is an A1 grade Japanese contractor (registered with the Building and Construction Authority, Singapore) which has implemented TQM and has attained ISO 9000, ISO 14000 and OHSAS 18000 certification. CS Corporation seeks to continuously secure projects and deliver them in the highest quality possible, so as to continue to make valuable contributions to both CS Corporation's International Division as well as the Head Office. In all its activities, CS Corporation is guided by the needs of its clients.

The quality management system used will be described in the following sections. It is noteworthy that the working culture had been passed down from its Japanese origin and has become an ingrained working system used in the local office in Singapore. A chart of the organisation showing the hierarchy within the project team is shown in Figure 2.

QUALITY MANAGEMENT SYSTEM

The quality management system used in CS Corporation is discussed below, and graphically represented in Figure 3.

1. Commencement meeting

The Director of the International Division decides on the five-year vision of the division, and determines the targeted work volume, the profit margin and the budget according to the countries. Prior to the start of a project, the General Manager (GM) in turn would give his policy directive to the Project Manager (PM) regarding the objective statements and project directions, as a planning guidance to the project. The appointed PM in-charge of the project is required to consider these and subsequently present his project plans and strategy at a meeting attended by top management and the PMs from all the other projects.

The PM would articulate at this commencement meeting, his project strategy and directions to the group present. Included in his plan are details of his plans of construction in the various aspects, such as sequence of construction, special methods used or even difficulties faced. Comments and suggestions from the top management and the project managers will be shared to assist the PM (who is presenting his project strategy), and possibly share experiences learnt from other relevant projects.

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2. Project Quality Plan

From the contributions and comments raised at the commencement meeting, the PM and his project team will study these additions and work out modifications to the project plans. Once the method statements and project directions are firmed up, these are translated into the Project Quality Plan (PQP) which serves as the guiding plan for the quality management of the project. On a shorter term basis, quality objectives and targets are set for each year of the project life and are set out in the form of a Quality, Environmental, Health and Safety (QEHS) plan. An example of a quality objective is as follows:
To achieve the corporate objective on CONQUAS (Construction Quality Assessment System) 21 score as:
a) Above 82 for Architectural category
b) Above 92 for Structural category
c) Above 95 for Mechanical & Electrical category

3.   Monthly Project Manager meeting

The monthly PM meeting is a periodic review process that monitors targets and facilitates a channel of feedback on problems faced on site. Such a review aims to capture progress by the project team and allows exchange of essential feedback amongst the PMs for learning. The monthly report submitted by individual PMs follows a standard format which aims to capture the main priorities for actions – namely procurement, safety, CONQUAS scores (where applicable) and costs (in particular the three main construction items of concrete, labor and steel).

4.   Monthly site safety visit

Each month, every site of an ongoing project will be visited by a group of top management staff, PMs and safety officers from other projects, to primarily evaluate site safety issues via a site walk-about. Originally designated as a site safety patrol, this has evolved into an all-purpose on-site observation of work standards, progress and environmental quality. Ideas, recommendations and observations are highlighted from an "outsider" perspective – from personnel uninvolved in the project. This routine review process enables the top management to validate the actual progress and instill cross-project learning throughout the organization.

5.   Completion meeting

At the end of the project, a final review session will be conducted with the same composition of members as the commencement meeting. This meeting serves to encapsulate experience and performance data of the project to provide an audit trail of how the project performed. The lessons pertaining to the key aspects of the

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projects - especially procurement, safety, CONQUAS scores and costs are captured in a standard document format and filed in the company's virtual database that is retrievable company-wide. However, it was noted that this documentation was written in Japanese and hence restricted its use to only Japanese literate employees. Decentralized project control is practiced at CS Corporation. The operations of the project per se are largely left to the prerogative of the PM and his management team. In other words, the system of review in the likes of commencement meeting and monthly PMs review meeting are only dictated at the headquarter level; and the process stops at the PM level, beyond which, the PM and his management team have liberty in implementing their own quality management system. Needless to say, the practices at the project level still conform to the ISO 9000 certification standards that CS Corporation has obtained.

At the project level, the PM will set quality targets for the project and for the work year. The deputy PM and his teams of site managers will work towards the targets set accordingly. The site management teams comprising of the engineers and supervisors would follow the in-house method statements of construction together with the specifications of the clients and consultants to ensure that the quality required is met. However, there appears to be no formal quality system other than the Quality Circle (QC) that addresses the quality improvement needs of CS Corporation.

