STUDIES OF STRATEGIC PERFORMANCE MANAGEMENT FOR CLASSICAL ORGANIZATIONS
THEORY & PRACTICE

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Preface

In 2007, when my supervisor Professor Liu suggested me that the main direction of my research would be performance management, I had no idea at all on performance management. I then went to libraries and Internet to check what the performance management stands for. Surprisingly, there are so many different definitions of performance and performance management. This also implies how hard to get through the scholar research of performance management. It seems to be unbelievable that in the past three years, I have devoted all of my time to our research on performance management. When I finally finished my thesis, I suddenly found some gray hair on my head. However, on the other hand, I also felt great by gaining so much ability and knowledge in the past three years. I have been keeping the words in my mind: No pain, no gain. I am now presenting my thesis, which has condensed my full efforts of such many days and nights in the passing three years. I hope the readers will like it.

This thesis focuses on studies of theoretical framework of performance management and its practical procedures for 'classical' organizations and their applications to some organizations in reality. There has been so much existing work on theoretical framework and practice of performance management. Our starting point is that the effective forms and structures of performance management for an organization are likely to much depend on type of the organization, among other important variables like ownership and environment. Performance management needs to coordinate well with other management activities in the organization. To our best knowledge there is little existing work in this direction.

This thesis is organized as follows:
1) Chapter 1 describes the development history of performance measurement & management;
2) Chapter 2 illustrates the development of performance management theories and frameworks;
3) Chapter 3 introduces some management science techniques, such as Data Envelopment Analysis (DEA), and Soft System Methodology (SSM);
4) Chapter 4 explains a methodology of SSM for decomposing objectives for an

organization and developing performance indicators via two cases;

5) Chapter 5 studies the theoretical framework of performance management from system perspective;

6) From Chapter 6 to Chapter 8, we shift our focus to the applications of our theoretical framework and its practical procedures in three cases to support our theoretical development,

7) Chapter 9 summarizes the main points in this thesis, and discusses some future research of performance management.

Abstract

Nowadays, the activities of "Performance Management" have spread very broadly in actually every part of business and management. There are numerous practitioners and researchers from very different disciplines, who are involved in exploring thedifferent contents of performance management. In this thesis, some relevant historic developments in performance management are first reviewed. This includes various theories and frameworks of performance management. Then several management science techniques are developed for assessing performance management, including new methods in Data Envelopment Analysis (DEA) and Soft System Methodology (SSM). A theoretical framework for performance management and its practical procedures (five phases) are developed for "classic" organizations using soft system thinking, and the relationship with the existing theories are explored. Eventually these results are applied in three case studies to verify our theoretical development.

One of the main contributions of this work is to point out, and to systematically explore the basic idea that the effective forms and structures of performance management for an organization are likely to depend greatly on the organizational configuration, in order to coordinate well with other management activities in the organization, which has seemingly been neglected in the existing literature of performance management research in the sense that there exists little known research that associated particular forms of performance management with the explicit assumptions of organizational configuration. By applying SSM, this thesis logically derives some main functional blocks of performance management in 'classic' organizations and clarifies the relationships between performance management and other management activities. Furthermore, it develops some new tools and procedures, which can hierarchically decompose organizational strategies and produce a practical model of specific implementation steps for "classic" organizations. Our approach integrates popular types of performance management models. Last but not least, this thesis presents findings from three major cases, which are quite different organizations in terms of management styles, ownership, and operating environment, to illustrate the fliexbility of the developed theoretical framework.

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List of Abbreviations

3 Es	Efficacy, Efficiency and Effectiveness
3 Ps	Preference, Production Possibility Set (PPS) and Performance measurement
ABC	Activity-Based Costing
ABPA	Activity-Based Profitability Analysis
AHP	Analytic Hierarchy Process
BEM	Business Excellence Model
BSC	Balanced Scorecard
CAS	Chinese Academy of Sciences
CATWOE	Customers (C), Actors (A), Transformation (T), Weltanschauung (W), Owner (O) and Environmental constraints (E)
CEO	Chief Executive Officer
CM	Conceptual Model
CM1.1	CM of activity 1.1
CTO	Chief Technology Officer
DEA	Data Envelopment Analysis
DM	Decision Maker
DMU	Decision Making Unit
DPOP	Department of Production & Operation Planning
DSC	Director of Strategy Committee
E1	Efficacy
E2	Efficiency
E3	Effectiveness
EFQM	European Foundation for Quality Management
EQA	European Quality Award
EVA	Economic Value Added
HPWS	High Performance Work System
HRM	Human Resources Management

HST	Hard System Thinking
IMD	IMD Business School in Switzerland
ISO	International Organization for Standardization
KP	Key Process
KPI	Key Performance Indicator
LGMB	Local Government Management Board
NAHT	National Association of Head Teachers
NHS	National Health Service
OD	Organization Development
OECD	Organization for Economic Co-operation and Development
OR	Operational Research
P	What to do
PCA	Principle Component Analysis
PDCA	Plan Do Check Action
PI	Performance Indicator
PPS	Production Possibility Set
PRI	Public Research Institutes
Q	How to do
R	Why to do
RD	Root Definition
R&D	Research & Development
REC	Research Evaluation Centre
ROI	Return on Investment
SCI	Science Citation Index
SCI Pub.	Publications included in SCI
SMART	Specific Measurable Attainable Relevant Time-bound
SSM	Soft System Methodology
TQM	Total Quality Management
VIP	Very Important Person
ZHG	Zotye Holding Group

Chapter 1

History of Performance

Measurement & Management

Today, the activities of 'performance management' have spread very broadly in every part of business and management. There are numerous practitioners and researchers from very different disciplines, who are involved in exploring different contents of performance management. For example, many researchers in financial accounting, operational research, human resource management, economic and management consultants, even journalists have engaged in academic and practical research of performance management.

So far, performance management market has grown significantly and fast, there are various theories and frameworks that came out continuously. However Performance management as a rigorous discipline seems still in an early state (Thorpe & Beasley 2004). In particular, it lacks a suitably grounded framework of the non-linear management of performance. Despite significant research efforts, it does not seem that the result is even vaguely visible (Smith & Goddard 2002). For example, there are even no universal definitions for performance management (or even performance) accepted by most of the researchers, see the relevant discussions in Chapter 2. Probably the main reason for this unsatisfactory situation is the complex and highly interdisciplinary nature of performance management research, involving many fields of varying states of maturity and methodological practice as mentioned before.

The main aims of this thesis are to attempt to build a framework of performance management suitable for some "classic" organizations from a system perspective, and to explore its relationship with some existing theories. We then apply these results in three case studies to support our theoretical development.

To explore the essence of performance management, we begin with a brief review of development history of performance measurement & management. Going through early literatures about performance management research, a majority of people comprehend performance management as performance measurement since people began to pay attention on firms' performance. Furthermore as mentioned there are several forces in studying performance management and we mainly examine the subjects from a point view of management science. Our literature survey has concentrated on the research from the researchers in this discipline, where the early

study of performance management started from performance measurement. Only later other activities in performance management started to receive much attention. In our research, we will explicitly distinguish performance measurement and management, as it is now a common idea that performance measurement is only a part of the performance management loop. We start our review from earlier work of performance measurement. Please note that our divisions of the development periods are not rigid and only facilitate as indications.

1.1 Phrase 1 pre 1970s performance measurement with financial indicators

Before the 1970s, financial appraisal was almost the whole content of performance appraisal of firms. It is easy to understand that in the early stage of development of modern industry, the firms were simpler and profits-focused. Thus various financial performance indicators were used in measuring their performance. During this period, the keystone of research on performance measurement was to develop financial indicators, as people paid most attention on profit, return on investment and productivity and so on. Moreover the evolution of appraisal methods was based on the financial indicators. The companies were purely profit-orientated, and owners or managers emphasize maximizing profit as a sole objective for operation. Thus financial indicators are the most obvious ones for performance appraisal of firms.

Furthermore the content of performance appraisal for firms seems closely correlated with the transformation of organizational structure and the form of firms. In the earlier stage, most companies were owned by the managers, in another word, ownership and management right were integrated as same one during the early period. Due to the structure and form of proprietorship individual and partnership, the demand of the external appraisal of firms was limited.

After corporation limited liability companies showed up, ownership and management right were separated partially, and partial investors who did not join production and operational process of firms, were eager to find out the operational situation of firms. This motivated more extensive performance appraisal of firms. But basically speaking,

the content of performance appraisal was limited within assets, debt, equity and the items listed in balance sheet and profits showed in report form of profit during this period.

At the beginning of 1900, DuPont brothers introduced DuPont system with financial ratio pyramid and Return on Investment (ROI). DuPont system was an integrated analysis method that used the internal connections between diverse financial ratios to appraise firm's holistic financial state. The key point of the system was to set up a completed and consistent system of financial ratios, and to determine an overall indicator as start, then to cascade it down so that inter-connections between indicators are made. The key indicator in DuPont system was net asset yield to reflect capability of making profit of firms. ROI was also used to assess firm's performance through examine the relationship between input resource and gain from investment of firms.

In 1911, 'The Principles of Scientific Management' by Frederick Winslow Taylor (Taylor, 1911) was published, which was the symbol of management science as a subject. This literature pointed out the whole U.S. was suffering from great loss as almost all daily duties were inefficient, and convinced the readers that the remedy for this inefficiency was systematic management. It also showed that the best management is a science and moreover that the fundamental principles of scientific management should be applicable to many kinds of business activities.

In 1920, Geoffrey Chandler and H. Thomas Johnson (1920) raised up traditional finance concept, which namely uses cash flow, asset debt and profit ratio and so on, so that basic financial indicators could be applied to measure firm's performance.

In 1928, Alexander Wole (1928) came up an integrated ratio appraisal system that integrates several financial ratios with linear relations to appraise financial state of firms, which was named Wole Scoring method. The detailed procedure can be explained as following steps: first of all, to pick up 7 financial ratios that are current ratio, property right ratio, fixed assets ratio, stock turnover ratio, trade debtors turnover ratio, fixed assets turnover ratio and innate rate of capital turnover, secondly assign appropriate weight to each of them, and then determine standard ratios based on, put actual ratios over standard ones, relative ratios are obtained, then multiply

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corresponding weights, finally overall accumulative total score is found out in order to appraise credit level of firms.

In conclusion, before 70s, finance based performance measurements were mostly used in performance appraisal of firms. There weren't rational quantity of public sectors involved in the performance appraisal system, also social accountability was not emphasized. But gradually, with development of capital market, thus ownership and management right were separated further, the situation of both operation and financial further attracted creditors and investors' attention, and the content of performance appraisal became wider and deeper. The details of performance appraisal started to include refund competence, operational competence and profit-making competence of firms.

1.2 Phrase 2 1970-2000 performance measurement with multi-indicators

The second phrase approximately began as the middle and late of 1970s until the end of 20 Century. At this stage, people started to examine more performance dimensions such as customer satisfaction, strategy and learning and innovation capability and so on. Non-financial indicators started to be seen in performance appraisal system of firms. These measurements were used to reflect effectiveness of operation, the overall situation of firms, and the trend of firms in the future.

In the field of financial appraisal of firms, other than traditional indicators such as surplus profit, earnings, operating capital flow and return of investment. Financial consultants Stern Stewart & Co. (O'Hanlon & Peasnell, 1998) proposed a new indicator that is Economic Value Added (EVA). EVA refers to opportunity cost factor of investment. In 1997, Jeffrey came up a revised EVA indicator (Bacidore & Boquist 1997). The revised EVA can reflect many activities using a single indicator.

Although EVA had attracted lots of researchers and practitioners' attention, there was solid evidence that shows EVA has no more economic correlation than surplus profit, earnings, operating capital flow indicators (Biddle & Bowen, 1993).

Still in the financial field, there was advancement that people pay attention not only to results, but increasingly also to the procedures. For instance, the theory of ABC claims that the process of offering products and services of firms consists of a series of activities, which are the reasons that resource is consumed. In a nutshell, ABC method is a new cost calculation method, and is applied to evaluate and analyze operation cost and its impact on profit (Gupta & Galloway 2003).

Since late of 1980s, with the faster enhancement of economic globalization over our world and more intense competition of firms, not only investors and creditors but also internal managers of firms, employees and the public have paid closer attention to performance of firms. The limitation of performance appraisal based on accounting information of firms was widely acknowledged by academic and practitioners. Furthermore, accounting information of firms are result-indicators, which only reflect the historic data of firms. The financial data alone cannot stand for the future performance. Some experts even proposed to forget financial appraisal as traditional financial accounting may work in old industrial era very well, but could produce misleading in competition environment of sustainably improvement and innovation (Bacidore & Boquist 1997).

During this period, therefore, more scholars started to include non-financial indicators into performance appraisal system, such as customer satisfaction, strategy and learning and innovation competence, competition competence, the relation with customers and so on. For example, some American scholars showed that intangible assets, especially knowledge, innovation and quality are driving factors to achieve success in competitions. They investigated more than 3000 firms in Europe and North America and concluded the point (Bacidore & Boquist 1997).

Fitzgerald *et al.* (1991) defined the six contents of performance appraisal of firms as financial performance, competitiveness, quality of service, innovation, flexibility and resource utilization (Gomes, Mendes and Garvalho, 2007). The international Institute for Management Development in Lausanne Switzerland publishes "World Competitiveness Yearbook" (see Publication: IMD World Competitiveness Yearbook 2006), and in that publication, the indicator system about international competitiveness is divided by four groups: they are productivity, labor cost,

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performance of firm and management efficiency. According to these four parts, there are 27 indicators came out as sub-items for that four aspects.

As many researchers all over the world realized the shortcomings of traditional performance appraisal system, a number of multi-indicator integrated appraisal systems were proposed such as Balanced Scorecard (BSC), Performance Pyramid and European Foundation for Quality Management (EFQM) and so on, to be explained below.

In 1987, R. Kaplan and T. Johnson claimed traditional finance indicators are not able to reflect firm's development state factually in their literature "Relevance Lost: The Rise and Fall of Management Accounting". This notion urged that firms measure firms' performance via customer indicators with pure financial indicators. (Kaplan & Johnson 1987)

Also in the 1980s, as the competition of firms was getting intense, supply overtook requirement in market. Firms trended to occupy market with high quality products. Therefore, quality control (ISO9000/TQM/EFQM) as one of firm Performance management methods appeared. ISO 9000 is a series of rigorous standards for quality management systems. ISO 9000 is proposed by International Organization for Standardization (ISO) and is administered by accreditation and certification bodies.

In 1989, Keegant, Eiler and Jones proposed the concept of Performance Measurement Matrix in order to balance between cost and non-cost, internal and external (Awasthi & Staehelin 1995). In 1991, Lynch R. and Cross K. (1991) improved indicators of performance measurement matrix, and prompted new technology of strategy measurement and report (performance pyramid).

Najmi, Rigas and Fan (2005) indicated "Andersson et al. (1989), Eccles (1991), Lynch and Cross (1991) and Kaplan and Norton (1992) identified the weaknesses of traditional measurement systems because of their uni-dimensional and backward looking nature. This led to the development of innovative performance measurement frameworks such as the BSC and the EFQM Excellence Model".

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In 1992, the concept of Balance Scorecard was proposed through a series of journal articles by Kaplan and Norton (1992). Then couple of years passed, they published the book 'The Balanced Scorecard'. Since the original concept was introduced, BSC had become a fertile field of theory and research. It began as a concept for vision and strategy, and focuses not only on financial indicators but also on the customer, internal operation and human resource learning and development issues. BSC provides a more comprehensive view of a business, by balancing financial objectives with customer, process and employee perspectives. The most creative point is that the indicators belonging to the each of four aspects are linked by rigorous logic relations. Later Kaplan noticed that the BSC should be used with Strategy Map (Kaplan & Norton, 2004) to involve strategy element in the performance indicator development. As to be seen later, this is in fact a key idea in future development of performance management, and has been widely accepted by other researchers.

Powell (1995) and Whitney & Pavett (1998) said Total Quality Management (TQM) is an integrated management philosophy and set of practices that emphasize continuous improvement. It aims to make quality consciousness penetrate to all operational processes, flows, and hierarchy structure of organization, and it can be and has been used as a framework for performance management. EFQM Excellence Model is a framework for organizational management systems, which was promoted by the EFQM in 1988 and designed to making organizations more competitive (Hakes, 1997). Chin, Pun & Lau (2003) claim the EFQM model was largely based on the concept of TQM as both a holistic philosophy and an improvement on other TQM-based models. In my point of view, this framework can be used as a general framework to measure performance of firms as it covers wide business success elements.

In 1995, Peter F. Drucker published remarks in 'Harvard Business Review', to illustrate the critical role of information system in performance management of firms.

Ghalayini & Noble (1996) show a chart that explicitly shows the differences between traditional and non-traditional performance appraisal system. It can be suggested that these new systems made great improvement compared with traditional appraisal system based on financial indicators alone. However, there are still some drawbacks.

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For example, these new systems could be tools for monitoring operation of firms, but lack of performance improvement functions.

.Having reviewed these developments during this period, we can have the following trends:

i.   Simple indicators were transformed into synthesized indicators;

ii.   Profit-focused measurement was replaced by boarder systems including such as customer, shareholder and external stakeholders;

iii.   Internal causal links of the organizations were explored;

iv.   It was realized that performance measurement needed to be combined with performance management.

1.3 Phrase 3 2000-present key stakeholders and communication become two of the key elements of performance management

With the development of stakeholder theory, increasingly researchers realized that key stakeholders were a necessary element of success that could play a significant role in performance measurement and management.

"...the days when CEOs could neglect their...owners and other corporate stakeholders are coming to an end...now managers will have to listen to - and learn from - other groups who are demanding a voice in the running of the corporation" (Nussbaum and Dobrzynski, 1987: 103). They highlight the significance of stakeholders in the running of the corporation. Performance Management is no longer just sets of management procedures and measurements, stakeholders' reactions are important as well.

Simmons (2008) argues that research has not fully recognized the significance of employee stakeholders in the design and effective operation of performance management systems, and he further demonstrates the centrality of employees within the stakeholder systems model of performance management. Simmons (2008) examines the significance and application potential of the stakeholder system development under scorecard-type performance management frameworks.

As stakeholders are becoming a major force, managers must consider ways to manage stakeholders (Kamalesh 1998).

Within the process of introducing stakeholder theory into performance measurement or management, whether a firm can simultaneously enhance the interests of its shareholders and other relevant stakeholders has been a major contention of stakeholder theory. Ogden, S. and Watson, R. (1999) examined the issue, and they conducted an empirical analysis in financial data relating to the U.K. water supply industry and using the customer service performance indicators. The results show that although improving the customer service performance is costly for the firms in terms of current profits, shareholder returns respond in a significantly positive manner to such improvements. They interpret this result as being consistent with stakeholder theory.

With emphasis on measuring key stakeholders' interests for sustainable development of organization, some different models of performance management with more ingredients of stakeholders are found in the literature. Such models highlight their importance as system of managing organizational performance, managing employee performance, or of integrating the management of organizational and employee performance.

DeNisi (2000) claims that performance management focuses on the range of activities engaged in an organization to enhance the performance of a target person or group, with the ultimate purpose of improving the organizational performance.

Baron and Armstrong (1998) emphasize to increase effectiveness of organizations by improving the performance of their employees and by developing the capabilities of teams and individual contributors.

In 2002, Neely, Adams and Kennerley prompted the concept of Performance Prism (Neely & Adams & Kennerley, 2002), which is a typical representative of the models concerning stakeholders.

The Performance Prism is an innovative performance measurement and management

framework, which basically covers all key stakeholders of an organization, such as investors, employees, suppliers, customers, regulators and communities. It concerns what the interest of the key stakeholders are, and what the organization wants from its key stakeholders.

The content of performance prism includes five aspects: Stakeholder Satisfactory, Strategies, Processes, Capabilities and Stakeholder contribution. Firms are suggested to select appraisal indicators according to the five dimensions.

The best characteristic of Performance Prism is that it embeds benefits of key stakeholders into performance measurement & management, which greatly differs from the past performance measurement methods.

The typical characteristic of performance management in this context can be summarized as follows: performance management is a coin, one side is the logical business procedures, for which science may apply, and the other side is the interaction with stakeholders, for which art applies. These two sides interact.

Employee, as an indispensable part of the key stakeholders, needs to be undoubtedly involved in performance management. Performance management should cover not only a list of performance measurements, but also integrated processes where managers work with their employees to set expectations, measure results, reward performance and feedback, so that employee performance would be improved. Mondy, Noe and Premeaux (2002) and Appelbaum et al (2000) showed this point. They also identify the significance of multi-way communication in performance management. Effective communication is the key in the process of setting expectations, measuring results, reward and feedback.

The concern of employees is much related to Human Resource Management (HRM), and thus there is obviously a link between HRM and performance management. Boselie, Paauwe & Jansen (2001) have done some research on linking HRM to organizational performance. Den Hartog, Boselie & Paauwe (2004) argue that taking a performance management approach with aligning HRM practices in such a way that they maximize both current and future employee performance, which is expected to

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improve the organizational performance. In another word, enhancing employee performance can be harmoniously consistent with maximizing the organization performance while performance management is integrated with aligning HRM practices.

Chapter 2

Review of Development of

Performance Management Theories

2.1 Some existing definitions of performance

Nowadays, "performance" is one of the most popular words over our world. For instance, a Google search yielded approximately 663,000,000 hits for "performance". A search for "football", which is one of the prominent important sports items, resulted in 429,000,000. Although a positive correlation between the number of hits in Internet and the significance of a concept cannot be proved rigorously, "performance" really makes a huge influence over our world.

The meaning of performance is dramatically widespread, and there currently exist many definitions of performance. What we wish to discuss is only limited in the management domain. Even so, there are a huge number of performance definitions in the management literature.

In fact, performance as an academic definition has not yet been well defined. In view of the relevance in today's industrial dynamics, the question is whether to examine performance from the perspective of one discipline, or whether to adopt a cross-disciplinary approach. Actually, often existing literature begins with some descriptions and then definition of performance management. The benefit is to put the performance concept in the context of management.

However there already exist so many related phrases in management literature like "performance measurement", "performance evaluation", where the second word are all well-defined. Thus, there is a need of defining performance rigorously. We will confine our attention mainly on definitions of **organizational performance**. In what follows we examine some existing definitions of performance in the context of organizational management. In Chapter 5 we will then produce a definition to be used in the later chapters of this thesis.

More than fifteen years ago Meyer and Gupta (1994) pointed out that there is "massive disagreement as to what performance is". Also it was pointed out by Fitzgerald and Moon (1996) that "performance is a multidimensional construct, the measurement of which varies, depending on a variety of factors that comprise it". So far, many new definitions of performance are still continuously coming out, by the

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researchers from academia and practitioners from industry. The controversy of what performance is has never ceased.

We will only select some samples of the existing definitions from our interests. Many examples selected from the vast collection of performance definitions are like below:

"Performance can be considered an outcome of both organizational and human activities" was proposed by Andre (2003). It seems that this definition is undoubtedly too broad, since not all outcomes of organizational and human activities can be counted as performance. Some organizational activities could be far away from organizational goals. Likewise, some human activities are possibly not what the organization pursues. These need to be further specified.

Baldvinsdottir (2003) stated: "performance is defined as carrying out tasks in a situation that allows optimal outcome." However, what optimal way is and the definition of optimal outcome are not specified. They are fuzzy so that we have no clue to measure performance using this definition.

Faulk (2002) adapted: "performance is defined as the accomplishment of job duties as required by the organization." It seems that this definition is obviously too narrow. For instance, we often see the situation there always are a few employees that accomplish not only the job duties but also beyond. Moreover, if the processes of achieving the jobs are improper, even if the job duties are accomplished completely, these should not be acknowledged as good performance. Thus one should pay attention to the processes to achieve the goals as well.

Hall (2003) stated: "performance is defined as the combination of competence in job skills and high levels of productivity." This definition seems to concentrate on personal performance. Furthermore outstanding competence does not automatically represent good organizational performance.

Campbell (1990) subscribes to the premiss that performance is behavior and should be distinguished from the outcomes because they can be contaminated by system factors, which are outside the control of the performer. Mwita (2000) observes "what is

implied in Campbell's argument is that performance measurement can only focus on an individual/group's final output, if and only if, system factors are controllable".

Rogers (1994) stated: "others argue that performance should be defined as the outcomes of work because they provide the strongest linkage to the strategic goals of the organization, customer satisfaction, and economic contributions." From there we can see that performance must contain a link between the work and the strategic goals of the organization.

Lebas (1995) pointed out: "performance is defined as the potential for future successful implementation of actions in order to reach the objectives and targets". It is interesting to see that two new dimensions: future and action came into the performance definition. However it seems that importance of outcomes was missing here.

Ermolayev and Matzke (2007) suggested a definition of performance: "performance is intentional action". We can see the merit of this definition is to emphasize intended action, which can be seen as the process yielding outcomes. However, it seems too broad. Furthermore, the basic point that the achievement against organizational objectives should be a main part of performance is ignored by this definition.

Otley (1999) proposed "performance is referred to as being about doing the work, as well as being about the results achieved". Bromwich (1990) also supports this view by arguing that performance means both behaviors and results. In my point of view, these two definitions stress that the behaviors that could be comprehended as actions, and the results deriving from the behaviors. However, they did not emphasize that the contributions should be measured against organizational objectives.

It seems that the definition proposed by Mwita (2000) is quite comprehensive: "...performance is achieved if it is defined as embracing three interrelated variables: behaviors (processes), outputs, and outcomes (value added or impact)." However it seems that the three elements need to be further specified.

In summary, people often defined (organizational) "performance" as the outstanding

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achievement against the goals of the organization. Furthermore we increasingly perceive the process of achieving goals and whether the achievement can make a positive effect on development in future. If a company only makes efforts on short-term financial profits but ruins long-term development, we will not judge the company as having achieved good performance.

Conclusion

As seen above, many scholars and practitioners have proposed a number of diverse definitions of performance. In summary, the existing definitions of performance could be classified as four categories below:

1) Defined by (intended) activities (Baldvinsdottir, Campbell, Lebas, Ermolayev and Matzke);

2) Defined by performing competencies/skills (Hall);

3) Defined by outcomes/achievements/contributions (Andre, Faulk, Rogers);

4) Defined by processes, outcomes and impacts (Oltey and Mwita).

Thus, we have seen some important dimensions of performance - actions, process, outcome or achievement against organizational goals, and future impacts. However these elements need to be combined together and further specified. Furthermore it is sometimes to use benchmarks as a standard to measure achievement. We will come back to this point in Chapter 5.

2.2 Definitions of performance management

In this section let us discuss some prevalent definitions of performance management. Again there were no all-accepted definitions for this subject as one can image after the above discussions of the definitions of performance. We will examine some samples of existing definitions again mainly from our research interests.

As stated by Smith (2002): "In spite of the enormous growth of interest in performance management, appropriate definition of the concept is elusive. For example, an OECD report on performance management in the public sector notes that

the growth in interest in performance management has been stimulated by the increased devolution of responsibilities in many public sectors, and the associated need to develop explicit models of accountability and performance measurement, but fails to arrive at a specific definition. This difficulty reflects the different connotations of performance management that exist, an issue we explore further in the next section by examining the organizational context within which performance management must operate."

Many researchers continuously suggested different definitions of performance management. Probably the main reason is again the complex and highly interdisciplinary nature of performance management research, involving many fields of varying states of maturity and methodological practice as mentioned in Chapter 1.

Therefore it is no surprise that there are many different definitions of Performance Management. Generally speaking, most of them can be characterized into two broad classes: general and specific. Some typical ones are listed below:

Type 1: General

Since organization performance is decided by so many factors and business functions, it is natural to think that performance management should deal with almost all the activities of in an organization. The definitions of this class intend to use the words like "a set of activities", "a series of routines and procedures" and so on. Performance management could cover all parts of a firm and contain all kinds of management, like human resource management, operational management, supply chain management, etc. These definitions do not seem to emphasize any particular management activities that performance management should cover. What is more, they do not characterize the relationship between performance management and the other existing types of management. This does not seem to be very helpful for those who need to set up or improve a performance management system.

Simons (2000) stated: "performance management systems are defined as: ...the formal, information-based routines and procedures managers use to maintain or alter

patterns in organizational activities." It indicates that performance management includes all the activities. However it seems clear that this definition missed the link between performance management and organizational goals.

Armstrong and Angeda (1998) suggested: "performance management is a strategic and integrated approach to delivering sustained success to organizations by improving the performance of the people who work in them and by developing the capabilities of teams and individual contributors." It is interesting to see that it suggests performance management can be a strategic and integrated approach to improve organizational performance, although it could only provide some partial details for the approach: This is again not very helpful for those who need to setup or improve a performance management system.

Daniels (1989) proposed: "the performance management model is defined within the context of private sector organizations as a systematic, data-oriented approach to managing people at work that relies on positive reinforcement as the major way of optimizing performance." It seems that this definition emphasized 'data-oriented approach' which implies the significance of performance measurement information.

Smith (2002) stated that a similar idea was used in NHS performance management system: "performance management in the NHS can be defined as set of managerial instruments designed to secure optimal performance of the health care system over time, in line with policy objectives." There are two aspects of this definition that should be highlighted: First of all, it emphasized the goal of performance management is to pursue optimal performance; Secondly, it explicitly mentioned that the NHS policy objectives need to be followed in performance management.

Some definitions of performance management emphasized that the activities in performance management have to follow the organizational objectives and strategies: "The performance management process is the process by which the company manages its performance in line with its corporate and functional strategies and objectives." (Bititci, Carrie and McDevitt, 1997). This definition reveals more details about how to manage performance. The process needs in line with organizational strategies and objectives. However, we still want to know how performance management should

work in line with the strategies and objectives.

In the overview of 'U.S. Office of Personnel Management', performance management is expressed as "performance management is the systematic process by which an agency involves its employees, as individuals and members of a group, in improving organizational effectiveness in the accomplishment of agency mission and goals." (U.S. Office of Personnel Management n.d.). It pointed that the aims of performance management is to accomplish agency mission and goals. Furthermore it mentioned some detailed activities although mostly from a point of view of human resource management.

Similarly, the NAHT (1991) describes performance management as "a process that links people and jobs to the strategy and objectives of the organization". Again this definition mentioned the contributions from the staff. More generally McNamara (2000) stated: "performance management includes activities to ensure that goals are consistently being met in an effective and efficient manner. Performance Management can focus on performance of the organization, a department, processes to build a product or service, employees, etc." This definition revealed that there are different levels of performance in an organization.

Rogers (1990) added more structures into his definition: "performance management can be characterized as '...an integrated set of planning and review procedures which cascade down through the organization to provide a link between each individual and the overall strategy of the organization." Rogers' definition highlights organizational control within a set of objectives. It makes more sense that 'cascade up' idea could be add in as a complement (Smith and Goddard 2002). Anyway, more structured activities were added into this definition. Generally speaking, strategy should be made relying on external market environment and oneself advantages or disadvantages and so on. Thus, on the one hand, strategy also should be amended if external environment suggests. External environment could be explained as improvement in technology, customer requirement and finance crisis and so on. Therefore, an outer loop should be characterized as a complement to the definition. On the other hand, because strategy decomposition usually apply 'top-down' sequence, at the same time, some oneself information return to top management as feedback with 'down-top' sequence. Hence,

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this double loop (down-top) also should be characterized as a complement to the definition. There are a few definitions highlight outer loop or double loop.

Procurement Executives' Association (1999) defines performance management as: "the use of performance measurement information to affect positive change in organizational culture, systems and processes, by helping to set agreed-upon performance goals, allocating and prioritizing resources, informing managers to either confirm or change current policy or program directions to meet those goals, and sharing results of performance in pursuing those goals" (Longenecker and Fink, 2001). We would think firstly this definition 'set agreed-upon performance goals' implies 'down-top' loop exists. Then, this definition stresses accessing the performance measurement information will be the basis of performance management. Performance measurement information is indeed an indispensable element to performance management. Thus, before the use of the information, performance management needs to define what constitutes the measurement information, and considers how to ensure the reliability of the information and the way in which to interpret the information. According to this definition, we would say part of the performance management is heavily associated with measurement and information. That part should be included in performance management functions: monitor and feedback, and indeed there are some information technology companies doing Enterprise Resource Plan and then claiming they were doing performance management. Obviously, this definition was defined by a practitioner body, who normally took a practical view without much attention to logics.

Type 2: Specific

Several researchers (including us) have been trying to characterize the relationship between performance management and the other existing management functions. This is very important, e.g., for consulting work, in setting up or improvement of performance management in an organization.

Pollitt (1999) painted the picture of performance management in characterizing performance management as a set of five processes that extend beyond the

organization's boundaries:

- Setting objectives;
- Assigning responsibility;
- Measuring performance;
- Feedback of information to decision making and extend accountability.

This definition provides some key processes, which are setting strategy, inner feedback of information and so on, and it seems to be relatively comprehensive. But we are not sure how these blocks came, and whether they are complete.

Mwita (2000) claimed that LGMB (1993) and the Audit Commission (1995) in the UK have adopted a broad definition of the performance management model that encompasses the functions and processes that may be used to manage both organizational and individual performance. This kind of vision of the performance management model creates a more integrated approach to the management of performance and enhances accountability in local authorities in general. The two institutions suggest that, in order to improve both organizational and individual performance, the following management functions are important:

- Defining and setting organizational and individual aims and objectives;
- Corporate planning;
- Linking organizational strategy and service objectives to jobs and clients;
- Identifying staff training and development needs;
- Assessing the results through personal appraisal using relevant performance indicators;
- Performance agreements or contracts;
- Using the knowledge gained through training to modify performance attitudes;
- External and internal communication systems;
- Organization development (OD) and performance review.

Similarly: "performance management can be thought of as a set of systematic efforts, initiatives and processes that have a number of characteristics. They attempt to:

- Define performance in terms of results (outputs, outcomes, effects, impacts, etc.);
- Set measurable levels of intended achievement (performance targets, service standards, etc.);

- Determine the extent to which results are achieved using performance indicators (performance measurement, performance monitoring, etc.);

- Provide an accounting for the achievement of results in light of the resources utilized (performance reporting, effectiveness reporting, value-for-money accounting, etc.);

- Base resource allocation decisions on performance information (performance budgeting, results-based budgeting, etc.)."(Davies, 1999) "

However with these detailed lists, worries are "where they come from" and "are they complete?" For example, Lebas (1995) suggested that "performance management involves training, team work, dialogue, management style, attitudes, shared vision, employee involvement, multi-competence, incentives and rewards, etc." All of them could be involved in performance management. But it does not seem to be enough to just list all these different elements without providing a suitable theoretical framework. We need to know which elements should be used and where to be used.

McNamara (1997) stated: "We're used to thinking of ongoing performance management for employees, for example, setting goals, monitoring the employee's achievement of those goals, sharing feedback with the employee, evaluating the employee's performance, rewarding performance or firing the employee. Performance management applies to organizations, too, and includes recurring activities to establish organizational goals, monitor progress toward the goals, and make adjustments to achieve those goals more effectively and efficiently. Those recurring activities are much of what leaders and managers inherently do in their organizations -- some do them far better than others." The above elements of performance management are summarized here:

   a) Setting goals;
   b) Monitoring the employee's achievement of those goals;
   c) Sharing feedback with the employee;
   d) Evaluating the employee's Performance;
   e) Rewarding Performance or firing the employee.

It is clear that they are quite important functions of performance management.

Conclusion

The definitions of performance management could be roughly classified as two types, one emphasizes the whole management activities, and the other thinks performance management has some distinctive characters and functions so one could paint its boundary. Thus it tries to describe some clear pictures of its unique functions. In our view, both types are useful. On the one hand, performance is indeed involved with all the part of management. When people start to diagnose health of performance for an organization, they have indeed to consider all the management functions. On the other hand, performance management **as an independent part of management** should have its identification. Otherwise it is difficult to know how to improve performance management. But we should not just list all these very detailed elements **without providing a suitable theoretical framework**. In Chapter 5 we will provide such a theoretical framework for some organizations via SSM and divide its main functions into several logic blocks.

2.3 Literature review of performance management and related

There is a confusingly vast body of literature relevant to performance management. Again probably the main reason for this is the complex and highly interdisciplinary nature of performance management research, involving many fields of varying states of maturity and methodological practice as mentioned before. The literature has been continuously contributed from the fields like economics, management science, management accounting, human resource management, operation management, quality management, strategy management and performance management, to say at least. Each field contributes different characteristics of the body. For example, management science contributes strongly to performance measurement and evaluation methods. It seems impossible to present any comprehensive literature here. We will focus our attention to the literature on research from management science and the developments relevant to our theoretical investigations about frameworks of performance management, although it seems that the vast majority of the literature is concerned with practical issues and applications in various areas.

2.4 Some relevant theories and framework of performance management

There have been a number of performance measurement or management frameworks or models. Folan and Browne (2005) said one of the first frameworks put forward for the process of performance management was by Sink and Tuttle. A six-step procedure for performance management in the planning phase was proposed by Sink and Tuttle (1989). Fitzgerald et al (1991) proposed the results and determinants framework. Lockamy III(1991) proposed four theoretical performance measurement system models. These models consist of cost, quality, lead time and delivery dimensions and provide linkages between operational and strategic performance Management systems. Lockamy III, Azzone et al (1991), in their framework seek to identify suitable measures based upon an internal and external division. A procedural stepwise framework models were proposed by Kaydos (1991) and Wisner and Fawcett (1991). Bradley (1996) stated the structural AMBITE performance measurement cube presents a tri-axis cube with three dimensions: business processes, competitive priorities and manufacturing typology. This framework measures enterprise performance in line with time, cost, quality, flexibility, and environment perspectives. Brown (1996) developed a structural framework which attempts to distinguish between input, process, output and outcome measures. Hudson et al (2001) proposed a procedural framework specifically for the needs of small and medium-sized companies. Yeniyurt (2003) proposed a structural framework for performance management. That framework uses a cross-process and cross-border approach and five dimensions of performance measurement: financial, consumer, internal processes, innovation and corporate culture. The structural integrated performance measurement framework, which attempts to integrate a number of structural frameworks, was developed by Rouse and Putterill (2003). Recently Paauwe and More worked on the concept of the High Performance Work System (HPWS) to relate HRM with performance, see Gilman and Roby 2008 for more details.

Besides, many scholars have conducted some beneficial attempts regarding to the process of how to create value for business, which could also benefit the research on performance management. Michael E. Porter proposed value chain process (Porter,

1998), and claimed that an enterprise is consist of various business operation activities. The value the enterprise creates roots in the results of the reduced cost and raised income, which derives from the rational combination of all the business activities. Thus, measuring if these activities achieve the value is namely performance evaluation of the enterprise, and the relevant departments, groups and individuals, which were involved in those activities.

In addition, agency model also benefits the extension of performance management research. In modern firms, agency relationship leads to agency cost, so the motivation such as Stock or Option, and powerful monitor are the common ways to reduce agency cost. Performance management can be useful to improve the efficiency of monitor.

Below we will give more detailed review on some of developments relevant to our research. In an effort to develop suitable theoretical frameworks of performance management as discussed before, at least three distinctive approaches were visible.

First approaches: Foundation

They try to describe the main parts of performance management.

Otley (1999) proposes a performance management framework to analyze the operation of management control systems structured around five central issues. These five issues relate to objectives, strategies and plans for their attainment, target-setting, incentive and reward structures and information feedback loops. They focus on the management of organizational performance.

The five central issues are represented as a set of questions. They need to be addressed to build a performance management system.

Otley (1999) listed the questions as follows:

1. What are the key objectives that are central to the organization's overall future success, and how does it go about evaluating its achievement for each of these objectives?

2. What strategies and plans has the organization adopted and what are the processes and activities that it has decided will be required for it to successfully implement these? How does it assess and measure the performance of these activities?

3. What level of performance does the organization need to achieve in each of the areas defined in the above two questions) and how does it go about setting appropriate performance targets for them?

4. What rewards will managers (and other employees) gain by achieving these performance targets (or, conversely, what penalties will they suffer by failing to achieve them)?

5. What are the information flows (feedback and feed-forward loops) that are necessary to enable the organization to learn from its experience and to adapt its current behavior in the light of that experience?

It can be concluded that these questions are related closely to some of the main issues of modern performance management. The first one is concerned with the formulation of overall goals and the measurement of their attainment. The second one is tightly related to the issues of strategy formation and decomposition to lower level management, and the measurement of the detailed plans or activities in every level. The third one is connected to the issues of setting target for overall objectives and sub-objectives. Practitioners need to consider what the appropriate performance targets are and what the best method to define them. The fourth question asks what the appropriate rewards and penalties are against different level performance achieved, and thus concerns the appropriate organizational responses, which could be broadly defined. The last question seems to still focus on the organizational responses. Obviously, it does not surround rewards and penalties against performers, but it highlights adjustment to organizational behaviors, which consist of organization structure, process and culture etc.

Smith and Goddard (2002) examine performance management from an operation research perspective and set out a framework to examine the performance management process. It argues that performance management should contain four broad blocks:

1) Formulation of strategy;

2) Performance measurement instruments;

3) Analytic techniques;

4) Encouraging appropriate organizational responses.

Smith and Goddard (2002) claimed that the success of a performance management system will depend on how well these four indispensable elements of the performance management process are welded into a coherent whole.

1) Formulation of strategy

Most performance management endeavor takes organizational strategy and objectives as given, and seeks to develop managerial instruments within that framework (Smith and Goddard, 2002). It is clear that performance management works indispensably according to organizational strategy and objectives as given.

Since organizational strategies and objectives are the starting point of performance management, generally speaking, organizations need to constantly adjust or reformulate their strategies and objectives to best match with the continuous changing interior and exterior environment, so that the organizations achieve sustainable development even if the environment changes.

In particular, soft systems methodology has been specifically useful in this block as it suits ill-structured and messy problem contexts where there is neither consensus about how to define the problem nor how to tackle it (Checkland, 1985).

2) Performance measurement instruments

There has been much research on performance measurement in operation research, see the references included in Smith and Goddard (2002). Also in Chapter 1, many

measurement instruments were briefly described in history of performance management. Some of relevant developments will be reviewed in details later in this chapter.

3) Analytic techniques

Smith and Goddard (2002) explained "broadly speaking, analytic techniques seek to understand the reasons why a particular indication of performance is observed."

Analytic techniques include DEA, cluster analysis and factor analysis, forecasting techniques and critical path analysis see as the references list in Smith and Goddard (2002). It is clear that performance data are frequently worthless until they are translated into meaningful signals of performance. It seems that analytic techniques could play a role to translate worthless to meaningful signal of performance. For example, pure cost or price seems to mean little, but traditional accounting is able to convert these data into measures of profitability, which can indicate financial performance.

4) Encouraging appropriate organizational responses

Milgrom and Roberts (1992) said "the most finely honed performance measurement system can prove worthless, even dysfunctional (for some stakeholders at least), if it is not embedded within an organizational environment that encourages appropriate behavioral responses on the part of managers." It suggests that inappropriate organizational responses could lead to failure of performance management.

Encouraging organizational responses can be accomplished through the use of incentives and other managerial devices. Designed incentives work to link the strategy to some level of performance by reward or penalty so as to strategy would be achieved.

There are also numerous discussions, especially from Internet discussion group, to suggest what the main tasks of performance management should be, as the example (Figure 2.1) below:

PLAN PERFORMANCE

- Identify organizational strategy
  - Define mission and vision
  - Define strategic objectives
  - Assess context, culture, clients, and audience
  - Benchmark with other organizations to discover alternate strategies for success
- Define outputs and measures
  - Identify outputs and outcomes required to achieve strategy
  - Identify critical dimensions for outputs and outcomes (time, cost, quantity, quality)
  - Define measures of each dimension for each output and outcome
- Develop measurement system
  - Define specific measures-based goals
  - Assign goals to organizational units
  - Develop data collection and analysis process and procedures
- Ensure employee readiness
  - Define and communicate specific goals for each employee
  - Ensure employees have the required performance elements to achieve their goals (information, environment and tools, competencies, motivation).

MEASURE AND ANALYZE PERFORMANCE

- Collect data
- Analyze and report data
- Identify
  - Areas of success
  - Sources of success (performance elements)
  - Challenges
  - Sources of challenges (performance elements)
  - Lessons learned
  - Needs for more information

MANAGE PERFORMANCE

- Prioritize challenges
- Develop strategic solutions to address challenges
- Integrate solutions and lessons learned into organizational processes
- Set up and implement mechanisms to maintain successes
- Modify performance measurements as needed

Figure 2.1: The main tasks of performance management (Daniels, 1989)

However it seems that the different issues or activities in the above approaches mainly result from some practical observations. We wish to **provide a suitable theoretical framework for them** so that we know which elements should be used, when and how to be used.