Central to its quality practice at CS Corporation is the QC, which is gaining popularity in the organization. It was first introduced locally through its first implementation at the inception of the Singapore Airport Terminal project and has to date gone through its sixth quarterly cycle. At the airport project, each of its departments such as the Contracts Department, Safety Department and Site Operations Department is tasked to form QC teams periodically to tackle prevailing issues in the projects. These may vary from the rectification of defective work to the improvement of coordination and communication between CS Corporation and the sub-contractors.

The composition of these teams is at the prerogative of the QC team leader, and is usually varied across different QC cycles. Each QC cycle essentially spans a quarter of the work year. The usefulness and effectiveness of such a quality initiative is, however, debatable. More importantly, the implementation team of a successful quality improvement initiative is usually separate from the QC conceptualising personnel. Thus, the QCs are found to be limited in their scope and provide little opportunity for the employees to have meaningful inputs.

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HOSHIN KANRI ISSUES

Observations were drawn to parallel quality management in CS Corporation and the *Hoshin Kanri* model. From the study of how higher management in CS Corporation ensure quality in the organization, some traces of *Hoshin Kanri* seem to be practiced amongst the executive planning matrix of the organization. However, *Hoshin Kanri* is about organization-wide deployment, which is not evident in CS Corporation, as shall be elaborated below.

1.   *Traces of Hoshin Kanri in CS Corporation's quality management*

At the HQ level of quality management in CS Corporation, there appears to be some forms of practice akin to *Hoshin Kanri.* The setting of long term visions, policy directives for projects and the review process before, during and after project completion seem to reveal traces of *Hoshin Kanri,* albeit not in its entirety. Top management have in place a review process structure that allows a periodic review of the construction project progress and its key aspects as mentioned in the earlier section. There appears to be participation by all managers down to the PM level.

2.   *Absence of strategic goals and their measurements*

Key measurement indicators used for monitoring are procurement, safety, CONQUAS scores and material costs. These are generic means of measurement used for periodic project monitoring and should not be confused with the measurements needed to monitor the processes in *Hoshin Kanri*. To implement *Hoshin Kanri*, the monitoring method should cater specifically to the policy objectives set out. These policy objectives should be that of the breakthrough strategies (translated from long term visions), and not of standardised PDCA targets.

3.   *Lack of architecture to cascade Hoshins to all employees*

Moreover, at the project level, there appears to be a lack of an organization architecture that is sufficiently transparent to link the daily management or operations of the project work with the strategic intent of CS Corporation. There is no formal or appropriate system that transcends throughout the organisation for policy objectives to cascade down to the individual worker. The only visible participation of the managers and engineers of the project in quality improvement is in the form of QC or other ad-hoc initiatives by the PM or deputy PM. In other words, participation in the strategic goals of CS Corporation terminates prematurely at the PM level.

4.   Inadequacies of quality circles

With *Hoshin Kanri,* staff on site can work in teams and manage their contributions to the strategic priorities. *Hoshin* plans are only finalised when the ownership of the objectives and the means to achieve them are clear. This process involves the site operations staff in an interactive process to agree on their contributions to the strategic priorities. Unlike QC, the *Hoshin* process manages the close loop delivery of predicted and sustained improvement that each individual and team as a whole has agreed upon.

5. Performance appraisal

Since the employees are committed in their contribution to the corporate strategic priorities, their performance should be linked with their appraisal. At CS Corporation, the appraisal format takes on a majority of subjective criteria, mostly tied to the superior's perceptions and personal evaluation of the subordinate's performance. Since *Hoshin Kanri* utilises actual performance data and measurable targets to monitor progress, this augers well for a more objective and a more transparent approach to appraise workers. For example, an engineer's contribution to the construction quality can be measured in term of the amount of reworks for a specified amount of in-site concrete cast. His performance and possibly monetary benefits can thus be tied to the degree in which his quality objective has been reached. This can be achieved with *Hoshin Kanri*
.
In summary, Table 2 compares the main difference between the quality management practices of *Hoshin Kanri* and of CS Corporation.

ORGANIZATIONAL FRAMEWORK

A suitable organizational structure is necessary to implement *Hoshin Kanri* in a construction organization. A generic format for the organizational structure which should be in place before *Hoshin Kanri* can commence is shown in Figure 4. The organization components of CS Corporation (Figure 2), is used as a sample construction corporation model.

At the top of the structure and in ultimate control is an Executive Steering Committee, comprising the GM and a small number of senior executives like the Deputy GMs. As part of their overall TQM responsibility, they conduct the annual corporate review, set the corporate vision and approve final plans, including budget and resource allocation.

The policy deployment arm of the Executive Steering Committee is the Policy Deployment Committee, also comprising relevant top executives. Their role is to

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coordinate the policy deployment activities. It is important for top management to understand the whole *Hoshin* process and drive the policy deployment in a manageable way. They set the initial mid- and short-term corporate plans and also schedule and guide the catch-ball deployment process. This committee is responsible to the Executive Steering Committee.

The final plans are determined through a series of catch-ball, in an iterative attempt to optimize the company's interests. This involves cascading information and ideas between four parties - Departmental committees, Cross-functional committees, Project Operations committee and the Policy Deployment Committee. It is essential if the company is eventually to operate with maximum productivity at minimum cost. Customer needs, such as quality (Q), cost (C) and delivery (D) of the product, enter as the organization's super-ordinate goals, and are the concern of the responsible cross-functional group.

Departmental and Project operations objectives are then aligned with these primary considerations in the optimization process. Departmental committees are traditional structures consisting of top departmental management in business support roles like logistics and finance, while Project Operations committees comprise of project director and managers from the site operations. Cross-functional committees, on the other hand, are headed by the department with greatest interest and expertise in the super-ordinate goal. For example, the financial controller may chair the Cost Cross-functional Committee, whereas the project managers may chair the Quality Cross-functional Committee.

Task teams operate either inter-departmentally or intra-departmentally, with improvements standardized into the underlying framework of daily control. Department, project operations and cross-functional team leaders report to the Executive Steering Committee in the annual corporate review. In summary, the organization architecture suggested in Figure 4 serves to facilitate the deployment and development of *Hoshin Kanri,* and the administering of support for learning.

IMPLEMENTATION FRAMEWORK

Adopting *Hoshin Kanri* is a long process that requires much fine tuning. Organizations need time to carefully consider the most suitable review and measurement system that caters to the organization's needs. However, no known framework is recorded in existing quality management literature. Hence, a framework recommended for the implementation of *Hoshin Kanri* in the construction industry is suggested in Figure 5. This consolidates the research findings from the experience gained from CS Corporation.

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In so far as the *Hoshin Kanri* planning report format is concerned, the literature review suggests that the format used for documentation of the *hoshins* and their planning process often vary from organization to organization; and in certain cases, even amongst departments. Some examples of the standard forms, drawing on the CS Corporation's case study that may be used are recommended below.

1. Hoshin process

Table 3 illustrates the goals set at various levels of a construction organization through the application of *Hoshin Kanri. Hoshins* or goals at higher level are more general and less prescriptive. The details of the *hoshins* become more specific as these filter down the hierarchy of management. Support departments, like the Planning Department, provide cross-functional management which affects the strategic goals of the other functional units, like the site team.

2. Hoshin plan report

The format shown in Table 4 has often been used by other *Hoshin Kanri* practitioners in Western countries. Table 4 is a sample of a *hoshin* plan that construction organizations might formulate together with the goals to be achieved. Note that the goals are restricted to a vital few. The business outlook is often highlighted for better appreciation of the strategies needed.

3. Activity plan report

Table 5 shows a generic format of documentation for *Hoshin Kanri* adapted from Pascal (2002). It is essentially a storyboard following a logical and standard structure depicting the process of planning. This structure can be modified to reflect the current status or address the problems as they occur. In this example, the *hoshins* from the country HQ are cascaded down to the project level, where the Project Manager sets out the activity plan for the particular project for implementation in the coming year's project progress. After the catch-ball activity (typically lasting a month), the managers of each project or department will identify action items (targets) and action plans for achieving them. Control points (indicated in the activity plan and report) for deploying the plans are also listed for monitoring purpose.

4. Implementation plan report

As the action plans cascade down through the department, further plans and tactics have to be made for implementing each action plan. Table 6 shows a breakdown of the strategy and tactics to be employed. Owners or responsible persons for the specific strategy are also named to ensure the means of achieving the target action plan goals.

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5. Hoshin review table

As part of the review structure, there needs to be clear documentation for proper review analysis and progress monitoring. The use of a standardized format or review allows seamless and effective analysis across functional departments. Table 7 is an example of a review table – in this case it is the review plan for the Deputy Project Management Team 1. *Hoshin* performance may be reviewed weekly or monthly within the team. Performance measures are taken at a regular basis, so that any deviations from the strategic objectives are easily spotted. While corrective actions may first require emergency counter measures, or even a short term fix, such follow up actions must ultimately provide a permanent solution.