Second approaches: Benchmarking

The second approaches try to establish more formal models that integrate various management and organizational elements within organizational performance. For instance, Paauwe (2004) combines the empirical evidence of the case studies with the theoretical work to develop a practical approach linking the different roles of human resource to specific aspects of performance. Gilman and Raby (2008) built a broad model integrating plentiful business operational elements, which contribute to organizational performance. Clearly such a model will have to be comprehensive to

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include most management aspects of a generic organization. In particular the results from the first approach should serve as one of the foundations of the models. Here we review four most influential frameworks: EFQM, Malcolm Baldrige Quality Award framework, Six-sigma, and Performance Prism.

In 1988, the EFQM was founded by 14 major European companies, with the endorsement of the European Commission (Wongrassamee, Gardiner and Simmons, 2003). In 1992 the first EFQM, European Quality Award (EQA) was established. Adebanjo (2001) and EFQM (2002) reported that the EFQM subsequently developed its BEM and used it as a framework for the award of the EQA and the associated national quality awards.

The "Business Excellence Model" was originated by the EFQM which aims to "assist management in adopting and applying the principles of Total Quality Management and to improve the Competitiveness of European industry." The Foundation has also instigated the "European Quality Award": the criteria developed to evaluate performance in the Excellence Model are similar to those used to evaluate contestants for the "Quality Award." This is illustrated by Andersen, Lawrie and Shulver (2000). It obviously implies the relationship between EFQM and TQM. Chin, Pun and Lau (2003) further said the EFQM model was largely based on the concept of TQM as both a holistic philosophy and an improvement on other TQM-based models.

Wongrassamee, Gardiner and Simmons (2003) claimed that although many organizations do not intend to win the award, top management and managers have applied the nine criteria of the Excellence Model to carry out self-assessment, which enables them fully to understand their organizational position and then use this benchmark data to pursue continuous improvement.

Andersen, Lawrie and Shulver (2000) proposed that EFQM is a tool that uses measures of an organization's performance to drive organizational improvement generally by highlighting current shortfalls in performance to management teams.

It is convinced that EFQM Excellence Model aims to improve organizational performance by seeking out the shortfalls, which is placed as the key point of EFQM.

It was introduced as the framework for assessing organizations for the European Quality Award. Currently it is the most widely used organizational framework in Europe and has become the basis for the majority of national and regional Quality Awards. The award is the benchmark for business excellence.

The basic idea of BEM is to enable the standardized benchmarking of performance results between different organizations, even though they are in different markets.

Andersen, Lawrie and Shulver (2000) further illustrated that EFQM is a framework designed to assist organizations to achieve business excellence through continuous improvement in the management and deployment of processes to engender wider use of best practice activities.

It enables the calculation of scores against a number of criteria that can be used for either internal or external "benchmark" comparisons. It is hoped that the results of these relative comparisons will lead to increased focus on improving key process performance, and so generate "business excellence".

EFQM model assumes the excellence requirement items for an organization. They are respectively:

➢ Results Orientation;

➢ Customer Focus;

➢ Leadership and Constancy of Purpose;

➢ Management by Processes and Facts;

➢ People Development and Involvement;

➢ Partnership Development;

➢ Public Responsibility.

The BEM is a framework based on nine criteria reflecting validated, leading-edge management practices (Porter *et al.*, 1998). Within these nine criteria, five of these are 'Enablers' and four are 'Results'. The 'Enablers' criteria cover what an organization can manipulate, and they are Leadership, People, Policy & Strategy, Partnership & Resources and Processes respectively. The 'Results' criteria cover what an organization achieves, it covers People Results, Customer Results, Society Results

and Key Performance Results. The Excellence Model is shown as follow (Figure 2.2):
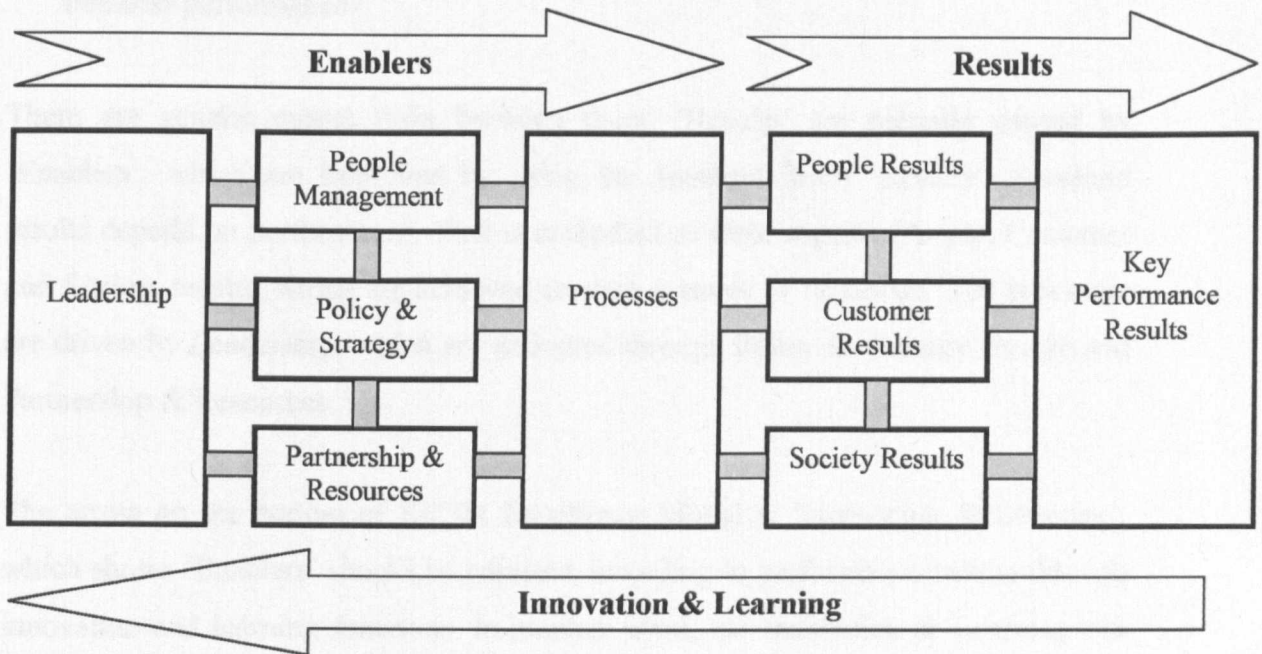
Figure 2.2: The EFQM excellence model is a registered trademark

(Andersen, Lawrie, Shulver, 2000)

These nine model criteria are briefly described as follows:

'Enabler' criteria:

➢ Leadership: how (leaders) to develop and clarify organizational vision and propose total quality improvement.

➢ People management: how to handle and develop the employees to improve business processes.

➢ Policy & strategy: how to implement organizational strategy.

➢ Partnership & Resources: how to manage the external partnerships and internal resources effectively according to organizational strategy.

➢ Processes: how to design, manage and improve the processes and activities.

'Results' criteria:

➢ People results: how do the organizational achievements satisfy the employees?

➢ Customer results: how do the organizational achievements satisfy the customers?

➢ Society results: how do the organizational achievements affect local, national and international society?

> Key performance results: what is the organization achieving against its planned business performance?

There are generic causal links between them. 'Results' are partially caused by 'Enablers', which are improved by using the feedback from 'Results'. Excellent results depend on performance. That is embodied as three aspects: People, Customer and Society results, which are achieved through a series of Processes. The processes are driven by Leadership, which are delivered through Policy & Strategy, People and Partnership & Resources.

The arrow on the bottom of EFQM Excellence Model is 'Innovation & Learning', which shows 'Enablers' should be adjusted according to performance results through innovation and learning functions. In another word, the Innovation & Learning can impact the 'Enablers' for maximizing the 'Results'.

In summary, EFQM Excellent Model serves as:
> A tool for setting right directions for business excellence;
> A way to benchmark with other organizations;
> A guide to identify areas for improvement;
> A structure for the organization's management system.

Referring to how to execute this model, Wongrassamee, Gardiner and Simmons (2003) explained there are many ways of carrying out excellent quality management and self-assessment. They further concluded that the model itself contains no detailed instructions for its use.

There is of course a similar framework in USA. Baldrige National Quality Award was first established in 1987 to recognize performance excellence, and managed by U.S. Commerce Department.

Malcolm Baldrige Quality Award framework represents the highest standards of quality. It is also a benchmark for business excellence. The award is evaluated on the basis of 1000 points and is divided in 7 main criteria as shown in the below diagram (Figure 2.3).
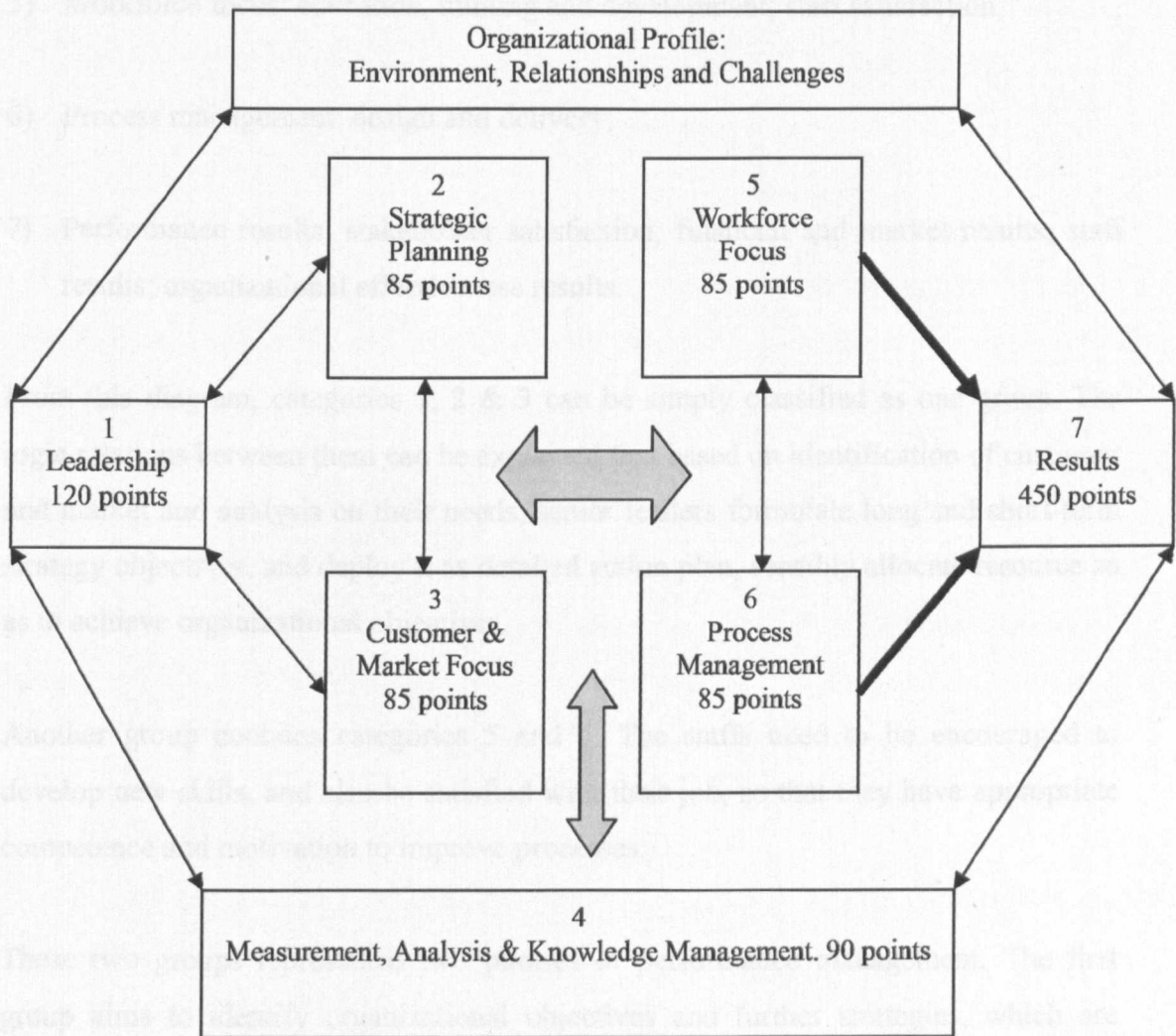
Figure 2.3: Malcolm Baldrige Quality Award framework
(Brent, Travis, Stacy, Stacey, 2007)

Baldrige framework consists of the following categories:

1) Leadership: it is mainly represented as senior leadership direction; highlight responsibilities to the public; support of key communities;

2) Strategic planning: strategy development process; short and long-term strategic objectives; strategy deployment and action plan; resource allocation;

3) Customer & Market focus: identification of customer and market; knowledge of customer and market; determining levels of customer satisfaction;

4) Measurement, analysis & knowledge management: measuring performance; Key Performance Indicators (KPI); data-based decisions;

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5) Workforce focus: education, training and development; staff satisfaction;

6) Process management: design and delivery;

7) Performance results: stakeholder satisfaction; financial and market results; staff results; organizational effectiveness results.

From this diagram, categories 1, 2 & 3 can be simply classified as one group. The logic relations between them can be explained that based on identification of customer and market and analysis on their needs, senior leaders formulate long and short-term strategy objectives, and deploy it as detailed action plan, sensibly allocate resource so as to achieve organizational objectives.

Another group contains categories 5 and 6. The staffs need to be encouraged to develop new skills, and also be satisfied with their job, so that they have appropriate competence and motivation to improve processes.

These two groups represented two phrases of performance management. The first group aims to identify organizational objectives and further strategies, which are formulated according to the customer's needs and the market actuality, and then deploy them into every management levels. The other group is in succession to highlight employee's learning and motivation to conduct good processes in line with the action plan, which is formulated by strategy deployment.

Category 4 represents the measures and analysis of the categories 1, 2, 3, 5, 6, which are the processes of the whole framework, also the performance results (Category 7), which is achieved by the processes. It fits in with the organization's overall measures of improvement.

Malcolm Baldrige Quality Award framework has been similarly used as EFQM Excellence Model.

In performance control, Six-sigma was originally developed as a set of practices designed to improve manufacturing processes and eliminate defects, but its

application was subsequently extended to other types of business processes as well. In Six-sigma, a defect is defined as anything that could lead to customer dissatisfaction. (Stamatis H., 2004)

Gack and Robinson (2003) indicated that the six-sigma approach offers frameworks for business improvement. The improvement approach in the foregoing starts from business goal definition and goal decomposition, and is oriented on quantitative performance measurement.

Similarly, Trienekens, Kusters, Rendering, Stokla (2005) proposed that Six-sigma methodology offers framework for improvement, starting from business strategy, pre-defined types of business goals and pre-defined type of metrics. Six-sigma emphasizes statistical techniques to isolate and quantify undesirable variations in process and product performance. It can be concluded that the mathematical techniques and analysis are central to Six Sigma steps for problem solving.

R. Michael Donovan and Co claimed in its official website: The general steps of the Six-sigma methodology would follow:

1) Identify a process or product variation that is creating undesirable performance results.

2) Define the scope and parameters of the problem.

3) Develop and apply initial measures of process or product variability.

4) Estimate the business performance impact.

5) Prioritize the project with other Six-sigma projects to establish when analysis begins.

6) Collect and organize the data needed to carry out a thorough analysis.

7) Analyze the data to pinpoint the cause or causes of variation.

8) Develop an action plan for improving the process or product and a time frame for full implementation of the action plan.

9) Implement the improvements.

10) Establish the control and feedback mechanisms for continuous improvement of the process or product.

(R. Michael Donovan and Co. Management Consultants n.d.)

Finally we examine the structural Performance Prism, which consists of five distinct but linked, and weighted perspectives of performance: stakeholder satisfaction, strategies, processes, capabilities and stakeholder contributions, was proposed by Neely and Adams (2000 & 2002).

These five perspectives are visualized by a three facet model, which is in the shape of a prism. The figure as follow shows this model (Figure 2.4):
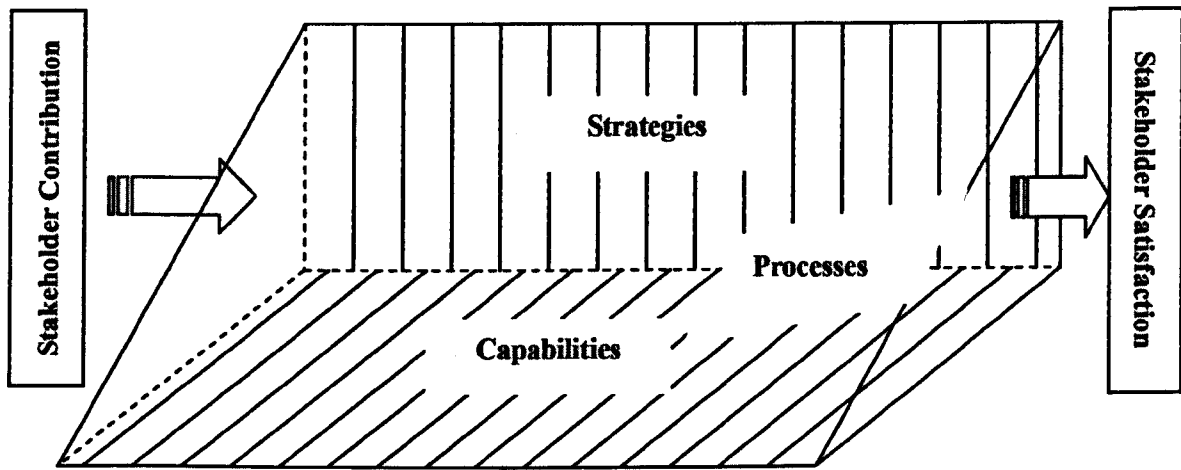
Figure 2.4: Performance Prism (Neely & Adams & Kennerley, 2002)

The three side facets are strategies, processes and capabilities, and the top and bottom facets are stakeholder satisfaction and stakeholder contribution respectively. These five distinct dimensions are interlinked. The measurement design of these five perspectives can be identified with some key questions:

➢ Stakeholder Satisfaction: who are the key stakeholders and what are their needs or expectations?

➢ Strategies: what strategies should the organization adopt so as to satisfy the key stakeholders?

➢ Processes: what critical processes does the organization need to undertake according to the organizational strategies?

➢ Capabilities: what capabilities does the organization need to cultivate staff to enhance the processes?

➤ Stakeholder Contribution: what contributions does the organization require from the stakeholders?

The innovation of this model is to not only stress stakeholder satisfaction, but also measure the stakeholder's contributions.

It can be suggested that there would be three basic premises, which make performance prism as a performance management framework.

➤ First of all, an organization could not achieve long-term and sustainable development by only focusing on only one or a few stakeholders (shareholders and customers).

➤ Secondly, an organization should integrate its strategies, processes and capabilities as an internal harmonious whole, so that the real value can be delivered to shareholders.

➤ Since the stakeholders expect to benefit from an organization, which also deserves the appropriate contribution of the stakeholders.

Third approaches: Strategy Decomposition

The third approaches require decomposing organizational activities according to logic paths or models – programmatic models like Activity-Based Costing (ABC) (Meyer, 2002) and BSC, so that key activities and KPIs can be identified level by level accordingly. It is generally thought more difficult to be used properly. In order to use this approach well, the management teams of the organizations need to be much involved as shown below. However, Andersen *et al.* (2000) claimed "Our practical experience has been that, compared to the BEM, the BSC forms a much better basis for the development of a tool for the strategic management of an organization...and many active users of the BEM have chosen to adopt in parallel BSC as a tool for strategic management activity."

Here we illustrate our point by examining BSC Approach closely.

BSC

Fleisher and Mahaffy (1997) stated that the BSC approach to assessing performance was first publicly coined in 1992 by two management accounting experts associated with Harvard University, Robert Kaplan and David Norton.

For majority of business firms, the overall strategy goal is usually long run and multi-dimension objectives. Only setting up a short run measures or sole indicator of success is obviously inappropriate as agreed by most researchers later.

Before the BSC was first publicly coined, many firms only adopt financial indicator, and all kinds of financial indicators become sole measurement criterion of firms' operation success.

As we have mentioned before, there are some serious drawbacks of traditional financial measurement:

- Financial indicators only can measure the results of the operation in the past, and it could not estimate the future performance;

- Focus only on financial indicators easily leads to excessively emphasizing financial results in short term. This disadvantage, to some extent, may lead to falsification to the financial report, and discourage managers to invest on some terms that could do contributions to long-term objectives but have no short-term surplus.

- The competence of firms may be ignored as non-financial indicators are not to be measured, such as customer satisfaction and quality etc.

Kaplan and Norton (1996) illustrated "However, the designing of the BSC forces the integration of an overall vision into the daily planning in a company, and furthermore, it forces the company to agree on what the vision should be and how it should be attained". It can be said that BSC set up a link between strategy and daily planning in a company. Obviously, this is a basic duty of performance management.

Their subsequent articles demonstrate that a further, central factor must be considered for the system to generate the greatest effect on strategy and vision (Fleisher and

Mahaffy, 1997). From this point, the model is revised as the follows (Figure 2.5):
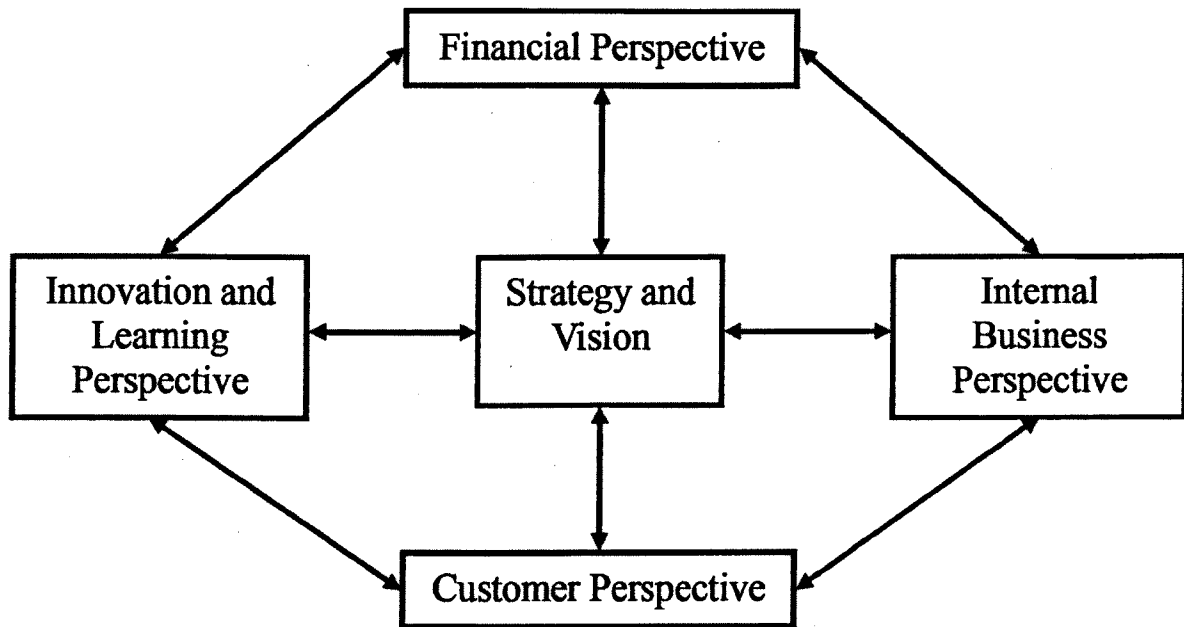
Figure 2.5: Balanced Scorecard categories relationships
(Kaplan & Norton, 1992)

Fleisher and Mahaffy (1997) claims "More importantly, BSC demonstrated how these aspects must interrelate in order for the company to be successful." It implied that the internal causality linking between the four aspects shows the basic idea of firms' success.

These four dimensions are logically linked to each other. Take the financial view, for example, the indicators that reflect how to satisfy shareholders and achieve their value will be categorized as the highest class indicators (financial indicators). This indicator class may overall and comprehensively measure the final achievement of business operation. In order to achieve these goals, the customers need to be taken care of. Thus the firms need to provide appropriate products and service to the customers, and meet their needs. When the firms are aware that what the customers needs are, the new question is that what improvements in the internal operation process the firms need to do so that the quality can be improved and cost can be declined etc as the customers' needs. Achieving the goals of improving the efficiency of internal operation depends on the sustainable development of firms. Thus, the indicator class of learning, growth and creativity competence measures the long term sustainable

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development competence of organization. In a word, actually these four dimensions are supported each other. The indicators in BSC are linked by causality. In order to use BSC correctly, firms have to find out their deriving business processes for the goals in the four aspects and then supporting sub-business processes, and so on, until suitable performance indicators are found. This is really the key of the BSC – strategy and operation decomposition. Thus it is quite demanding in applying the BSC properly. This will be clearly seen in our case study later.

Since BSC was introduced in 1990s, it has been applied broadly in management practice over the world. Balance Scorecard not only overthrows traditional measurement idea based on financial indicators, but also drives firms to set up management system working for strategic goals, so that the firms can achieve breakthrough in staff cultivation, process, market, products and customer key domains. First of all, BSC highlights that strategy is the core of whole management process (this is true at least for the "classic" organization). It describes the specific embodiment in each level of management though a systematic framework. Therefore, this kind of framework to decompose strategy via strategy map and scorecard is significantly different from the BEM methodology.

Kaplan and Norton therefore developed a multi-dimensional instrument that seeks to capture contemporary indicators of future success in the four broad domains of finance, customer perspective, internal business process, and learning and growth. The principle underlying such methods is that past success may not be a reliable indicator of future success (Smith and Goddard 2002).

Main differences between BEM and BSC

Andersen et al. (Andersen et al., 2000) stated "In spite of sharing a number of apparent similarities, the BSC and the EFQM are based on fundamentally different concepts about how best to improve the performance of an organization. The BSC favors a clear focus on the specific strategies adopted by an organization, providing a robust tool onto which other management processes can be built at the expense of a more complex design processes: the BSC is based on a dynamic and individual

abstraction rooted in explicit cause and effect relationships. The BEM is based on a static design derived using "plausible logic" and contains a standard set of strategic objectives applied to all organizations using BEM equally – and only implicit representations of the "generic" cause and effect relationships that link the strategic objectives together. But the use of this standard model facilitates the use of a much simpler design process, and the "benchmark" comparison of BEM outputs between the entire universes of organizations using the tool."

However there are different voices as echoed in Wongrassamee (2003). There are many successful cases applying the BEM, particularly in the field of HRM, although these cases cannot be used to evaluate the performance of the two approaches. For example, it is clear that BSC may not be able to address issues on stakeholders interests sharing, being developed from a point of view of shareholders. However its framework can be modified to address these issues if the top strategies have accommodated them, see the discussions in Chapter 6. Also they may just lead to very similar top level performance indicators in spite of the fundamental differences.

In our opinion, the real difference between the second and third approaches is neither just the differences of the component blocks in the models (which can usually be visually mapped), nor generic logics of the models. The key words are performance benchmarking for the former but strategy-operation decomposition for the latter. The former provides templates of performance checking for a wide range of organizations; the latter provides a logic framework for hierarchical presentations of the specific strategies adopted by an organization.

Using a BEM it is easier to build up benchmarks for a wide range of firms and then the model can be conveniently used to diagnose health of performance of an organization. By decomposing the current strategy-operation, it becomes clearer how to improve performance of the relevant parts, which may not be the case if just using the former. Also it can be easily applied only to a part of operations or management. In this sense, it supports the first approach.

In summary, the former provides macro and outside views of performance chain and is useful for diagnosis while the latter offers tools for micro and inside views

and will show how-to-improve. Thus they can be, and have been jointly applied in practice (Andersen et al., 2000).

The main differences of the ABC and BSC approaches can be found in "Rethinking performance measurement: beyond the balanced scorecard" (Meyer 2002). It seems that Mayer thinks human beings used to work with single performance indicators, and he does not believe it is possible to combine the four group indicators to form a single meaningful performance indicator.

One important problem in using original BSC is that it requires decomposing strategies by the existing business procedures. Consequently all existing faults in the system remind. In practice, many practitioners suggest applying Business Process Reengineering before using BSC. Furthermore BSC is designed for business and takes the shareholders' view (Kaplan, 1996). Thus although it has been used in public sector, there was no strong evidence that shows it works as well as in business sector.

Some special developments

Below we review some special developments in performance management literature. First of all, performance measurement is one of the focuses of operation research related to performance management, although we wish to emphasize that it should now be clear that performance measurement is only a part of integrated performance management. There are many papers in this area like those mentioned in Chapter 1. Here we examine two representatives: performance measurement matrix and Performance Pyramid System:

Keegan et al (1989) presented the structural performance measurement matrix. The matrix examines internal and external and cost and non-cost performance measures.

Keegan, Eiler and Jones (1989) realized performance measures must support the company's multidimensional environment. It seems they criticized many organizations tend to spend a great deal of time on their internal performance measurements, but ignore the external measures, and though that external

performance measures are worthy of special attentions. They have illustrated some performance measures and classified them as internal or external, cost and non-cost dimensions as the figure below (Figure 2.6):

Non-cost   **Cost**

External

- Number of repeat buyers
- Number of customer complaints
- Market share
- Product image among target customers
- (Many others)

- Competitive cost position
- Relative R&D expenditure
- Supplier cost position
- Relative labor cost
- (Many others)

Internal

- Design cycle time
- Percent on-time delivery
- Number of new products
- First-pass quality
- Product complexity
- (Many others)

- Design cost
- Material cost
- Manufacturing cost
- Distribution cost
- End-product cost
- (Many others)

Figure 2.6: Internal or external, cost and non-cost dimensions
(Keegan, Eiler and Jones, 1989)

However not like the BSC, no causality likings between the four aspects were discussed, as in the following framework.

Lynch and Cross (1991) proposed the structural performance pyramid. For this model, Folan and Browne (2005) claimed it highlights a hierarchical view of business performance measurement, and a 10-step procedural model to describe what needs to be done in terms of performance management. Lardenoije (2005) summarized: in short, performance pyramid is an interrelated system of different performance variables, which are controlled at different organizational levels. The performance pyramid looks as follow (Figure 2.7):
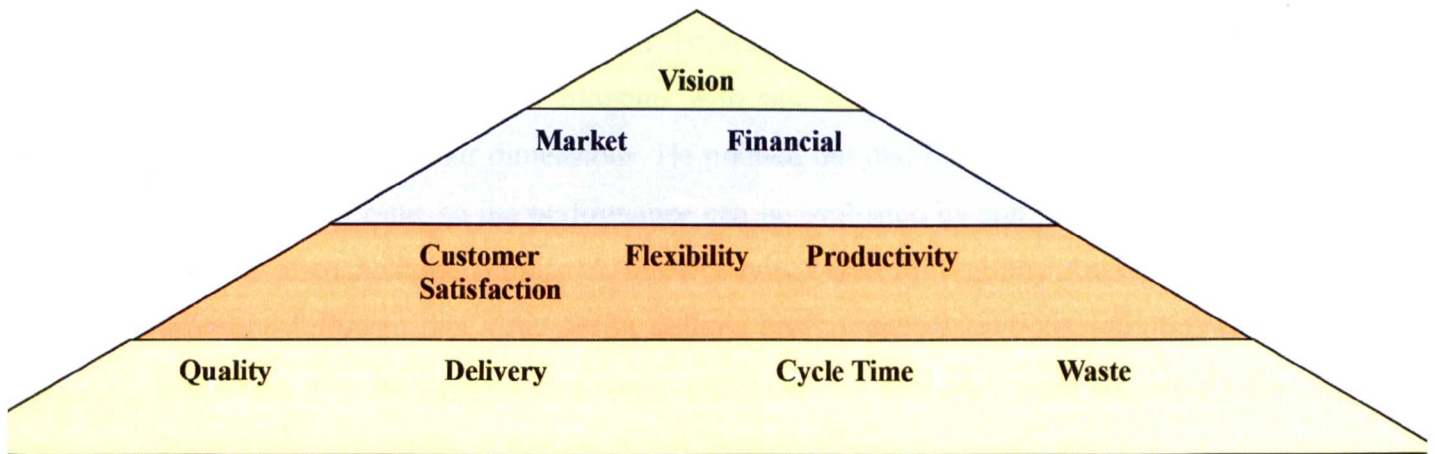
Figure 2.7: Performance Pyramid (Lynch and Cross, 1991)

Laitinen (2002) indicated the performance pyramid aims to "link an organization's strategy to its operations by translating objectives from the top down (based on customer priorities) and measures from the bottom up". Therefore, 'Vision' is placed on the top of the performance pyramid as the development of performance management system of an organization starts with the specification of an overall proper vision, which will be then decomposed into the business objectives embodied in Market and Financial two perspectives at the second level. In order to attain these market and financial objectives, key driving elements of Customer Satisfaction, Flexibility and Productivity need to be measured. These key elements are in the third level of the pyramid. Afterwards, they are further translated into specific internal operational measures, which consist of Quality, Delivery, Cycle Time and Waste all are at the bottom.

It can be acknowledged that the performance pyramid presents an interesting hierarchical view of business performance measurement. It not only lists some dimensions for performance indicators as usual, but presents a hierarchical logic structure for these blocks. **Therefore it seems possible to combine this framework with the second or the third approaches.** For instance it seems to be possible to decompose a firm's strategy–operation following the structural performance pyramid to develop lower levels of indicators. However, it could be argued that there may be flaw, which is the apparent ignorance of prominence to stakeholder satisfaction and contribution.

The main difference between ABC approach and BSC was illustrated in 'Rethink Performance Measurement: beyond Balanced Scorecard' (Meyer, 2002). Meyer thought people are used to measure with one single indicator, and doubted the rationality of using four dimensions. He pointed out that the operation activities cost but also get income, so the performance can be evaluated by comparing the cost and revenue of each single activity. ABPA (Activity-based Profitability Analysis) that he proposed followed this idea. ABPA defined performance as various activities of an enterprise, and the values of revenues minus costs of these activities are namely the, performance measures. In a word, ABPA roots in ABC.

Besides, it is necessary to introduce the concept of Total Performance Scorecard (Rampersad, 2002). It integrates the concepts and principles of BSC, Total Quality Management, and Performance Management. This integrated and systematic process includes five perspectives: individual BSC, organizational BSC, TQM, performance and competence management, and Kolb learning cycle. The individual BSC includes individual mission, vision, important role, key success elements, goals, performance measures, targets and improvement actions. Organizational BSC includes organizational mission, vision, value judgement, key success elements, goals, performance measures, targets and improvement actions. TQM is based on PDCA Deming Cycle (Plan, Do, Check, Action), and focuses on constant and systematic improvement. Performance and competence management refer to the development of skills. Kolb Learning Cycle contains four phases: concrete experience, reflective observation, abstract conceptualisation, and active experimentation. After these, the cycle restarts. In the Total Performance Management model, those five parts are interrelated, and improvement, development and learning are its common core.

In evaluating performance one has to aggregate all these (ever increasing) indicators into a performance score. In business one usually computes a weighted sum to form the score. However it is very difficult to decide proper weights for most of the public organizations. Since 70s, DEA has been widely used in aggregating efficiency score for public sector. The DEA approach has been adopted to evaluate those not-for-profit public sectors as it does not require price data that are obviously impossible to obtain, such as schools (Grosskopf *et al.* 1999, Bifulco and Bretschnerder 2001, and Portela and Thanassoulis 2001), research and education institutions (Sarrico and Dyson 1998,

Avkiran 2001, Abbott and Doucouliagos 2002, Guan and Zhang 2003, Meng, Liu and Li 2005, and Meng, Huang and liu 2006), hospitals (Chirikos and Sear 1994, Jaume 2000, and Chen, Huang and Shao 2005), police forces (Thanassoulis 1995, Sun 2002, Drake and Simper 2003), etc.

However one of the problems to apply DEA was that DEA models could not handle too many indicators, but increasingly numbers of indicators have being used in public sector performance evaluation.

Many researchers have examined performance management mechanism. They tried to explains how and why performance management works, using such as economic models (Speckbacher, 2003), learning theory (Moynihan, 2005), and stakeholder view. Normally this kind of models is too abstract for direct practical use, but is useful for understanding performance management. Below we review a work which is quite relevant to our research.

Economic models of firm

Speckbacher (2003) shows and illustrates three economic models of firm that are very useful for the foundation of performance management systems. In our opinion, the concepts of performance management or measurement are based on certain models of firm.

Model 1: The technological view of the firm

Speckbacher (2003) stated "Traditional microeconomic theory models the firm as a technology set (see, for example, Mas-Colell, Whinston, and Green, 1995, chapter 5)".

"At the heart of the technological view of the firm are the concepts of profit and profit maximization" (Speckbacher, 2003).

Under the technological view, the firm is simplistically seen as a black box between

input and output. The input enters this box from one side and output gets out from the other side. The core question is whether this production process is efficient, whether there is much resource wasted. Because profit can be calculated from output minus input with same currency unit, profit can be the ultimate measure of performance, and the complex input-output relation can just be measured via a single number that is profit. Although there may be several or many owners or shareholders, the maximization of profit always assumed to be the focus.

Most traditional cost accounting and management accounting systems can be explained with the technological view (Speckbacher, 2003).

It is clear that profit as a single measure for good performance does not always work as there are some output dimensions that profit cannot measure. For example, university may prefer to provide more valuable products for society like graduated students with high quality rather than providing profitable products. For the output of university, people pay more attention on its accountability. As the same way, it is really insensible to measure profit as the main performance measurement for a hospital. However this model does give a good approximation for earlier firms.

Most importantly, the technological view does not offer guidance for deriving and clarifying the mission (Speckbacher, 2003).

As the model is very abstract and rough, the question who have authority or who is willing to define the mission is not explained clearly. Therefore, the technological view is not helpful to specify where the mission and strategy come from and even strategy decomposition.

Model 2: The view of the firm in the traditional property rights literature

In these models the firm is understood as a nexus of interrelated contracts among the suppliers of inputs and the purchasers of outputs (Speckbacher, 2003).

In this traditional property rights model, each party that contains employees, suppliers, customers is assumed to be fully protected by complete contracts, except the owners.

The contracts specify exactly what and what extent of contribution this party needs to do and what this party can obtain after it fulfills the compulsory tasks. Owners or shareholders receive the residual profit but take all residual the risk. As the result that owners or shareholders bear all the residual risk, they have the authority to control the firm, namely they have the residual decision right. The residual decision right means the part that the contracts do not cover or protect.

Under this model, the employees should do what they are paid for as contracts say, and the owners need monitoring systems to secure this. Thus, it is obvious that the ownership is the strongest incentive at the top of the hierarchy for the monitor system.

However it is acknowledged that the shareholder (share-price) is the measure for success. This of course does not mean the each party of organization really tries to maximize the profits for success. There are two root reasons to explain the problem above, first one is that the view of each party in a firm can be conflicting, secondly, the information is not distributed symmetrically.

The traditional property rights view of the firm, with its focus on ownership rights and their enforcement through monitoring and incentive mechanism, is the backbone of today's shareholder value based performance management systems (Speckbacher, 2003).

Because shareholders employ staff even managers to operate and administrate the firm, even though each party has contracts, shareholders still need build up monitoring and incentive mechanism.

Model 3: The modern stakeholder view of organizations

Combined with the fact that the contractual relationships in a firm are typically incomplete, the problem of managing specific investments becomes obvious (Speckbacher, 2003).

From the view of this model, the firm is seen as a nexus of incomplete contracts. To explain incomplete contracts, take some examples, the contracts can specify the initial

wage and working conditions and some rough objectives, but how much efforts employees should devote can't be specified in the contracts. A worker is voluntary to buy a car so that he can get to work fast, this kind of extra efforts can't be specified in the contracts. As this specific investment, the worker expects that firm will encourage this investment with increased wage or promotion and so on in order to make the worker to realize personal goals and value. Because the contracts are incomplete, they cannot guarantee that all parties involved (who are referred to as stakeholders) will devote enough efforts required by organizational goal, In modern stakeholder theory balancing the interests of all stakeholders and making them work harder for organizational goal are the key of performance management.

Therefore, balancing the contributions of all stakeholders against their share and hence determining the extent to which implicit claims are fulfilled is the core of performance management. In this sense, the incomplete-contract view of the firm can serve as a theoretical foundation of a modern stakeholder-oriented strategic performance measurement system (Atkinson, Waterhouse, and Wells, 1997). **This thesis will also take this view as the starting point.**

The traditional property rights model (the complete-contract view) assumes that all parties (stakeholders) except owners or shareholders are fully protected by complete contracts, and this implies that the owners (shareholders) should have the residual control right as they bear whole the residual risk. However the stakeholder model (incomplete contract theory) does not assume that implication. In the stakeholder model, the key stakeholder group collectively should have the ultimate decision rights of control as the result that they make the most primary and significant specific investments.

2.5 Summary of the issues and our main contributions

First of all, we need to provide more comprehensive definitions for performance, which will be provided in Chapter 5.

We then will develop multi-level DEA models in Chapter 3, which can handle many

more indicators.

As mentioned before, these key activities of performance management identified in the existing first approach mainly result from some practical observations. We wish to **provide a suitable theoretical framework** so that we know which elements should be used, when and how to be used. In Chapter 5, we will logically derive some key functions of performance management for "classic" organizations using a system approach – SSM, which will be introduced in Chapter 3. We will further develop detailed theoretical and practical procedures for how to carry out these functions in that class of organizations.

As discussed before, most existing methods in the third approach could not fix the system faults, and may not be suitable in the public sector. In Chapters 4-5, we will develop methods that can decompose organizational activities and objectives not necessarily by just following the existing business procedures. They can inspect and improve the existing business procedures while decomposing the activities and objectives. Consequently the existing faults in the system could be fixed without first applying Business Process Reengineering. They are able to identify key stakeholders while decomposing them. Furthermore these methods do not make pre-supposition about the structure or processes of the organization, and thus fit well in the public sector: the missions of public sector organizations are often very different from each other, and so are their organizational structures, values (which are very important in public organizations), cultures and governing roles.

These theoretical developments will then be used in the case studies of Chapters 6-8.

Chapter 3

Introduction of Some

Management Science Techniques

In this chapter we introduce some quantitative and qualitative tools from Management Science, which will be used in later chapters. One group of techniques denote to mathematical methods of aggregating evaluation data in performance management. The techniques in this group are preferences, DEA, and multi-level DEA models. Another group of techniques, SSM and its variants, help us develop a theoretical framework for performance management from a system perspective.

3.1 Introduction of preference

In many applications, we need to evaluate performance of a group of homogeneous organizations – to be referred as Decision Making Units (DMUs). It is clear that DMUs are built or operated for some specific purposes. In order to be able to evaluate organizational performance precisely, we need to formulate "preference" in the input-output space (W, T) to avoid those *fuzzy* descriptions like "higher" or "lower", "better" or "worse". Evaluation of performance should be carried out with a clear preference.

Example 3.1.1

Let $X = (x_1, x_2)$, $Y = (y_1, y_2)$ represent examination marks in math. and phys. for two students A and B, respectively. The statement of quality of A better than B could mean that $x_1 \geq y_1$, $x_2 \geq y_2$. In this case both math and phys. are considered to be equally important and non-compensable with each other. However, if we think math is important and equally important is the overall capability which can be reflected by math+ phys, then the same statement means $x_1 \geq y_1$, $x_1 + x_2 \geq y_1 + y_2$.

If we want to evaluate two outputs $X = (x_1, x_2, x_3)$, $Y = (y_1, y_2, y_3)$, with three attributes there have many different ways (preferences) to evaluate which one is better:

A) $X \geq Y$, if and only if $x_1 \geq y_1$, $x_2 \geq y_2$, $x_3 \geq y_3$

B) $X > Y$, if and only if $x_1 > y_1$;
  or if $x_1 = y_1$, then $x_2 > y_2$;   or if $x_1 = y_1$, $x_2 = y_2$, then $x_3 > y_3$

C) $X \geq Y$, if and only if $x_1 \geq y_1$, $x_1 + x_2 \geq y_1 + y_2$, $x_1 + x_2 + x_3 \geq y_1 + y_2 + y_3$

D) $X \geq Y$, if and only if $x_1 \geq y_1$, $x_2 \geq y_2$, $x_3 \geq 0.5 y_3$

Preferences in Example 3.1.1, such as *A, B, C, D* all reflect the fact that *X* is better than *Y*, but in different meanings or in different preferences. Different preferences may lead to different results in performance evaluation. It is very useful for a Decision Maker to understand the meanings of the preferences precisely in their evaluations.

The most striking thing about these preferences may be that it is not possible to give a preference between two outputs. For instance, in A), (1, 0, 0) and (0, 0, 1) cannot be compared according to this preference, although they can be compared in B). In multi-objective decision making, if two DMUs are not comparable, often they will be considered to be of non-dominant status. Therefore on selecting preference, the weaker the comparable conditions is, the stronger its discrimination power; that is, fewer incomparable elements in this preference. For example, in Pareto order, $(x, y, z) \geq (w, s, t)$, one needs to have $x \geq w$, AND $y \geq s$, AND $z \geq t$. Thus assuming that (x, y, z) are marks for math, physics and chemistry exams, then student A is better than B in this sense iff A is better than B in math, physics and chemistry. This may leads to many units **incomparable**, thus become **efficient** in evaluation.