6. Communication network

The progress and review of the *hoshins* should be reported through the specialist network of quality managers and equally important, through the company's communication media. The two channels are essential to relay information about best practices and success stories. The network in tandem with the communication media plays an important role in cross departmental learning and even in the dissemination of lessons across projects. At CS Corporation, documentation of project data is stored and accessed through its intranet network, albeit in the Japanese language. It is recommended that in this digital age, construction companies can also set up an internal network for submission of all *hoshin* reports, for real-time monitoring by management and also for organization-wide learning by all employees.

CONCLUSION

This study is an attempt to bring the relevance of *Hoshin Kanri* into the construction industry by suggesting an implementation framework for the application of *Hoshin Kanri* into a construction organization. Using CS Corporation and its practices as a model, the issues of applying *Hoshin Kanri* are discussed, with recommendations for organizational framework, *Hoshin* report and review formats. There is a potential for *Hoshin Kanri* to propel the construction industry further upstream in its TQM journey.

Porter (1980) defined strategy as the application of resources to pursue the aims of policy, which should contain two critical elements. Firstly, strategic thinking - where managers synthesize their strategic vision using intuition and creativity to create an integrated perspective of the enterprise, or a vision of direction; and secondly, conversion of the vision into actionable steps to achieve realization of the vision.

Hamel and Prahalad (1994) sees strategy as an envisioning process, which creates an organizational wide consensus where employees help develop and manage strategies; and the means for achieving them. Hayashi (1978) contends that a primary purpose of Japanese corporate planning is to set up targets of endeavor for the business. This hopes to unify managerial thoughts within the organization and to create an achievement orientation and motivational effect in the organization.

The primary role of strategic planning is to set the right objectives for the business, determine the best means of achieving the objectives, and facilitate the effective implementation and review of the means as the plan is executed. This requires that the planners should work in the context of the objectives and purposes of the organization. As such, this is where *Hoshin Kanri* is proposed by Tennant and Roberts (2000) as an effective methodology for Strategic Quality Management (SQM).

The benefits of *Hoshin Kanri* as a tool for strategic quality management compared with the conventional planning system include integration of strategic objectives with tactical daily management, the application of the Plan-Do-Check-Act cycle to business process management, parallel planning and execution methodology, company-wide approach, improvements in communication, increased consensus and buy-in to goal setting, and cross-functional management integration (Tennant and Roberts, 2000).

Hoshin Kanri represents a very powerful tool for deploying the strategic direction of any organisation. It not only ensures that everyone in an organisation understands the strategic direction but it also ensures that they understand how their work and the work of other teams within the organisation fit together. It is also a powerful tool for bringing out the best in everyone through participation.