In business and management areas, the frequently used preferences are Pareto-Koopmans preference, Lexicographic preference, K-cone preference, which will be explained in the below. We go further to try to classify most useful preferences:

a) Dominant: Lexicographic preference

Sometimes, Lexicographic Preference is very useful when the kth component of an element coordinate is overwhelming more important than $k+1^{th}$ for $k=1,2,...,n$-1. The most known case is gold medals, silver medals, and browns. The mathematical definition is as follows:

Let $X = (x_1, ... x_n), Y = (y_1, ... y_n) \in R^n, X > Y$ if and only if $x_1 > y_1$,
or there is some $k \in (2, ..., n)$ so that $x_k > y_k$ and $x_i = y_i$ for $i = 1, ..., k-1$

b) Equally important and non-compensable: **Pareto-Koopmans preference** (Pareto preference)

The most frequently used preference in business and economics is Pareto-Koopmans preference. The mathematical definition of Pareto-Koopmans preference is as follows:

Let $X = (x_1,...x_n), Y = (y_1,...y_n) \in R^n, X \geq Y$ if and only if $x_i \geq y_i, i = 1,...,n$.
$X \leq Y$ if and only if $-X \geq -Y, i = 1,...,n$.
Thus no performance of one aspect can substitute or compensate other, and they are all considered to be equally important.

Example 3.1.2: If we have two units A, B with three outputs, $A = (y_{a1}, y_{a2}, y_{a3})$, $B = (y_{b1}, y_{b2}, y_{b3})$, $A \geq B$ (a) if and only if $(\frac{y_{a1}}{y_{b1}} \geq r, \frac{y_{a2}}{y_{b2}} \geq s, \frac{y_{a3}}{y_{b3}} \geq t)$. If $r=s=t=1$, then this is just Pareto.

c) Directly compensable:

Let us assume that there is a mathematical department that wishes to assess its new intakes' qualities. The students had taken examinations of math., phys., and chem. and the results are represented by a 3-dimensional vector X = (math. phys, chem.) for each of the students. It is reasonable that this department will emphasize students' mathematical capability, but also equally important their overall capability in science. With these outputs, we then formulate two new non-compensable outputs: (math. capability, overall.capability) = (math., math+phys+chem.). We conclude that the student X is better than Y: $X \geq Y$ iff $x_1 \geq y_1$, $x_1 + x_2 + x_3 \geq y_1 + y_2 + y_3$. Thus we in fact form new outputs with linear combinations of the original outputs.

On the other hand, with statistical methods like Principle Component Analysis or Factor Analysis, one often can find a small numbers of linear combinations, which can almost represent the original data. Thus it is reasonable to evaluate DMUs with the new outputs – the linear combinations. Let Y be an output vector of s-dimensions, and A be a $l \times s$ matrix. Mathematically, we form a new output AY with now l-components. If we consider now the new outputs to be non-compensable and equally important, then

$X \geq Y$ in this new preference iff $AX \geq AY$ in Pareto preference.

If l=1, then in fact there is direct price for all the performance measurements. Thus a full ranking list can be easily produced.

Example 3.1.3:

Define: $X \geq Y$, if and only if $x_1 \geq y_1, x_1 + x_2 \geq y_1 + y_2, x_1 + x_2 + x_3 \geq y_1 + y_2 + y_3$.

Then it can be written as: $AX \geq AY$, with $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$. If take $A = \left(\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 1 \end{bmatrix} \right)$, then,

AX and AY can be interpreted as math. capability and overall capability vectors.

d) Indirectly compensable:

Sometimes, a direct compensation of value judgments is not accepted in empirical applications. Instead, indirectly compensable value judgments are more popular in assessment.

Example 3.1.4: If we have two unit A, B with three outputs, $A = (y_{a1}, y_{a2}, y_{a3})$, $B = (y_{b1}, y_{b2}, y_{b3})$, define $A \geq B$ (a) if and only if $(\frac{y_{a1}}{y_{b1}} + \frac{y_{a2}}{y_{b2}} + \frac{y_{a3}}{y_{b3}} \geq r)$, or (b) if and only if $(\frac{y_{a1}}{y_{b1}} \geq s, \frac{y_{a2}}{y_{b2}} + \frac{y_{a3}}{y_{b3}} \geq t)$, where r, s, t are actual values. In (a), it means that performances in three components are indirectly compensable. In (b), the second and third are indirectly compensable, but the first is not.

In many cases preference are only implicitly used in evaluation. Nevertheless suitable preferences often need to be understood for interpreting evaluation appropriately.

3.2 Introduction of DEA

Performance evaluation and benchmarking have now become routine practice in performance management. It has also been well recognised that a single indicator may not be sufficient for performance management. Multiple measures for reflecting more key aspects of decision making units (DMUs) are now mostly used. However how to suitably aggregate them into a single overall performance score is still a challenging research topic. In business applications the most widely used way is to aggregate

multiple indexes into a weighted sum to produce the final evaluation score, where weights reflect the relative importance for those selected indexes. Naturally, it is important to select the weights rationally and fairly.

DEA is now one of the most widely accepted methods to measure relative efficiency or productivity for DMUs with multiple-inputs and multiple-output. DEA was first introduced by Charnes, Cooper and Rhodes in their highly influential paper published in 1978 (Charnes, Cooper and Rhodes, 1978). The authors described DEA as a "mathematical programming model applied to observational data that provides a new way of obtaining empirical estimates of relations, such as the production function and/or efficient production possibility surfaces". Thus DEA employs mathematical programming techniques, and is able to handle multiple inputs and multiple outputs without assuming model parameters or weights. It then became a popular method in performance evaluation of homogenous DMUs. In DEA, a DMU is regarded as the entity that produces outputs by consuming inputs.

The first DEA model—the CCR model was proposed by Charnes, Cooper and Rhodes (1978) in *European Journal of Operation Research* by generalising Farrel (1957) single-output/single-input technical efficiency to the multi-outputs/multi-inputs case. Since 1978, both theoretical development and practical applications of DEA have increased at an **explosive** pace. By now many good books have been published, see Charnes *et al.* (1994), Sengupta (1996), Cooper, Seiford and Tone (2000), Thanassoulis (2001), Zhu (2003), and Cooper, Seiford and Zhu (2004).

DEA has now been widely applied in evaluation of for-profit organisations, such as banks (Schaffnit, Rosen and Paradi 1997, Kuosmanen and Post 2001, Manandhar and Tang 2002, Paradi and Schaffnit 2004), telecommunications (Giokas and Pentzaropoulos 2000, Lien and Peng 2001), insurance companies (Brockett, Charnes and Cooper 1997), and marketing productivity (Donthu, Hershberger and Osmonbekov 2005) *etc.*

However in many applications the standard DEA models need to be modified and

indeed new DEA models frequently need to be developed. These call for more thorough understanding of the structure of DEA models. However, the standard DEA models were derived from economic efficiency theory including Debreu-Farrell efficiency, Pareto-Koopmans efficiency, or more general axiomatic approaches, see Färe and Lovell (1978) and Russell (1988). Therefore, modifying the standard DEA models to suit a particular application may not be easy via using such approaches.

3.2.1 Two different perspectives of DEA

DEA can be viewed from two different perspectives: virtual efficiency ratio and production frontier building, as introduced below.

3.2.1.1 DEA as efficiency ratio

Let us assume that we have n DMUs using m inputs to produce s outputs, where all inputs and outputs are desirable. Let x_{ij} and y_{rj} be the level of the ith input and r^{th} output observed at DMU$_j$ ($j=1...n$). Then we have the following DEA model:

$$\text{Max} \quad h_0 = \frac{\sum_{r=1}^{s} u_r y_{r0}}{\sum_{i=1}^{m} v_i x_{i0}}$$

$$\text{Subject to:} \quad \frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \leq 1, \qquad j = 1,...n \tag{3.1}$$

$$u_r, v_i \geq \varepsilon, i = 1,...m, \ r = 1,...s$$

Where index 0 refers to the DMU to be assessed, u_r, v_i are unknown weights for inputs and outputs, and ε is non-Archimedean infinitesimal.

Model 3.1 is referred to as the CCR ratio model. The essential characteristic of the CCR ratio model is to maximise the ratio of the single 'virtual' output divided by the single 'virtual' input for DMU$_0$, where the weights were decided by the mathematical programming to maximise the ratio for the assessed DMU. Thus non-negative weights

$(u_r \text{ and } v_i)$ are derived to maximise the efficiency score (h_0) of DMU$_0$, instead of being given in advance. Thus DMU$_0$ has full flexibility to select the best favourable weights to maximise its score. If the ratio is 1, then DMU$_0$ is classified as efficient. Under these weights, if DMU$_0$ is still inefficient, then it can hardly argue that its inefficiency is due to possible bias of weights selection. The constraints in Model 3.1 mean that the ratio of "virtual output" vs. "virtual inputs" should not exceed 1. The economical meaning is that the productivity should not exceed 1, see Cooper, Seiford and Tone (2000).

Model 3.1 can be re-formulated as the following linear programming:

$$\text{Max} \quad \sum_{r=1}^{s} u_r y_{r0}$$

$$\text{Subject to :} \quad \sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \leq 0 \quad j = 1,...,n$$

$$\sum_{i=1}^{m} v_i x_{i0} = 1 \tag{3.2}$$

$$u_r, v_i \geq \varepsilon, i = 1,...,m, r = 1,...,s$$

Of course one can also minimize the virtual inputs while standardizing the virtual outputs.

3.2.1.2 DEA as building production frontier

Each linear model has its dual model, and the dual model of Model 3.2 reads:

$$\text{Min} \quad \theta - \varepsilon \left(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+ \right)$$

$$\text{Subject to :} \quad \sum_{j=1}^{n} x_{ij} \lambda_j + s_i^- = \theta x_{i0} \quad j = 1,...,n$$

$$\sum_{j=1}^{n} y_{rj} \lambda_j - s_r^+ = y_{r0} \quad r = 1,...s \tag{3.3}$$

$$\theta > 0, \lambda_j . s_i^-, s_r^+ \geq 0, i = 1,...m$$

Model 3.2 is usually referred to as the CCR **multiplier** model, while Model 3.3 is referred to as the **envelopment** model. According to the envelopment model, DEA

can be interpreted as building production frontier and then projecting DMUs on it. For example, we have 7 DMUs that use two inputs to produce the same output, as Figure 3.1 presented, where the poly-line ABCD represents the production frontier so that only DMUs on it are efficient.
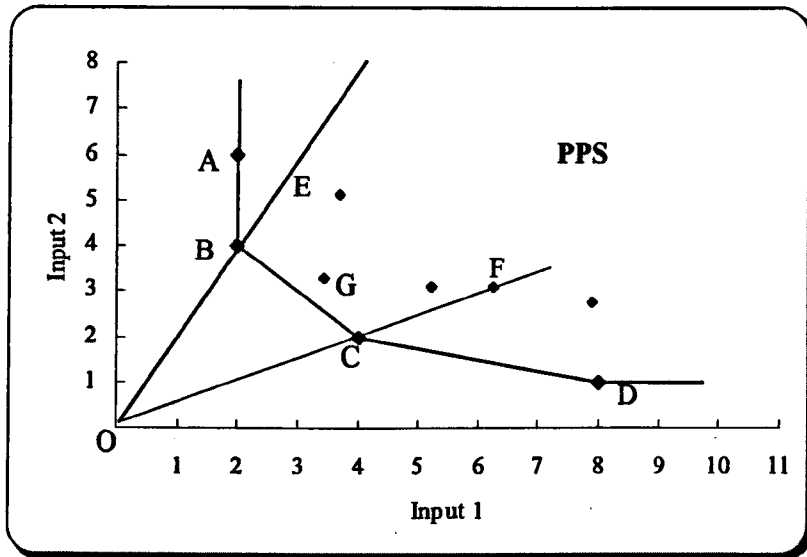
Figure 3.1: Seven DMUs with two inputs and one output
(Charnes, Cooper and Rhodes, 1978)

How to build the frontier depends on Production Possibility Set (PPS), and preferences adopted, which are explained in Liu, etc 2006. The DMUs on the frontier are marked as efficient, such as A, B, C and D, and the others are not, such as E, F and G. For those DMUs not on the frontier, their distances to the frontier can be defined according to applications, to decide their efficiency scores. For example, the efficiency score of F can be measured as $\dfrac{OC}{OF}$. Thus two things can be seen: first, DEA compares DMUs with their best peers; second, DEA is built on PPS, preference and distance.

3.2.2 Further DEA models

3.2.2.1 The BCC models

The CCR model assumes constant return to scale (CRS), where the BCC model

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(Banker *et al.* 1984) assumes variable return to scale. Model 3.4 below is the input-oriented BCC model. Comparing with Model 3.3, the constraint $\sum_{j=1}^{n} \lambda_j = 1$ is added into the BCC Model, which enforces variable return to scale.

$$\text{Min} \quad \theta - \varepsilon \left(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+ \right)$$

$$\text{Subject to:} \quad \sum_{j=1}^{n} x_{ij} \lambda_j + s_i^- = \theta x_{i0} \qquad i = 1, \ldots m$$

$$\sum_{j=1}^{n} y_{rj} \lambda_j - s_r^+ = y_{r0} \qquad j = 1, \ldots n \qquad (3.4)$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

$$\theta, s_i^-, s_r^+, \lambda_j \geq 0, r = 1, \ldots s$$

On the other hand, if all the aggregated outputs are regarded as equally substitutable, and the DMs or evaluators prefer to compare their performance in the average sense, then the following DEA model can be used, where the average level is measured in the objective function, see (Liu, Meng, and Zhang, 2006) for the theoretical explanation.

$$\text{Max} \quad \frac{1}{s} \sum_{r=1}^{s} \theta_r + \varepsilon \sum_{i=1}^{2} s_i^-$$

$$\text{Subject to:} \quad \sum_{j=1}^{n} x_{ij} \lambda_j + s_i^- = x_{i0} \qquad i = 1, 2$$

$$\sum_{j=1}^{n} y_{rj} \lambda_j = \theta_r y_{r0} \qquad r = 1, 2 \qquad (3.5)$$

$$\sum_{j=1}^{n} \lambda_j = 1, \quad \sum_{r=1}^{s} \theta_r \geq s, \quad s = 1, \ldots, n$$

$$s_i^-, \theta_r, \lambda_j \geq 0, j = 1, \ldots n$$

Let us note the constraints $\sum_{r=1}^{s} \theta_r \geq s$, $\theta_r \geq 0$ in Model 3.5 imply that the three outputs can be substituted.

3.3 Two-level DEA models and Index Models

The main part of this section comes from Meng *et al.* (2008). For evaluation of Decision Making Units (DMUs) with multiple-inputs and multiple-outputs in public

sector, DEA is now one of the most widely accepted methods to measure their relative efficiency or productivity. However, it is well known that the discrimination power of DEA models will be diminishing if too many inputs or outputs are used. It is a dilemma if the Decision Makers (DMs) wish to select comprehensive indicators to present a relatively holistic evaluation using DEA. Intuitively, people may wish to use some statistical techniques to reduce numbers of indicators in order to improve DEA discrimination power. In practical applications, there have quite a few papers proposing different techniques on indicator reduction or aggregation, such as dropping highly correlated indicators (Kao, Chang, and Hwang, 1993), (Zhang and Bartels, 1998), (Jenkins and Anderson, 2003), (Farzipoor Saen, Memariani, and Hosseinzadeh Lotfi, 2005), or selecting the main components by Principle Component Analysis (PCA) (Adler and Golany, 2001).

However the standard DEA models are sensitive to indicator set changes. It was shown that even removal of a highly correlated output (or input) can much change the evaluation results (Dyson, Allen, Camanho, Podinovski, Sarrico, and Shale, 2001). Furthermore often the DMs wish to include many such correlated indicators in order to present a relatively comprehensive evaluation. It may be difficult to justify removals of the indicators just because of data correlations.

It has been observed that often these indicators can be grouped hierarchically, where weights can be assigned to reflect their relative importance in overall substitution within the groups, while no such substitutions can be easily decided between these groups so they are best considered to be no-substitutable. There are possible ways to handle such data in DEA evaluations.

Take research evaluation as example: research outputs are numerous, depending on different stakeholders' views. For example, direct research outputs, research competitiveness and scientist cultivation are the three main aspects on performance evaluation of basic research in the Chinese Academy of Sciences (CAS). Figure 3.2 represents a view from the level of the Bureau of Basic Sciences on the most important performance indicators of the 15 institutes for basic research in the CAS. These indicators are direct research outputs, external research funding, and scientists cultivation respectively (Andersen and Petersen, 1993). They are also frequently used in performance evaluation of basic research in the world (Anon, 1999), (Armson *et al*, 2002), (Arnold, 2004), (Arunachalam and Manorama, 1988), (Avkiran, 2001).

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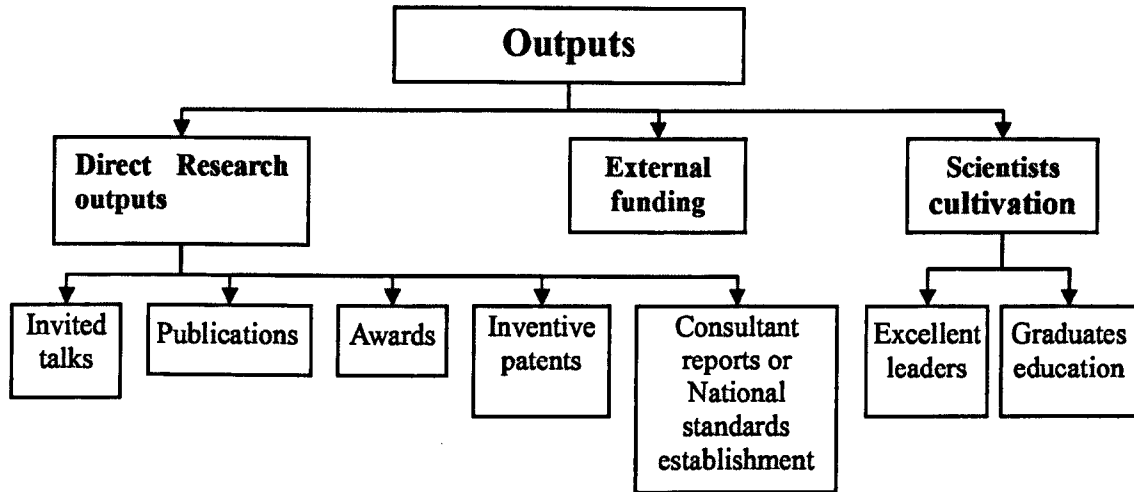
Figure 3.2: Research outputs with hierarchical structure

Meng *et al* (2005) presented a questionnaire analysis in 2005, where AHP was used to judge relative importance for some research outputs of the 15 CAS research institutes, and the selected research outputs were structured in three levels, as Figure 3.2 shown (Andersen and Petersen, 1993). Direct research outputs, external research funding and scientists cultivation are the first level. On the second level, direct research outputs can be further decomposed into five sub-indicators, as invited talks, publications, awards, inventive patents and consultant reports or national standards establishment. External research funding obtained is regarded as an indicator for research competitiveness. Scientist's cultivation includes excellent research leaders and postgraduates. The relative importance of the selected sub-indicators was found using AHP and is shown in Table 3.1 (more details can be found in (Andersen and Petersen, 1993)), which will be used as a base for formulation of our two-level DEA approaches.

Table 3.1: Weights of 5 sub-indicators of direct research outputs using AHP

Eigenvalue		Publications	Awards	Invited Talks	Invention Patents	Cons. Rep. Stand. Estab.
Geometry Mean A_{geo}	5.8996	0.23593	0.42606	0.36661	0.2195	0.17549
Percent% (weights)		16.57	29.93	25.75	15.42	12.33

Since we only have 15 DMUs, it seems impossible to directly use all of these indicators in standard DEA models. In the next section we first aggregate related sub-indicators bottom up using the weights generated from AHP, and then apply DEA at the first level. This approach is related to the approach of data transformation as discussed in (Bala and Cook, 2003) and (Banker, Charnes, and Cooper, 1984).

3.3.1 DEA with data transformation

When data are of the above structure, we can directly aggregate the indicators within the groups by computing weighted sums using suitable weights. Then we will have new aggregated indicators and can apply DEA models on the new data. This approach is often referred to as Data Transformation. However one of the key problems is to decide the weights. In practical applications, AHP was often used to decide these weights, see Meng *et al.* (2005) for more details.

In the case of CAS, the five sub-indicators are firstly aggregated into direct research outputs according to the weights obtained in the Table 3.1. For the third output—scientists cultivation, the two sub-indicators are used: 1) the number of excellent research leaders - an indicator to represent research sustainability and reputation; 2) graduate education – an indicator to represent sustainability and social accountability of basic research as well as research reputation. Thus excellent research leaders and graduates enrolments are selected to reflect scientist's cultivation of the institutes, and regarded as equally important in this pilot study.

Thus we have three inputs – the number of research staff, the research expenditure and the value of research equipments, and three aggregated outputs – direct research outputs, research competitiveness (via external research funding), and scientists cultivation. Then the standardized data are shown in Table 3.2. The formula to standardize these indexes is $\bar{y}_{ij} = \dfrac{y_{ij}}{\underset{i}{Max}\, y_{ij}} \times 100$. The purpose to standardize the indexes is to remove scale differences in these weighted sums.

Table 3.2: Standardized data with aggregated outputs

DMUs	Staff	Equipments	Research expenditure.	Research outputs	External funding	Scientists cultivation
Unit 1	34.39	19.65	44.61	49.89	47.96	**100**
Unit 2	37.83	80.35	59.53	62.60	94.60	70.47
Unit 3	6.15	4.53	9.80	6.27	7.79	22.36
Unit 4	**100**	78.05	69.06	11.90	66.54	72.06
Unit 5	22.44	23.04	14.09	4.43	18.71	18.45
Unit 6	74.93	**100**	**100**	14.92	**100**	39.09
Unit 7	43.53	14.95	39.08	4.38	44.47	18.03
Unit 8	44.62	33.63	30.42	3.25	17.28	18.39
Unit 9	17.92	11.65	17.22	3.13	21.65	10.09
Unit 10	21.99	13.91	24.27	27.96	28.11	4.67
Unit 11	50.05	32.36	46.26	10.19	92.11	19.82
Unit 12	31.40	30.83	36.88	11.69	42.87	23.29
Unit 13	40.27	49.22	58.31	**100**	84.68	73.08
Unit 14	23.53	17.76	20.51	41.44	46.04	15.73
Unit 15	27.51	27.56	44.29	17.34	94.94	44.80

Now let us consider DEA models. In this section we will firstly apply the following BCC model with the aggregated data in Table 3.2.

$$\text{Max} \quad \theta + \varepsilon\left(\sum_{i=1}^{3} s_i^- + \sum_{r=1}^{3} s_r^+\right)$$

$$\text{Subject to}: \quad \sum_{j=1}^{15} x_{ij}\lambda_j + s_i^- = x_{i0} \qquad i = 1,2,3$$

$$\sum_{j=1}^{15} y_{rj}\lambda_j - s_r^+ = \theta y_{r0} \qquad r = 1,2,3 \tag{3.6}$$

$$\sum_{j=1}^{15} \lambda_j = 1$$

$$s_i^-, s_r^+, \lambda_j \geq 0, \; j = 1,\ldots,15$$

The results are shown in the second column of Table 3.3, named as Model 3.6. The third column presents the ranking order based on the DMUs' efficiency scores.

On the other hand, if all the three aggregated outputs on the first level are regarded as equally substitutable, and the DMs or evaluators prefer to compare their performance in the average sense, then the following DEA model can be used.

$$\text{Max} \quad \frac{1}{3}\sum_{r=1}^{3}\theta_r + \varepsilon\sum_{i=1}^{3}s_i^-$$

$$\text{Subject to:} \quad \sum_{j=1}^{15}x_{ij}\lambda_j + s_i^- = x_{i0} \qquad i=1,2,3$$

$$\sum_{j=1}^{15}y_{rj}\lambda_j = \theta_r y_{r0} \qquad r=1,2,3 \qquad (3.7)$$

$$\sum_{j=1}^{15}\lambda_j = 1, \quad \sum_{r=1}^{3}\theta_r \geq 3$$

$$s_i^-, \theta_r, \lambda_j \geq 0, \ j=1,...,15$$

Let us note that Model 3.7 is not just the standard DEA model with the Russell measurement. In the Russell model the constraints for θ_r are $\theta_r \geq 1, r = 1,2,3$, which mean that Pareto Preference is assumed for the outputs. In Model 3.7, the constraint is $\sum_{r=1}^{3}\theta_r \geq 3$, $\theta_r \geq 0$, which implies that the individual measurements can be smaller than one as long as their average is greater or equal to one, see Liu et al (2006) for the theoretical explanation.

The efficiency scores are shown in the fourth column, named as Model 3.7 in Table 3.3:

Table 3.3: Efficiency scores based on DEA models with aggregated indicators

DMUs	M3.6	Rank M3.6	M3.7	Rank M3.7
Unit 1	100	1	100	1
Unit 3	100	1	100	1
Unit 13	100	1	100	1
Unit 2	100	1	90.55	4
Unit 14	100	1	77.86	5
Unit 15	100	1	57.43	6
Unit 5	86.18	12	43.49	7
Unit 12	56.92	14	33.74	8
Unit 6	100	1	31.85	9
Unit 4	87.59	10	28.06	10
Unit 11	96.84	8	26.60	11

Unit 9	70.93	13	25.19	12
Unit 7	94.17	9	22.56	13
Unit 10	86.70	11	22.32	14
Unit 8	36.56	15	13.39	15

Table 3.3 uses the rank of Rank Model 3.7 in sorting data. There are 7 units ranked as efficient. However, if the average preference is preferred, only Units 1, 3 and 13 are still efficient, and all the rest become inefficient, as Rank Model 3.7 shown in Table 3.1. The difference comes from the different value judgments (or preferences), as Model (3.7) adopts the average preference. Taking Unit 2 as example, its individual measurements of each output in Model (3.7) are $\theta_1 = 0.84$, $\theta_2 = 1.49$ and $\theta_3 = 0.99$. These imply that the external research funding obtained of Unit 2 is far behind its peers (Units 3 and 13) although the rest two outputs are compatible. One of the key differences is that now the individual measurements can be smaller than one as long as their average is greater or equal to one.

3.3.2 Two-level DEA models

In this section, we will not directly aggregate the indicators by transforming data, but develop suitable DEA models to reflect the data hierarchy structures.

We firstly show the standardized data of the sub-indicators as the follows (Table 3.4):

Table 3.4: Standardized 8 output indicators

Units	Publications scalar (A₁)	Invited talks (A₂)	Awards (A₃)	Invention patents (A₄)	Report (A₅)	External funding (B)	Excellent leaders (C1)	Graduates education (C2)
Unit 1	31.01	100.00	0.00	0.00	0.00	47.96	100.00	60.12
Unit 2	93.88	0.00	50.00	53.44	0.00	94.60	57.69	55.14
Unit 3	23.40	0.00	0.00	0.00	0.00	7.79	26.92	8.88
Unit 4	33.80	0.00	0.00	11.45	0.00	66.54	15.38	100.00
Unit 5	12.27	0.00	0.00	4.58	0.00	18.71	3.85	25.70
Unit 6	32.86	14.29	0.00	0.76	0.00	100.00	26.92	35.67
Unit 7	8.55	0.00	0.00	8.40	0.00	44.47	7.69	21.18
Unit 8	12.15	0.00	0.00	0.00	0.00	17.28	11.54	17.91
Unit 9	11.72	0.00	0.00	0.00	0.00	21.65	3.85	12.31
Unit 10	7.12	14.29	0.00	0.76	100.00	28.11	0.00	7.48
Unit 11	35.26	0.00	0.00	3.05	0.00	92.11	15.38	16.36
Unit 12	14.24	0.00	0.00	18.32	16.67	42.87	7.69	29.60
Unit 13	100.00	0.00	100.00	100.00	0.00	84.68	34.62	82.40
Unit 14	30.43	0.00	50.00	36.64	0.00	46.04	3.85	21.34
Unit 15	12.98	0.00	0.00	55.73	0.00	94.94	30.77	40.97

Still taking the same case used in above section as example, if all the eight indicators shown in Table 3.4 are all to be used by the DMs in order to present a relatively comprehensive evaluation, and if all the indicators use Pareto Preference, then the BCC model should be used, and variable return to scale is assumed. The results are presented in the second column in Table 3.5. There are 11 DMUs classified as efficient by the BCC model. Obviously, here the standard DEA models may not be very discriminative because too many indicators are used. Even so, as we have discussed, the full flexibility on weights selection in the standard DEA models has its unique advantage on judging inefficient DMUs. In this case, Units 7 and 8 are still ranked as the worst. Therefore, there should be no excuse on possible unfair weights selections for these two units.

As discussed, some indicators in the same level can be substitutable. For instance, if the five sub-indicators of direct research outputs (A₁-A₅) and two sub-indicators of

scientists cultivation (C_1-C_2) are allowed to be substituted according to the relative importance within the categories, but the three categories still use Pareto Preference, then a new DEA model can be built to directly reflect the hierarchical structure and incorporate the value judgment of the DMs. Some of these indicators such as awards have upper bounds, and thus variable return to scale is assumed. Then we can build the following two-level DEA model, where different sub-systems have different preferences. Pareto preference is still assumed for the three outputs on the top level, as Model 3.8 presented.

$$\text{Max} \quad \theta + \varepsilon \left(S^- + S^+ \right)$$

$$\text{Subject to:} \quad (AX)\lambda + S^- = AX_0$$

$$(BY)\,\lambda - S^+ = \theta(BY_0), \tag{3.8}$$

$$\sum_{j=1}^{n} \lambda_j = 1, \lambda_j, S^-, S^+ \geq 0, \sum_{l=1}^{5} w_l = 1,$$

$$A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \quad B = \begin{pmatrix} w_1 & w_2 & w_3 & w_4 & w_5 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 \end{pmatrix}$$

where S^-, S^+ are slacks vectors, and the weights can either be fixed or **allow some variations**. In all our computations, we allowed the weights to have 20% variations around their averages. Ideally the weight bounds for those five sub-indicators of research outputs should be decided by some statistical methods or peer review through Delphi or AHP. For instance, in (Takamura, and Tone, 2003) the weights restriction in terms of assurance region type I was incorporated in assessing the case of sites location, where the assurance bounds were calculated by the evaluator's weights (W_{kl}) based on AHP, and the lower and up bounds were defined as

$$L_{i1,i2} = \min_k \frac{W_{kl1}}{W_{kl2}} \quad , \quad U_{i1,i2} = \max_k \frac{W_{kl1}}{W_{kl2}}.$$ However in our case, if we adopted this idea to

derive our weights bounds, the assurance boundaries became too wide to use, as we had 89 valid questionnaires, and scores of each indicator from individual samples could be between 1 and 9. Thus we still use the average weights derived from AHP, but allow certain flexibility. We will revisit this issue at the end of this section.

As Model (3.8) is formulated, apparently 8 indicators are aggregated into three overall outputs. However this model is different from the data aggregation models used before or the standard Cone-Ratio DEA models. For example, here certain flexibility

is allowed for the weights, which is not given but to be decided by the mathematical model. Thus the mathematical programming is not linear anymore. The evaluation results are presented in the third column of Table 3.5.

Table 3.5: The results of two-level DEA approaches

DMUs	BCC score	Model 3.8	Rank Model 3.8	Model 3.9	Rank Model 3.9
Unit 1	100	100	1	100	1
Unit 3	100	100	1	100	1
Unit 13	100	100	1	100	1
Unit 2	100	100	1	88.55	4
Unit 14	100	100	1	74.51	5
Unit 15	100	100	1	49.64	6
Unit 5	100	86.19	12	37.51	7
Unit 12	71.49	56.92	14	28.95	8
Unit 6	100	100	1	25.40	9
Unit 4	100	87.59	10	23.58	10
Unit 11	100	96.84	8	22.84	11
Unit 10	100	86.69	11	21.88	12
Unit 9	72.23	70.93	13	20.85	13
Unit 7	94.17	94.17	9	18.10	14
Unit 8	40.59	36.56	15	10.30	15

If the DMs prefer to compare the overall performance using the average preference, then we have the following DEA model:

$$\text{max} \qquad \frac{1}{3}\sum_{r=1}^{3}\theta_r + \varepsilon\sum_{i=1}^{3}s_i^-$$

$$\text{subject to:} \quad \sum_{j=1}^{15}x_{1j}\lambda_j + s_1^- = x_{10}, \quad \sum_{j=1}^{15}x_{2j}\lambda_j + s_2^- = x_{20}, \quad \sum_{j=1}^{15}x_{3j}\lambda_j + s_3^- = x_{30}$$

$$w_1\sum_{j=1}^{15}y_{1j}\lambda_j + w_2\sum_{j=1}^{15}y_{2j}\lambda_j + \ldots + w_5\sum_{j=1}^{15}y_{5j}\lambda_j = \theta_1(w_1y_{10} + w_2y_{20} + \ldots + w_5y_{50})$$

$$\sum_{j=1}^{15}y_{6j}\lambda_j = \theta_2 y_{60} \qquad\qquad (3.9)$$

$$\sum_{j=1}^{15}y_{7j}\lambda_j + \sum_{j=1}^{15}y_{8j}\lambda_j = \theta_3 (y_{70} + y_{80})$$

$$\sum_{l=1}^{5}w_l = 1, 0.8 \le \frac{w_l}{\overline{w_l}} \le 1.2, \theta_1 + \theta_2 + \theta_3 \ge 3,$$

$$\sum_{j=1}^{15}\lambda_j = 1, s_i^-, \lambda_j, \theta_r \ge 0, i = 1,2,3, r = 1,2,3, j = 1,\ldots,15$$

The results of this model are shown in the fifth column of Table 3.5.

As shown in Table 3.5, there are 11 efficient DMUs in the BCC model, while only 7 DMUs are efficient in Model (3.8). With the average preference, only Units 1, 3 and 13 are still efficient, followed again by Unit 2. Comparing with Rank Model 3.9 by Model (3.9) in Table 3.5 and Rank M3.7 in Table 3.3, the top 3 are same, while these three units were also ranked as the top three according to research sustainability evaluation in the CAS 2002.

3.4 Introduction of SSM

In our research SSM and its variants are among the main tools in developing a theoretical framework for performance management from a system perspective.

3.4.1 SSM introduction

The origins of SSM appeared in 1972 with Checkland's first publication of *towards a system-based methodology for real-world problem solving* (Checkland, 1972). As Checkland points out, in *hard system thinking* (HST), the system is generally given and the ultimate question is how to design a model to meet the requirements, such as,

to minimize costs or maximize profits. However, real-world problems are not always that easy to be formulated and then solved by mathematical models, especially when they involve human beings. Performance management, which involves many human activities, often has many possible *right* answers or solutions. Sometimes even defining those messy and complex problems or issues is problematic. Since hard system thinking is unsatisfied, SSM emerges as a successful approach to understand and analyze messy people-based organizational problems. SSM can enable DMs, senior managers and others users, to explore problem situations from different perspectives with holistic views, and accommodate different viewpoints for further improvement. Applications show that SSM is quite useful in dealing with complex organization management (Jacobs, 2004).

The core spirit of SSM is that any system can be analyzed from repeatedly answering three questions, 1) what to do (P), 2) how to do (Q), and 3) why to do (R) respectively. A system can be monitored and controlled from three aspects: efficacy (E1), efficiency (E2) and effectiveness (E3). Efficacy reflects P, which measures the outputs of a system; efficiency relates Q and evaluates the rate resources utilisation, while effectiveness reflects R, which assesses whether system outputs are meaningful or useful to higher (broader) system, as Figure 3.3 presented. E1 and E2 relate with internal organisational management, while E3 needs to be judged from up level. Taking one basic research institute as an example, publications can be attributed to efficacy (E1), as it is one of directly research outputs. Whether we can produce more publications using same resources is related with E2, while whether these publications could contribute to institute's innovation, research impact are related with E3.

Since introduced in 1972, SSM becomes a popular and effectively tool to diagnose complex and problematic
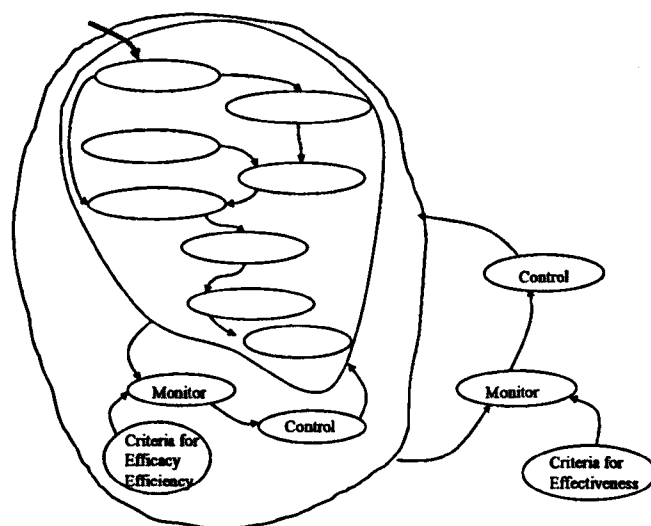
Figure 3.3: Operational and strategic control

(Liu W.B, *et al*, 2010)

situation. For instance, Bolton and Gold (1994) examined the use of SSM in the analysis and improvement of a messy Human Resources Management (HRM) in Nationwide Building Society, especially in the area of career management and career counseling. Hsu and Yeo (1996) adopted SSM to analyze public research institutes (PRI). SSM is used to help PRI re-think and re-state its mission, goals, values and accommodate different stakeholder's motivations in order to bring improvements in performance. Chapman (2002) argued that British policy makers should employ SSM to view problem situation holistically in order to better account for organizational complexity.

3.4.2 Historic development of SSM

As Mingers (2000) summarized, the historic development of SSM could be classified into three stages, as birth, growing up and maturity respectively.

During the 1970s, due to unsatisfied results on solving those not well structured and/or messy real-world problems by hard OR, especially related with social or organizational problems, people turned to find other method with systematic, holistic and soft approach. It leads to SSM emergence. Seven-stage diagram becomes as an iconic of SSM (Checkland, 1972), as Figure 3.4 presented (more explanations will be given later).

Since 1980s, further development of SSM has been generated through empirical applications. For instance, seven-stage procedure has been replaced by *four-activities* as: 1) finding out about a problem situation with cultural and political influence; 2) formulating some relevant purposeful activity models; 3) debating the situation with systemic desirability and cultural feasibility; 4) taking action to bring about improvement. Core elements in Root Definition (RD) of SSM became as "Do P by Q in order to achieve R", which answers the three questions as what to do (P), how to do (Q) and why to do (R) respectively. Efficacy, efficiency and effectiveness, sometimes more, have been defined on monitoring and control stage of a Conceptual Model (CM), where users of SSM have been extended from internal to external.
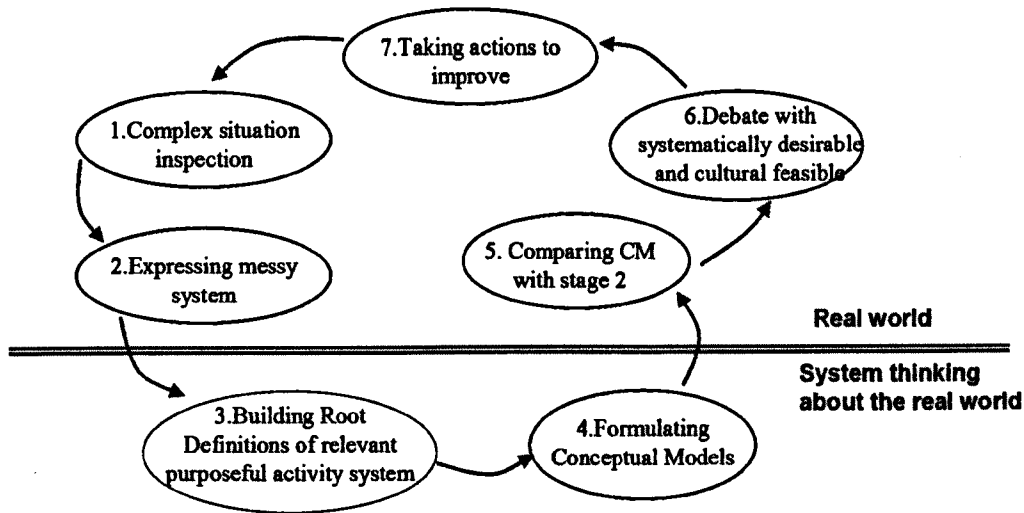
Figure 3.4: The seven-stage approach (Checkland, 1972)

Since 1990s, SSM becomes one of most frequently used soft methods in the real-world problem solving. For example, a few investigations of SSM application areas and effect were surveyed (Minger and Taylor 1992, Ledington and Donaldson 1997). The results presented that the application areas of SSM were varied from organizational design, information systems, performance evaluation, education to general problem solving etc. Geographically the theoretical development and empirical applications of SSM have been emerged in different countries, such as Australia (Crawford et al. 2003, Ledington and Donaldson 1997, 1999), the Netherlands (Pala et al. 2003), Sweden (Beigvall-Kåreborn et al. 2004), Brazil (Ferrari et al. 2002), South Africa (Luckett et al. 2001), the United State of America, Japan (Tajino et al. 2004) etc. Even in China, a few Chinese papers which published in Chinese Journals presented an initial applications of SSM on learning and analyzing complex social and human resources problems although it is still weak (Han et al 2004, Xie and Xue 2004, Meng et al 2006).

3.4.3 Building indicators database using the classic SSM

SSM provides an ideal way to create indicator system depending on its transformation process. Figure 3.5 below illustrate a holistic picture combined the CM, CATWOE (Customers, Actors, Transformation, Weltanschauung, Owner and Environmental

constraints), and performance measure based on 3E (Efficacy, Efficiency, Effectiveness).
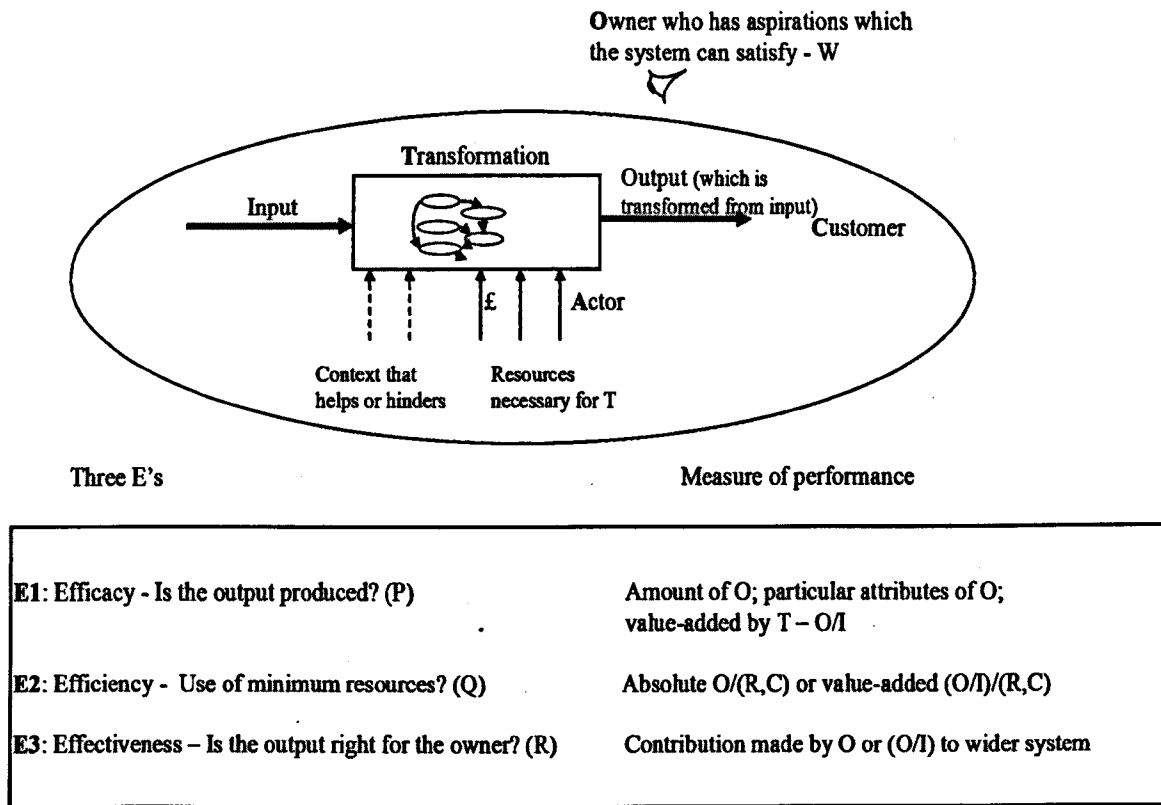
Figure 3.5: Holistic picture of SSM combined CM, CATWOE and 3Es

(Mingers, Liu and Meng, 2009)

Here RD is created as a condensed statement about the problematic system by taking a checklist of CATWOE. The core of an RD is T. The transformation is a process that transforms current input into expected output, and leads directly into the activities of the CM. Thus, SSM is about to build models of purposeful activity and any activity can be seen as a transformation process. The core of an RD is: an Input – Transformation – Output, where the output is a transformed version of the input. Actors and necessary resources are needed to carry on the transformation process in order to produce expected outputs for customer. Then more detailed models of how to do are included in CM, and the process is repeatedly applied until enough details are seen, see Chapter 4 for more details. During this process, some soft factors (political, culture, economic factors) beside hard factors (resources) that help or hinder this transformation process also need to be considered. Then it becomes possible to

monitor outputs and activities and take control action if the results are not satisfied. This led to the "3Es" way to check system performance – efficacy, efficiency, and effectiveness. Since each activity can be checked from 3Es, a set of indicators from 3Es can be extracted. Furthermore, an indicator system can be created, where these indicators can be either qualitative or quantitative. This methodology has been successfully applied to building complex indicator systems for real applications, like Mingers, Meng and Liu (2008), Meng, Liu and Mingers (2007), Meng, Li and Liu (2008). It is important to point out the approaches developed can effectively decompose the top strategies in these organizations.

However this methodology is quite formal and difficult to understand for the middle managers generally. Furthermore work and time needed to develop the SSM models is enormous. In Chapter 4, we will generalize and simplify this methodology. Furthermore our emphasis will be on strategy decompositions.

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Chapter 4

A Methodology for Decomposing

Objectives for an Organization and

Developing Performance Indicators

Performance management often needs performance indicators. Let us first point out that developing a structural performance indicator system often related to decompose the top organizational activities and objectives. After the objectives and strategies being decomposed into suitable levels of operation and management, an indicator system will be then developed.

As discussed before, the existing decomposition approaches may not be able to fix the system faults, and may not be suitable in the public sector. Here we will develop methods that can decompose the top activities and objectives not necessarily by just following the existing business procedures. They can inspect and improve the existing business procedures while decomposing them. Consequently the existing faults in the system could be fixed during the decomposition. These methods do not make pre-supposition about the structure or processes of the organization, and thus fit well in the public sector.

The main context of this chapter comes from Liu *et al.* (2010). Currently, formulation of most indicator systems uses a combination of experience, opinions of expert panels, and sometimes statistical methods such as regression. However, such a strategy has no guarantee of producing a suitable indicator system for a particular evaluation, especially when no similar evaluation has been conducted before. Thus it would be very useful for evaluators to have some frameworks or procedures that can help them to formulate a suitable indicator system for a particular evaluation.

Such frameworks do exist, particularly in the industrial and business world, for example the Strategy Map (Kaplan and Norton, 2004), which has been used to develop performance measurements in particular instances. However, they tend to make some pre-supposition about the structure or processes of the organization. For example, in the case of the Strategy Map there is a vertical dimension consisting of Finance, Customer, Internal, and Learning and Growth perspectives while the horizontal dimension is structured in terms of shareholder value. This does not fit well in the public sector: the missions of public sector organizations are often very different from each other, and so are their organizational structures, values (which are very important in public organizations), cultures and governing roles. Furthermore, funding and capital distributions are diverse and certainly different from the business

sector.

Moreover, such frameworks tend not to have a structured method for deriving specific performance indicators in a logical and coherent way. It is often easier to derive the top level indicators by using these frameworks, but then further down the relationships become rather ad hoc – they often seem sensible but one can always ask "why this and not that?"

This suggests that what is needed is a methodology with a sequence of logically structured procedures that can help develop an indicator system suitable for a particular organization no matter what its purpose or activities. The methodology that we have developed has two principal strengths:

- It provides a means of moving from quite high-level organizational missions and objectives to all levels of managerial activities in order to develop very detailed performance indicators in a rigorous and transparent manner.

- It does not necessarily follow the current organizational practices (which may well benefit from significant change and improvement) but allows for a particular view of the purpose of the organization to be articulated and then follows through the logical implications of that view.

These characterizations provide a suitable and powerful means of decomposing the top objectives to various departments and sub-groups of an organization, and then extract performance indicators.

There are already some attempts that try to general indicators for some organizations, for example, Casu *et al* (2005) and Meng, Mingers and Liu (2007). However, these examples are quite case dependent while this study attempts to address this issue at a higher level. **The techniques developed here go beyond the issues of developing performance indicators and into objectives and strategy decomposition.** Furthermore the techniques developed here are much accessible to general managers and thus to performance management of general organizations.

4.1 A 3E framework for evaluation

We will first describe a generic model for the evaluation of organizations. At its most general, an organization can be seen as a human activity system, which is a system of people and resources that exists to conduct some purposeful activity (Checkland, 1981). If it has a purpose (although there may be debate about that purpose) the system must produce or generate some output which could be products, services, or information and knowledge. In order to do this it will require resources and the outputs it produces will have effects, desirable and undesirable, on its environment and wider systems.

To evaluate its overall performance we may ask three questions (Checkland, Forbes and Martin, 1990):

- Does the system actually produce the outputs that it is supposed to (*Efficacy*)?
- Does it produce them in a manner that is not extravagant in using resources (*Efficiency*)?
- Are the outputs appropriate for the wider system (the "owner" of the system) and the system's environment (*Effectiveness*)?

This is illustrated in Figure 4.1.
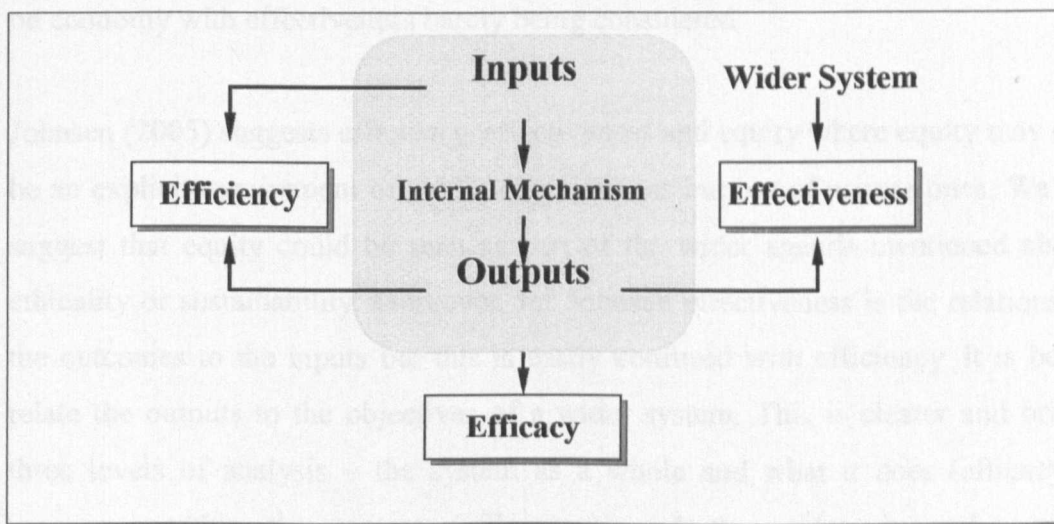
Figure 4.1: Overall evaluation framework (Checkland, Forbes and Martin, 1990)

Therefore, logically an organization can be evaluated in terms of these three

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categories of criteria, and for each one there will need to be some measure(s) of performance (the indicators) as well as some standards as to what would constitute acceptable performance (Behn, 2003). Thus the indicators that are generated will belong to one of the three E-categories:

- E1-efficacy – concerns WHAT the system produces;
- E2-efficiency – concerns HOW the system produces it;
- E3-effectiveness - concerns WHY the system produces it.

Another way of looking at this is to ask how the system might fail? The transformation might not actually produce the output (efficacy); it might produce it uneconomically (efficiency); or the output might not actually satisfy the aspirations of the owner (effectiveness).

These basic ideas are not new and are in fact drawn from a well-established approach to problem structuring known as Soft Systems Methodology (SSM) (Checkland, 1981; Checkland and Poulter, 2006; Checkland and Scholes, 1990). There are similar, although not identical, formulations already in existence. The public sector has traditionally used economy, efficiency and effectiveness (Goddard, 1989), but this has weaknesses: it ignores efficacy (is the output actually produced?); economy can be seen as part of efficiency, and as Midwinter (1994) argues, the emphasis tends to be on economy with effectiveness barely being considered.

Johnsen (2005) suggests efficiency, effectiveness and equity where equity may clearly be an explicit requirement of public organizations but not of private ones. We would suggest that equity could be seen as part of the wider agenda mentioned above of ethicality or sustainability. Moreover, for Johnsen effectiveness is the relationship of the outcomes to the inputs but this is easily confused with efficiency. It is better to relate the outputs to the objectives of a wider system. This is clearer and brings in three levels of analysis – the system as a whole and what it does (efficacy); the processes within the system (efficiency); and the wider ownership systems (effectiveness).

Our 3E measurement framework is not only a realization of the common principle of performance measurement: - measurement of processes + measurement of outcomes (here E1-E2 for the former while E3 for latter), but also a tool to develop structured indicators for sub-processes at a micro level. In fact the main advantage of the approach advocated here is not simply the clarity and coherence of the categories of PI, but the fact that it includes a rigorous and systemic method for generating indicators of hierarch structures appropriate to any particular organization without simply mapping the processes as they are currently configured.

4.2 Methodology for decomposing top objectives and then developing performance indicators

The core of our method is to continuously ask and answer the questions: *what to do?* *why do it?* and *how should it be done?* with all the relevant stakeholders, following carefully structured and constructive procedures. We summarize the proposed procedures in the following five steps:

1. Determine the overall mission of the organization (or part of it). This may already be agreed and available, or it may need a process of discussion and debate among a variety of stakeholders to reach a consensus or accommodation. Resulting from this, the main functional areas or primary activities of the organization need to be agreed. As part of this step the objectives of the evaluation itself should be specified as this will inform the focus and boundaries of the process.

2. For each key activity a definition of *what* is to be done, and *why* it is to be done in terms of higher level systems is produced. Often it should connect to the "what to do" question in the higher level activities.

3. The activity is then broken down into a set of sub-activities or actions which together should logically ensure that the overall purpose of the activity is achieved (the *how*). They may or may not be the same as the current practices in the organization. Consensus, or at least accommodation, needs to be reached among the relevant stakeholders. Also the inter-connections with other key activities should be considered. At this point the performance criteria,

E1-E3, are specified together with their measures or indicators and appropriate standards or levels.

4. It is often the case that initially the level of the activity is too general to be able to identify all the necessary indicators. When this happens steps 2) and 3) should be repeated for any sub-activity for which this is felt necessary. Then 4) is repeated recursively until all activities result in satisfactory PIs.

5. A complete set of indicators can then be extracted from the activity models and classified in different ways, for instance in terms of the general type of activity involved, or according to the area(s) of the organization.

For those familiar with SSM, it is clear that these steps bear similarity to parts of the seven steps in SSM analysis, and this will be elaborated further later.

These steps have been illustrated in the following flow chart which will be explained in more details below (Figure 4.2):
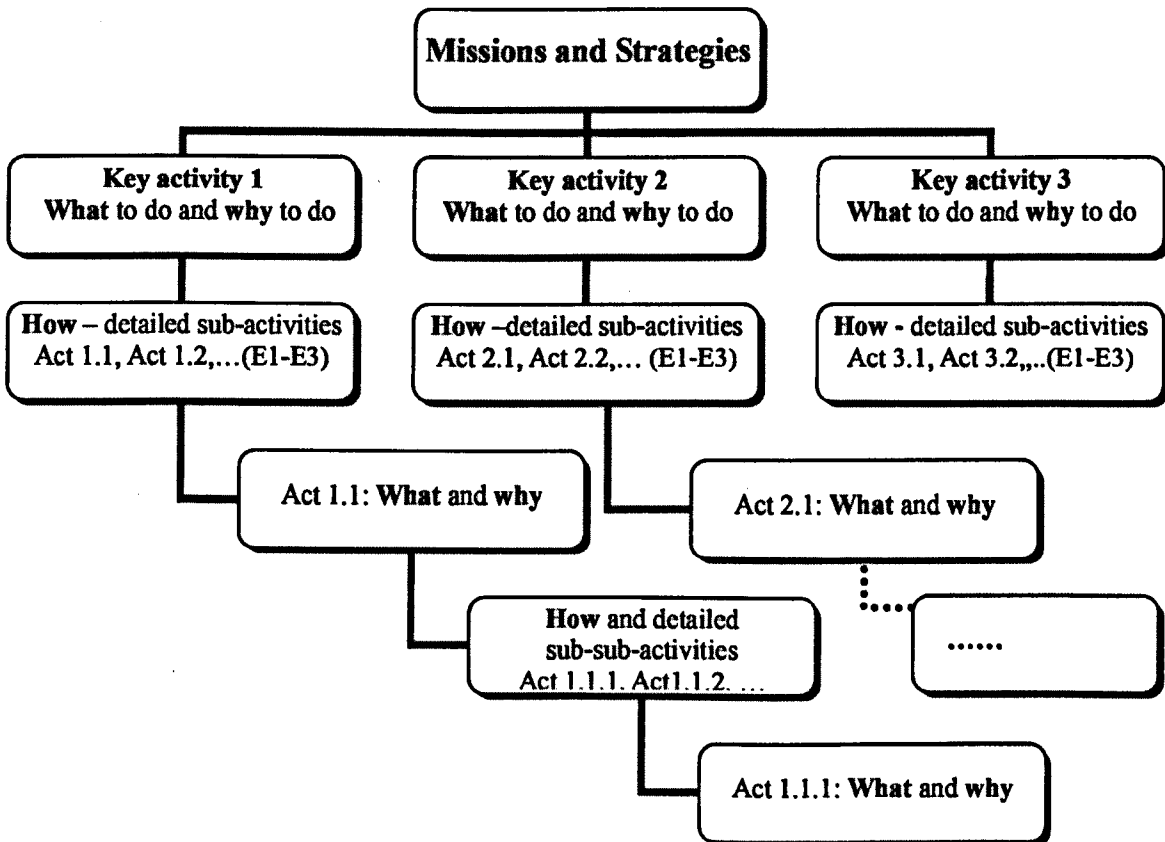
Figure 4.2: The main steps to develop performance indicators

We will use as an example a project undertaken for the CAS to illustrate these procedures (Mingers, Liu, and Meng, 2009). CAS was founded in 1949 to develop capacity in natural science and technology. In 1998, the Knowledge Innovation Program was launched to enhance its innovative capability, competitiveness and sustainability. At the end of 2004, it encompassed over hundred science and technology units including 89 research institutes, universities and libraries; and employed 33,000 researchers (Suttmeier, Cao, and Simmon, 2006). CAS is concerned to monitor the performance of its institutes and to ensure that the resources invested in it is properly used, and to this end has its own internal Research Evaluation Centre (REC). A requirement from the REC is to have an indicator system for evaluating the basic research conducted in CAS. Since the research institutes are basic units of research activities of CAS, we were asked to develop indicators for the basic research performance of a generic research institute in CAS.

Step 1: We start the process at the level of CAS as a whole. At this top level, CAS does not itself do research but is responsible for monitoring and controlling the work of its constituents which actually do carry out the research. Although our focus is a generic institute we need to look at the higher level in order to consider E3, effectiveness, in terms of the institute's owner, namely CAS. This could be done from existing documentation but it is often better, especially in terms of commitment to the results, to engage in a process of discussion and debate.

A mission statement on basic research in the form of *what-how-why* for CAS was agreed as follows:

CAS as a whole
1. To improve the originality, significance, reputation and sustainability of CAS basic research in the natural sciences. (What)
2. By developing the research capabilities and infrastructure, and by improving resources utilization of CAS. (How)
3. In order to benefit Chinese social and economic development and to enrich human knowledge. (Why)

Step 2: From this top level it was then possible to discuss and agree a mission statement for a generic basic research institute as follows (again in the what-how-why format):

Generic Institute
1.To enrich the world's knowledge in a particular scientific domain with original and significant research.   2.By identifying potential areas of discovery, developing the capabilities to undertake appropriate research, carrying out the research and disseminating it through prestigious channels.   3.In order to enhance the reputation, resources and sustainability of CAS and the Institute.

All the stakeholders were involved in the discussions. In mission statements such as these it is helpful for clarity to focus only on a single aim in terms of "what to do", and to specifically relate this to the aims of the higher level statement. If several different things need to be done, then each will need such a statement to proceed. Note that the "why" part of the statement refers back to the "what" part of the higher level statement.

Step 3: The next step is to think about how to achieve "what to do", in this case "To enrich the world's knowledge ..." via a sequence of connected actions. It is possible to just follow the practices already being carried out in CAS, but it will be a chance for CAS to rethink its management procedures if we first logically construct a most reasonable sequence of actions to achieve the goals, and then have discussions and feedback with the stakeholders of CAS to reach an agreement. If eventually a different management model is agreed, then we will develop this indicator system via the new model, although then some data may not be available. Through this step, we reached the following system of activities (Figure 4.3):
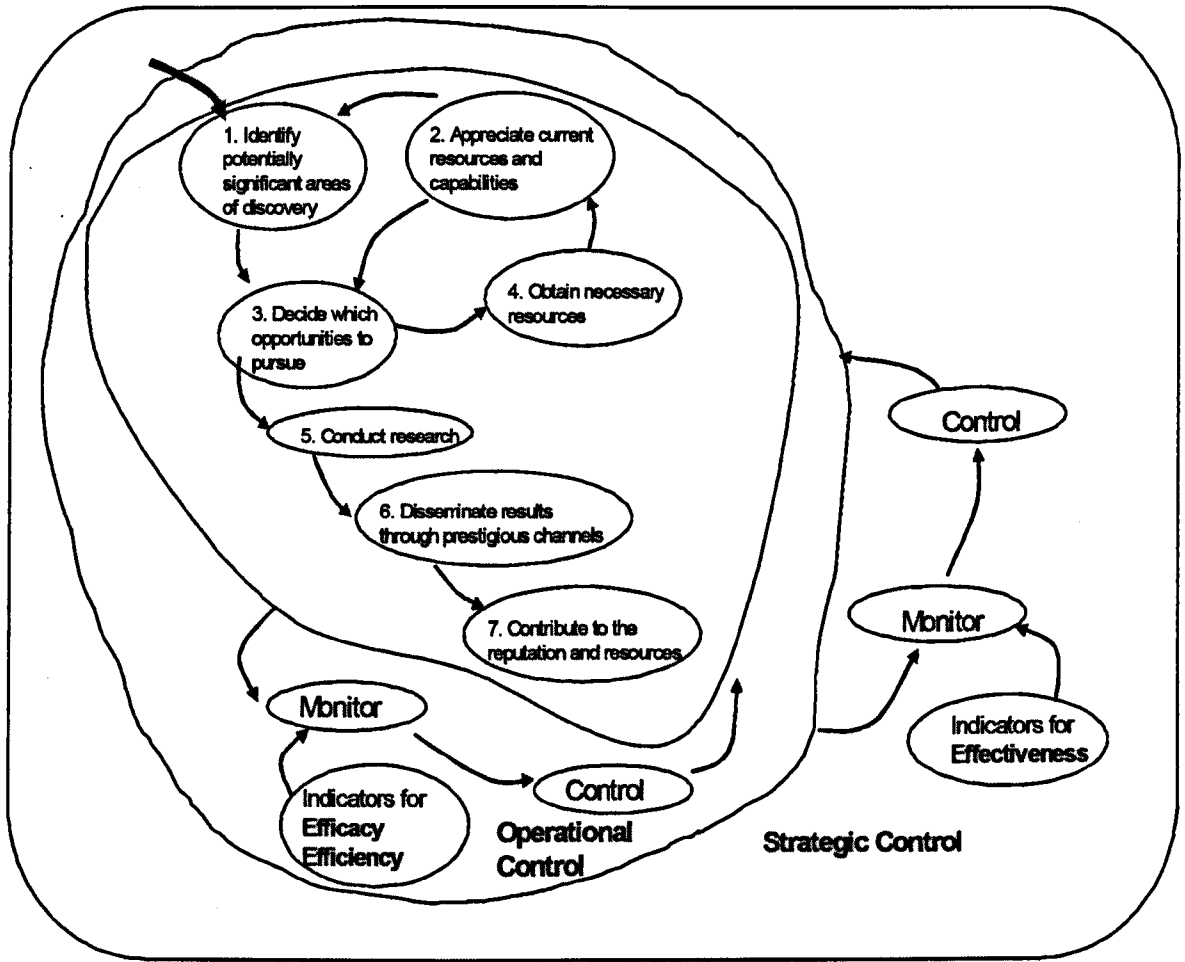
Figure 4.3: Activity model for a generic basic research institute

In this model it is considered that there are seven activities necessary for achieving the stated purpose of "enriching the world's knowledge with original and significant research". In general, not more than nine activities should be considered at each level. More detailed activities can be further considered at a subsequent level. As well as that we can see that the 3Es are used to monitor and control this system. Efficacy and efficiency are considered to be at the internal or operational level as they are concerned with producing the desired output. Effectiveness is at the strategic level as it concerns whether or not the output is actually the correct one given the aspirations of the wider system.

Step 4: Since at this stage, it is not clear what are suitable indicators for measuring these activities, steps 2 and 3 are repeated for each of the seven activities in turn. Thus

for each activity we agree a what-how-why statement and then a model of activities. For example, the following what-how-why statement was agreed for activity 1 – in Figure 4.3 ("identify potentially significant areas of discovery"):

Activity 1:
1. To identify potential research opportunities for the institute that are significant and original having regard to the necessary resources and capabilities.   2. By effective external scanning and by improving internal discussion and communication.   3. In order to decide which opportunities to enrich the world's knowledge in the scientific domain of the Institute.

Possible actions to achieve what to do – "To identify potential research opportunities..." were discussed and feedback were sought again. The information was then used to generate the system of activities shown in Figure 4.4 after discussion with CAS.
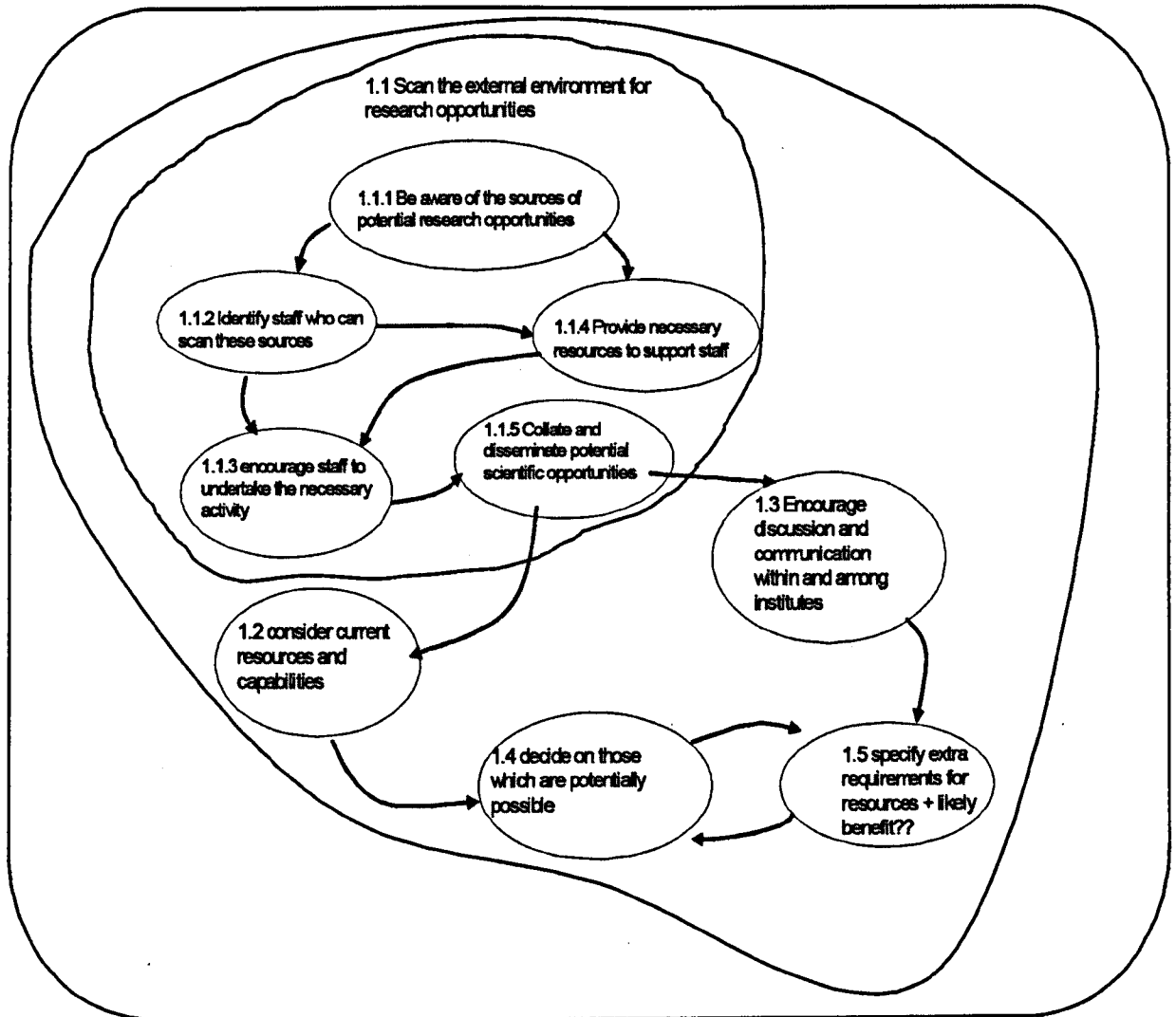
Figure 4.4: Activity and sub-activity models for "identify potentially significant areas of discovery"

Figure 4.4 shows five activities concerned with "identifying potentially significant areas" (1.1 – 1.5) and also shows a further level of resolution – sub-activities for activity 1.1 "Scan external environment" (1.1.1 – 1.1.5).

After this step, some indicators can easily be seen. For example, for activities 1.1.1-1.1.5, the following indicators were developed (Table 4.1):

Table 4.1: Some indicators of activities 1.1.1-1.1.5

E1 Efficacy: Number of potentially significant areas discovered

Plus more detailed indicators for each activity: 1.1.1 satisfaction assessment of current information system, 1.1.2 funding to support necessary activities, 1.1.2 facilities utilization, 1.1.3 new academic organization position, 1.1.3 number of conference attending, 1.1.3 number of organized conferences, 1.1.3number of academic visitors, 1.1.3 number of presentations, 1.1.5 reports or proposals list potential significant scientific opportunities

E2 Efficiency: Amount of outputs/ resources used (e.g., time, money, administrators)

E3 Effectiveness: Do the areas discovered lead to good opportunities for research

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The above analysis and feedback have to be carried out until all the actions have been measured using 3E indicators. In the work with CAS the final model went down to four resolution levels and included over 70 activities.

Step 5: Then an indicator system is formed based on all the measures of performance that have come out from the various activities. Some of them are shown in Table 4.1 where the number by each indicator shows which activity in the model it came from. This enables its chain of functions to be easily determined. Sometimes the same indicator may be derived from several activities – the more time it appears the more important it is.

The above indicator system has been used as the framework for basic research evaluations in CAS. More detailed discussion about the use that was made of the indicators in CAS can be found in Mingers *et al* (2009). In this indictor system, some of the indicators can be seen as primarily concerned with efficacy – is new knowledge actually produced (SCI publications, research grants etc.) while others concern the higher level of effectiveness – does the research actually contribute to the reputation and sustainability of CAS (citation numbers, important prizes and positions in major academic organizations). Interestingly, the indicators did not only cover direct scientific research and communications but also issues of internal management and sustainability. In other words, the indicators did not simply cover research but also the

overall management and well-being of CAS institutes.

4.3 Theoretical base of the methodology

Our method has drawn on Soft Systems Methodology (SSM), a systems-based approach to problem structuring and taking action in soft, complex situations, see Chapter 3. As mentioned there it has been developed over 30 years of engagement with real-world problem solving (Checkland, 1981; Checkland, and Poulter, 2006; Checkland, and Scholes, 1990) and is now one of the most well-know systems methodologies (van der Water, 2007).

SSM begins with the idea that organizations are systems of purposeful activity that continually bring about change or transformation. Actors undertake activities that produce some output, which could be a physical entity, a service or information, for a notional customer. The system operates on behalf of an owner, who has the power to terminate the system, within an environment not under its control (see Figure 4.5). These elements are known by the acronym CATWOE – Customer, Actors, Transformation, Weltanschauung, Owner, and Environment.

The diagram shows:

Owner who has aspirations which the
system can satisfy - Weltanschauung

Transformation

Input

Output (which is
transformed input)

Customer

£

Actor

Environment
that helps or
hinders

Resources
necessary for T

Three E's

Measure of performance

E1: Efficacy - Is the output produced? (What)
E2: Efficiency - Use of minimum resources? (How)
E3: Effectiveness - Is the output right for the owner? (Why)

Amount of O; particular attributes of O;
Output/Resources
Contribution made by O to wider system

Figure 4.5: Elements of a system of purposeful activity (Mingers, Liu, and Meng, 2009)

SSM recognizes that different stakeholders may well have different views (*Weltanschauungen*) about the nature and purpose of a particular organization and so it builds models to reflect these varied viewpoints. These models consist of a *root definition* which is a concise description of what the system is, and an *activity model,* which is a model of the activities necessary to achieve the transformation specified in the root definition. The mission statements above are actually cast in the form of a root definition from SSM, which provides a useful structure in terms of *what* to do, *how* to do it, and *why* it should be done, thus explicitly bringing in the three levels of analysis mentioned above.

Traditionally, SSM consists of seven stages although these are seen as both cyclical and iterative.

1. Recognize the complex and unstructured problem situation

2. Explore the situation and the intervention to find out about the issues, the prevailing culture, and the political dimensions

3. Identify purposeful actions or activities that may be relevant to the situation and describe them in root definitions each with a CATWOE.

4. Articulate these into sets of linked activities (activity models) needed to achieve the purpose described in the root definition. This includes consideration of monitoring and control activities through the 3Es. Where necessary, expand the activities into further levels of detail.

5. Compare the models from 3 and 4 with the understanding of the situation from 1 and 2 in order to identify ideas for change and improvement.

6. Through a process of discussion and debate gain agreement for changes that are both desirable and feasible.

7. Implement the agreed changes.

It can be seen that the method for developing performance indicators described in this paper mainly involves stages 3 and 4 of SSM. We now illustrate the methodology with another case study within a university setting.

4.4 Case study: Foreign Language School of Hunan University[1]

Scientific research, as one of the three main functions for higher institutions, is increasingly recognized in China. Nowadays more emphasis is placed on scientific research rankings which, to some extent, can influence the funding and position of a university. Academic schools are the basic units of a university. Thus it is vital to study how to evaluate and manage the scientific research level and scientific research achievements of these schools, in order to invest the limited resources to those of potentials.

Hunan University has a long history but it is now a middle-ranking university in China. The University is determined to recover its past glories: "The target is to build up a distinctive and comprehensive University, which reaches national top research

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[1] Note that the research was actually carried out in Chinese – it has been translated into English for this paper.

level and marches towards international high ranking university." This aim should be combined with three main duties for higher education: training talents, scientific research and social service. According to the plan of the University, the main development objectives of college should be formed by decomposing the objectives from top to bottom and distributing the contributions to subordinated schools accordingly. Here, as an example, we discuss how to develop scientific research management procedures and performance indicators for the School of Foreign Languages.

The School is in the process of setting up a management system for its scientific research. The first step of this process is to develop management procedures and the corresponding indicator system for performance evaluation. The authors were invited to join this project. Based on our experience, the above methodology was proposed. A working group was formed with the School Party Leader (in university schools it is normally the Party Secretary who is in charge of management procedures), the Vice-Director who was in charge of research, one secretary, one interpreter and the authors.

Here we report how this project applied the developed methodology to decompose the key tasks of research management, and then develop indicators for the school's research performance, by setting up management procedures for the School of Hunan University, finally building a scientific research evaluation system which can serve as a model for the scientific research and scientific research management of the other schools.

Step one: Top level analysis. Although the project aims to decompose the School's key tasks in research management and then build an indicator system for the scientific research of the School, the School is obliged to serve the top level purpose—the goal of the University (E3). In theory the goal of a university should be seen from the university mission statement or the related documents, and it should be confirmed and be described in the "what to do-how to do-why to do" format. However, this turned out to be a messy and difficult job since so many things were stated in the mission statement of the University. The Party Leader had to discuss with several relevant people to clarify what is the University's goal to develop scientific research. In the

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end it was agreed that the development goal of the University is "to build up a distinctive and comprehensive University, which reaches national top research levels and marches towards international high ranking university.", which is quite different from that of CAS.

Step two: construct a clear mission statement in the form of what-how-why.: "Concentrate excellent research in certain selected fields at least at national, some of them at international level (What). Build strong research teams in these fields and produce research results, which are in the first class in China or may be useful in language teaching (How) in order to have a first class foreign language college in China with clear characteristics, and some subjects internationally known (Why)."

Step three: construct more detailed strategies for how to reach the objectives. For instance, one should develop strategies for "...concentrate excellent research in certain selected fields at least at national..." The procedures will first be proposed by the working group and then discussed with some key members of the School. Thus it provides a chance for the School to rethink its development strategy and management procedure and see whether a proper scientific operational mechanism can be established for supporting the realization of the goal. As the starting point, a procedure similar to the one used in CAS was used as the initial model, as shown in Figure 4.6, since we thought that the main procedures of carrying out scientific research should be more or less universal.
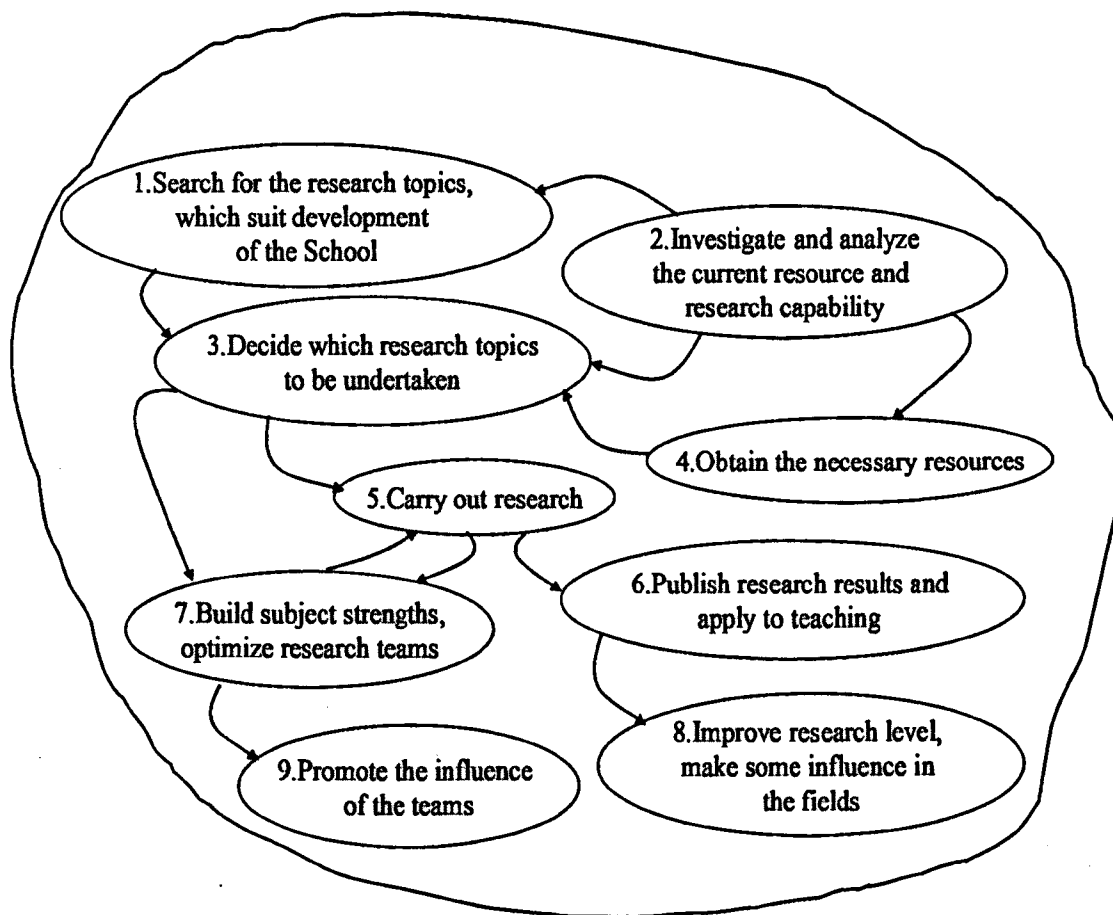
Figure 4.6: Initial research activity model for Foreign Language School

After initial feedback with some key members of the School, it was clear that the emphasis of the research policy of the School was quite different from that of CAS. It turned out that the School mainly emphasized two outcomes from its research – that it should either bring the School good national or perhaps international influence, or that it should be useful in teaching activities either within the School or even nationally, for example, a method for potentially increasing students' vocabulary. At this stage, the School thinks it should first become well-known nationally rather than internationally whereas the CAS aims at the top level of the international research community. After several feed-back and discussion sessions, the following CM (the detailed HOW) was agreed and introduced (Figure 4.7):

Figure 4.7: Agreed research activity top model for Foreign Language School

Step four: Again at this stage it is not clear what suitable indicators for measuring these activities are. Thus steps 2 and 3 were repeated for each of the ten activities in turn. For each activity we agreed a what-how-why statement and then a model of activities.

For ease of comparison we here also use activity 1 as illustration. Here the what-how-why statement was agreed for activity one was – Search for potential research topics in order to suit development of the college. In order to develop further activity models for achieving this, we have to discuss many administrative details with the School.

It turns out that in this School, two administrative staff would be assigned to assist the

academic staff to identify potential research topics. This was possible since the School aims at research activities of national level so it is enough for some administrators to browse the relevant research council website or discuss potential needs with its teaching staff. This was not possible for CAS where the academic staff had to search for possible topics by themselves due to the high level of research aimed. Furthermore the assigned staff would also compile the collected information and the school guidance into a handbook. The information was then used to generate the system of activities shown in Figure 4.8 after discussion with CAS.

1. Seek for the research topics with development potential

Figure 4.8: Activity for 'seek for the research topics with development potential'

Figure 4.8 shows six activities concerned with "identify research topic of potentials" (1.1–1.6). For the activity 1: Define the boundaries of scans, it is clear and logical that the School needs to provide topic key words to the assigned staff for searching, and

these key words have to be discussed and agreed by the academic staff. However it is still not all clear where the 3-E indicators come from for activity 1.2. To this end, we provide an example to develop a further level of resolution – sub-activities for activity 1.2. The what-how-why statement is: Provide lists of opportunities and classifications of potential research topics in order to select suitable ones for the School later. Then after several discussions within the working group five activities (1.2.1–1.2.5) in Figure 4.9 were agreed. After this step, some indicators can easily be seen. For example, for activities 1.2.1-1.2.5, the following indicators were developed:

1.2 What to do? Provide lists of opportunities and classifications
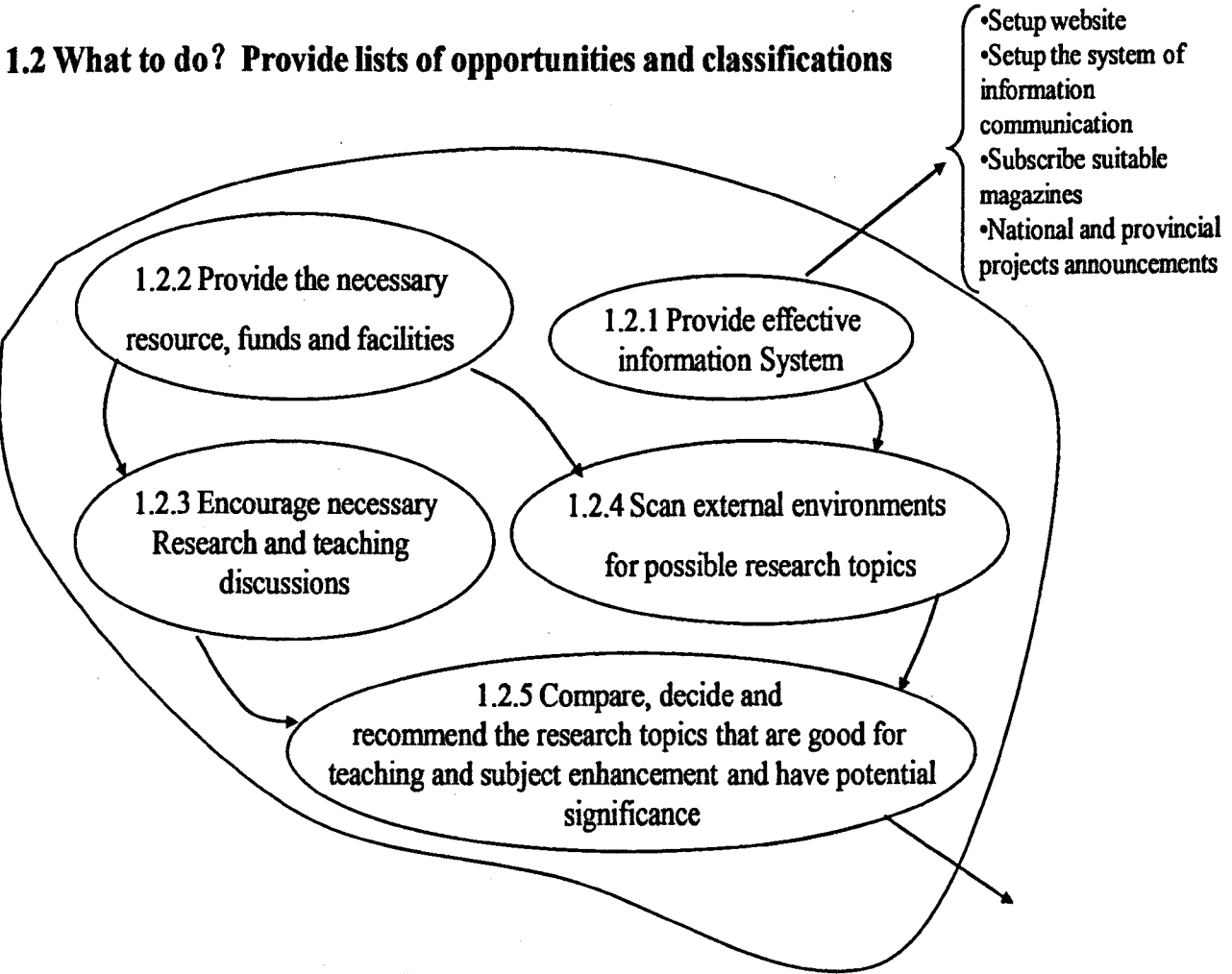
Figure 4.9: Some indicators for activity 1.2 and its sub-activities

In the process of building the activity concept models of scientific research of the school as the above procedures, the whole model is divided into four levels consisting of 112 steps.

At this stage, a formal feedback discussion meeting was organized for the working group members and staff representatives from all different levels were invited.

The working group introduced the background of building scientific research management CMs and the significance of feedback by researcher. Then SSM was briefly introduced and the main working pattern – comparisons between logic and real worlds was emphasized. The proposed research activity models were discussed level by level from top to bottom, and the suggestions were first discussed and then recorded. All of which created a theoretical foundation for the future establishment of scientific research evaluation index system and performance evaluation. The outcomes of the feedback are summarized as follows:

A: A preliminary understanding of the general objective generated by the University and the School has been agreed. It is agreed to be necessary to know the objective and procedure of scientific research. The concern is how to realize those objectives.

B: All agree with the fact that the scientific management is sorely needed judging from the current scientific research management situation in the School and University.

C: Many questions and suggestions were raised about the details of the models. It was then believed that after such feedback and discussions, building management and indicator system now has theoretical justification and scientific support. It should be possible to apply this methodology even in other schools as well. It was agreed that the modified models can be used as the base of developing scientific research management procedures and performance indicators.

Step five: A complete set of indicators was then extracted from the activity models and classified in different ways, for instance in terms of the general type of activity involved. Table 4.2 provides an example of representing the indicators further into four parts, namely direct output, academic exchange, sustainable development ability and scientific research management.

Table 4.2: E1 indictors from the SSM models

	Direct Research Outputs	Academic Exchanges
1	1.3.4.2 Research grants	1.1.3.4 Visitors to outside universities
2	8.4.5 Key subjects of provincial, national	1.5.3 Invited well-known researchers
3	9.2 SCI, SSCI publications	9.5 Numbers of workshops, audiences
	......	......

	Sustainability	Internal Management
1	1.1.3.5 Numbers of new research projects;	1.1.1 Numbers of subscribed Journals
2	1.3.4.2 Numbers of research teams	1.2 Research project management satisfactory
3	7.3.4 Young talents introduced;	8.5 Research monitoring system satisfactory;
	......	......