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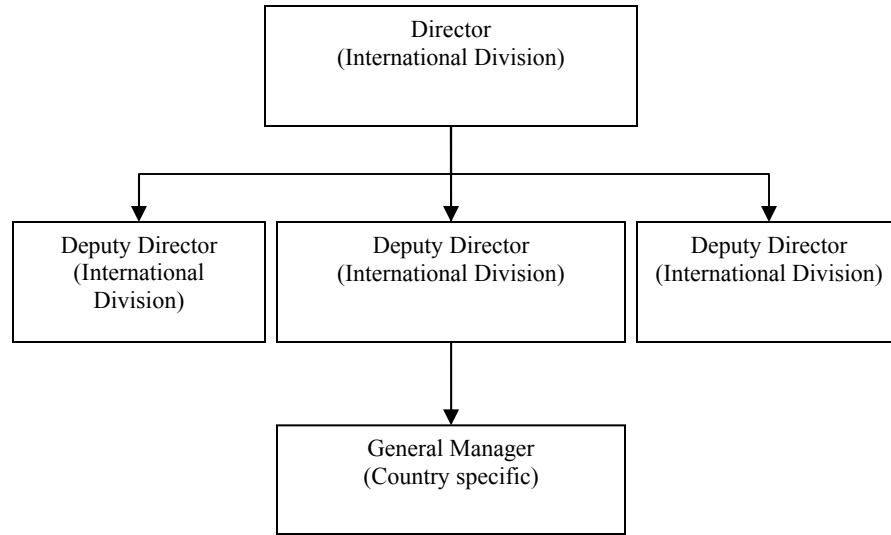
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                    ┌──────────────────────┐
                    │      Director        │
                    │(International Division)│
                    └──────────────────────┘