The developed indicator system can be used to evaluate the research performance of the School. The indicators can be classified in different ways for instance as 3E, into groups of activities, or for different evaluation objectives. Furthermore the relationship of the indicators and the management activities from which they are derived is very clear.

4.5 Methodology of developing performance management framework

It is vital to note that the above research activity models provide a base of structured research performance management framework. For instance, the agreed activities can be used to job-designs of administrative and academic. The intrinsic cause-effect relationship between different levels and different sets of research activities can be used to design managerial procedures later on, and furthermore the derived indicators will be nicely served as the performance indicators of the performance management system. However more research is still needed to explore potential applications of the models in these aspects.

Chapter 5

System Perspective of

Performance Management

5.1 Introduction

As mentioned before, these key activities of performance management identified in the existing first approach mainly result from some practical observations. We wish to **provide a suitable theoretical framework** so that we could know which elements should be used, when and how to be used. Furthermore the existing methods in the third approach may not be convenient to fix the system faults, and may not be suitable in the public sector.

In this chapter we wish to address these issues. The basic idea adopted in our work is that performance management should have particular core forms and structures in different organizations. However it is clear by now that these forms have to be very flexible and have to deal with alignments with other management functions like operations and human resource. Identification of its mostly suitable formulations and structures for a particular type of organizations will need much understanding on the organization's structures and operation environment, and thus is anything but trivial. In this chapter we try to logically derive performance management frameworks using Soft System Thinking for some "classic" organizations, where the functions and hierarchical structures are clear and stable. **In particular there are clear and stable strategy and operating core, sound and well-developed departments to work out operational processes, conventional tasks and assignments with high specialization, concentrated decision-making authority** (to be explained in Section 5.5), **so that strategy apex and functional departments both should play important roles in performance management.** This class of organizations includes the typical manufactures, classic business, and so on. Our approach combines the first and third approaches as reviewed in Chapter 2. **We first identify the fundamental blocks of performance management for such organizations and then develop tools and frameworks for hierarchical presentations of the specific strategies adopted by an organization.**

As seen in Chapter 2, there have been numerous definitions for performance with various advantages and problems. Also performance can be related to the organization, departments, processes, employees, etc. There could be a confusion cycle around the

·concept of performance. In the following two sub-sections we try to first give more comprehensive definitions for Organizational Performance, which will then be used in the rest of the thesis.

5.2 Basic elements of performance

It follows from our discussions in Chapter 2, we have known some important dimensions of organization performance: action, achievement and impact in future. Thus a satisfactory definition should have at least three dimensions: outcomes comparing with the organizational aims and objectives (or some external benchmarks), actions to achieve them, and the expected gains of these two in the future.

Furthermore as Beamon (1999) argued today's systems should be measured and managed in the context of the total business rather than narrowly looking at the "within-enterprise" processes and people.

Let us elaborate these basic elements of performance: The basic logic is good action leads to achievement relative to goals, and then to expected impacts. Action also can make impact on future, but future impact can only be estimated or expected.

Why do we need to count impact to future? For example, salesman can sell out all the products by cheating customers. Thus the results can look extremely good. However then we can expect with high confidence that this action would lead the bankrupt of that business even we have not seen this so far. Thus in order to assess the overall performance of this business, we need to estimate the future impact of the action and achievement. Therefore, estimated gain in future should be an important element of performance.

Note that achievement can be made from unintended action. In this case, although the achievement is counted in performance, the actions is not so. Unexpected impact or gain is not counted in performance since it was only found after the time of evaluation. Furthermore an academic definition normally can only deal with 'normal cases'. However it could be questioned: expected by whom? Different people may have

different expectation, and expectation changes with time as well.

5.3 Definition of performance for a dynamic organization

In the discussion above, it is assumed that there is no radical change in objectives and strategies during the period of evaluation. Otherwise it is difficult to decide which is to be counted as achievement since the objectives have undergone radical changes. Thus it is necessary to specify which objectives are used as the references for counting the achievement. Furthermore we will assume that it is the Decision Maker (DM) to expect the future gains, who normally consists of the key stakeholders of the organization.

However if now the objectives and strategies can be changed as wished, the DM can simply add the expected gains into the objectives of the organization to avoid uncertainty. Thus these considerations lead to the following definition:

Organizational performance over a period of time are the achievements relative to the LAST organizational objectives or external benchmarks and the intended actions leading to those achievements during that time.

This definition can be simplified as a rough formula:

Measure of performance = measure of processes + measure of outcomes.

In this definition above, the objectives are not fixed during the period, so that if one action is expected by the DM to have future gains in the end, its targets could be then included in the latest objectives, so that its achievement and the action can be measured and counted.

Why do we emphasize 'intended action leading to the achievement' in this definition? Because it implies the people makes a plan of action so as to achieve the objectives, then the people just follow the plan. In another word, some action out of plan should not be counted as performance. Let us take an example: suppose the objective of a firm is to make profits up to some certain level. However, if the firm just luckily picks

up a bag of huge money off the street, the action undoubtedly cannot be counted into performance, although the unexpected incomes can be counted in achievement. The reason is that performance from processes should be manageable and that is why we study performance management. Such an unintended action however cannot be managed. Therefore, unintended action should not to be counted in performance.

Any adjustments or changes would still need clarity of purpose and direction. The purpose and direction can serve in some way as a broad context in which performance can be measured. Thus this definition has considered that factor.

5.4 Hierarchy structure of performance

It has been mentioned before that performance can be measured at different levels, although we have concentrated on organizational performance. On the other hand, it is useful to examine the relationship among the performance of different levels. Broadly speaking, "performance" can be classified as five levels (at least):
1) Each employee's performance;
2) Business sub-processes performance;
3) Department performance;
4) Business processes & program performance;
5) Organizational performance.

They form the hierarchy of performance as below (Figure 5.1):
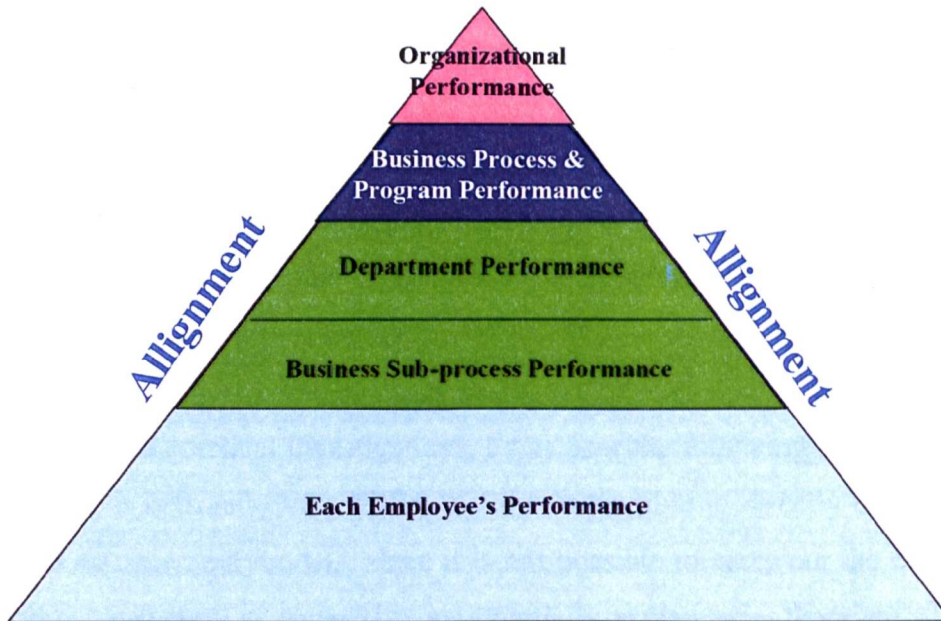
Figure 5.1: Hierarchy structure of performance

It is clear that the bottom performance is the base for all the others. This indicates the importance of employees' performance. However employees' performance needs to be aligned with group and organizational objectives to lead to the top performance.

5.5 A framework of performance management from system perspective

Organization performance depends on many factors like Strategy Management, Human Resource Management, Operations Management, etc. As stated, our approach is firstly to identify the relationship and interaction of performance management with other management functions. Through these investigations we will be able to see how performance management could work jointly with other management in an organization.

In this section we will try to identify relationship of performance management and other well-established management functions for some "classic" organizations, where the functions and hierarchical structures are clear and stable. After we identify these

connections, we then are able to define performance management and its main functions. We achieve this via identifying the missing links between the strategy unit and the operation core in the organizations. However such definitions only suit this class of organizations. It seems very difficult if not impossible to identify the suitable forms of performance management for all organizations. From our initial field work, it seems that in non-classic organization they could be vastly different from those we are painting in this thesis. For example, there may be no apparent strategy block in some organizations. Also in some organizations the structures of operations are under constantly changes.

Before we turn to theoretical investigations, let us bear the following in mind: Not as natural science, it is usually very difficult if not impossible to directly compare and evaluate two management models, since it is not possible to carry out the controlled experiments as in natural science. That may partially explain why there are so many popular BEMs as reviewed in Chapter 2. Nevertheless the basic logics and recognized social and managerial theories, some of which will be introduced in the following section, do play an important role in building and judging these models.

5.5.1 Some preliminaries

Before we examine performance management it is clear that its **suitable** frameworks will, to a large extent, depend on structure of an organization. Of course the precise forms of implementation will further depend on other contingent factors like ownership, resources, and environments. To this end we will first introduce definitions for organization, resources, strategy and management:

1) An organization is an organized group of people. 'organize' is defined as arrange in a particular order or structure; make arrangements for an event or activity. a social arrangement which pursues collective goals, which controls its own performance, and which has a boundary separating it from its environment (Oxford Dictionary, 2007).

Organizations are a number of clustered entities. The structure of an organization is usually set up in one of a variety of styles, dependent on their objectives and

ambience. The structure of an organization will determine the modes in which it shall operate and will perform.

Organizational structure allows the expressed allocation of responsibilities for different functions and processes to different entities. Ordinary description of such entities is as branch, site, department, work groups and single people. Contracting of individuals in an organizational structure normally is under timely limited work contracts or work orders or under timely unlimited employment contracts or program orders.

The study of organizations includes a focus on optimizing organizational structure. According to management science, most human organizations roughly fall into four types:

- Pyramids or hierarchies;
- Committees or juries;
- Matrix organizations;
- Ecologies.

One of the best known organization structure theories is Five Organizational Structure. In this theory, five basic parts of an organization are identified: (Mintzberg, 1979)

- **Operating core**
  - The basic work of producing the organization's products and services gets done.
- **Strategic apex**
  - The home of top management
- **Middle line**
  - Managers who stand in a direct line relationship between the Strategic Apex and the Operating Core.
- **Technostructure**
  - The staff analysts who design the systems by which work processes and outputs are standardized in the organization.
- **Support staff**
  - The specialists who provide support to the organization outside of its operating workflow.

The relationship of the five parts is illustrated as below (Figure 5.2):
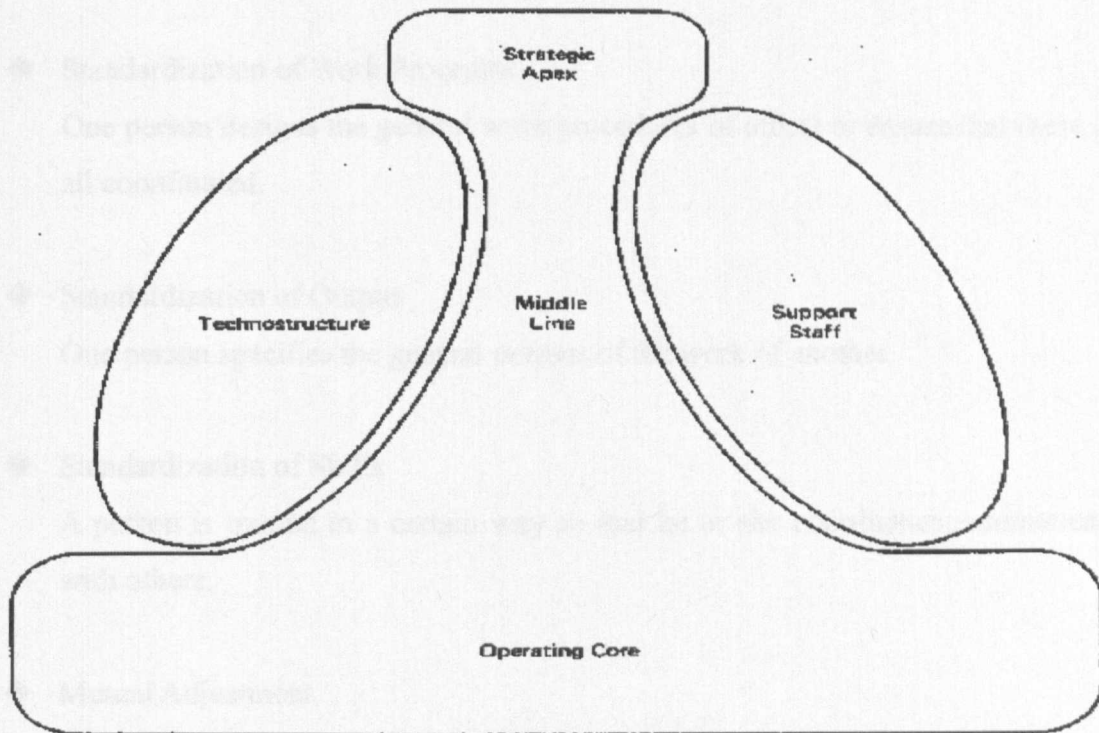
Figure 5.2: Five basic parts of the organization (Mintzberg, 1979)

For some organizations these parts may not exist or be stable. For example, some block may be no apparent (e.g. strategy block) in some organizations. Also in some organizations the structures of operations are under constantly changes.

According to Mintzberg, specialization and coordination are the two basic activities of human management to form **configuration** of an organization.

'Coordinate' is defined: 'bring the different elements of something together so that it works well; to negotiate with other people to work together effectively; to match or look attractive together' (Oxford Dictionary, 2007).

Coordination is the process of coordinating; the ability to move different parts of the body smoothly and at the same time (Oxford Dictionary, 2007).

Some ways to effect Coordination below (Mintzberg, 1979):

◆ Direct Supervision

One person gives direct orders to others.

◆ Standardization of Work Processes

One person designs the general work procedures of others to ensure that these are all coordinated.

◆ Standardization of Output

One person specifies the general outputs of the work of another.

◆ Standardization of Skills

A person is trained in a certain way so that he or she coordinates automatically with others.

◆ Mutual Adjustment

Two or more people communicate informally among themselves to coordinate their work.

'Specialize' is defined: 'concentrate on and become expert in a particular skill or area; adapted or designed for a particular purpose or area of activity'. **Specialization** is the noun. (Oxford Dictionary, 2007)

Thus, **Specialization** can be understood as the separation of tasks within a system. E.g., in capitalist societies, individual workers specialize for functions such as building construction or gasoline transport. Job design and the five decentralizations (Mintzberg, 1979) all belong to specialization, which will not discussed in details in this thesis.

Some of the main organization classifications by Mintzberg are as follows (Table 5.1):

Table 5.1: Mintzberg's organization classifications (Mintzbergs, 1989)

Organizational configuration	Main coordination mechanism	Key parts	Decentralization
Simple Structure	Direct supervision	Strategy Apex	Vertical and horizontal decentralization
Machine Bureaucracy	Standardization of work processes	Technostructure	Limited horizontal decentralization
Professional Bureaucracy	Standardization of skills	Operating Core	Horizontal decentralization
Divisionalized Form	Standardization of outputs	Middle Line	Limited vertical decentralization

Furthermore, Mintzberg and Ludo (1999) developed a new way to see organizations, which is called an Organigraph. Organigraphs contain two conventional components: the set and the chain. However, they also contain hubs, which depict movement to and from one focal point, and webs, which allow open-ended communication and continuous movement of people and ideas. An organization can be seen as a nest of chains, hubs, webs, and sets.

One of the benefits of seeing organizations differently is that one begins to see management differently. For example, in the traditional organizational chart, the decision makers always appear on top. However as argued by Mintzberg and Ludo (1999), this might not be right if the organization was viewed as a hub: "In fact each organizational form suggests a different philosophy of managing. Sets suggest that managers stay away from the action, watching and comparing. The chain puts a boss above as well, but in this case above each link-a manager for each and a manager for all. In the hub, management appears in the center, around which activities revolve, and Managing at the center implies something profoundly different from managing on top." Thus the hierarchical methodology like SSM and BSC may not work very well for an organization with a hub or web structure. Now it seems clearer from the above discussions that **suitable performance management form will much depend on structure of an organization!** And this will be further elaborated in the next section.

2) Resource is a stock or supply of materials or assets; something that can be used to help achieve organizational aims; personal qualities that help you to cope with

difficult circumstances (Oxford Dictionary, 2007).

Resources include personnel and major items of equipment, supplies, and facilities that are available for assignment to incident operations. Resources are described by kind and type; their status is maintained until released by supervisory personnel.

3) Management (from Old French ménagement "the art of conducting, directing", from Latin manuagere "to lead by the hand"): the action of managing; the managers of an organization. 'Manage' is defined as be in charge of people or an organization; succeed in doing; be able to cope despite difficulties; control the use of money or other resources (Oxford Dictionary, 2007).

4) Mission: an important assignment, typically involving travel abroad; an organization involved in a long-term assignment abroad; a military or scientific expedition; the work of teaching people about Christianity; a strongly felt aim or calling (Oxford Dictionary, 2007).

5) Vision is the ability to think about the future with imagination or wisdom (Oxford Dictionary, 2007). We could comprehend 'vision' as the desired or intended future state of an organization Vision is a long term view, sometimes describing how the organization would like the world in which it operates to be. For example a charity working with the poor might have a vision statement which read 'A world without poverty'.

6) A strategy is a plan designed to achieve a long-term aim (Oxford Dictionary, 2007). Strategy is differentiated from tactics or immediate actions with resources at hand by its nature of being extensively premeditated, and often practically rehearsed.

7) A tactic is the method you use to achieve something (Oxford Dictionary, 2007). An organization uses it to achieve a specific objective, or to advance toward a specific goal. A tactic is implemented as one or more tasks.

These concepts can be defined as a hierarchy:
• Strategy

- Operational objective
- Tactic
- Task

In our work we will adopt the economics stakeholder model of performance management as reviewed in Chapter 2. A stakeholder is any group or individual who may affect or be affected by the achievement and action of an organisation as illustrated in the following Stakeholder Mindmap (Figure 5.3):
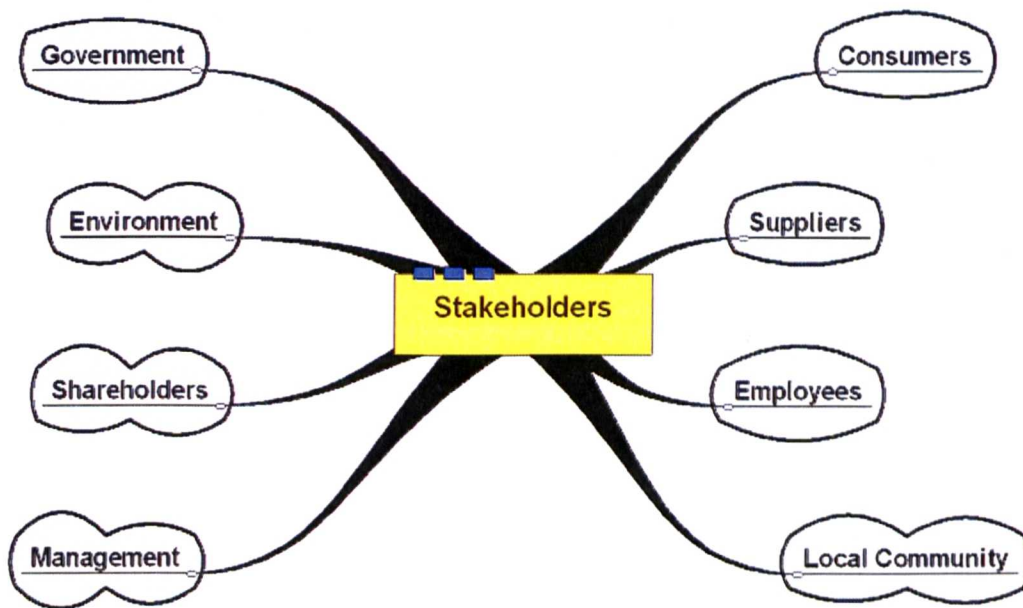
Figure 5.3 Stakeholder mindmap (Jansson, 2005)

For more details, please see (Jansson, 2005). The key stakeholders are those stakeholders that the organizational objectives cannot be achieved without them.

In our investigation we will assume that the organizations have a stable hierarchical structure with clear **Strategy Apex** and **Operating Core** (like **Machine Bureaucracy in Table 5.1**). This is reflected in its management style: powerful Strategy Apex with formal channel of communication, and it has a strong Techostructure and stable Operating core with specialized routine work.

5.5.2 A SSM theoretical framework for performance management

Organization performance depends on many factors like Strategy Management,

Human Resource Management, Operations Management, etc. As stated, our approach is firstly to identify the relationship the interaction of performance management and other management functions. Through these investigations we will be able to see how performance management could work jointly with other management in an organization.

In this section we will try to identify relationship between performance management and other well-established management functions for some "classic" organizations, where the functions and hierarchical structures are clear and stable. We achieve this via identifying the missing links between the strategy unit and the operation core in the organizations. However such definitions only suit this class of organizations. It seems very difficult if not impossible to identify the suitable forms of performance management for all organizations. From our initial field work, it seems that in non-classic organization they could be vastly different from those we are painting in this thesis.

As reviewed in Chapter 2, there are at least three different classes of frameworks in the study of performance management. The first approach tries to identify essential functions of performance management, the second one provides standardized management models for benchmarking and diagnosing, and the third one presents frameworks for realization of the specific strategies adopted by an organization.

Some useful relationships between these frameworks are summarized below:

1) The common purpose of these approaches is to enhance performance.

2) While the second is more global and comprehensive, the others focus more on unique tasks and functions of performance management.

3) The findings from the first provide foundations for the second and third.

4) The principle of the second framework is standardization, while that of the third is specialization.

As discussed before there are many existing performance management frameworks. It is interesting to notice that various different results and conclusions from different research disciplines have been obtained in the performance management literature. Also in most of the existing frameworks, assumptions on organizational form and

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structure were not clearly specified. We do not think these two phenomenon come as a coincidence. **We believe that the apparent confusions partially result from the negligence of role of organizational configuration in the current performance management research. One of our main findings is that a feasible performance management form much depends on configuration of an organization,** since a different organizational configuration suggests a different way of managing. For example, as mentioned before the hierarchical methodology like SSM and BSC may not work very well for an organization with a hub or web structure, or without a stable strategy block.

One of our innovations in this thesis is to apply SSM to logically derive the fundamental blocks of performance management for a class of organizations. Although there is much research on using SSM to support Strategy, see Smith and Goddard (2002) and Frances, *et al.* (2007), there seems to exist very little known work to apply SSM to studying the performance management framework. The only relevant references we found were Simmons and Iles (2001, 2005) on using SSM to design stakeholder-focused appraisal system but without much detail, and Dr. Stephen *et al.* (1997) where SSM is used as a framework to design Business Process Reengineering. One of the advantages of our approach seems that we can then clearly see those assumptions supposed (like organizational structure, key stakeholder) and its relationship with other management blocks, which have been more or less hidden in the complex frameworks before. This is, to say at least, an interesting effort to make performance management as a rigorous discipline, and paves the way for future rigorous theoretical studies. The main theoretical bases of our framework are:

1) Economics stakeholder model of performance management;
2) Mintzberg's organizational structure theories;
3) SSM and 3E indicator theory;

Also we need some general assumptions:

1) Internally, an organization has goals, and needs to have resources to achieve them;

2) The strategies are determined by the key stakeholders of the organization.

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Some of them may be outside the organization, and they have to consider the resources, cultures and structures of the organization in developing the strategies, which will also be affected by its environments;

3) To achieve the aims and objectives of an organization efficiently and effectively, it must have a management system to organize and deploy the resources according to its strategies.

In the follows we will try to build SSM models for performance management, and these assumptions will be specified in Root Definitions of SSM models. There should have, of course, different SSM models from different perspectives and assumptions. Here we just show a systematical way to develop theoretical frameworks for performance management. The top level SSM models start from strategy formulation, and then to performance management. Then we will further investigate some of the main dimensions of performance management and build generic CMs, so that we eventually develop a programmatic framework of performance management, which can be, in fact has already been (to be seen in the case study in Chapters 6-8), used to design and improve performance management for some organizations.

Let us first define a root definition of strategy formulation:

- **Root Definition 1**: A system, owned by the organization's stakeholders, to set and adjust its aims and objectives and to formulate corresponding strategies, in the light of its resources, organizational configuration, culture and environment, in order to realise the vision and mission as developed by its key stakeholders.

To achieve the aims and objectives of the organization, it of course needs a management system in place to organize and deploy the resources according to its strategies. Let us assume that this management system aims to enhance the organizational performance as our purpose of studies. Here we will concentrate on how performance management should interact with other functions – to enhance organizational performance there are so many related factors and functions. Furthermore there are already many existing management and technical expertise like

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strategy management and operation management for enhance performance of these functions, and performance management could not and also should not replace them. It follows Mintzberg's organization theory that an organization needs to have a suitable configuration, which consists of two parts: specialization and coordination as the main structure to link them together, in order to achieve the aims and objectives of an organization. Let us argue that it is our view that coordination should not be confined only on the direct actions to achieve the objectives. In the processes of specialization, the interests of key stakeholders are likely decomposed. In order to balance the main interests of key stakeholders not only globally but also locally, their interests should also be coordinated by the five main standardizations plus culture standardization, throughout the specialization processes. This action is in fact to motivate all the key stakeholders based on their balanced key interests. Thus we then reach the following Root Definition for performance management:

- **Root Definition 2** (Performance Management): An integrated and strategic management system, owned by the stakeholders, to enhance organizational performance mainly by specialization and coordination, linking other management functions and following the objectives and strategies set up in RD1.

Now let us discuss possible CMs of performance management – how should performance management enhance organizational performance? It is clear that there may be many possible ways, depending on the configuration of organizations to say at least. For example, there are some organizations where the top managers delegate most of important strategic decisions to sub-level managers, and thus there is actually no organizational strategy formulation apex (but web). Feasible forms of performance management may be quite different in such organizations. Now we need to examine the organization structure of the organization and the basic assumptions. In our investigation we will assume that the organizations have a stable hierarchical structure with clear **strategy** and **operation core blocks**. This is reflected in its management style: powerful strategy apex with formal channel of communication; it has a strong Technostructure and stable operation core with specialized routine work.

Unless undergone through revolutionary changes, specializations in an organization

are to a large extent fixed already. Thus one may mainly use coordination that has different emphasis in different types of organizations (like process standardization), as summarized in Mintzberg's book.

We start with strategy apex. In our case, the strategies are usually formulated in the top of hierarchical structure, and kept stable. In addition, according to stakeholder theory, the interests of key stakeholders should be considered and balanced, so we need to first understand strategies and adjust them to balance the main interests of key stakeholders.

Then according to Mintzberg's theory, for such an organization, the key mechanism of coordination is standardization of work processes (see Table 5.1). This implies that the Technostructure decomposes objectives and strategies, and then cascades them down from top to bottom.

The interests of key stakeholders should be balanced in the organisational objectives and strategies. Besides, the interests of key stakeholders should also be made balanced at all the lower levels via coordination too, although it is often not the case in practice. Achieving such balances essentially leads to aligned motivations, which can be rewards or other various forms.

Although it is sometimes possible to directly link the strategy block with the function parts, often this cannot be provided within the organizational management as it has to be conducted on behalf of the key stakeholders. The key stakeholders may not have such expertise and time; also they may not completely trust the top managers for this function as discussed in Agency Theory. Thus most likely it will be provided as follows (Figure 5.4):

Figure 5.4: Strategy, performance management and other management

Thus, in summary， performance management in such organizations should **(at least)** firstly understand organizational strategies, and decompose them to low level functions, then deploy them into all the levels of operation and management. From the stakeholder economic model, performance management needs to balance the key stakeholders' interests, not only just understand the strategies. Moreover, performance management needs to motivate, monitor and then feedback all levels performance so as to align all management functions towards to the strategic goals determined by the key stakeholders. Therefore, we can conclude that performance management has at least six functions: strategy understanding and adjustment, strategy decomposition, deployment, motivation, monitor, feedback at all management levels from the Strategy Apex to the Operating Core.

Then it seems that the (minimum) main functions of performance management under our assumptions can be illustrated by the following flowchart (CM) (Figure 5.5):
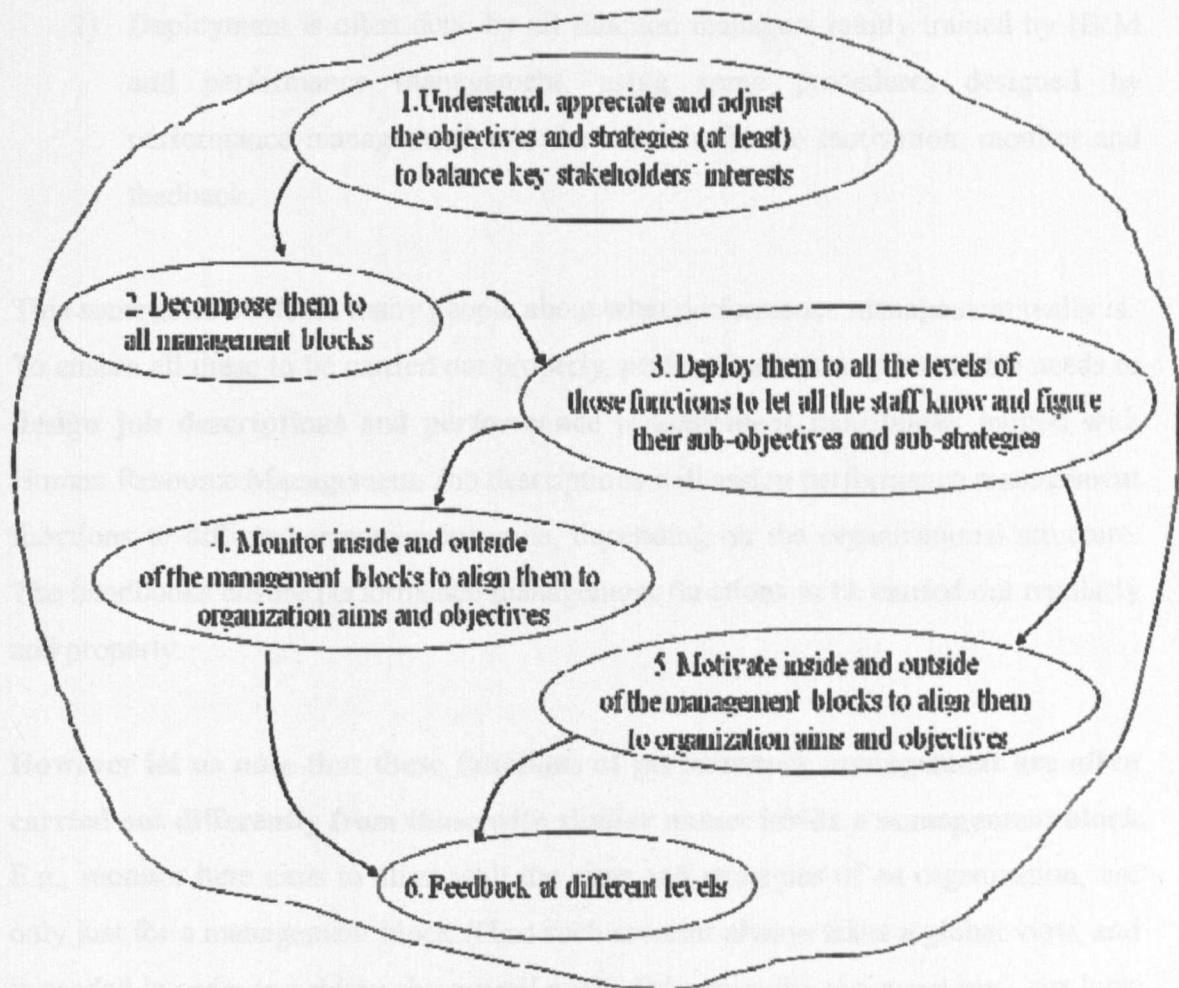
Figure 5.5: A CM of performance management

In our above arguments, our reasoning is based on specialization and coordination of an organization. We therefore cannot claim that this is a "best" approach, but rather a feasible one. Indeed, if one takes a holistic view, different approach may be possible. In fact, often there exists more than one feasible CM for a root definition.

In order to achieve its objective, performance management often needs to utilize other function managements for its purposes, e.g., it may need information management for data collection, and it may need Human Resource Management for incentives, etc. Looking at the six functions; they interact with all management! In particular:

1) Strategy decomposition to operations cannot just be done by the managers of operations. This has to be done with the key stakeholders, for example the owner group. In practice the decomposition is often done by an external consultancy of performance management with some key stakeholders;

2) Deployment is often done by all function managers jointly trained by HRM and performance management, using some procedures designed by performance management, and the same is for the motivation, monitor and feedback.

This sometimes confuses many people about what performance management really is. To ensure all these to be carried out properly, performance management also needs to **design job descriptions** and **performance management handbooks** jointed with Human Resource Management. Job descriptions will assign performance management functions to different management units, depending on the organizational structure. The handbooks ensure performance management functions to be carried out regularly and properly.

However let us note that these functions of performance management are often carried out differently from those with similar names inside a management block. E.g., monitor here aims to align with the aims and strategies of an organization, not only just for a management block. Thus such monitor always takes a global view, and is needed in order to achieve the overall goals. Otherwise the managers may just look at the local goals and benefits. There may be local monitors already but they may be carried out differently from the global monitor as explained. Also understanding and adjusting strategies can be found in strategy management. However performance management emphasizes the balance of the key stakeholders. **Thus one can probably see another advantage of our approach: it presents clearer performance management relations and connections with other managerial fields.**

As reviewed in Chapter 2, Otely (1999) proposed a framework for performance management by asking five questions, which can be understood as the five central issues of performance management:

1) Objectives;
2) Strategies and plans for their attainments;
3) Target-setting;
4) Incentive and reward structures;
5) Information feedback.

Compared with Otely's model, our actions are more comprehensive and detailed since we have explicit assumptions on organizational structures. For instance, target-setting is included in deployment. Similarly performance measurement in Smith and Goddard (2002) is often developed from strategy decomposition and used for monitor.

How to process the six main performance management functions? This requires developing further CMs for this root definition. When an organization has more known structures like a private company focus on profits, then we can use for example, the Strategy Map and BSC approach to understand and decompose its strategies. This works for the first two functions that are strategy adjustment and strategy decomposition (maybe a part of deployment), although it does not cover the rest of the performance management functions. **Thus the roles of many existing approaches can be seen clearly in our framework.** Without assuming more structural and managerial information, we below build examples of possible generic CMs for these functions without explicitly giving the root definitions:

1) Strategy Understanding and Adjustment

    a) Understand the internal and external environments;

    b) Understand missions, main objectives, functions;

    c) Understand current strategies;

    d) Identify the key stakeholders;

    e) Identify their main interests;

    f) Check the balance their interests in Strategy;

    g) Adjust if necessary

2) Strategy Decomposition

    a) Understand all the core operations, and their management structures;

    b) Create or use an existing model (BSC, EFQM, Soft System Methodology) to represent the objectives and strategies approved by the stakeholders;

    c) Decompose the objectives and strategies to all operations blocks;

    d) Further develop measurement indicators, if needed, to all the functions levels,

approved by the managers.

3) Deployment based on Motivation and Competence of Staff

    a) Realize the function, strategy and objectives;

    b) Identify the career development needs and competence of each staff to integrate their needs with work to be assigned;

    c) Integrate the job descriptions into the assessment;

    d) Distribute them into all the levels of the function by setting their objectives and targets and setting up the standards of assigned work;

    e) Discuss possible difficulties and suitable guidance and help should be provided;

    f) Get approved by those staff.

4) Motivation

    a) Identify sub-level stakeholders' interests;

    b) Delegate organization missions to all levels;

    c) Identify staff career development needs;

    d) Identify staff competence;

    e) Integrate their needs with work assigned;

    f) Discuss the way of assistance for their work;

    g) Provide continues encouragement and help.

5) Monitor

    a) Monitor of stakeholder balance at sub-levels;

    b) Set regulations for what and how to monitor and procedures;

    c) Data collection and management;

    d) Date aggregations;

    e) Performance appraisal at all the levels including strategic, inter-functional, and functional, and staff level at suitable timing;

    f) Records and communications.

6) Feedback

    a) Possible coordinate actions at all levels of management hierarchy;

    b) Discuss regulations and delegate for regular feedback of all levels of management hierarchy;

    c) Discuss and delegate regulations for rewards and penalties;

    d) Delegate performance feedback and help;

    e) Connect with motivation and convey;

    f) Overall feedback to key stakeholders.

Now, we see more detailed actions of performance management, and soon after, we need to deal with the questions **how and who do these jobs? or CATWOE.** Then we can develop a hierarchical framework of performance management with ever more details should more information on the organization is given. **Therefore we have just shown a systematical way to develop frameworks for performance management logically and rigorously. One may reach different framework under different sets of assumptions.**

Many well-known approaches in performance management literature can, in fact do, play roles in these functions. For example when an organization is a private company focus on profits, then one can use the Strategy Map and BSC approach to understand and then decompose its strategies. On the other hand, the Paauwes model can be used for the last three functions of performance management at the staff level. However one may need to replace HRM by performance management (or add) in the model, referring to Figure 5.6.
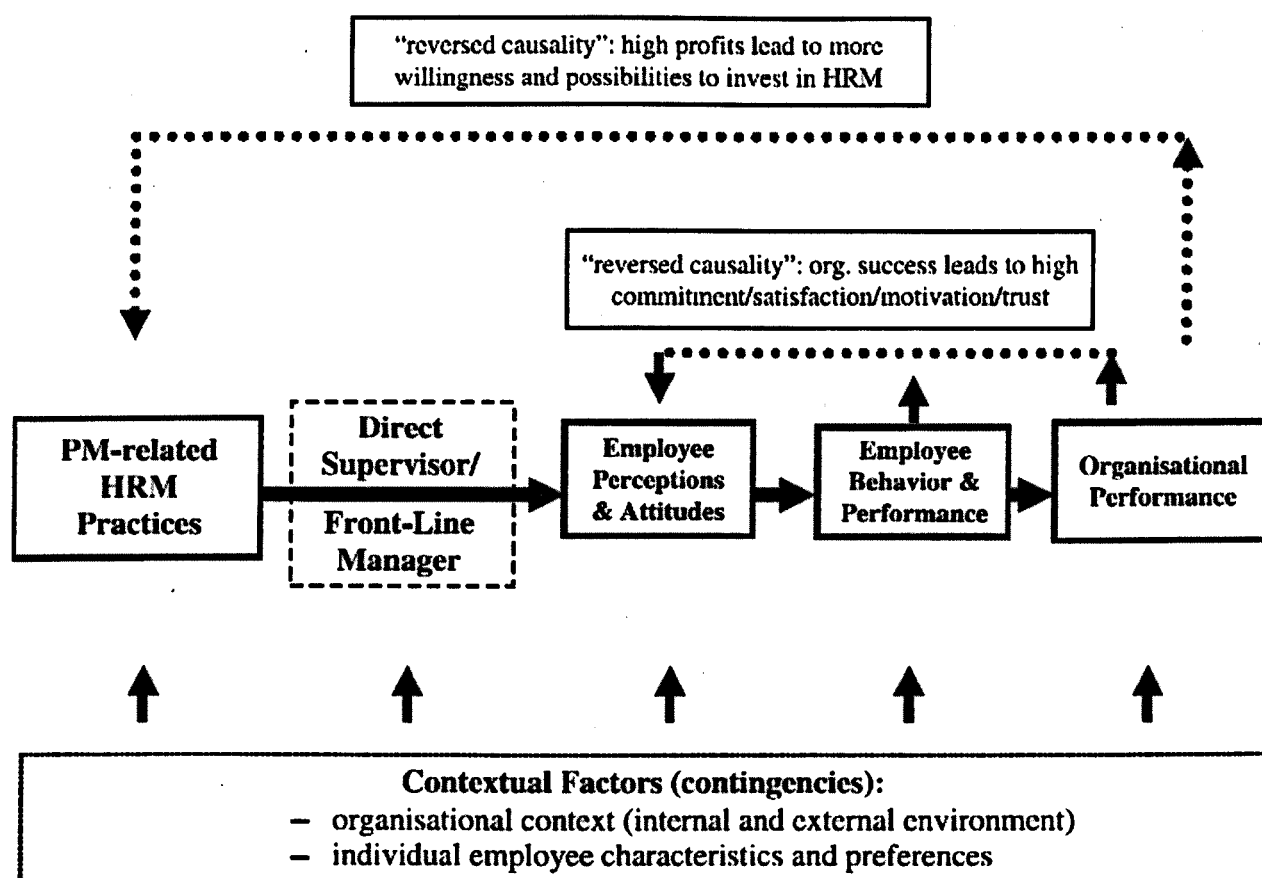
Figure 5.6: A model of the HRM and performance management
(Den Hartog, Boselie & Paauwe, 2004)

5.6 New methods for functions of performance management

Now we develop a new methodology for the steps 2-3). The main motivation is that the current BSC is designed for for-profit organizations. Furthermore the BSC asks how we realize the objectives, while SSM asks how we should realize them.

We first modify the methodology developed in Chapter 4 for the action of objectives and strategies decomposition. Then we will develop other methods based on it.

The core of this modified method is still to continuously ask and answer the questions: *what to do? why do it?* and *how should it be done?* with all the relevant stakeholders, following carefully structured and constructive procedures, as discussed in Chapter 4. However in practical applications it may be very expensive to implement any change

in a business procedure, and one may have to just follow the existing business procedures and the given management framework. In that case, one does not need to answer *why*. Furthermore here we need to identify the key stakeholders and their interests in each level. We summarize the proposed procedures in the following five steps:

1. Determine the overall objectives of the organization (or part of it). This may already be agreed and available, or it may need a process of discussion and debate among a variety of stakeholders to reach a consensus or accommodation. Resulting from this, the primary activities of the organization need to be agreed. In this stage, it is often useful to employ Strategy Map.

2. For each key activity a definition of *what* is to be done, (and *why* it is to be done in terms of higher level systems) is produced. Often it should connect to the "what to do" question in the higher level activities. Furthermore the key stakeholders and their interests are identified.

3. The activity is then broken down into a set of sub-activities or actions which together should logically or actually ensure that the overall purpose of the activity is achieved (the *how*). They may or may not be the same as the current practices in the organization. Consensus, or at least agreements, needs to be reached among the relevant stakeholders for any changes. Often it is helpful to ·use one of the existing frameworks (Like BSC, BEM and those reviewed in Chapter 2) to guild this decomposition. Also the inter-connections with other key activities should be considered. At this point the performance criteria are specified together with their measures or indicators and appropriate standards or levels.

4. It is often the case that the activity needs to be further decomposed. When this happens steps 2) and 3) should be repeated for any sub-activity for which this is felt necessary. Then 4) is repeated recursively until all necessary activities are clearly seen.

5. A complete set of key processes and related indicators can then be produced

from the activity models for all necessary levels of activities.