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Figure 1 Organization structure (CS Corporation's International Division)
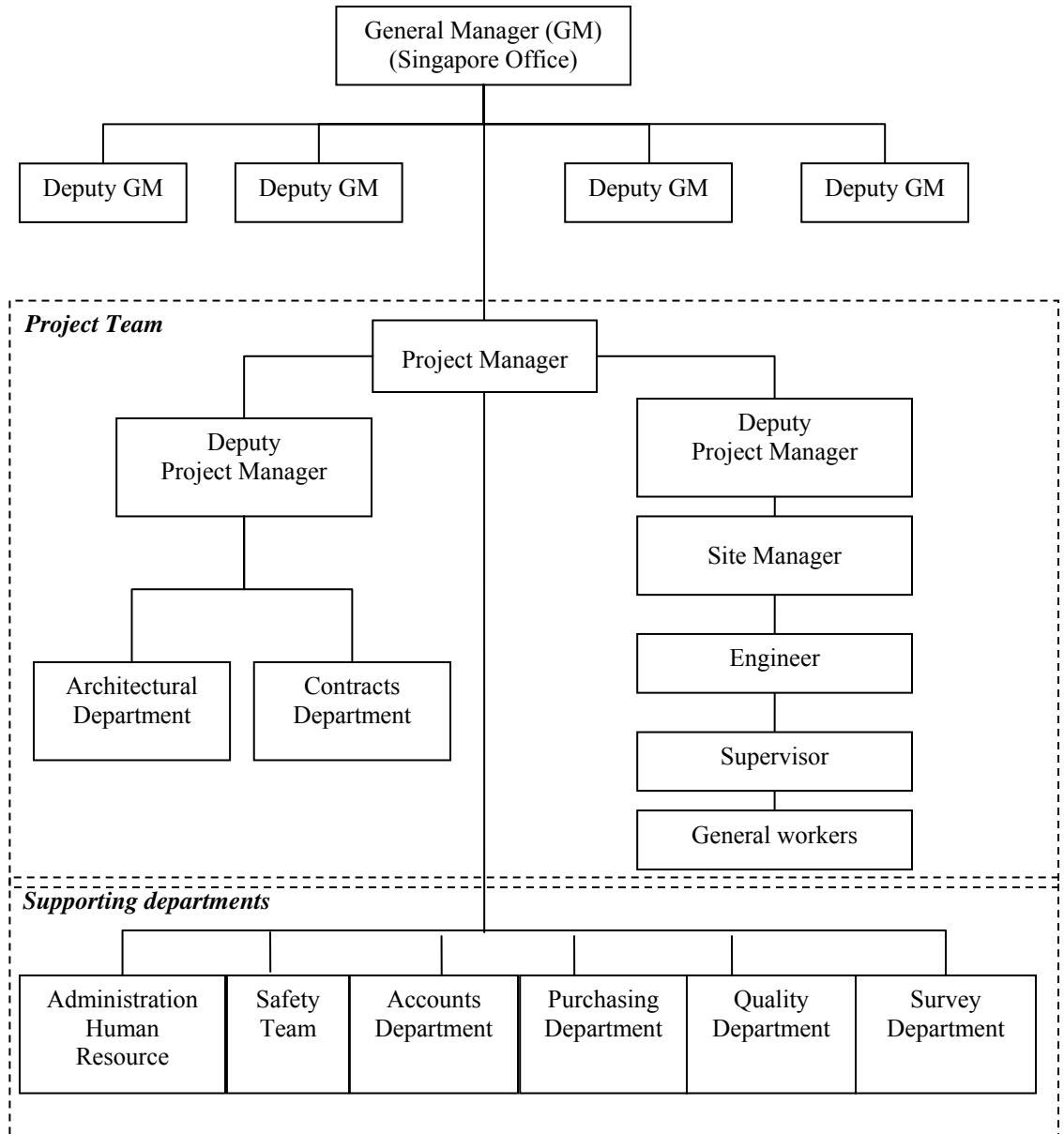
Figure 2 Organization chart (CS Corporation, Singapore office)
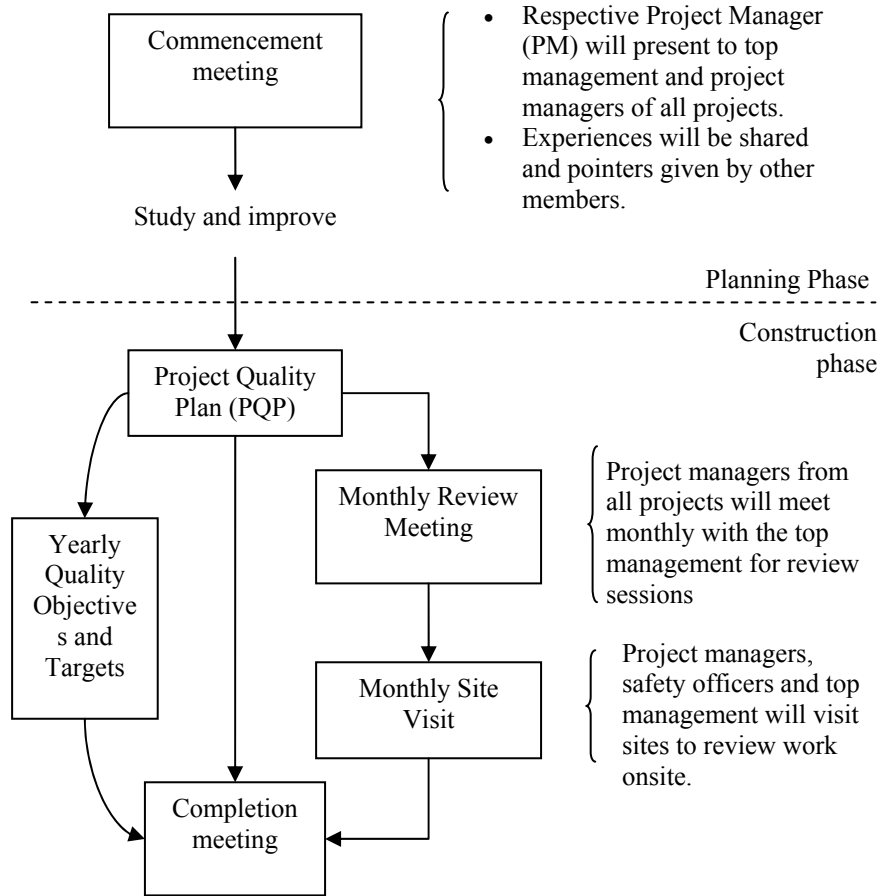
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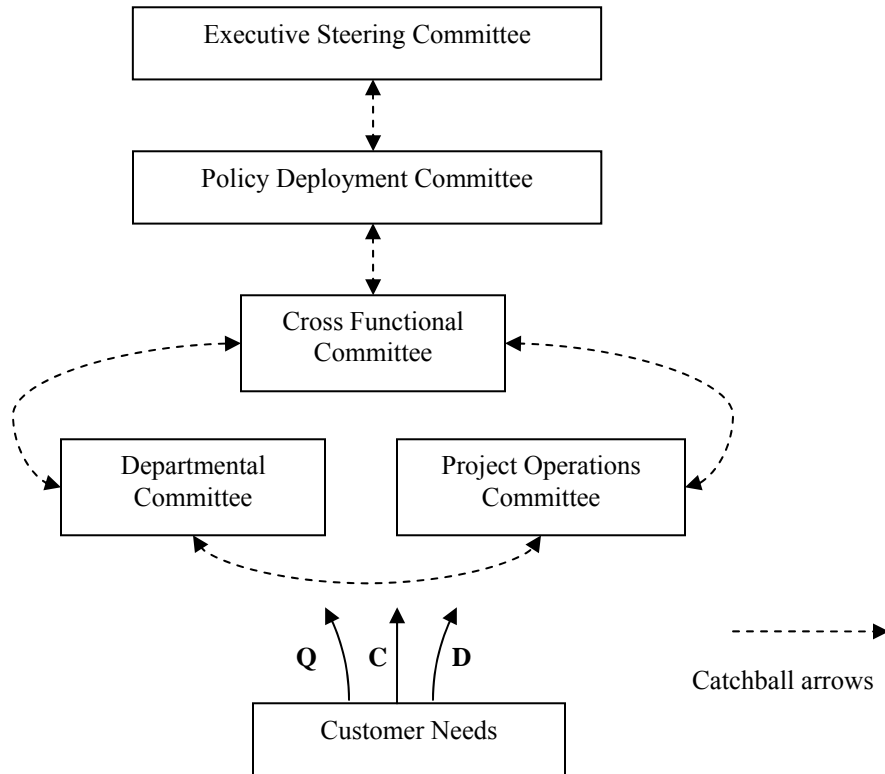Figure 3 Quality management system in CS Corporation