These steps have been illustrated in the following flow chart (Figure 5.7):
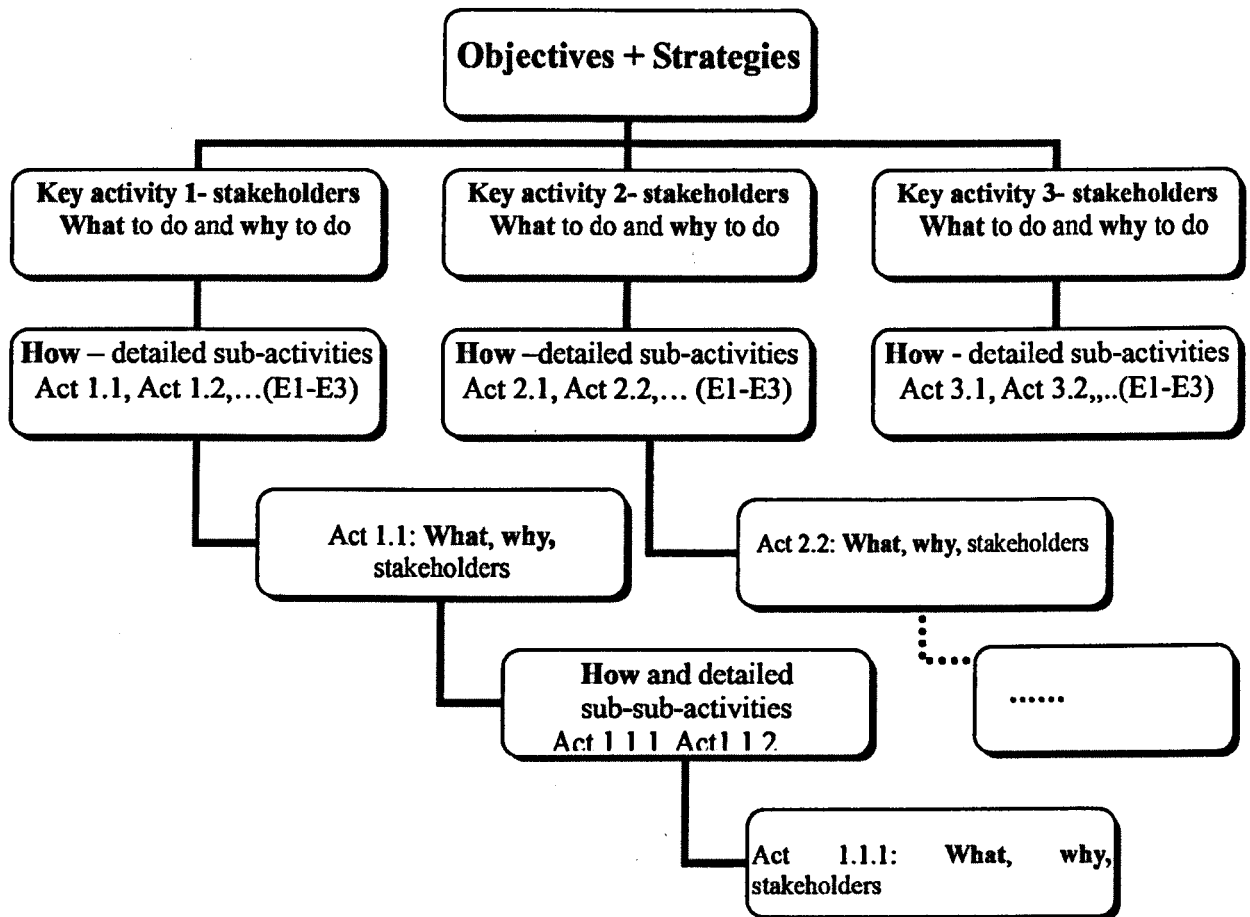
Figure 5.7: The main steps to decompose objectives and strategies

Some guidelines in using this method:

1. In Step 3) one can use 3E indicator framework or more conventional ones like "speed, quality, cost, quantity and safety" framework. Then in the end we will have Key Process (KP) and Key Performance Indicator (KPI) for all department, sub-groups and even individuals.

2. How far of these decompositions should go? This often depends on customer's requirements. For instance, in many companies, we are only required to develop performance management system up to the middle managers, while leave the rest performance management system to them. In such a case, the decomposition

stops when KP and KPI for these middle managers become clear.

3. In theory the information on the key stakeholders is to be used in motivating staff and balancing their benefits at different levels, although this is often the most difficult job.

4. From our experience for "classic" companies, the easiest way is to start with Strategy Map to present their objectives and strategies within the BSC framework. However in principle it should be possible to use a BEM model to start.

This method will always be used in our case study in Chapters 6-8. Based on this methodology, below we further outline a more practical procedure of developing or improving a performance management system for an organization. The first stage of this procedure is to gather as much information as possible on:

1. Current state and structures of organizations;
2. Key stakeholders and their main interests;
3. Existing performance management system.

And set up a performance management working team with representatives from key stakeholders. Discuss and communicate with top management team on existing issues and ideas of performance management. At this stage, the team should interview relevant personals and read relevant documents. It is often very useful to have training or discussing sessions with middle managers. Then the next stage:

1. Understand missions, main objectives, current strategies;
2. Understand business and operation procedures;
3. Check the balance of main stakeholders' interests in strategy;
4. If possible, make diagnosis using the BEM approach. Adjust strategies and business procedures if necessary.

After the team is happy with the agreed objectives, top strategies and core operations, it starts to decompose these to all levels of operations and management via the method developed above. For a 'classic' company, one can often use the Strategy Map and

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BSC framework to represent the top level objectives and strategies. One should start from finance objectives, then customers, internal operations, and then staff learning, as illustrated below (Figure 5.8):
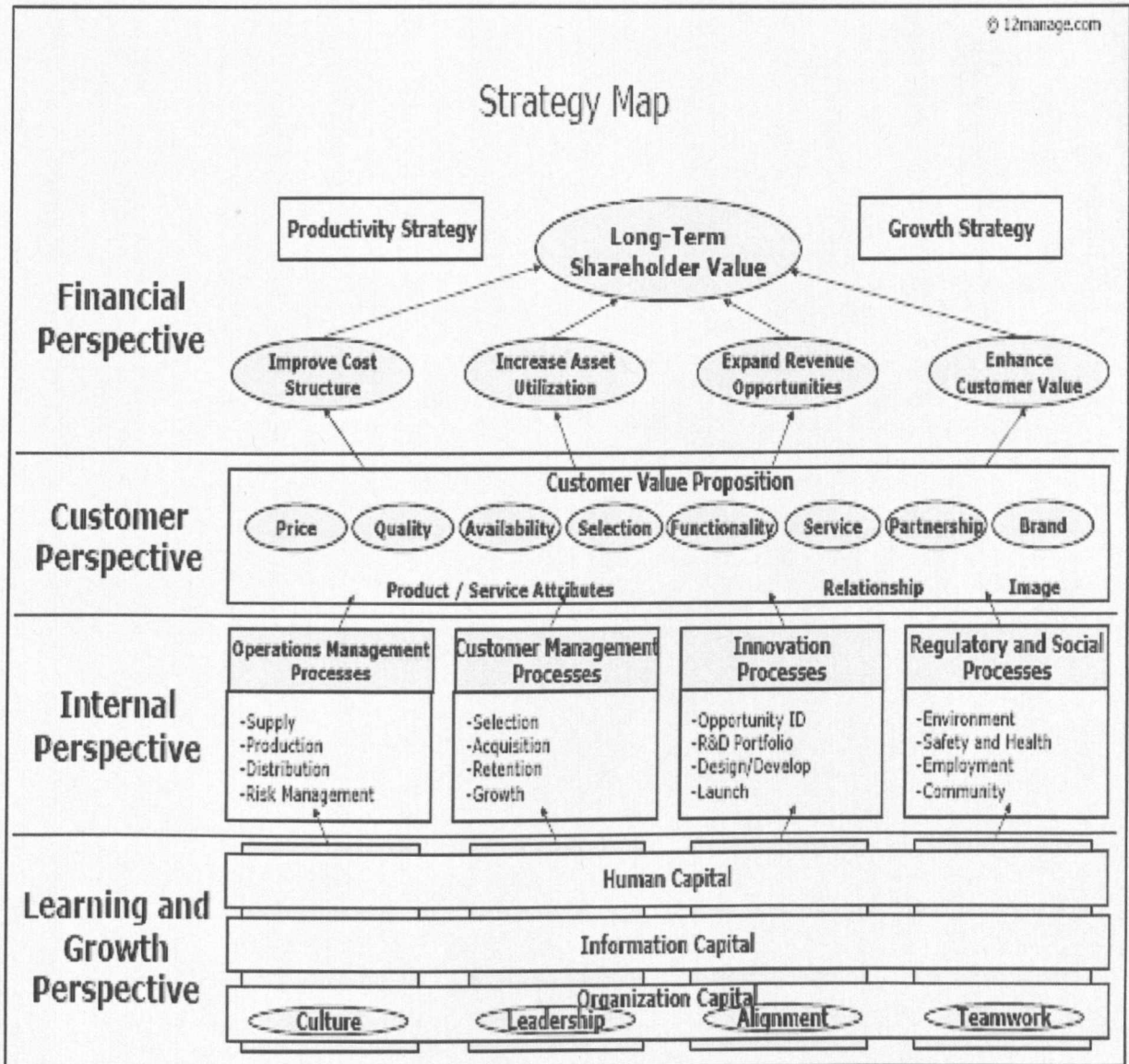
Figure 5.8: The strategy map and BSC framework (Kaplan and Norton, 2004)

However in public sector, the team may have to find a different point to start as illustrated in the case study of Chapter 4. For the further decompositions, sometimes one has to follow the exact business procedures as illustrated follows (Figure 5.9):
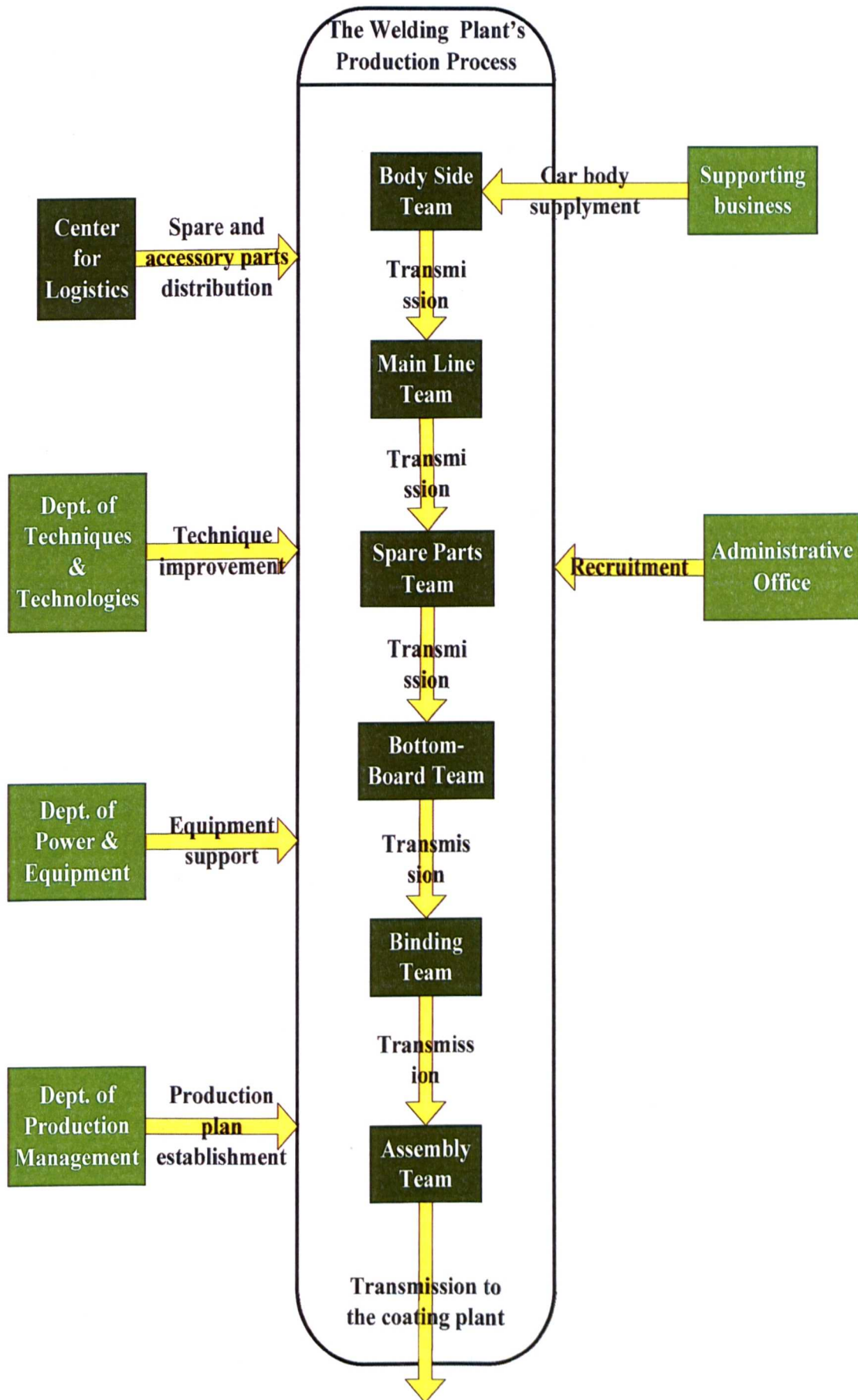
Figure 5.9: A welding plant's production process

For organization like a university, it is possible to first decompose strategies using SSM, while ignoring the current management structures as illustrated in Chapter 4. However most likely one will adopt a mixed approach: to mix SSM models with the current business procedures. This will be elaborated in Chapter 7.

Then, the team should now have a set of objectives and strategy decompositions to suitable levels of operation and management: KP and KPI. In order to execute these jobs efficiently and effectively, the staff needs to understand the objectives and strategies. They need to be motivated and guided by their managers within its culture. Their performance needs to be monitored. All these are packed into a so called Performance Plan in the next stage, which answers:

- ❖ What benefits can staff obtain by working hard?
- ❖ What are the assignments and responsibilities of staff?
- ❖ What are the specific objectives of assignments of staff?
- ❖ How important is each objective?
- ❖ What are the main processes and indicators of performance appraisal?
- ❖ What are the main likely problems that staffs may encounter?
- ❖ What kind of assists that manager would offer for staff?
- ❖ Where staff can get help for difficulties that they may encounter?

A performance plan is made at the beginning of the year, by a staff and his or her line managers, and reviewed regularly. In public sector, it is sometimes just a performance appraisal. There are many possible ways to form performance plan. Our performance plan formulation is based on the decomposed KP and KPI, and is *programmatic*.

In our performance plan:

1. Each line manger will assign his or her KPI and associated KP to his or her staff with agreed targets. Ideally the manger should assign the jobs by first identifying the career development needs and competences of the staff, and then integrating their needs with jobs to be assigned. However this requires much skill and experience. Thus suitable training is often needed for all the managers.

2. Then staff is asked to present initial working plans for KP and explain how to achieve the agreed targets with time frames and milestones. Staff should get feedback and guides from their line managers, and all these are recorded.

Remember that a manager may be a staff of higher level managers. Therefore the performance plan system is of hierarchical structure and the informal and formal chats and negotiations between the managers and their staff need to be carried out iteratively from top to bottom and then bottom to top several times before the plans are finally agreed. One of the benefits of using the performance plan is to establish effective two-ways communications between staff and line managers.

3. Furthermore monitoring methods for the agreed working plans need to be discussed and agreed between the staff and managers.

At this stage a system should then be set to monitor the KP and KPI according to the performance plan, and to aggregate the data. There is much research on how to aggregate data correctly. For companies the most common method is to compute weighed sums of KPI, although sometimes selections of weights cause great controversies. These get much worse for the organizations in public sector as now it is often difficult to price their outputs. Thus here index DEA is found useful, where the weights are selected by the organizations to be evaluated, see Chapter 3. The aggregated results need to be recorded. However data collections could be very difficult and unreliable.

Then at suitable stages, the results will be used for feedback or responses: rewards or punishments. Of course, these jobs may need a great deal of skill and experience. Thus normally they need to be carried out by trained staff from HRM. In this area there is much relevant research like High Performance Work System (HPWS).

Of course, in reality most of performance enhancement projects only carry out a part of the above. For example, one very popular formulation used in consultancy starts from a similar preparation as our stage one (but most likely without 2 of Stage one). Similarly as in our stage two then

1. Understand missions, main objectives, current strategies;

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2. Understand business and operation procedures;

3. If possible, make diagnosis using the BEM approach. Adjust strategies and business procedures if necessary.

Then various approaches from simple performance measurement frameworks to Strategy Map + BSC decompositions can be used in order to develop performance measurements system for required levels of operation and management. Then reward and punishment system will be linked to the KPI system developed, and the whole system is documented and handled to the organization. The functions like motivating, assigning tasks and helping staff will be left to HRM.

On the other hand, it is possible to first use a BEM to diagnose performance of an organization, and then try to enhance its performance working from the weakest part and so on. This approach will need a longer time to execute (say one or two years), and need a lot of deeper understanding on the organization.

5.7 Definition of performance management again

It is now clear that performance management contains so many contents that often either it was defined very abstract so that the definition does not tell people much, or it was defined like a list of actions without clear internal logics. For example, Lebas (1995) suggested that "performance management involves training, team work, dialogue, management style, attitudes, shared vision, employee involvement, multi-competence, incentives and rewards, etc." as seen in Chapter 2.

Our suggestion is to provide suitable definitions of hierarchical structures with ever higher levels of abstraction. Summarizing what we have discussed, it can be agreed that performance management is a strategic and integrated approach to improve organizational performance at the highest level of abstraction. Without giving further information on the organization, no much more can indeed be said. But this does not tell us much about it. To be able to see it at a greater resolution, we need to have more information on the organization. Then we may be able to identify the essential blocks or contents of performance management for that class of organizations. Then we will

be able to give the second level of definitions. For the organizations studied in this chapter we can state:

- Performance management is a stakeholder-owned system to coordinate all the management activities of the organisation by appreciating, decomposing, deploying the strategy, and motivating, monitoring and feeding back the performance of the staff so as to balance and realise the long term objectives of the stakeholders

5.8 Conclusions & future research

We have developed theoretical frameworks and practical working procedures for performance management in some organizations, using soft system thinking. We discussed the relationship between these frameworks and the existing theoretical research. These frameworks seem to be flexible enough to cover various applications. However these frameworks have assumed several important conditions on organisational structures. In particular, we assumed that the structures will not be subject to changes in a short term. However this is unlikely true in many cases. Often one needs to modify the structures according to changes of strategic objectives and environment. A theory that can integrate all these will be one of our future research options.

Chapter 6

Case Study of

Zotye Automobile Co., Ltd.

6.1 Background & overview of Zotye project

Upon the invitation of Zotye Holding Group (ZHG), Kent Performance Management Construction Team started a performance management system development project for Zotye Automobile Co., Ltd. (Zotye Auto) in April of 2008. The project is to diagnose Zotye Auto's existing performance management system, and improve and perfect the system on the basis of the diagnosis.

In the process of the diagnosis, the performance management construction team had extensive and in-depth interviews with employees at various levels and conducted surveys. Based on the systematic analysis of the consultant team's interviews and on-site investigations, the consultant team summarized the main problems of Zotye Auto's existing performance appraisal system and management methods (For more details, see Section 6.3).

With the investigations and analysis of Zotye Auto's company circumstances and the framework for performance management discussed in Chapter 5, the consultant team put forward its procedures to rebuild Zotye Auto's performance management system. In line with the proposed performance management framework, a BSC-based department performance measurement & management procedure were initiated and implemented.

The consulting team tried to improve and rebuild Zotye Auto's performance management system essentially in line with the practical procedures developed for performance management consultation projects in Chapter 5.

The first phase is to collect as much information as possible, and at the same time build a promotion team, which consists of the key stakeholders of the enterprise, for the performance management system designing. The promotion team communicates with Zotye Auto's top management about the problems of the existing performance management system and their understanding of performance management. The promotion team also interviews relevant parties and consult related files and materials. This process also aims to train the managers. The main tasks for the promotion team at this stage are the follows:

1. Understand the mission, major objectives, and current strategies of the organization;

2. Understand the business process, the organization's circumstances and the organizational structure;

3. Determine the key stakeholders and their major interests;

4. Check whether the key stakeholders' major interests are well balanced in the strategies;

5. Investigate the circumstances of the existing performance management system;

The second phase is to decompose the strategies after the promotion team has reached a common understanding of the objectives of the organization, the strategies for development and the core operation processes. With the help of the BSC and the strategy map, the strategies will be broken down to the level of departments in line with the current organizational structure and the core business processes.

In the third phase, the promotion team decomposes the objectives and tasks to department levels, and discusses them with the department managers, and finally formulates KPs and KPIs for each department and its managers.

The fourth phase is to develop performance plans for the company. A good performance planning system must enable the supervisors and the subordinates in the hierarchical structure to communicate and negotiate formally and informally. The performance planning system will help planning go through the management top-down and then bottom-up reiteratively several times and then finally reach a consensus of a performance plan. One of the purposes of the performance planning system is to build effective bi-directional communication among the higher and the lower levels of the management. In this phase, we will examine whether we need or how to design a suitable performance panning system for Zotye Auto.

In the fifth phase we suggest how to utilize the performance measurement for performance feedbacks or organization responses: rewards and penalties in a due time (normally for half a year or a full year). Generally speaking, these tasks are carried out by the human resource department of the organization.

Due to the actual circumstances, not all the tasks discussed in the five phases above are involved in Zotye Auto's performance management system designing project. The concrete tasks performed will be covered in full detail in Section 6.4.

6.2 Introduction to Zotye Holding Group

Zotye Holding Group is a large private enterprise group with research and development of automotive vehicle, engine and gear box as its core business and development orientation. Currently, it has two production bases in Zhejiang Province and Hunan Province, and two automobile brands of Zotye and Jiangnan. Zotye Holding Group possesses 4 advanced production lines of punching, welding, coating, and assembly, and a vehicle dynamic performance test line. In 2006, Zotye Holding Group introduced its first type of vehicles Zotye 2008 into the market, and exported its vehicles to more than 50 countries and regions, such as Middle East, western Asia, Russia, Latin America. Zotye Holding Group established technology development teams in Italy and Japan, and employed excellent management and technology development talents from Taiwan, and China FAW Group Corporation, DongFeng Automobile Co., Ltd., Tianjin Motor Dies Co., Ltd., to build teams for vehicle and key parts research and development and for management.

6.2.1 Zotye Auto's annual task & target

Zotye Auto, as a subsidiary company affiliated to Zotye Holding Group, is independently operated. The general manager of Zotye Auto is directly responsible to the president of Zotye Holding Group, and the president issues the production and operation plan to Zotye Auto through the Department of Production and Operation, such as production increase plan, cost reduction target. Zotye Auto will formulate its own production plan according to their targets from the Group.

Zotye 2008 recreational vehicle was launched into the market in 2006. The output was 10, 000 in 2006, and 30, 000 in 2007. 10, 000 vehicles were exported in 2007, which accounted for a third of the output of that year. In 2008, Zotye Auto was estimated to turn out 70, 000 vehicles, of which 20, 000 would be exported. In the following year 2009, Zotye Auto would plan to manufacture 100, 000 vehicles, including the output of remolded vehicles. In the year 2010, the output was estimated to amount to 120, 000, and in 2012 it would reach 150, 000. It was planned to increase the export share to 50% of the annual output in 2010 (see Figure 6.1).
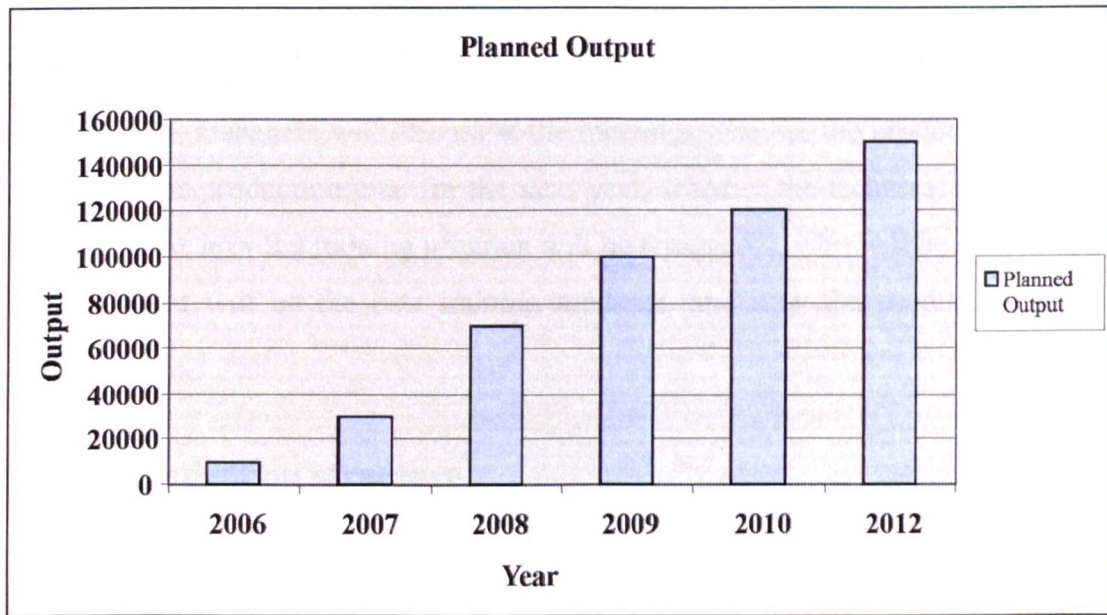
Figure 6.1: Zotye Auto's recreational vehicle output target

In addition to the output target, Zotye Holding Group has its target of quality improvement for Zotye Auto. Zotye Holding Group hopes Zotye Auto can decrease its repair rate by 10%, and the procurement cost by 15%. In order to meet the challenges, Zotye Auto must elevate its management level, tap its potential and make concerted efforts to achieve sound and quick development to reach the goals.

6.2.2 Issuance of plans

The Department of Production & Operation Planning (DPOP) established in April of 2008 is the unit through which Zotye Holding Group's production and operation plan for Zotye Auto is issued. DPOP formulates production & operation plans according to

domestic and overseas demands, and the Group president's annual production and operation decision which is generally made through meetings of the Group top management and the board of directors. The production & operation plan mainly includes output, cost, quality indicators, and customer complaint rate. Zotye Auto will break down the production & operation plan to various production units and functional units to organize its own production and operation.

In Zotye Auto, the top management arranges annual meetings on production and operation planning for the top and middle-level managers. The primary concerns of the meetings are to break down the production & operation plan issued from the Group to the departments and subordinate plants. For example, as to technical improvement, managers will discuss at the meetings whether the production capacity can match the production plan for the next year, whether the technical improvement must be made, how the training program will be arranged, who will be chosen as the trainees, what will be the best training methods, and how the production will be organized.

6.2.3 Organization structure

The top managers of Zotye Auto are the general manager and the assistant to the general manager. The functional and production units of Zotye Auto includes the Administrative Office, the Department of Management, the Center for Logistics, the Department of Production Management, the Department of Techniques and Technologies, the Department of Quality Assurance, the Department of Procurement & Supply, the Department of Power & Equipment, the Welding Plant, the Coating Plant, and the Assembly Plant. The organizational structure of Zotye Auto is shown as follows (Figure 6.2).

General Manager

Assistant to General Manager

Administrative Office

Dept. of Management

Dept. of Production Management

Dept. of Techniques & Technologies

Dept. of Quality Assurance

Dept. of Procurement & Supply

Dept. of Power & Equipment

Center for Logistics

Welding Plant

Coating Plant

Assembly Plant
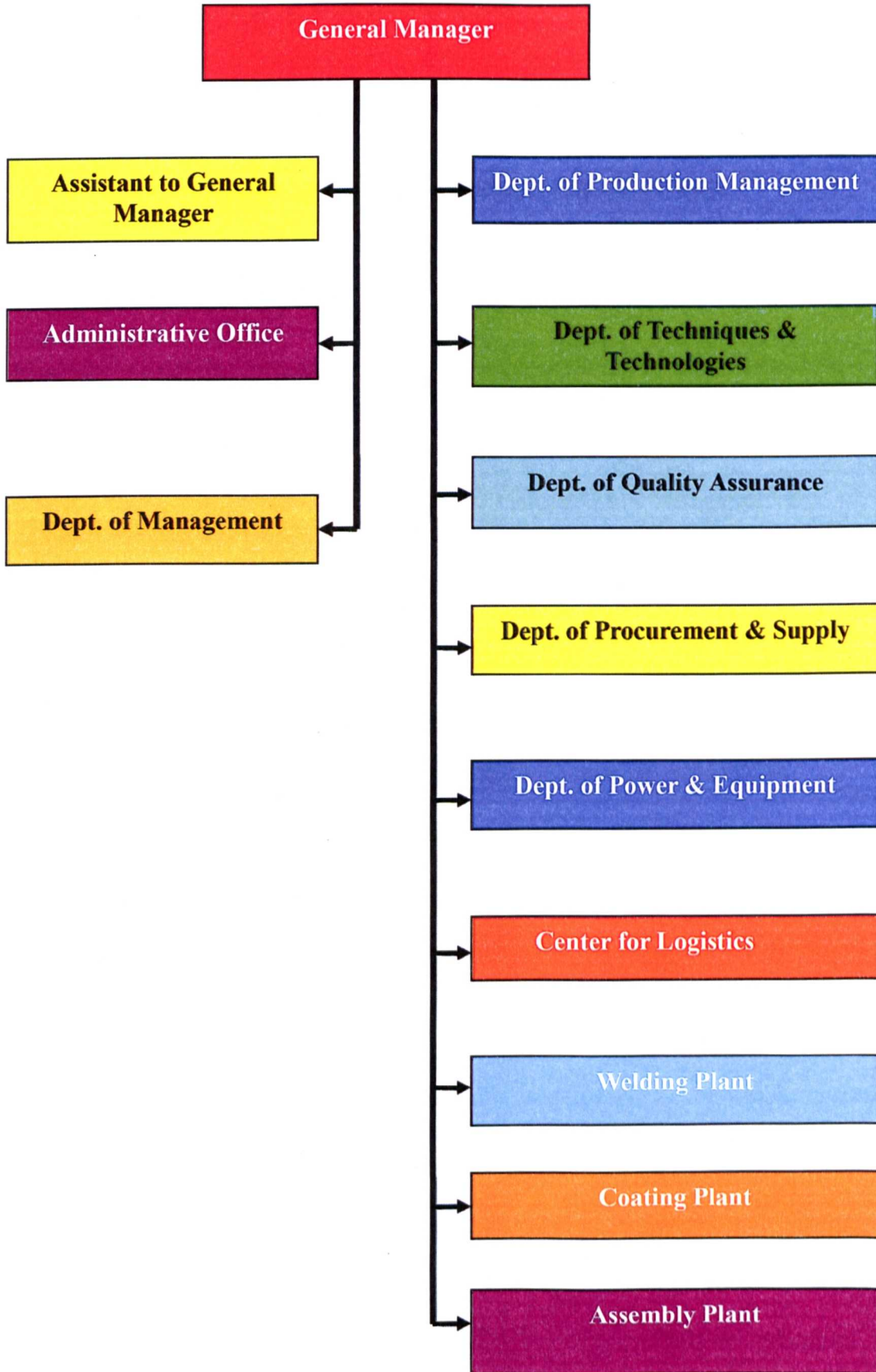
Figure 6.2: Organizational structure of Zotye Auto

6.2.4 Primary duties of functional units

The duties of the functional units under Zotye Auto are shown in the following Table 6.1:

Table 6.1: Duties of Zotye Auto's functional units

Units	Principal Duties
Administrative Office	Recruiting, training, salary, appraising, transferring
Dept. of Management	Rules and regulations formulation, promotion of standardized management
Center for Logistics	Spare parts collection and booking, storage, materials issuing
Dept. of Production Management	Production plan, routine management
Dept. of Techniques & Technologies	Technique analysis, production layout and planning, technique and procedure management
Dept. of Quality Assurance	Quality system designing and implementation
Dept. of Procurement & Supply	Equipment complete set planning, procurement, etc.
Dept. of Power & Equipment	Equipment maintenance and service, etc.
Welding Plant	Organizing to achieve production plan, managing production, techniques and administrative affairs
Coating Plant	Organizing to achieve production plan, managing production, techniques and administrative affairs
Assembly Plant	Organizing to achieve production plan, managing production, techniques and administrative affairs

6.2.5 Introduction to Zotye Auto's former performance management system

1. Performance appraisal of Zotye Auto's top and middle-level managers

In general, the management of Zotye Holding Group does not interfere in Zotye Auto's management. The Group's mode of management for Zotye Auto was to issue production tasks and targets to Zotye Auto, and then Zotye Auto made its own production & operation plan in line with the production tasks and targets, and then implement.

Zotye Auto's top and middle-level managers were the general manager, the assistant to the general manager, the managers of all the departments, and plant directors of the 3 plants. The Human Resources Department of Zotye Holding Group reviewed the performance of the general manager, the assistant to the general manager, and the director of the Administrative Office. The performance of the other top and middle-level managers of Zotye Auto was assessed by Zotye Auto's General Office. Essentially, Zotye Auto utilized the same performance appraisal methods for the Group's middle-level managers to assess and score the performance of Zotye Auto's middle-level managers from the perspectives of work attitude, work discipline, compliance to supervisor's requirement, work achievements, etc. The performance appraisal form of Zotye Auto's departmental managers and plant directors consisted of qualitative indicators and quantitative indicators, which are shown in Table 6.2.

Table 6.2: Former performance appraisal system for top and middle-level managers

	Quantitative Indicators	Qualitative Indicators
Director of Administrative Office		
Manager of Dept. of Management		
Manager of Center for Logistics		
Manager of Dept. of	Production plan	Production schedule controlling

Production Management	completion	Production plan management
		Comprehensive management skills
		Work attitude and ethics
	Rate of system operation	Work skills
		Satisfaction of the subordinates
		Satisfaction of the general manager
Manager of Dept. of Techniques & Technologies	Production plan completion	Loss from serious mistakes in work
		Readiness for and attitude to on-site service
	Success rate of product processes	Management of the department
		Technological problem solving skills
		Readiness to assignments
	Rate of system operation	Attendance
		Satisfaction of the subordinates
		Satisfaction of the general manager
Manager of Dept. of Quality Assurance		
Manager of Dept. of Purchasing & Supply	Rate of production plan completion	Managerial skills
	Rate of timeliness of Materials procurement	Purchasing cost control
	Pass rate of procured Materials	Work attitude
	Rate of system operation	satisfaction of other departments
	Materials procurement planning	Satisfaction of the general manager
Manager of Dept. of Power and Equipment	Rate of production plan completion	Equipment management & maintenance
		Timeliness and efficiency of equipment maintenance
		Work skills
	Rate of equipment utilization	Managerial skills
		Work attitude and ethics
		Satisfaction of the subordinates

	Rate of system operation		Satisfaction of the general manager
Director of Welding Plant Director of Coating Plant Director of Assembly Plant	Production safety	Site management	Work attitude
		accidents	
			Work skills
	Rate of system operation		Satisfaction of the subordinates
	Product quality	Pass rate under First acceptance check	Satisfaction of the general manager
		Quality management	
	Rate of production plan completion		Managerial skills

As is shown in the above table, Zotye Auto's scope of the performance appraisal involved the output target, the quality target, work safety, equipment breakdown, and production site maintenance. Cost was also an important performance indicator for middle-level managers. Middle-level managers' performance appraisal had adopted an appraisal based primarily on quantitative measure in place of previous qualitative appraisal combined with a quantitative one. The quantitative indicators generally concerned the rate of task completion, cost, safety, quality, and equipment utilization rate, etc.

Formal Communication about completion of the production plan was carried out through meetings. Managers had meetings on the company's major targets and significant development directions to facilitate the achievement of consensus of the various departments and plants on meeting the targets and implementing the plans. Besides, the general manager and plant managers conducted non-scheduled and frequent on-site inspection to judge whether their subordinates' work is satisfactory or not.

Note that the results of the middle-level managers' performance appraisal were not directly linked to their pay. Only some especially excellent managers and employees

(10%) would get some rewards.

2. Performance appraisal of administrative staff & production line workers

The departments and plants employed a similar measure to review the performance of their employees, which involves the following aspects:

1. Task performance (output, quality);
2. operation safety;
3. Equipment maintenance;
4. Work attitude;
5. Work skills;
6. Attendance.

Emphasis was put on the timeliness, quantity and quality of their task performance in their task performance appraisal. Every aspect of the performance measure was rated in 4 classes with each class assigned a score range which is given by their supervisors.

Operation safety primarily referred to whether workers operate correctly, whether they were safety-conscious, whether they got injured in work, how they handled dangers. This aspect was also rated in 4 classes.

The aspect of equipment maintenance concerned production line workers. They were rated in 4 classes according to what knowledge they had of the performance of the equipment, whether the equipment was kept neatly and in good condition, and what skill level they reached to maintain the equipment they operate.

The aspect of work attitude was assessed in 2 classes in terms of whether the staff could actively collaborate with other groups.

Besides, the employees' ability to coordinate and their attendance was reviewed. But the results of performance appraisal did not have a direct effect on their wages.

6.3 Main problems of Zotye Auto's former performance appraisal

In this section, we summarized the main problems of Zotye Auto's former Performance Appraisal System and Management Methods. On top of our systematic analysis of our consulting team's interviews and on-site investigations, we reviewed our analysis in light of performance management theories and practices, and we believed that the main problems of Zotye Auto's former performance appraisal system and management methods were the following 4 aspects:

1. Performance appraisal was not linked with the company's current strategy for development;

The essence of modern performance management is to deploy the enterprise development strategy level by level to each employee's daily work, while in Zotye Auto, the major strategy was not embodied in the indicators for performance appraisal, as the indicators were mostly built on managers' responsibilities for routine management work.

2. The results of performance appraisal of the managers on the middle-level and above were not linked to their salaries;

An enterprise's motivation should not be limited to payment. Many of Zotye Auto's executives came from state-owned enterprises, and thus have rich experience and solid background in management. Although their pay did not show much flexibility, they think that they have a better platform for their career development in Zotye Auto as contrast to state-owned enterprises. So they have great incentives to work, but this covered up, to some extent, the shortcomings that the inflexibility of the remuneration system dampened their enthusiasm to work. In the long run they might be discouraged when they thought that their contributions were far greater than their fixed pay. Therefore, it is imperative to implement new performance appraisal system that will closely link their performance level to their remuneration for the long-term development of the enterprise.

3. Zotye Auto lacked standardized performance management system;

In Zotye Auto, the performance appraisal forms prepared by the Human Resources Department of Zotye Holding Group and the Administrative Office of Zotye Auto were used in some cases, but most of the managers tended to use their own methods to assess the performance of their subordinates. At that time, managers' performance appraisal methods had their own individualistic characteristics. Although quite a few of the methods were effective and should be adopted as reference, Zotye Auto needed a uniform performance management approach to guarantee that their performance management would be continuously improved.

4. Employees (esp., middle-level managers) did not actively participate in the performance management.

The results of performance appraisal were not linked to the pay, so the middle-level managers paid insufficient attention to performance appraisal. Many middle-level managers even did not know how their own performances were appraised.

6.4 Improving Zotye Auto's performance management

The consulting team improved and designed Zotye Auto's performance management system in light of practical procedures for performance management consultation project proposed and discussed in Chapter 5. In the implementation of Zotye Auto's performance management system designing project, not all the areas in the framework were handled, due to the limitation of the circumstances.

6.4.1 Phase I

In this phase, we, as external consulting experts, tried to collect as much information as possible through various channels for a full picture of Zotye Auto. At the same time, we established the performance management promotion team made up of the key stakeholders of Zotye Auto. We interviewed with Zotye Auto's decision makers and discussed Zotye Holding Group's mission, major goals, development strategies and

other relevant matters with them. In effect, what is covered in Sections 6.2 and 6.3 is the summary of the work we did in this phase. A further description will be provided below.

As a subsidiary company of Zotye Holding Group, Zotye Auto is only responsible for the task of manufacturing vehicles, but not the sales. It does not keep an independent financial accounting. Zotye Auto's target, task, and strategy are designed by Zotye Holding Group. Zotye Holding Group has its own financial target, and its strategy for the financial target is to achieve customers' satisfaction, raise the market share, control the cost and strengthen work safety. For customers' satisfaction and market share, the Group stresses the timeliness of delivery, and quality of products. Consequently, Zotye Holding Group has its annual targets of output, quality, cost controlling and work safety for Zotye Auto. The annual operation target for Zotye Auto involves output, cost, indicators of quality, and rate of customer complaint (for year 2008, 70,000 vehicles, rate of repair decreasing by 10%, production cost dropping by 15%), see Section 6.2.1. Zotye Auto then breaks down the annual production & operation target to all the departments, plants and units, draws up its production & operation plan, and organizes its production and operation.

So the consulting team began to design the performance management system starting from the annual target of 2008 assigned by the Group to Zotye Auto. The consulting team did not study whether the Group's operation target and strategy for Zotye Auto well balanced the interests of the key stakeholders.

With the interviews with Zotye Auto's top management, we acquainted ourselves with Zotye Auto's operation process (detailed later in the section about strategy breakdown), the circumstances of the company (see Section 6.3.1), the organizational structure (see Section 6.2.3), the former performance management system, and their expectation of future performance management. As a pure production organization, Zotye Auto's organization structure and operation process are clear and simple. The employees, both managers and workers, all have rich experience. Thus there was not much space to adjust in the organizational structure or the operation process. Therefore, the promotion team didn't believe that it needed to restructure the organizational structure and the operational process before the BSC was implemented.

The interviews with the top and middle-level managers were in fact training processes of spreading the ideas of performance management, which enabled the managers to better understand performance management, broaden their horizon and exchange their experience. The consulting team also informally interviewed some staff of the functional units and some production line workers.

6.4.2 Phase II

In Phase II, decomposition of the strategy was performed after the promotion team achieved consensus on the organizational target, the development strategy, and the core operation process. In decomposing the strategy, the BSC and the strategy map or the SSM discussed in Chapter 4, or BSC and SSM combined, can be exploited according to the different features of the organizations.

Zotye Auto's functions and tasks are relatively simple, and its structure and operation process are clear-cut; so there was not much room for operation process optimization.. The BSC and the strategy map start from the shareholders' interests, and decompose the strategy in terms of the existing organizational structure and the operation process. Zotye Auto's case conforms to the requirements of exploiting the BSC and the strategy map, so the promotion team decided to use the BSC and the strategy map to decompose the strategy based on the existing operation process of Zotye Auto's departments and plants.

First of all, Zotye Auto's strategy map was drawn up. For Zotye Auto, its strategy map does not involve the financial level and the customer-market level, and only consists of internal operation level and the employee learning and growth level. Below is Zotye Auto's strategy map drawn up by the promotion team (Figure 6.3):
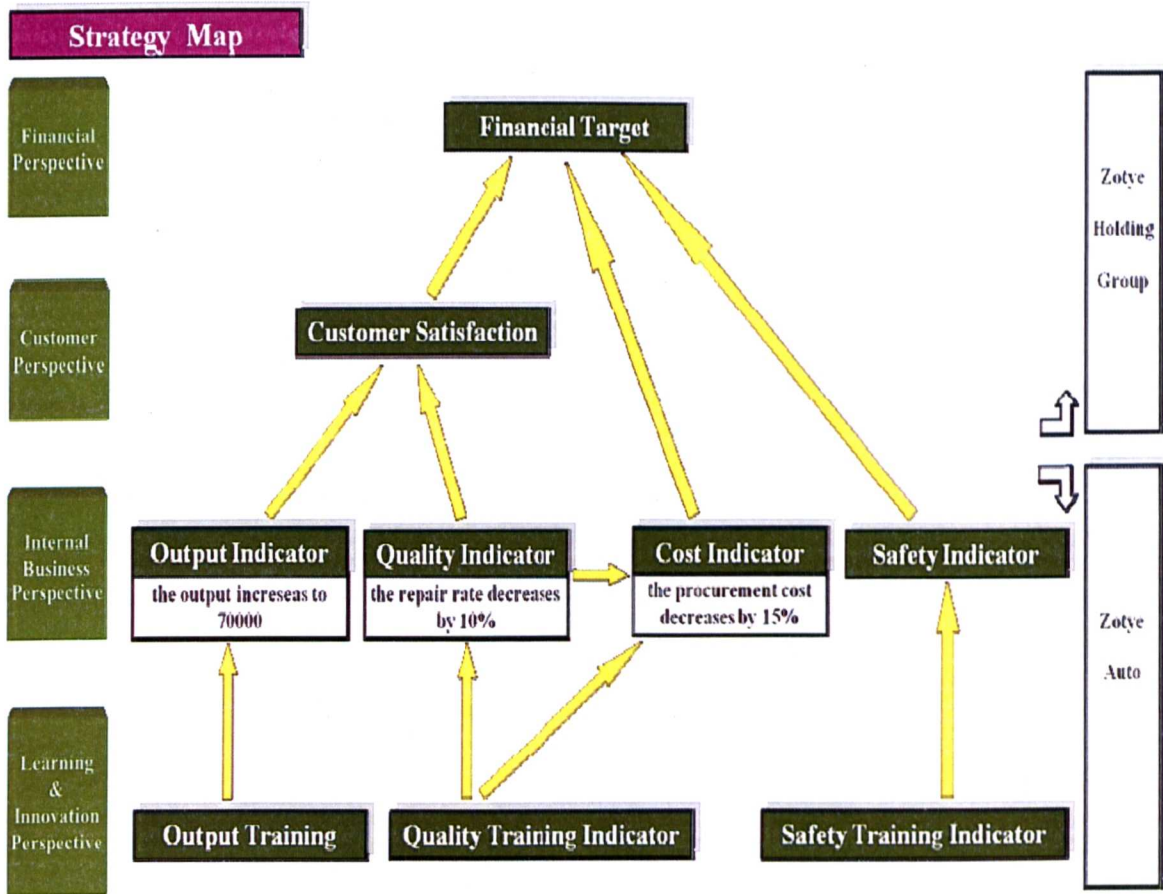
Figure 6.3: Zotye Auto's strategy map

In this strategy map, output indicators, quality indicators, cost indicators, and safety indicators comprised the indicators of internal operation perspective. When the indicators of the Zotye Auto were designed, the next step was to decompose these indicators to develop department indicators. There were two approaches to do that: either, to link the breakdowns to departments and plants based on the existing business processes; or, Re-engineer and optimize the existing business processes, then break down the indicators based on the new operation processes.

Zotye Auto is only responsible for production. The existing operation processes at the company level didn't show much room for improvement. So the promotion team, after soliciting the opinions of Zotye Auto's top management, decided to develop the indicators based on the existing business operation processes of Zotye Auto. The performance management promotion team developed four groups of indicators for the internal operation: they are output indicators, quality indicators, cost indicators, and safety indicators respectively, and summarized four driving processes for the four

groups of the indicators, namely, Zotye Auto's output process, quality process, cost controlling process, and production safety process, which are shown in the following figures (Figure 6.4, 6.5, 6.6, 6.7):
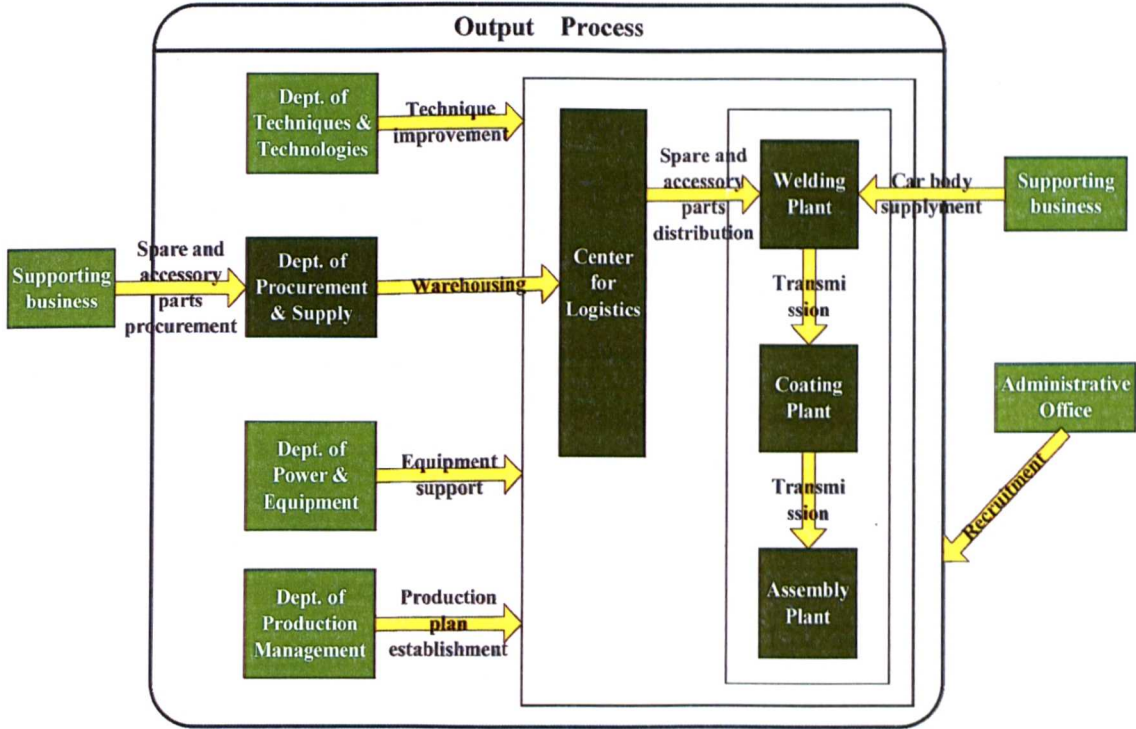
Figure 6.4: Zotye Auto's output process
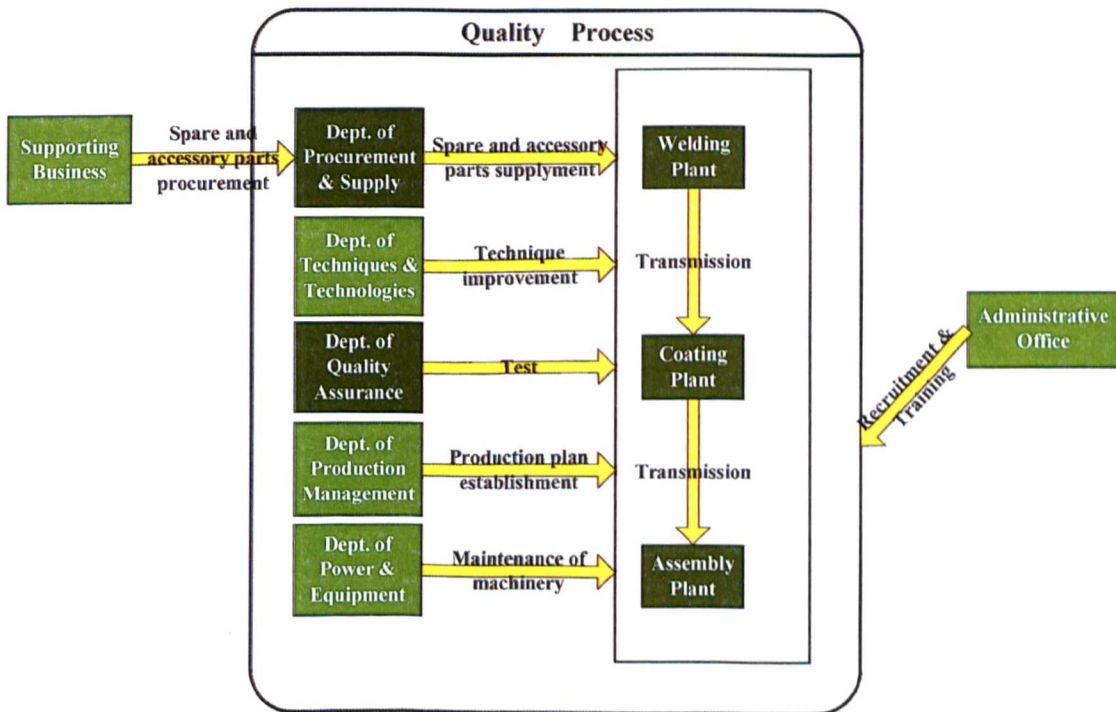
Figure 6.5: Zotye Auto's quality process
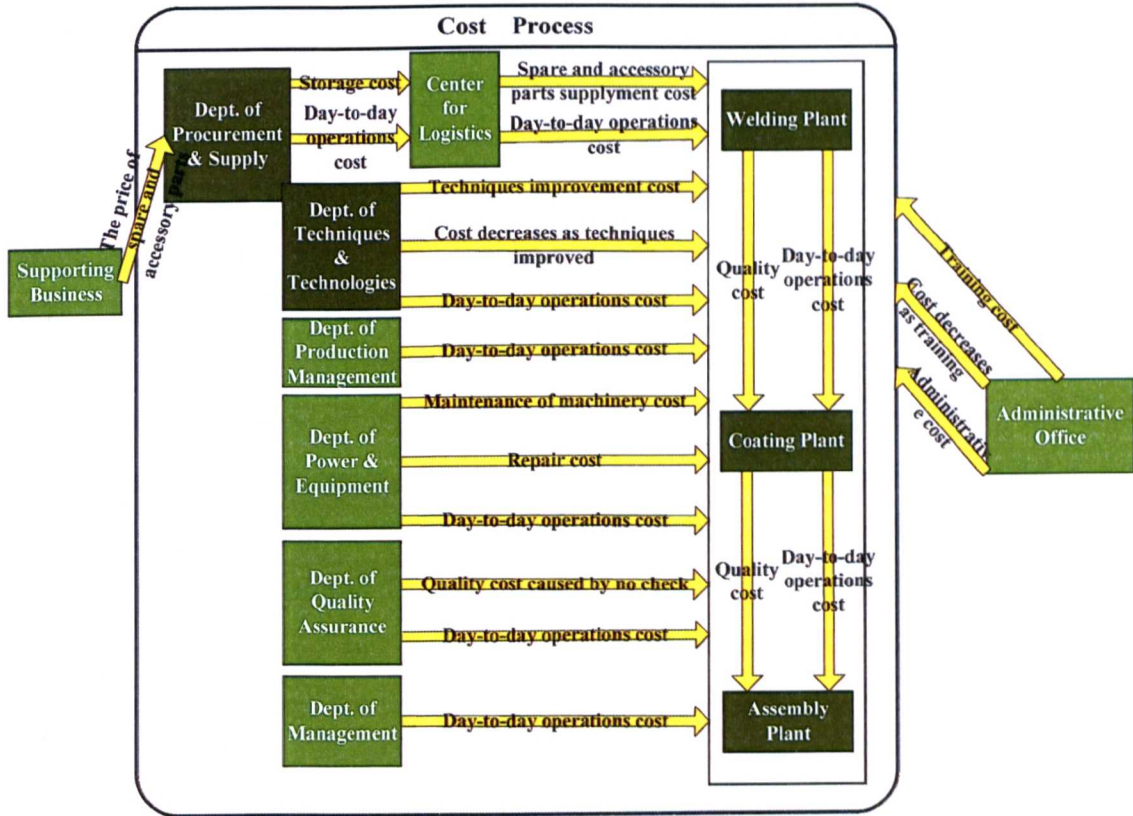
Figure 6.6: Zotye Auto's cost controlling process
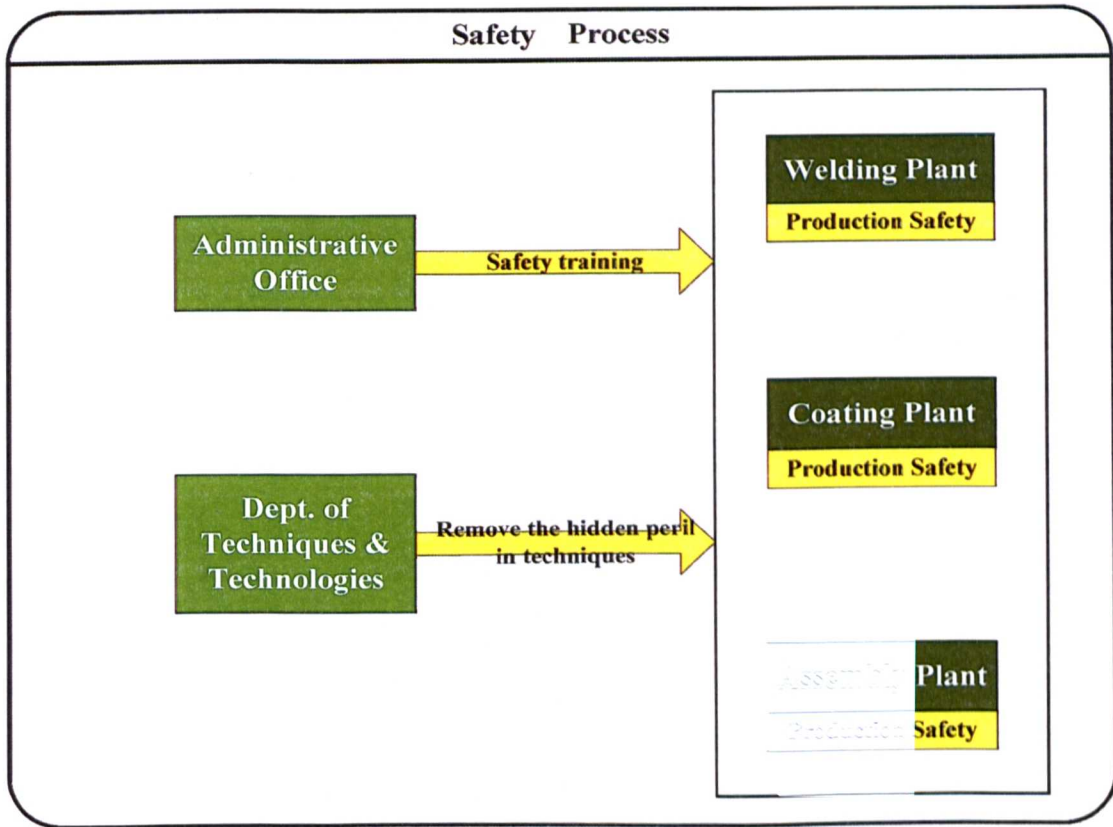
Figure 6.7: Zotye Auto's production safety process

Then the processes would be further decomposed. Take the output process for an example, the Department of Procurement & Supply purchased the spare and accessory parts of vehicle from the suppliers and stored them in the warehouse. The Center for Logistics kept the spare and accessory parts and delivered them to relevant posts of the plants. A vehicle body would first be distributed to the Welding Plant, and welded there. Then the welded vehicle body would be sent to the Painting Plant, afterwards to the Assembly Plant, and finally a complete vehicle would roll out of the plant. In the above processes, some of the functional departments would also give their supports: the Department of Techniques & Technologies would improve the techniques; the Department of Power & Equipment would maintain the machines for normal production; the Department of Production Management would draw up a reasonable output target and plan, and arrange the various resources for production; and the Administrative Office would recruit, train and supply workers needed on the production line for the production. Form the figures we can clearly see that the output process involved the Department of Procurement & Supply, the Center for Logistics, the Welding Plant, the Coating Plant, the Assembly Plant, the Department of Techniques & Technologies, the Department of Power & Equipment, the Department of Production Management, and the Administrative Office.

The sub-process of these functional units and the plants are also clear at this stage. For example, the technique improvement process of the Department of Techniques & Technologies, the equipment maintenance process of the Department of Power & Equipment, the production plan making process of the Department of Management. The achievement and action of these processes would constitute the indicators for the various departments and plants, which can be measured through quantity, quality, time, cost, and safety, or through 3E system. These perspectives can be seen as the base and starting point to form the indicators for the various departments and plants. If it is necessary to design appraisal indicators for further internal operation units of a department or a plant, these sub-processes can be further broken down. For example, the production process of the Welding Plant can be broken down into secondary sub-processes as shown in the following figure (Figure 6.8):
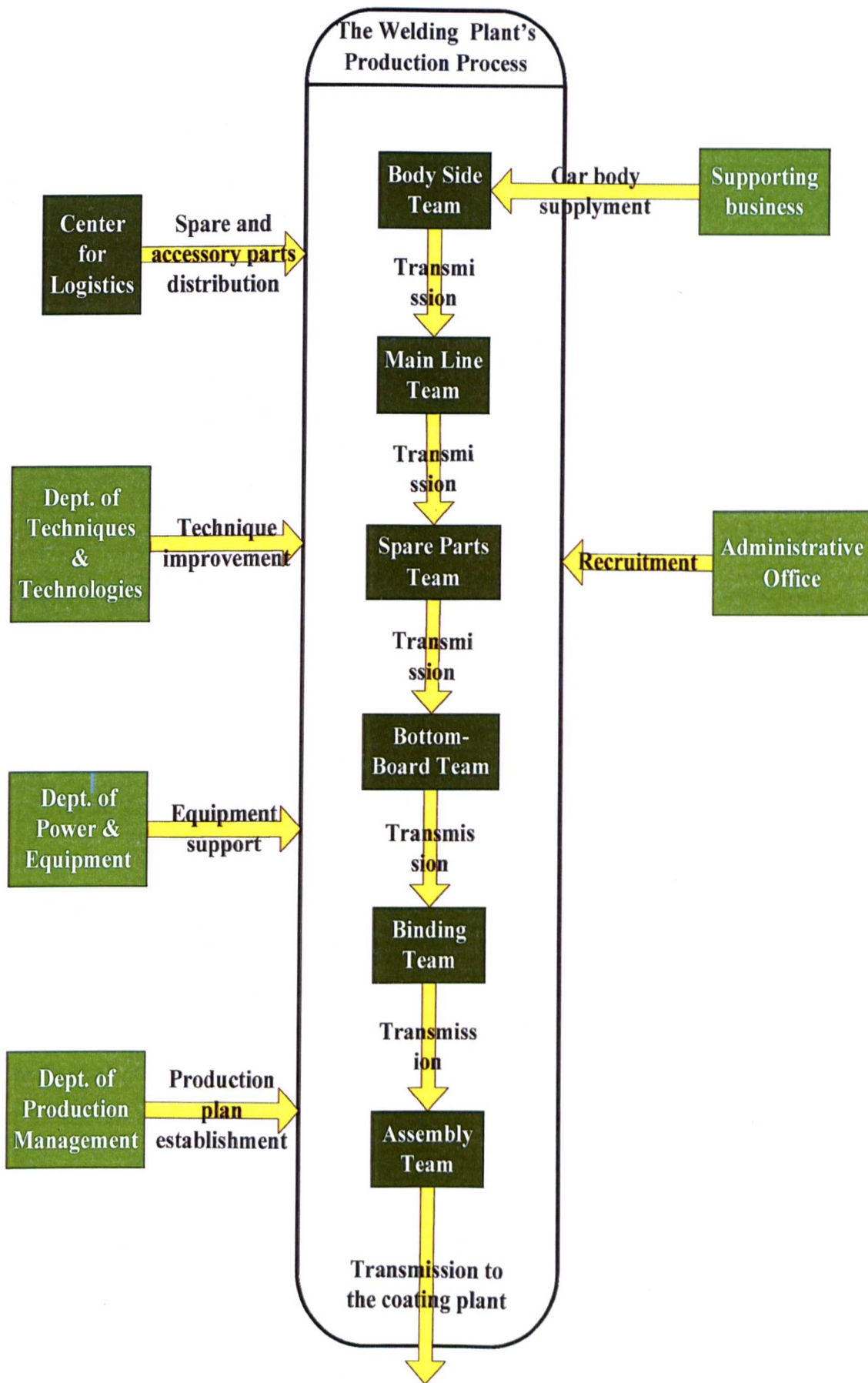
Figure 6.8: The welding plant's production process

6.4.3 Phase III

At Phase III, the processes had been broken down to second-level processes. And then the contribution of each second-level process to the 4 primary performance indicators could be measured through the 5 perspectives of quantity, quality, cost, time and safety. Thus the ultimate performance indicators system could be worked out, and the targets for those sub-processes could be exploited as the standards of the indicators. Then the consulting team discussed the indicators with the managers of relevant departments, and decided the most essential and feasible indicators. Finally, the KPIs for each department or plant and their managers were established. In Zotye Auto's performance management project, the KP and KPI for the departments and their mangers were the same.

Here we take the Department of Purchasing & Supply and the Administrative Office as an example to demonstrate how the indicators for departments are formed with respect to the output process (Figure 6.4).

The task of the Department of Procurement & Supply for the output process (first-level process) is to purchase vehicle parts (second-level process) to satisfy the demand of production. Then the purchasing process can be measured from the five perspectives of quantity, quality, time, cost and safety to see how the process affects the overall output: from the quantity perspective, the Department of Procurement & Supply should purchase adequate number of vehicle parts to meet the demand of the production lines; from the perspective of quality, the quality of the vehicle parts that the Department of Purchasing & Supply procures should not affect the production; from the perspective of time, the vehicle parts procured should be in place in good time, and should not cause any delay in production; and from the perspective of cost, the purchasing cost should be cut down, but should not affect the production directly. In this sense, the quantity and the timeliness of the purchasing process directly contribute to the timely fulfillment of the overall output target. Consequently, "the indicator of timely fulfillment of the purchasing plan" measures the two perspectives of quantity and timeliness; "the indicator of vehicle parts quality" measures the perspective of quality. The consulting team used a quantifiable measurement to

measure the indicator of timely fulfillment of the purchasing plan, i.e., "the monthly average stock-out rate of each type of parts multiplied by the average stock-out days". After discussing them with the manager of the Department of Procurement & Supply, these two indicators were established as the KPIs for the manager of the Department of Procurement & Supply.

The Administrative Office's relevant work tied to the output process (first-level process) is recruiting workers for various tasks for the production lines (second-level process). From the perspective of quantity, the number of workers recruited should meet the demand of the production lines; from the perspective of quality, the qualifications of the recruited workers should conform to the requirements of the Plants. Otherwise, it would affect the output; from the perspective of timeliness, the recruitment should be performed timely to meet the demand of production; from the perspective of cost, the recruiting cost should be controlled properly, but the cost would not affect the production directly; from the perspective of safety, the recruitment generally would not concern safety, so it can be ignored. And thus the two perspectives of quantity and quality were integrated into one indicator, i.e., "the fulfillment rate of the recruitment plan in good time", which could be measured with a more specific measurement, which is "the number of worker in shortage in plants and departments"; if the quality indicator was measured by whether the qualities of the recruited staff conform to the requirements of the plants, the measurement would not be quantifiable. Therefore the consulting team exploited a more specific measurement, "percentage of automobile production vocational school graduates of the recruited staff", "percentage of senior high school graduates of the recruited staff", and "drop-out rate of the recruited staff in the first three months". After discussing with the director of the Administrative Office, those indicators were established to measure performance of the Office director.

The performance appraisal system of Zotye Auto's department heads comprises two parts:
1. KPI;
2. Job responsibility performance indicator.
The weighted score of the two type indicators forms the ultimate performance score.

The performance appraisal indicators of job responsibility, which were based on Zotye Auto's Post Instruction Booklet, were formulated through summarizing the duties and the specifications of task. Generally speaking, the majority of the indicators are qualitative, and different scoring standards were assigned to different indicators. The direct (and indirect) supervisors evaluate the appraisee by scoring his/her day-to-day performance.

6.4.4 Phase IV

Phase IV is for performance plans. A good performance management system should make employees at various levels aware of the organization's targets and strategies, and motivated effectively. Their performance should be monitored closely, and guided by the supervisors. All the above mentioned functions were to be designed in the fourth phase. A good performance plan allows formal and informal communication and negotiation between the higher and the lower levels in an iterated top-down and bottom-up manner for several times to achieve a consensus on a performance plan. Also according to the performance plan, the performance planning system will monitor the KPs and the KPIs, and process the data collected and aggregated to form a picture of the state of the performance of the organization or individuals.

In Zotye Auto's project, the works for this phase were not conducted in strict conformity to the requirements of performance planning, as Zotye Auto's former performance management was only performance review and the contents reviewed were too simple. The promotion team decomposed the task targets to form systematic KPI through the BSC. Modern holistic performance management with KPI is a new start for Zotye Auto, and majority of the managers do not have the concepts and knowledge for modern performance management. In this case, the modern performance management would harm the enterprise, if it was implemented in a full scope at the first attempt. Consequently, the promotion team advocated building and conducting the performance management system step-by-step.

6.4.5 Phase V

In the fifth phase, we suggest how the results of performance measurement would be employed to make performance feedback or organizational response in the form of reward or penalty in due time (normally, half a year, or a year). Generally, the feedback or organizational response will be made by the human resources department. The consulting team made some suggestions on Zotye Auto's remuneration system. For example, 30% of the annual salary as a bonus for the middle-level management is a proper organizational response to the results of the KPI performance appraisal.

6.5 Performance management manual

The Performance Management Manual is the complete document of performance management system handed over to the top management of Zotye Auto when the performance management project was finished.

The complete set of performance management manuals consists of 11 booklets, including the general regulations, the manuals for each functional unit and the plant.

The booklet of general regulations for performance management includes the following information:

1. The purposes, concepts, and principles of Zotye Auto's performance management;

2. The organizational relationship and the responsibility division for Zotye Auto's performance management, i.e., with respect to performance management, what are the responsibilities of Zotye Holding Group, the top management of Zotye Auto, the Department of Human Resources Management of Zotye Holding Group, Zotye Auto's Administrative Office, Zotye Auto's departments, and Zotye Auto's plants;

3. The requirements and contents of Zotye Auto's performance management cycle, i.e., the requirements and contents for performance planning, for performance tracking and mentoring, for performance appraisal, and for performance feedback;

4. The purpose, function and principle of Zotye Auto's performance appraisal;

5. The appraisees, the indicator categories, the indicators for employees at all levels, the indicator breakdowns, application scope, appraisal characteristics, appraisal approach, and appraisal duration of Zotye Auto's performance appraisal;

6. The target values and the weights for the indicators of Zotye Auto's performance appraisal;

7. The specifics and the specific processes of Zotye Auto's performance appraisal;

8. The significance, the conditions, the forms, and the treatment processes of Zotye Auto's performance appraisal;

9. The use, storage and access to the files for Zotye Auto's performance appraisal;

10. The regulations for the implementation and modification, performance appraisal indicators adjustment, and implementation time of Zotye Auto's performance management system.

The contents of the booklets for Zotye Auto's departments and plants include:

1. The specifics and the scoring rules for the KPIs of each of Zotye Auto's department or plant;

2. the specifics for job responsibility performance indicators for each post of a department or plant;

3. The computing method of the overall score of performance of each appraisee;

4. Various forms: employee service attitude complaint form, employee learning and growth indicator scoring form, the performance appraisal scoring standard.

Chapter 7

Case Study of

Beijing Tonsan Adhesives Inc.

7.1 Background & overview of Tonsan project

Upon the invitation of Beijing Tonsan Adhesives Inc. (Tonsan), Kent Performance Management Construction Team started a performance management system development project for it in December, 2008. The objective of the project is to diagnose Tonsan's current performance management system, and improve and perfect the system on the basis of the diagnosis and help implement the improved system. Beijing Tonsan Adhesives Inc. is a high tech-company with its own marketing, research and development, production, logistics, purchasing and management teams, and thus its performance management system is rather complicated.

In the diagnosis, the consulting team conducted extensive interviews with Tonsan's employees at various levels, on-site investigations and thoroughly analyzed the investigations and interviews. On the basis of the investigations and analysis, the consulting team planned the steps to construct Tonsan's performance management system with the processes discussed in Chapter 5. In line with that performance management framework, the consulting team proposed a preliminary improvement plan for performance measurement and management process on the basis of the BSC and SSM CM.

In Chapter 6, we have systematically discussed the five practical steps we developed. Those steps were also employed in the performance management system development project of Tonsan. However the specific tasks for some steps were very different, as Tonsan's circumstances differ vastly from those of Zotye Auto.

The tasks for Phase I are roughly the same as those in Phase I of Zotye Auto project. The consulting team tried to collect as much information as possible, and at the same time set up the performance management system construction promotion team (promotion team, for short) made up of the key stakeholders of the enterprise. The promotion team communicated and discussed with Tonsan's top management about the circumstances of Tonsan's performance management system and their understanding of performance management. The promotion team would need to interview with stakeholders and consult relevant documents and materials.

The goal of Phase II was to achieve consensus on the organizational objective, the strategy, and the core operation processes, with the key stakeholders, and then decompose the strategy. In this phase, the promotion team used a different method from that employed in Zotye Auto project. The organizational strategy was displayed in a complete strategy map, which was vastly different from Zotye Auto's, due to the fact that Tonsan has its own marketing, research and development, production, logistics, purchasing and management systems. The strategy map of Tonsan is much more complicated than Zotye Auto's. On the other hand, the consulting team firstly constructed the SSM CMs for the elements on the strategy map, and stressed the optimization of processes and organizational structure. This was different from the practices in Zotye Auto project in which we directly linked the current operation process to the organizational strategy and the various departments (see Chapter 4 for relevant discussion). Then we identified the driving operation processes which were critical to the success of the various tasks in SSM CM. Those driving processes were normally performed by one or several departments. In this way, the organizational strategy was more effectively decomposed to various departments, and the key management aspects or elements supporting the organization strategy were made clear at the same time. In Zotye Auto project, we identified the current operation processes which were critical to the realization of the elements in the strategy map. The primary reason that these two different modes were employed is that Zotye Auto's organizational structure and management tasks are relatively simple, while Tonsan has full-fledged functional units and rather meticulous management system.

In Phase III, Zotye Auto's promotion team constructed the KPIs from the five perspectives, which are quantity, quality, time, cost and safety respectively, on the basis of the breaking down of the target and tasks to the middle-level management, communicated with the managers of the departments, formulated the feasible indicators, and finally developed the complete KPI system for department managers. Tonsan has higher managerial skills and greater enthusiasm for performance management on the top management. Tonsan's promotion team decomposed the target and tasks with SSM as its core method, so the ultimate performance indicator system was based on 3E indicator theory discussed in Chapter 4. According to the SSM models, the promotion team firstly sorted out the KPs, and then developed the KPIs for Tonsan's department and the department managers. The KPI and the KP

constituted the foundation of Tonsan's performance management.

Generally speaking, the employees at various levels should understand the organizational targets and the strategies, and be effectively motivated. The staff performance should be monitored, and guided and facilitated appropriately by the supervisors. The performance planning system allows formal and informal communication and negotiation between the higher and the lower levels reiteratively in a top-down and bottom-up manner for several times to achieve a consensus on a performance plan. One of the objectives of the performance planning system is to build an effective bi-directional communication channel between the lower levels and the higher levels. Generally speaking, performance planning is liable to become a mere formality due to the difficulty in prescribing the specific contents of the communication and discussion in performance plans. But the performance planning system the consulting team designed is based on the KPs and KPIs which had been abstracted in the last phase, and thus the contents for the communication and discussion are more specific and systematic. Consequently, the performance planning system gained the approval of Tonsan's management. In Zotye Auto's project, the consulting team only conducted lectures of basic concepts of performance plans for its top and middle-level managers by several times, and gave no suggestions regarding to implement full performance planning system. On the contrary, Tonsan's top management has ever since spared no efforts to strengthen modern management education, and thus has relatively higher managerial skills. Modern management concepts are not new to the management, so Tonsan's management is well prepared and equipped with the necessary skills to implement a full performance planning system.

Tasks of the fifth phase are very similar to those in that phase of Chapter 6.

The specific tasks of Tonsan's performance management system construction project will be detailed below.

7.2 Introduction to Tonsan

Beijing Tonsan Adhesives Inc. was founded in 1993. Tonsan is a Chinese high-tech enterprise, specializing in the R&D, production, sales and service of engineering adhesives. Tonsan has several hundred products covering 7 categories: cyanoacrylate, anaerobic, α-cyanoacrylate, epoxy, silicone, polyurethane, and modified neoprene. Tonsan has strong R&D teams and a marketing and service network extending to large & medium-sized cities in China. Tonsan adhesives Inc. is now globalizing with tens of worldwide agents, and Tonsan's products are widely used in automobile industry, construction machinery, photovoltaic solar industry, railway, ship building, metallurgy, oil chemical industry, power plant, foundry, electronics, and electronic appliances, and others. In its 14 year history, Tonsan has undergone 4 stages of development roughly: (1) Founding Stage (1994-1996); (2) Development Stage (1997-2000); (3) Initial Specialization Stage (2001-2005); (4) Specialization Stage (2006-2010).

7.2.1 Tonsan's mission, vision, values and overall targets

Tonsan's mission is to make machinery operate more safely and more reliably.

Tonsan's vision is to build Tonsan into a more creative and more competitive engineering adhesives multinational in 2033. This ambition will be achieved in 3 steps:
(1) the first brand of engineering adhesives in China in 2013 at the 20th anniversary;
(2) the biggest industrial market share in China in 2023 at it's 30th anniversary;
(3) one of the most globally famous brand of engineering adhesives in 2033 at its 40th anniversary;

The values Tonsan cherishes are honesty and responsibility, continual innovation, high-quality products and services.

Tonsan's overall targets for 2008-2010 is to to take the preparatory work to get Tonsan listed in the securities market as the opportunity to build Tonsan into the most specialized engineering adhesives provider in China by strengthening Tonsan's

corporate governance, improving its corporate regulations, and enhancing its competitiveness.

7.2.2 Setting operation target

Tonsan is a private high-tech enterprise, established by 4 partners who equally hold all the shares, and the board of directors is also the 4 shareholders.

After a meeting of the board in October, 2005, Tonsan made clear its target market and made specialization as its development direction. Tonsan has profit as its target and seeks long-term sustainable development to become "a big fish in a small pond". In July, 2007, at its shareholders meeting and the meeting of the board of directors, the shareholders and the board of directors unanimously agreed to improve corporate governance, and make the company go public in 3-5 years. They decided to take the process of making the company go public as the opportunity to strengthen corporate governance, improve the corporate regulations and enhance its comprehensive competitiveness, so as to develop Tonsan into the most specialized engineering adhesives provider in China in 2010. It was at that meeting that Tonsan shaped its business plan for 2008-2010.

Based on Tonsan's annual operation targets, all the departments come up with their own preliminary annual targets and targets for different stages in terms of the breakdown of the operation target. After the discussion and approvals of the president's and the directly responsible shareholders', the departmental preliminary targets will become their ultimate targets for the departments for the year. The departments will then break down their departmental targets to employees as their respective targets. Tonsan and the departments will review and discuss their targets every half a year, and the board of directors will adjust Tonsan's target in accordance to the circumstances inside and outside of the company.

7.2.3 Corporate target for 2008-2010

1) Sales target: RMB 0.236 billion (after tax) in 2008; a sales increase of not less

than 30% in 2009 & 2010;

2) Market share and customer satisfaction: the biggest market share in loading machine, photovoltaic and machinery industries in China; Customer satisfaction surveys twice every year, and customer satisfaction will be greater and equal to 80%;

3) Research & Innovation: building a 30-person R&D team; gaining a lead of technology in Silicon, Healant, Oxidized Rubber, PSU, MS, Industrial Detergents in China;

4) Production & Construction: Completion of 5S (SEIRI, SEITON, SEISO, SETKETSU, SHITSUKE), annual productivity increases by 25%; completing the construction of No.3 plant;

5) Profitability and payment collection rate: annual net profitability not less than 30%; collection rate not less than 90%;

6) Corporate governance & development: completion of corporate governance tasks and the preparatory work for company going public; employee satisfaction will be greater and equal to 80%.

7.2.4 Organizational structure

There are altogether 4 shareholders for Tonsan, and they are respectively the legal person and chairman of the board, the CEO and president of the company responsible operation and management, and the vice president responsible for construction, R&D, and the director of the strategy committee (DSC).

Tonsan's significant operation and management decisions are made through communication and discussion of the 4 shareholders. The president and the vice president are responsible for routine operation and management. Tonsan is divided into 3 systems and some units directly under the company: the purchasing and

marketing system comprising the Sales Department (the Sales Department instituting Channel Development Division, Business & Sales Division, and Regional Sales Division and others), the Marketing Department, the Technology & Engineering Department (including an Automatic Adhesive Application Division), the International Marketing Department. The production and supply system comprising the Purchasing & Planning Department, the Production Department, the Equipment Department. The human resources and the administrative system comprising the Department of Human Resources, the Department of Administration and Properties, the Department of legal Affairs, and the units directly under the company: the Office for President (to be established), the Office for Construction (to be established), the R&D Department, the Finance Department, the Quality Assurance Department, and the Information Management Department. One chief officer is instituted for the 3 systems respectively.

Tonsan's organizational structure is as follows (Figure 7.1):

```
                          ┌──────────────────────┐
                          │    Board Chairman    │
                          └──────────────────────┘
   ┌──────────────────────────────┐
   │ Director of Strategy Committee│
   └──────────────────────────────┘
                          ┌──────────────┐
                          │     CEO      │
                          └──────────────┘
          ┌───────────┐              ┌──────────────────────────────────┐
          │    CTO    │              │ Representative of the Management  │
          └───────────┘              └──────────────────────────────────┘
     ┌────────────────────────┐
     │ Deputy General Engineer │
     └────────────────────────┘
```

Chief Officer of Marketing		Chief Officer for Tech. Center	
Vice Sales Manager – North of China	**Vice Sales Manager – South of China**	**Executive Administrative Manager**	**Assistant**
Deputy Manager of Sales in Electronic Industry	**Manager of Marketing Dept.**	**Manager of Product Management Department**	**R&D Manager**
	Manager of Intl. Marketing	**Engineering Lab**	
		Chief Technology Support Expert	
Manager of Sales Channels Division	**Shanghai Office for Marekt & Tech.**	**Manager of Adhesive Application**	**Manager of Information Dept.**

Chief Officer of Supply Chain		Chief Officer of Administration & Human Resources	
Manager of Purchasing & Planning Dept.	**Manager of Production Dept.**	**Human Resources Dept.**	**Manager of Administration & Properties**
	Officer in Charge of Equipment	**Legal Affairs Dept.**	**Warehousing & Logistics Dept.**
Manager of Finance Dept.		**Manager of Quality Assurance Dept.**	**Office of Construction**

Figure 7.1: Tonsan's organizational structure

7.2.5 Main Functions of Departments

The main functions of all the departments of Tonsan are described in Table 7.1:

Table 7.1: Main functions of Tonsan's departments

Departments	Main Functions
Sales Dept.	According to the development strategy of Tonsan, collect and sort out market information to support the management's decision-making for the overall development planning, draw up and carry out the marketing strategy and the sales plan, manage customers effectively to guarantee the fulfillment of the company's operation targets.
Sales & Business Dept.	Ensure the approval and fulfillment of the contracts and orders of the customers in accordance to the indicators of Tonsan's quality management system; serve the customers and satisfy their needs; ensure the normal collection of Tonsan's receivables.
International Trade Dept.	In line with Tonsan's development strategy and marketing plan, expand the exporting of Tonsan's products; import the raw materials, equipment and spare parts to meet the needs of Tonsan's production.
Tech. & Engineering Dept.	Provide the customers (including regional sales managers and dealers) with professional solution to adhesives application, and technical support.
Marketing Dept.	Product promotion in various industries and product management: Categorize customer demands and cognitions through surveys and investigations to select Tonsan's advantageous market segmentation; carry out marketing planning with an emphasis on 4Ps; gain more profit and more market share and build a good brand image through scientific product planning and sales promotion campaigns.
R&D Dept.	Work out program development plans and organize the implementation in accordance to Tonsan's technology and product development plan; responsible for the technical training and commercialization of the programs.
Production Dept.	Track and study the advanced technologies and management concepts of the industry, employ and popularize the application in Tonsan, and build and improve Tonsan's production management system, efficiently utilize the materials and equipment to produce cost effectively and safely through scientific planning and

	coordination, and employee training and reasonable production organization.
Purchasing & Planning Dept.	Purchase and supply various equipment and materials for Tonsan's production, research and development activities and normal operation and responsible for stock and warehousing management (excluding Tonsan's finished products).
Equipment Dept.	Manage and maintain Tonsan's buildings, infrastructure, utilities, equipment, and working environment effectively to ensure smooth production and operation.
Quality Assurance Dept.	In line with Tonsan's strategy, targets and the requirement of production and operation, assist, coordinate and conduct routine work prescribed by the quality management system; manage Tonsan's product globally to meet customers' demands; organize and implement product quality check and test, process control and improvement; supervise and inspect, so as to implement Tonsan's quality policies, and achieve Tonsan's quality target in collaboration with relevant departments.
Information Dept.	Track and study the advanced concepts and technologies for management informationization, and utilize and popularize them in line with Tonsan's business characteristics and development trend; build, integrate and improve Tonsan's information system and management system, and provide IT support and solutions to facilitate Tonsan's strategic development, increase operation effectiveness, enhance work efficiency and guarantee the quality of product and services and cut down the operating cost.
Finance Dept.	Responsible for Tonsan's corporate financial management and internal control, and fund Tonsan's operation to achieve Tonsan's financial target in line with Tonsan's operation targets and the industrial accounting regulations.
Human Resources Dept.	Manage Tonsan's human resources to support and guarantee Tonsan's development effectively in accordance to Tonsan's regulations and the requirements of Tonsan's corporate culture.
Administration & Property Dept.	Provide Tonsan with good logistics services.
Legal Affairs Dept.	Provide Tonsan with support in the respect of legal affairs.

7.2.6 Introduction to Tonsan's performance management systems

Tonsan employed different performance management systems before and after 2008. We call the performance management system used before 2008 the former, and that after 2008 the current performance management system.

a) The former performance management system

Performance targets and indicators setting

Tonsan's former performance management system was used to measure the performances of the top and the middle-level executives. The performance appraisal plan was shaped through discussions among the top managers, the Human Resources Department, and the appraised Departments. The performances and the services of the appraised departments were reviewed and the Human Resources Department was responsible to record and write reports for the top managers' reference. Rewards and penalties were meted out on the basis of the performance appraisal results. In drawing up the performance indicators and the relevant targets, the appraisees would first set up the indicators and targets for themselves, and then after the negotiation with and approval from the responsible shareholders or the supervisors, the indicators and targets agreed to or modified would become the ultimate appraisal indicators and targets for performance appraisals. Those performance indicators were of quantitative and qualitative categories, the qualitative targets being setting up with reference to the routine and daily work and duties of various departments and posts.

Appraisal method

Qualitative appraisal was primarily rated by the leaders in charge on the basis of their subjective judgment with a full score of 100. It mainly reflected whether the work processes were performed, but was not easy to measure what the quality was and what the effects were of their services on the fulfillment of Tonsan's overall strategic targets. For example, the performance appraisals of managers of various departments were mainly qualitative appraisal based on their routine work, which were not necessarily

relevant to Tonsan's overall targets. Quantitative indicators were predominantly employed in the Sales Department, the Production Department and plants, which account for certain percentage of the entire appraisal to measure the status of achievement of the pre-set quantitative indicators. For example, there were qualitative and quantitative appraisals for the sales manager, including sales indicators (quantitative), sales force building (qualitative), and market development (qualitative) and so on, where the quantitative indicators accounted for a large proportion of the appraisal.

Motivation plans

Apart from the bonuses to sales people, Tonsan appropriated for a manager a sum of fund equivalent to a certain proportion of the yearly salary of the top and middle-level manager as the bonus base. The top and middle-level managers were rewarded in accordance to their appraisal results. The calculation method was: a manager's year-end bonus = the percentage score of his performance appraisal of the manager X the manager's yearly bonus base number; the appraisal results did not affect the top and middle-level managers' salaries. Tonsan would reward those staff or departments winning outstanding performance appraisal results with overseas travel as an extra.

The performance appraisal of and bonus for the sales people were primarily linked to the status of achievement of the sales targets, with proportional and no upper limit commissions rewarded to the sales people. But the sales targets were, to a large part, put forward by the Sales Department itself and then with the approval of the top management. Whether the sales target could be achieved depended, to a larger extent, on the difficulty of achieving the target and the natural increases of different markets, and thus had great uncertainties, but did not necessarily have a direct relationship with salesperson's efforts.

b) Current performance appraisal system

At the beginning of 2008, Tonsan attempted to design a performance indicator system by decomposing quantitative KPIs to the 3 levels: the company, the departments and the individuals using a one-tier BSC framework on the basis of Tonsan's strategic

targets. The final appraisal system combined the KPIs with qualitative indicators for special tasks to form following performance appraisal method:

Target System

1) Company-level Target: break down Tonsan's overall target to 4 aspects in line with the BSC thinking;

2) Department-level Target: either the breakdown of Tonsan's overall target to the department, or target and improvement desired for the departments;

3) Post target: sub-breakdowns of the above targets to an employee and targets for self-improvement and development;

Indicator Category: Quantitative indicators and qualitative indicators

1) Quantitative Indicators: result-oriented KPI indicators;

2) Qualitative Indicators: Process-oriented qualitative special tasks (projects or key tasks)

Appraisal Method and Appraised Period are showed below (Table 7.2):

Table 7.2: Appraisal method & appraised period

Appraisee	Feature of performance appraisal	Method for performance appraisal	Appraised period
Top management	KPI based on business operation and economic returns	KPI measuring; Service review report	One year
Mid-level management	KPI the basis of the fulfillment of strategic target in terms of job qualification	KPI measuring; Service review report	Half a year
Mid-level/ Grass-root employee	KPI and key service appraisal in fulfilling KPIs	KPI measuring; Service appraisal	Season
Operation employee	Departmental KPI breakdown and key service appraisal daily in fulfilling KPIs	KPI measuring; Service appraisal	Daily record reviewing

Appraisal indicator and appraisal method:

Company-level KPI Indicators: they were selected by breaking down Tonsan's overall target and strategy into 4 perspectives of BSC, where the financial indicators were used as the appraisal indicator for the employee's bonus computation coefficient.

Departmental KPI Indicators: Departmental KPIs mainly came from 2 sources, one being the breakdown of the company overall target, and the other being the targets for local enhancement or improvement important for the department. The target values were determined by the following principles:

—Take on the breakdowns in strict conformity, if they were specified in Tonsan's Target;

—Set a target in reference to the last year's real value with an increase added to or to select the appropriate benchmark of the industry as the target, if Tonsan did not specify the target.

Targets for post performance appraisal were the breakdowns of targets at the immediate higher level, the priorities prescribed in the planning, and targets for improvement for the position.

Employee performance appraisal:

Department/Division Managers: the task indicators for department managers adopted the KPIs of their respective departments, with the weights approved by their direct supervisors; their management performance (KPIs + work priorities) appraisals accounted for 30~50%, where the weight of 360-degree assessment was above 20%. Performance appraisal was carried out annually with a face-to-face performance review in the middle of the year.

Staff with Managerial Duties: In appraising those staff, managers were advised to assess their managerial performances with a certain weight (for example, 20~30%); appraisals were conducted annually with a face-to-face performance review in the

middle of the year.

Ordinary staffs (including drivers) were assessed annually with a face-to-face service review in the middle of the year.