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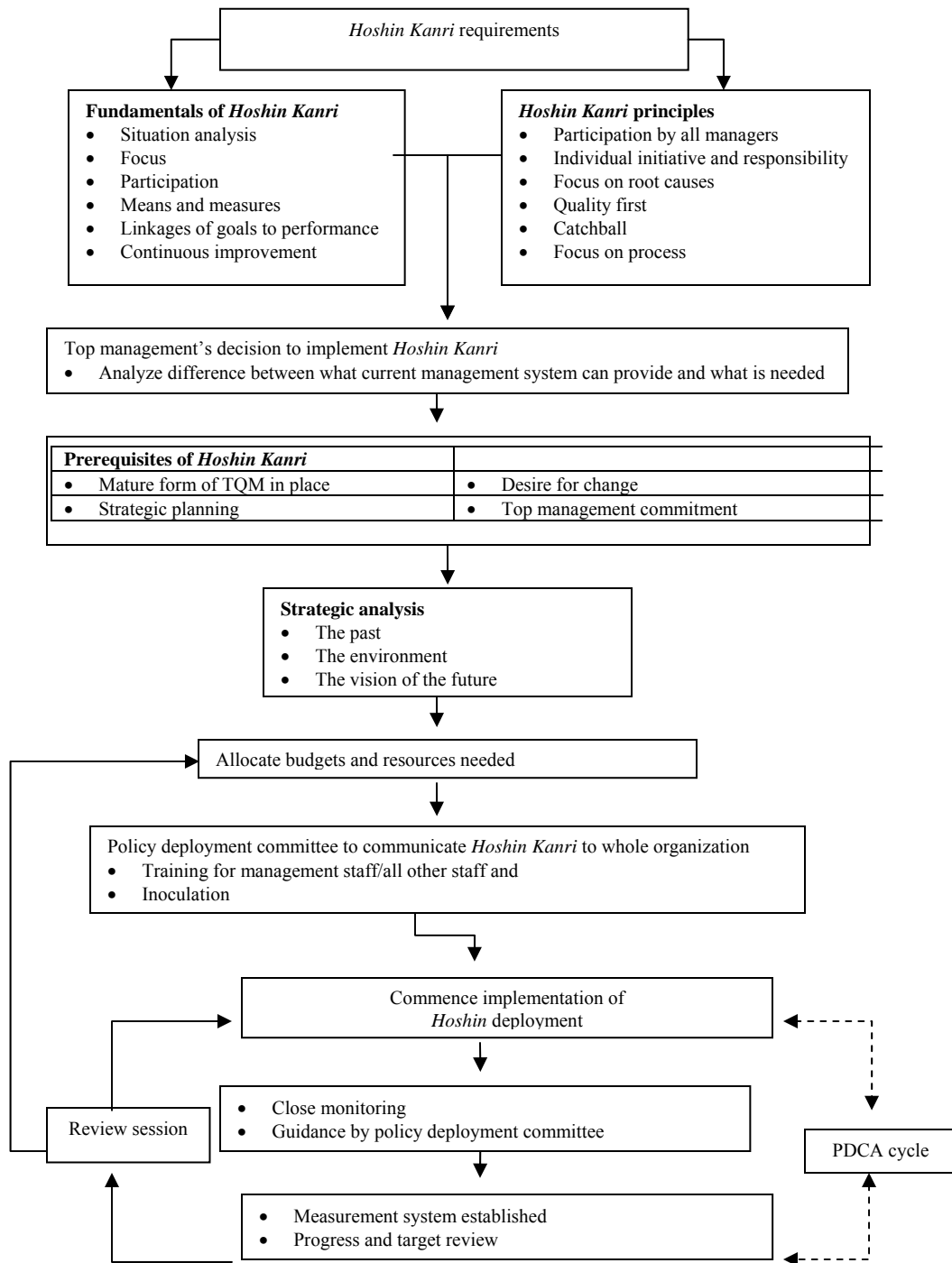Figure 4 The organization of *Hoshin Kanri* management model

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Figure 5 Implementation framework

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Table 1 *Hoshin Kanri* principles used to rectify common problems that occur during planning

Problems	*Hoshin Kanri* Principles						
	Participation by all managers	Individual initiative and responsibility	Focus on root causes	No tie to performance appraisal	Quality first	Catchball understanding	Focus on process
No Plan	●	●			●		
Short-term focus				●	●		●
Difficult to measure success		●					
Goals not measured		●			●		●
Language problems	●	●				●	
Gets filed		●				●	●
Fragmented	●					●	
Long range by corporate only	●	●				●	
Long range not related to daily operations		●	●			●	●
Can't handle emergencies	●	●		●	●	●	
New manager						●	●
Don't plan for progress	●	●	●		●		●
People plan for others	●	●				●	
Unrealistic plan		●	●	●		●	●
Plan as a weapon, not a tool	●	●	●	●	●	●	●
Plan poorly communicated	●	●				●	

(Source: King, 1989)

Table 2 Comparison between *Hoshin Kanri* and quality management at CS Corporation

Hoshin Kanri	Quality management at CS Corporation
Strategic goals linked to long term vision of the organization	Internally focused on specific short-term issues

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Consultative participation - catchball	Objectives are either passed down or of short-term nature in QC
Total management philosophy	Limited management involvement especially within the project

Table 3 Goals at various levels of the construction organization

Level	Goal
Corporate	Providing customers with maximum value
International Division	Improving the competitiveness and earning potential of its construction operations
Country (Singapore)	To improve competitiveness and quality of construction works.
Project Team	To achieve CONQUAS 21 (Construction Quality Assessment System) scores of: (a) Architectural category: 82 (b) Structural category: 92 (c) M&E category: 95
Site Team	Reduce rework for non-conformance work by double checking prior to casting
Support departments Examples: Safety Department	Improve safety awareness of all staff on site
Planning Department	Reduce work stoppage due to inefficient scheduling
Administrative	Hire workers of adequate and matching skill level

Table 4 A *hoshin* plan format

Prepared by: General Manager		Entity/Department: HQ	
Situation: Growth of government projects is expected to decline sharply. Level of private-sector construction is anticipated to remain low. Restrained capital investment climate.			
Objective	No.	Strategy/Owner	Measures

To improve competitiveness and quality of construction works	1.	Improve corporate image and quality branding: Deputy General Manager (Strategic Marketing)	To secure three high profile building projects
Goals	2.	Reduce errors in planning: Deputy General Manager (Construction)	Reduce schedule error from 5% to < 3%
Q1: Increase work volume by 15% Q2: Improve profit margin by 5%	3	Improve quality assessment grade: Deputy General Manager (Construction)	Improve CONQUAS score from 82.0 to 87.0

Table 5 Department/Project activity plan and report

Department/Team: Project Manager		Project: Singapore Airport Terminal	
A. Last year's targets and results: • CONQUAS score of 82.0		C. This year's target/mid-term targets: • Achieve CONQUAS score of 89.0	
B. Reflections on last year's activities and results: • Lack of coordination and supervision on site		D. Action Plan (for Breakthrough Targets): • Conformance of rebar layout and M&E fittings to specifications.	
E. Control points:			
Item	Current performance	Target	Completion date
1. Uniformity in concrete density in columns	Deviation of 5%	Deviation of 1%	3rd Quarter

Table 6 *Hoshin* implementation plan

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Department: Deputy Project Management Team 1 Manager: Mr. P K Lee					FY: 2008		
Action Plan: Conformance of rebar layout and M&E fittings to specifications.							
Strategy	Tactics	Owner	Q1	Q2	Q3	Q4	Review Date
Inspections	Visual inspection by engineer prior to calling for inspection by clerk-of-works Hiring of better skilled rebar workers	Team Engineers Admin Department		●————————————●			End of Q2 End of Q2

Table 7 *Hoshin* review table

Department: Deputy Project Management Team 1		FY: 2008	Date: November 2007		Prepared by: Mr. P K Lee
Objectives/Strategy	Achieved Performance	Deviation	Status	Future implications	Corrective actions
Improve CONQUAS scores from 82.0 to 87.0	86.0	- 1.0	Below Target	Problems associated with design of rebar layout	Suggest alternative design to design consultant

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In the words of Erich Fromm, an astute observer of the roots and fruits of the Personality Ethic:

> Today we come across an individual who behave like an automation, who does not know or understand himself, and the only person that he knows is the person that he is supposed to be, whose meaningless chatter has replaced communicative speech, whose synthetic smile has replaced genuine laughter, and whose sense of dull despair has taken the place of genuine pain. Two statements may be said concerning this individual. One is that he suffers from defects of spontaneity and individuality which may seem to be incurable. At the same time it may be said of him he does not differ essentially from the millions of the rest of us who walk upon this earth. – *Stephen R. Covey*