Procedures and requirements of Tonsan's performance appraisal

Company-level KPIs: The Strategy & Planning Committee was responsible for drawing up and tracking the implementation the KPIs; the Office for the Board Chairman was responsible for data collection and statistics; the CEO would check and approve the data and the statistics; and the Board Chairman would preside a board meeting to review the progress.

Department-level KPIs: the CEO would break down Tonsan's strategy to departments. The Office for the Board Chairman was responsible for the data collection and statistics. Department managers would check and approve the data and statistics, and the CEO would preside a meeting with the department managers to review the progress.

Employee Performance Target: the immediate supervisor was responsible to break down the target to employees and draw up performance targets for employees. The Human Resources Department would take part in these activities. The staff in charge of data collection and statistics was responsible to collect the performance targets data, hand in these to the supervisor and regularly check the progress (monthly, or every season). The department manager was responsible for these activities.

7.3 Problems of Tonsan's current performance appraisal system and methods

The consulting team had extensive discussion on and in-depth analysis of the main problems of Tonsan's current performance management with Tonsan's management and overseas management experts after analysis of the interviews and on-site investigations on the basis of internationally advanced performance management

theories and practices. Drawing on the results of our discussions, the consulting team summed up six major aspects of problems of Tonsan's current performance management system and performance management methods:

1) Tonsan's performance management system was incomplete;

Tonsan had its regulations for performance management, but they were not systematic or all-around. This state led to the weak oversight of the routine work, and improper rewards or penalties. Even when problems were spotted, they could not be solved timely, reflecting the weak execution of the management. The incomplete performance management system was closely related to Tonsan's previous management style—the low hierarchy of the previous management enabled the shareholders to keep in constant touch and frequently communicate with department managers and even the employees, and thus the decision-making process was direct. To build complete performance management system is now of great urgency, as the management scope and the management hierarchy has gradually increased with Tonsan's development. The previous management style of handling the management affairs personally is now unrealistic, and the management style needs to be improved.

2) The process of decomposing and setting of Tonsan's KPIs needs improvement;

First, Tonsan directly fitted the four perspectives of the BSC into each department to decompose the overall target for department targets, thus setting up the current KPI system. Consequently, the logic between the KPI system and Tonan's overall strategy and target was not clear. The priorities of the strategy were not well represented in the department tasks and targets, and the target breakdowns were not easy to understand, so that it is difficult for some departments to decompose their indicators and targets, and some breakdowns were not closely linked to the tasks of the employees.

Secondly, excessive stress was put on the result-oriented lagging indicators, while the process-oriented leading indicators were not paid due attention.

3) Post responsibilities need to be strengthened in the current appraisal;

The current performance appraisal system changed the previous performance assessment method which used the post responsibilities as the standard of performance appraisal to the performance appraisal of overemphasizing the KPIs and the priorities, but the responsibilities of routine work were not fully included in the new appraisal system. So the resulting performance appraisal system overstressed the result-orientation, and the appraisal of Tonsan's daily work conduct code and the core value of the corporate culture were not paid due attention, which was not suitable to evaluate the circumstances of employees' work in a fair way.

4) The effective bi-directional communication mechanism was not in place, and the managers did not give their subordinates adequate guidance;

Some of Tonsan's executives did not pay adequate attention to guiding their subordinates in the process of carrying out the performance management. Managers did not communicate sufficiently with the employees, and did not pay adequate attention to the problems that might arise on the side of the employees in the process of drawing up and implementing the performance plans. The most cases were that the managers would mete out punishment after problem arose, which doubtlessly hurt the morale of the employees.

5) Frontline employees lacked the initiative and the awareness to participate in the performance management;

Tonsan did not offer systematic performance management training to the middle-level managers and the employees, and lacked relevant tools and follow-up assessment procedures for training effectiveness. The long-term communication mechanism for performance management between the managers and the employees was not in place, and the managers did not give adequate guidance to the employees. Consequently, the frontline employees lacked the awareness to participate in the performance management and thus played a rather passive role in executing their work plans.

6) Some of the work processes need to be further optimized;

The internal processes in the production plants and the linkage process for the R&D Department and the Sales Department needed to be further optimized to meet the needs of Tonsan's development. The production processes needed to be optimized in its entirety, and the monitoring and guiding system for the production process was in an urgent need to be put in place. The technical training for the frontline employees and the appraisal system for them needed to be improved.

7.4 Improvements in Tonsan's performance management

The consulting team sought to improve and build Tonsan's performance management system on the basis of the practical steps for performance management projects developed in Chapter 5. In the implementation of the project, not all the tasks prescribed in the framework were carried out due to the limitations of Tonsan's conditions and circumstances.

7.4.1 Phase I

In this step, we, as the commissioned external consultants, tried to collect much information and data for a clear picture of Tonsan, and helped to establish the performance management promotion team, which consists of Tonsan's key stakeholders. We interviewed with Tonsan's decision-makers, discussing Tonsan's mission, its main long-term targets, and its development strategies in full detail. The specific contents introduced in Sections 7.2 and 7.3 were actually the tasks we performed in this step. Here some further descriptions were given.

Tonsan's mission statement given by the owners is, "to make machines run more safely and more reliably". Starting from the mission, they thus described its vision, "to build Tonsan into a more creative and most competitive engineering adhesives multinational in 2033". The short-term overall target namely overall objecitve of Tonsan from 2008 to 2010 is to take the preparatory work to get Tonsan listed in the securities market as the opportunity to build Tonsan into the most specialized

engineering adhesives provider in China by 2010 by strengthening Tonsan's corporate governance, improving its corporate regulations, and enhancing its comprehensive competitiveness. The value Tonsan's managers have ever since advocated is honesty and responsibility, continual innovation, high-quality products and services.

So the challenge Tonsan faces now is how to achieve the short-term target developed form its vision. Tonsan has operated in its industry for years and maintained lead in market share more often than not. So it is needless to say that Tonsan has its own advantages. On the one hand, we communicated with the executives and the employees and consulted many materials, files and documents to explore and extract Tonsan's successful development strategies. On the other hand, we attempted to add strategic elements which we believe to be conducive to fulfilling Tonsan's long-term target and vision to their strategies on the basis of the exploration of Tonsan's characteristics. With the above two considerations, we depicted Tonsan's development strategies after achieving a consensus with Tonsan's top and middle-level executives. They are Tonsan's critical works for the fulfilment of Tonsan's overall target:

> Leading with professional and honest sales management;

> Supporting the customers with friendly technical services;

> Guiding Tonsan's development with market research for accurate segmentation;

> Bolstering Tonsan with customer-oriented product research and development;

> Guaranteeing Tonsan's development with timely delivery of quality products;

> Basing Tonsan on the corporate culture of learning, innovation, honesty, and diligence.

The work listed above also serves us as the basis for the formulation of Tonsan's strategy map.

In interviewing with Tonsan's top and middle-level executives, we got to know in much detail Tonsan's business operation processes (there was room and a realistic need for improvement in some processes, although most of them would be directly applied in breaking down of strategy afterwards), the circumstances of the organization (see Section 7.3.1), the organizational structure (see Section 7.2.3), the

current performance management system (see Section 7.3.1) and the expectations of Tonsan's executives and employees.

Tonsan satisfies the conditions for a classic organization, and is a full-blossomed enterprise with its functional units involving production and operation, marketing and sales, financing and auditing, logistic management, product research and development, and so on. Consequently, the organizational structure and the operational processes are complex, with room for improvement and adjustment in some parts of the organizational structure and some of the processes. Furthermore, it would be difficult to plan the specific points for negotiation and communication in performance planning, and thus performance planning would be reduced to formalities, if the BSC technique was used directly as described in Chapter 6. Tonsan's performance planning, however, was one of the areas where improvement was urgently desired. In view of this fact, the promotion team believed that it was necessary to adopt SSM to . decompose the strategy on the second tier, recognized the necessity to optimize the organizational structure, management and the operation processes, and would adjust them as the circumstances allowed. The work for these will be discussed in more detail in Phase II.

The process of interviewing with the top and the middle-level executives also served as the training of modern performance management concept for them, which facilitated them to gain an all-around and systematic understanding of the modern performance management, expand their horizons and exchange their experience. We also had casual communications with some employees in functional units and the production frontline.

7.2.4 Phase II

Strategy Map

In this phase the promotion team decomposed the strategy after the consensus on the organizational objectives, the development strategy and the core operational processes. The breakdown of the strategy can be carried out utilizing the BSC and the strategy

map or the SSM as illustrated in Chapter 4, or the BSC combined with SSM, depending on the features of the organization.

Tonsan is a full-blossomed company with all-around functions and business activities. As can be seen from the development strategies we summed up, its structure and operation processes are much more complicated when compared with those of Zotye Auto. In the first phase of interview and investigation, we have found that there is room for improvement in the current operation processes and the organization structure. Therefore, we proposed that process-innovation-oriented SSM be exploited to break down the strategy. In this way, the improved processes and organization structure could be more conducive to Tonsan's development, and the KPs could be derived. However, if the strategy breakdown was carried out by using SSM from the top level all the way to the bottom, the process would be rather complicated with an unbearable workload. As Tonsan was in an urgent need to improve its current performance management system, thus, we utilized SSM to break down each element on the strategy map only, and the breakdown of the lower processes were still implemented in line with the current organization structure and the existing operation processes.

In terms of the company-level strategy map, the strategies for the perspectives of finance, customer and market, internal operation, and learning and growth were all represented in Section 7.4.1. We first drew up Tonsan's BSC strategy supporting map in line with Tonsan's organizational structure, shown in Figure 7.2. The breakdown of the second-level strategy will be detailed later. Here we need to explain a little; usually we draw the strategy map with the BSC to represent the strategy of the organization (detailed in Chapter 6). For Tonsan, we could have represented the strategy directly with the BSC & strategy map, but for a more graphic view of Tonsan's organizational strategy, we made a new representation of Tonsan's strategy, which did not change the principles of the strategy map, but helped us better understand Tonsan's strategic priorities.
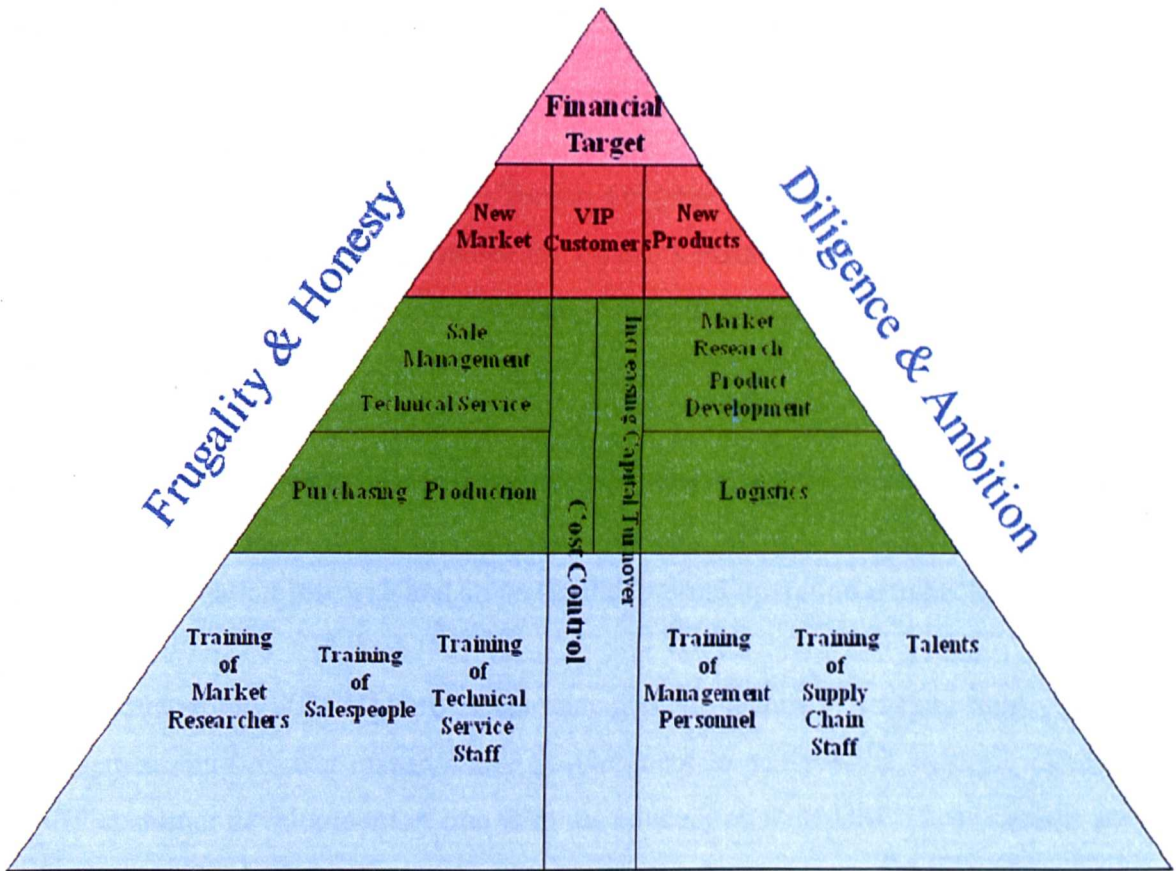
Figure 7.2: Tonsan's BSC strategic supporting map

Here it is clear that: Tonsan emphasizes the shareholders' interests, which is directly reflected in the emphasis of the financial target in the map. As to the fulfillment of the financial target, Tonsan's top executives think: they should set new market, VIP customers, and new products on the customer perspective as the priorities, while sales management, technical support service, market investigation, product research and development, production management, logistics management, and management of purchasing jointly support the three elements. Training of various employees at the learning and development perspective promotes highly efficient internal operation. Besides, Tonsan's corporate culture of Diligence and Ambition, Frugality and Honesty, and Learning and Innovation should be practiced throughout the operations of the company.

Specifically, Tonsan stresses two points in the financial perspective—increasing profitability and capital turnover, which are realized primarily through raising sales income and cutting costs to increase profit.

In the perspective of customers, the following three strategic priorities should be stressed:

● VIP customers: the foundation for tonsan's survival;

● New market: the prerequisite for Tonsan's expansion; and

● New products: the basic guarantee for Tonsan's sustainability.

Based on the logic of the strategy map, these three priorities in perspective of customer is the foundation of achieving the financial objectives.

The first strategic priority in the customer perspective is developing VIP customers, and the relevant work involves sales management, technical service, supply chain management, market research and so on (in the internal operation perspective).

We constructed the SSM CMs for sales management, technical service, supply chain management, and market research and development to achieve the strategic element of VIP customer development in line with the concept of SSM CM. These models are not rigorous SSM CMs, but task sets based on the concepts of innovation and optimization of SSM, which were approved by Tonsan's top executives after repeated discussions, see below:

The relevant main tasks of sales management supporting the strategic element of VIP customer development involve:

● Building of professional sales force;

● Cultivation of integrity and honesty;

● Understanding customers' needs;

● Development of new VIP customers; and

● Management of sales channels.

The relevant main tasks of technical service supporting the strategic element of VIP customer development involve:

● Understanding customer needs and providing technical solutions to their problems timely;

● Providing all-around and professional technical solution to customers;

● Assisting VIP customers to innovate their techniques, persuading them to use more Tonsan's adhesives to raise the productivity of VIP customers;

- Solving problems in collaboration with relevant internal units; and
- Developing training programs for customers and relevant internal units.

The relevant main tasks of supply chain management supporting the strategic element of VIP customer development involve:

- Achieving comparatively higher production quality in the industry through employee training, optimization and standardization of production processes, and process control;
- Increasing productivity and the efficiency of logistics; and
- Delivering goods timely.

The relevant main tasks of market research and development supporting the strategic element of VIP customer development involve:

- Cultivating Talents and raising the professional level;
- Improving production techniques, and raising product quality and productivity;
- Satisfying VIP customers' practical needs;
- Speeding the development of the products VIP customers demand; and
- Inducing VIP customers to try Tonsan's new products.

The second strategic priority in the customer perspective is developing new market, and the relevant work involves sales management, technical service, supply chain management, market research and so on (in the internal operation perspective).

The priority tasks related to the development of new market but not included in the above-mentioned main tasks in sales management include:

- Development and management of sales channel and direct selling in new market;
- Customer feedback from new market; and
- Launching effective product promotional activities in new market.

The priority tasks related to the development of new market but not included in the above-mentioned main tasks in technical service include:

- Technical training for customers in the new market;

- Fast feedback to technical problems of customers in the new market; and
- Guidance of technical application to customers in the new market.

The priority tasks related to the development of new market but not included in the above-mentioned main tasks in supply chain management include:

- Ensuring product quality; and
- Guaranteeing timely delivery of goods.

The priority tasks related to the development of new market but not included in the above-mentioned main tasks in market research and development include:

- Positioning Tonsan's new market development;
- Researching and developing, and promoting products for new market; and
- Shortening the cycle of research and development of new products, and raising the success rate.

The third strategic priority in the customer perspective is developing new products, and the relevant work involves sales management, technical service, supply chain management, market research and so on (in the internal operation perspective).

The priority tasks related to the development of new products but not included in the above-mentioned priority tasks in sales management include:

- Mastering the knowledge of the new products, and understanding customers' technical requirements;
- Promoting the sales of new products; and
- Relaying customers' feedback on new products to relevant departments.

The priority tasks related to the development of new products but not included in the above-mentioned priority tasks in technical service include:

- Guidance to and training of customers in relation to new product application;
- Trouble shooting for the customers in their new product application; and
- Relaying customers' feedback on new products to relevant departments.

The priority tasks related to the development of new products but not included in the above-mentioned priority tasks in supply chain management include:

- Ensuring the quality of new products; and
- Guaranteeing the timely delivery of goods.

The priority tasks related to the development of new products but not included in the above-mentioned priority tasks in market research and development include:

- R&D personnel familiar with the market to locate the market needs and spot new product development opportunities;
- Shortening the cycle of research and development of new products, and raising the success rate; and
- Promoting customers' understanding and application of new products.

Besides, the cost control management, receivables management and other aspects at the internal operation level of the strategic supporting map are not explored here.

The above CMs were constructed as a result of the discussions of the promotion team and the top and middle-level executives on the basis of their actual practices and after reaching the consensus with the stakeholders.

For the learning and growth perspective, the cultivation of talents is the fundamental work to guarantee Tonsan's long-term development. All the tasks of a company are executed by employees, so the training of employees at various levels and posts is an important part of Tonsan's routine work.

In order to adapt to these new processes, i.e., the new tasks in the CMs, or the tasks to be further stressed, the promotion team put forward some suggestions for improvement, which included some changes of the former organizational structure and management methods.

Table 7.3 summarized the suggestions for improvement.

Table 7.3: Suggestions for improvement

Item	Suggested Project	How	Why
1	Combining Sales Dept. and R&D Dept.	To hunt for a manager who not only has intimate understanding of the market, but also is proficient in product research and development to lead the combined departments	To solve the problem of the poor linkage of the R&D Department and the Sales Dept.—the mutual ignorance of their respective capabilities of the two departments
2	Setting Up Product Management Dept.	To combine a part of the tasks of the former Market Research Department with those tasks concerning product technology of the former Technology & Engineering Department, in order to establish a Product Management Department which will be responsible for product line planning, product operation, and product promotion and play the role of product technical support.	To focus the Market Research Department's attention to market investigation and analysis, market development in important industries, market promotion and publicity, and transfer the responsibility of technical support to a specially established department.
3	Setting up Sales Channel Management Division in the Center for Marketing	To focus on sales channel policy, channel development, channel order maintenance; and channel assessment and other relevant works.	To contribute to develop VIP customers
4	Establishing Warehousing & Logistics Dept.	To combine warehousing activities of raw materials and finished products, and packaging, and transportation to form a Warehousing & Logistics Department to manage warehousing and transporting.	To cut down the warehousing and transporting costs and ensure the safety, timeliness and high efficiency of warehousing and transporting.
5	Defining new market and new product	Unifying the understanding of new market and new product in Tonsan.	To clearly define the indicators in relation to new product and new market included in the performance appraisal system.
6	Linking R&D staff's performance to sales revenue	To set a performance indicator linked the sales revenue of new products to a researcher's developed products.	To encourage R&D staff to dip into the market for development ideas.

7	Optimizing production processes	To carefully optimize the various production process links	To reduce waste arising from the unscientific production process links
8	To make team heads half-full time managers dealing with management issues directly in production activities	To make team heads half-full time managers dealing with management issues directly in production activities.	To give them time to manage the quality of products the employees timely.
9	Setting up piece-work wage system for frontline employees	To practice piece-work wage system for the frontline employees	To raise frontline employees' wages as the production processes optimized and labor intensity increased
10	Assessing the effectiveness of training for frontline workers	To assess the effectiveness of work skill training for frontline workers	To solve the problem of employees' low work skills

Some of the above suggestions were accepted by Tonsan's executives, but some were not for the time being due to Tonsan's circumstances. For example, the integration of the Market Development Department and the R&D Department was not implemented due to the unavailability of a manager who not only has intimate understanding of the market, but also is proficient in product research and development to lead the combined department.

After our discussing with the executives about the feasible process optimization and the management approach adjustment, we needed to further break down the tasks listed in the CMs. As discussed above, we would break down the tasks through Tonsan's existing processes. After determining the existing support processes, which achieve the priority tasks listed in the CMs, we would decompose the indicators in line with the existing support processes, and link the indicators to various functional units and departments.

Take an example, the priority tasks of sales management, which are relevant to VIP customers, include:

- Building of professional sales force;
- Cultivation of integrity and honesty;
- Understanding VIP customers' needs;
- Development of new VIP customers; and
- Management of sales channels.

The entire supporting processes analysis is shown in the following table (Table 7.4):

Table 7.4: The entire supporting processes analysis

Customer perspective	Internal operation perspective	Tasks in conceptual model (2nd level processes)	Existing support process (3rd level processes)	Relevant departments	Internal support process of relevant departments (4th level processes)
VIP customer	Sales Management	Building of professional sales force	Process of training of sales force	Sales Department	Training of sales
				Product Management Department	Training of product technology
				Marketing Department	Training of product promotion
				Human Resources Department	Training of regulations
			Process of introducing market management executives	Human Resources Department	Recruiting top market management talents
		Cultivation of integrity and honesty	Sales force management process	Sales Department	Implementing sales management regulations
		Understanding VIP customers' needs	Sales force management process	Sales Department	Getting information about VIP customers' needs
		Development of new VIP customers	Sales management process	Sales Department	Visiting new VIP customers, analyzing rivals and mastering external environment analysis methods
		Management of sales channels	Dealers management process	Sales Department	Training of dealers
				Channel Management Department	Training of dealers

Process of training of dealers	Sales Department		Training of dealers
	Channel Management Department		Training of dealers
	Product Management Department		Training of dealers
Technology support to dealers	Product Management Department		Product technology support

In the above table, the tasks included in the CMs are defined as the second-level processes; the existing support processes are third-level processes, and the support processes in various departments which are linked to the third-level processes are the 4th-level processes. Included in the process appraisal column for various relevant departments are the 4th -level processes in the above table. It can be seen here both the operation processes and the relevant management processes are adopted for the breakdown of the strategy. Besides, some processes, which have possible optimization room, were considered whether further improvement should be conducted.

7.4.3 Phase III

When getting to the third phase, the promotion team has shaped a set of targets and tasks of the middle-level departments (the 4th-level processes), which stemmed from the strategy decomposition from top to the middle level management. The promotion team chose to measure the performance for the 4th processes by using 3E dimensions (efficacy, efficiency and effectiveness, see Chapter 4 for the details) so as to form the performance indicator system. And the targets to be achieved through the processes were transformed into the targets for the indicators. Then after discussing with the department managers about the indicators, the promotion team selected the most needed and feasible indicators to form the KPIs and KPs for each department and its managers. For Tonsan Project, the KPIs and the KPs for the departments and their managers are the same.

We continue the example (Table 7.4) to discuss the process, which is shown in Table 7.5. The columns of "Relevant Department" and "Internal Support Processes of Relevant Department" follow the contents shown in Table 7.4.

Table 7.5: KPs & KPIs

Relevant department	Internal support process of relevant departments (4th level process)	KPIs for relevant departments	KPs for relevant departments
Sales Department	Working out sales training programs	Number of sales people in service (E1); Passing rate for sales expertise assessment of sales people (E3); Sales Department unit (region or individual): fulfillment rate of sales target (E3); Satisfaction rate of sales people in service with training of sales skills (E3)	Sales force management regulation implementation; Sales training implementation
Product Management Department	Working out training programs of product technologies	Number of sales people in service (E1); Passing rate for product technology assessment of sales people (E3); Satisfaction rate of sales people in service with training of product technologies (E3)	The implementation of training of product technologies
Marketing Department	Working out training programs of product promotion skills	Number of sales people in service (E1); Passing rate for product promotion skill assessment of sales people (E3); Satisfaction rate of sales people in service with training of product promotion skills (E3)	The implementation of training of product promotion skills
Human Resources Department	Working out training programs of regulations	Number of cases of salesmen's violating regulations in the first three months after induction (E3)	The implementation of human resources management regulations and norms

Department	Task	Measures	Implementation
Human Resources Department	Recruiting top executives for market management	Tonsan's 4 major shareholders' satisfaction with the newly recruited market top executive (E3)	None
Sales Department	Sales Department implementing regulations for sales people	None	The implementation of regulations of sales people
Sales Department	Implementing relevant regulations on getting demand information of VIP customers	Number of visits to VIP customers (E1); Quality evaluation of report on visit to customer (E3)	The implementation of relevant regulations on getting demand information of VIP customers
Sales Department	Visiting new VIP customers, analyzing rivals and mastering external environment analysis methods	Number of new VIP customers (E3); Increasing rate of New VIP customers (E3); Success rate of visit to target customer (E3); and Sales revenue to new VIP customers (E3)	Quality of report on visit to new VIP customers
Sales Department	Implementing regulations on dealers	Dealers' satisfaction rating with Tonsan's support (E3); Dealers' satisfaction rating with Tonsan's sales training (E3); Dealers' increasing rate of sales revenue (E3); Dealer's sales target fulfillment rate (E3); Dealer's payment rate (E3); and Receivable collection time (E3)	The implementation of dealer management regulations; The fulfillment of training programs for dealers
Channel Management Department	Implementing regulations on dealers	Dealers' satisfaction rating with Tonsan's support (E3); Dealers' increasing rate of sales revenue (E3); Dealer's sales target fulfillment rate (E3); Dealer's payment rate (E3); and Receivable collection time (E3)	None
Sales Department	Implementing regulations on training of dealers	None	The implementation of regulations on training of

		dealers	The implementation of regulations on training of dealers
Channel Management Department	Implementing regulations on training of dealers	None	None
Product Management Department	Implementing regulations on training of dealers	Dealers' satisfaction rating with Tonsan's training of technologies (E3); Sales Department's satisfaction rating with Product Management Department's training of technologies to dealers (E3)	
Product Management Department	Product technical support	Dealers' satisfaction rating with Tonsan's technical support (E3); Sales Department's satisfaction rating with product management Department's technical support to dealers (E3)	None

The above table shows, from the left to the right, that, first, the relevant departments linked to Tonsan's third-level processes were made clear. Secondly, the 4th-level processes linked to the 3rd-level processes in relevant departments were also determined. Generally, the KPIs developed with the 3E indicator system for each 4th-level processes are quite a bunch, but most of them will not be used as KPI, but as monitoring indicators. The promotion team needs to discuss the KPIs developed by 3E theory with the relevant department's managers over and over again. Modern performance management theory underscores the importance of bi-directional communication, including sufficient communication with the performance appraisees, on the basis of due respect for the appraisee's opinions. Reasonable and feasible KPIs will be selected from the set of indicators developed with the above strategy decomponsation, and finally the KPIs for the department managers will be shaped and the KPs will be determined simultaneously. Starting from this point, the department managers will break down their own KPIs and KPs to the employees at the level next to the managers' as their KPIs and the KP to achieve the KPIs. In this way, the KPIs and KPs for employees at various levels will be derived, and for some of the employees at the grass-root level, KPs may not be determined as their tasks are mostly simple and repetitious matters.

KPIs are mostly result-oriented indicators, while KPs mainly reflect the processes which achieve the KPIs (actually, ultimately the overall objectives). KPs and KPIs are the basis of the entire performance management cycle. Only when the KPs and the KPIs are reasonable, can the performance management be carried out smoothly. Below is an employee's KP and KPI appraisal form (Table 7.6):

Table 7.6: KPIs & KPs form of packaging inspector

Employee ID No.	Name	Post	Department	Appraising period
090086	Liu **	Packaging Inspector	Quality Assurance Dept.	Quarter

KPI appraisal form (KPI)

1. KPI targets (60%)

KPI items	KPI definition	Appraising standards						Weights (%)	Period of data collection	Data providers	Actual results	Score	Explanation about exception
		0	50	80	100	120	150						
KPI1													
KPI2													
KPI3													
Total													

2. KP targets (40%)

KP items	KP description	Expected results	Key strategy and techniques	Indicators for monitor	Weights	Appraising period	Self-evaluation	Supervisor's appraisal
KP1		1) 2) 3)	1) 2) 3)	1) 2) 3)				
KP2								
KP3								
Total								

Targets comfirmed				
Signature of appraisee	Date		Signature of supervisor	Date

The current performance appraisal system replaced the former one which appraised the execution circumstances of the job position duties, but instead overly stressed the appraisal of the KPIs, as it did not include the routine work in the performance appraisal system. Due to the excessive result-orientation of the current performance appraisal system, it could not assess the employee's actual service fairly in an all-inclusive manner.

In view to this inadequacy, we added the non-KPI appraising factors into the new appraisal. The following table (Table 7.7) is the appraisal form of non-KPI indicators for Tonsan's Quality Assurance Department.

Table 7.7: Tonsan's non-KPI appraisal form

Employee ID No.　　　Name:　　　Department: Quality Assurance Dept.　　　Post: Manager

Items	Appraisal indicator	Appraisal requirements	Weight	Rating standard	Self-rating	Remarks	Appraiser	Rating	Remarks
Post duties (50%)	Quality management system construction	Effective operation and continual improvement of quality management system		5.0: up to or superior to the requirements of the appraisal of post duties; 3.5-4.5: essentially up to but still falls short of the requirements of the appraisal of post duties; 2.0-3.0: clear gap between the performance and the requirements of the appraisal; 0.5-1.5: a wide gap between the performance and the requirements of the appraisal; 0: completely fail to satisfy the requirements of the appraisal; *Note: Rating should be round up to an integer or 0.5.*			CEO		
	Product quality management	Quality management of purchased goods, manufactured products, and the market							
	Product Standard	Product standard setting and continual improvement							
	Monitoring and measuring devices	Configuration, purchasing planning, and maintenance of monitoring and measuring devices,							
	Training	Training of quality, safety and environment							
	Lab management	Management of experiment equipment and lab environment							
	Department and subordinates management	Setting up plans and delegating tasks reasonably and fairly, facilitating and aiding subordinates to fulfill the tasks, and recruiting, training, appraising, motivating, promoting and eliminating employees							

			Appraiser	
Employee management & development (20%)	Understanding employees' needs and tapping their potentials	0-5: CEO rates the appraisee in light of appraisee's direct subordinates and CEO's own judgment. Employee's appraising form attached separately to this form.	CEO	
	Employees' career development planning			
	Employees' work target setting, training, helping, and guiding			
	Performance communication and feedback			
	Employees' development and work performance results			
Corporate values (work attitude) (20%)	Integrity and Honesty	Be disciplined: obey the disciplines and regulations; Keep promises: make promises within the limits of Tonsan's regulations, and keep to them; Be open: publicly express one's own opinions, and not conceal or one's own or others' mistakes or errors	5.0: up to or superior to the requirements; 3.5-4.5: essentially up to, but still falls short of the requirements; 2.0-3.0: a gap between the work attitude and the requirements, but can be narrowed through improvement; 0-1.5: a wide gap between the work attitude and the requirements, or completely fail to satisfy the requirements. Note: Rating should be round up to an integer or 0.5.	CEO
	Responsibility	Be responsible: carry out the tasks delegated by supervisors responsibly and conscientiously, and actively take on the tasks that do not clearly fall inside the areas of his or her duties but are relevant to his and her work; Be frugal: come up with creative ways to fulfill the tasks at the least costs for the best results		
	Cooperation and Sharing	Be cooperative and willing to share:		

	Learning and Innovation	Willing to share resources with colleagues and actively aid and support them to fulfill the tasks Actively learn: continuously improve oneself through continuous learning and seek one's progress with a view to Tonsan's development; Make continuous improvement: probe for continuous improvement in working procedures via continuous learning, thinking, and experience refining, and implement and improve the new ways with the authorization of supervisors		
Internal collaboration (10%)	Cross-departmental cooperation	Responsibly manage the resources belong to his own department and actively share with others as the fulfillment of tasks requires; in cross-departmental projects, respect colleagues from other departments and work in unison to achieve mutual targets	5.0: up to or superior to the requirements; 3.5-4.5: essentially up to, but still falls short of the requirements; 2.0-3.0: a gap between the performance and the requirements, but the gap can be narrowed through improvement; 0-1.5: a wide gap between the performance and the requirements, or completely fail to satisfy the requirements. Note: Rating should be round up to an integer or 0.5.	CEO & the other managers 10%
Extra items (±10%)	Point-winning Items	Outstanding service in work	Reward 0-5 points in terms of his actual performance. Note: Rating should be round up to	CEO

		CEO			
					an integer or 0.5.
Point-losing	Obvious error in work	-10%			Subtract 0-5 points in terms of the influence of his error.
Items					*Note: Rating should be round up to an integer or 0.5.*

In the above table, the highest rating is 5 points, and the lowest is 0. It is stipulated that if the rating is less than 2.5 points for an item, an explanation to the reasons is expected. The total score can be standardized into the 100-point system with the formula: $((\sum\text{actual rating of each item*weight})/5)*100\%$.

The non-KPI appraisal comprises the five aspects: post duties, employee management and development, work attitude, internal collaboration and extras. "Post duties" rate a summarization of Tonsan's post descriptions, which assess the fulfillment of the post duties of an employee. "Employee management and development" monitor how the departmental managers consider their subordinates career planning and development, and provide appropriate help and guidance to them. "Work attitude" rating is to encourage the performance appraisee to nurture the values Tonsan advocates, which include integrity and honesty, responsibility, cooperation and sharing, and learning and innovation, they are just the values Tonsan has been keeping during the intrapreneurship history of Tonsan. "Internal collaboration" emphasizes the capabilities to collaborate with internal customers. The "extras" give a consideration to the outstanding service and the obvious errors in work.

The KPI appraisal (including KP appraisal) and the non-KPI appraisal complement each other, and account for different weights of the complete performance appraisal in different departments.

7.4.4 Phase IV

Phase IV is for design of performance planning. For better performance management, employees at various levels need to understand organizational objectives and strategies, and are thus effectively motivated. Performance progress state needs to be monitored, and guided and supervised properly by higher level managers. The performance planning system must enable the supervisors and the subordinates in the hierarchical structure to communicate and negotiate formally and informally. The performance planning system will help planning go through the management top-down and then bottom-up reiteratively several times and then finally reach a consensus of a performance plan. One of the purposes of the performance planning

system is to build effective bi-directional communication among the higher and the lower levels of the management. In this phase, the performance planning system will be employed to monitor the KPs and the KPIs, and then integrate the data collected. Performance planning is liable to be reduced to a mere formality due to the difficulty in preparing the specific contents of the communication and discussion in performance planning. On the other hand, our performance planning system is based on the KPs and KPIs which had been abstracted in the last phase, and thus the contents for the communication and discussion are more specific and systematic. Consequently, the performance planning system gained the approval of Tonsan's management.

The purpose of a performance plan is to analyze what specific tasks must be carried out for the KPs that support the KPIs so that the KPIs can be fulfilled; Next, after sufficient communication between the supervisors and the subordinates, consensuses can be achieved on the specific methods and procedures, including when, in what progress, for what purpose and what task must be fulfilled, what aid from the supervisor and what resources are needed; when the supervisor and the subordinate will have the next face-to-face communication on the circumstances of the fulfillment of the task; and how adjustments in the target, the method and the procedures can be made in accordance with changes in the circumstances. The principle of "no-surprise" should be practiced, that is, the appraiser and appraisee will have no surprise to the final appraisal results: as the long time needed to fulfill the KPIs is segmented into smaller time periods that are tracked, proper aid are provided during the right periods, and thus the supervisor is well aware of the difficulties the subordinate encounters in the progression of his work.

This is a very practical management approach. In terms of modern management theory, the supervisor should not release himself from the duties of monitoring the progress, after setting up the KPIs and targets for the subordinate, and wait for measuring at the ending point of the performance cycle the KPIs which were set up at the starting point of the cycle. On the contrary, these concepts of sufficient communication between the supervisor and the subordinate, full knowledge of the subordinate's tasks and their progresses on the part of the supervisor, and the subordinate's being clear about the supervisor's possible aid and guidance conform to

the modern management theory, and contribute to fulfillment of the collective performance driven by individual performance.

Of course, this management approach calls for higher quality and managerial skills on the managers. The performance plans in a face-to-face manner with the subordinates will burden the supervisors with more pressure, but this can also improve the messy state of the management work. This approach can release the managers from the complicated yet trivial routine work, and input their energy and time into the more important KPs.

We found that the Tonsan's managers are of relatively high quality, and have quite strong power to execute. The shareholders and the top executives have always been promoting performance management passionately. Therefore it is suitable to implement complete performance planning system. The promotion team developed the specific contents (see Table 7.8) for their performance plan for each department and unit at various levels in accordance with the KPs derived in the third phase, and called upon the managers at various levels to implement performance plan agreed upon by both managers themselves and their subordinates, track their subordinates' progresses, provide proper guidance, and keep records of their tracking and guidance.

Table 7.8: KPIs & KPs form of packaging inspector

Employee ID No.	Name	Post	Department	Appraising period
090086	Liu **	Packaging Inspector	Quality Assurance Dept.	Quarter

KPI appraisal form (KPI)

1. KPI targets (60%)

KPI items	KPI definition	Appraising standards						Weights (%)	Period of data collection	Data providers	Actual results	Score	Explanation about exception
		0	50	80	100	120	150						
KPI1													
KPI2													
KPI3													
Total													

2. KP targets (40%)

KP items	KP description	Expected results	Key strategy and techniques	Indicators for monitor	Weights	Appraising period	Self-evaluation	Supervisor's appraisal
KP1		1) 2) 3)	1) 2) 3)	1) 2) 3)				
KP2								
KP3								
Total								

Targets confirmed			
Signature of appraisee	Date	Signature of supervisor	Date

The manager's above mentioned work should be recorded in the '*KP Adjustment and Tracking Record*'. The following table (Table 7.9) is a sample in which the manager kept the record of his face-to-face communication for adjustment and tracking of the tasks his subordinate:

Table 7.9: KP adjustment and tracking record

Department	Quality Assurance	Time	M D , Y
Appraisee	Liu **	**Title**	Packaging inspector
Appraiser	Li **	**Title**	Manager, QA

Record of main results of KP communication and tracking and plan for next period:

1. KP1   System management work: twice company-wide inspections per month;
2. KP2   Sorting out and optimizing Tonsan's processes: add a new procedure change document, and other documents systematically modified to comply with the new procedure change;
3. KP3   Tonsan's business process: the third quarter mainly for maintenance of routine processes;
4. KP4   Lab management: made sure of lab tools' proper;
5. KP5   Packaging inspection, measuring instrument counting and inspection: timely inspection (finished in 2 work days), with no mistakes; all the inspecting instruments calibrated in time; fulfilled the promise of providing quality service to customers: finished the amendments to the standards for air-tightness inspection of packaging of all products;
6. KP6   Temporary errands delegated by supervisors: finished in time;
7. KP7   Learning and growth: conducted inspection on package in workshops every week to spot problems in the first time, and handed in the report on learning for the 3rd quarter.

Supervisor's review of and reply to appraisee's KP report:

Agreed KP tracking and adjustment results (determined via discussion):

1. Continuing sorting out Tonsan's processes;
2. Timely spotting the problems of in its operation, and adjusting in the organizational structure change;
3. Continuing tracking and confirmation of the improvement projects;
4. Learning knowledge on techniques regularly;
5. Assisting departmental managers to fulfill routine work of the department.

Confirmation of the results of this time communication:

Appraisee: Liu ** (signature)	Supervisor: Li ** (signature)
Time: M D , Y	Time: M D , Y

7.4.5 Phase V

In due time (usually in the middle of a year or at the end of a year), the results of performance appraisal are used for performance feedback or organizational response: reward or penalty. Generally, these tasks are executed by the Human Resources Department. For Tonsan's compensation system, we put forward some suggestions, for example:

> ➤ Change the sales commission from basing on sales revenue to gross profit for those people at the level of sales director or above;

> ➤ Properly raise sales people's commission rate; and

> ➤ Repeal the reward for R&D programs, and shift to 3+2 year-end performance appraisal, i.e., appraisal of the progress and quality of programs every 3 months, and appraisal of post duties performance every two months, e.g., monthly work review, product analysis, visits to customers, technology sharing, and so on.

7.5 Performance management system

Tonsan's Performance Management System is a complete set of performance management documents that the promotion team handed over to Tonsan's top executives when the performance management construction project was fulfilled.

The General Provisions of *Tonsan's Performance Management System* include:

1) Purposes, concepts and principles of Tonsan's performance management; the effects, essentials, meanings and principles of performance management;

2) Organizational relationship and functional unit division for Tonsan's performance management, i.e., the performance management responsibilities of shareholders' meeting, Tonsan's 4-level management, CEO, the chief officers of the functional systems, the departmental managers;

3) Tonsan's performance management process, i.e., the six steps: I) Architect of the performance appraisal indicator system, II) Performance planning setting up, III) Performance Tracking and Guidance, IV) Performance appraisal, V)

Appraisal result feedback, and VI) Uses and requirements of appraisal results;

4) Definitions, functions, and principles of Tonsan's performance appraisal;

5) Application objects, indicator categories, appraisal indicators for employees at various levels and their breakdown methods, application ranges, appraisal characteristics, methods, and period of Tonsan's performance appraisal;

6) Target values and weights of Tonsan's performance appraisal indicators;

7) Procedures and specific rules of Tonsan's performance management appraisal;

8) Meanings, conditions, forms and handling procedures of complaints about Tonsan's performance appraisal;

9) Uses and keeping of, and access to the documents of Tonsan's performance appraisal; and

10) Provisions of implementation of and amendments to Tonsan's performance management system; adjustment of the indicators of the performance appraisal; and enforcement time of Tonsan's performance management system.

Chapter 8

Case Study of Shanxi Huada

Science & Technology Co., Ltd.

8.1 Background & overview of Huada project

Upon the invitation of Shaanxi Huada Science and Technology Co., Ltd. (hereinafter called Huada), Kent Performance Management Construction Team started a performance management system development project for it in July 2009. The objective of the project is to diagnose its current performance management system, and improve and perfect the system on the basis of the diagnosis and help implement the improved system.

Huada is a large state-owned technology-based enterprise with its own marketing, research and development, production and operation, and logistics systems. Its structure and culture boast characteristics of typical state-owned enterprises in China, so its performance management system needs to adapt to these characteristics.

During the diagnosis, Kent Performance Management Team pointed out several major problems (see Section 8.3) in the existing performance management system based on in-depth analysis and summary of thorough and extensive internal interviews with staff members at different levels in Huada, and field research and the findings. On the basis of investigation and analysis of reality in Huada, and in combination with performance management framework set forth in Chapter 5, the consulting team worked out practical steps for performance management system construction in Huada. Accordingly, the consulting team proposed and implemented an initial improvement plan for performance measurement and management processes on the basis of company-level strategy map decomposition, in partial combination with SSM CMs.

In Chapter 6 and Chapter 7, through the analysis on cases of Zotye and Tonsan, we have systematically illustrated the five practical steps stemmed from the performance management theory framework we developed. Those steps were also applied in the establishment of the performance management system for Huada, but actual work content in some steps varies widely because the circumstance of Huada differs from those of Zotye and Tonsan.

The tasks of the Phase I are roughly same as those in Phase I of Zotye and Tonsan

Projects. It was to collect as much relevant information and data as possible, and at the same time to establish performance management construction team (promotion team, for short), which was made up of key stakeholders of the enterprise. The promotion team discussed and communicated with Huada's top management about the status of the existing performance management system of Huada and their knowledge on performance management.

The goal for Phase II is to reach a consensus among relevant stakeholders on organizational goals, development strategies and core operational processes, and then to decompose the strategy. At this stage, the promotion team used a different method from those applied in Zotye and Tonsan projects. First of all, the organizational strategy of Huada was also displayed in a complete strategy map, because Huada has complete marketing, research and development, production, logistics, and procurement management systems just like Tonsan. Secondly, the SSM CM is constructed for the factors associated with R & D in the strategy map of Huada, with focus on the optimization of R & D system process and structure. Afterwards the driving processes, which support the tasks in the CM of R & D to succeed, were identified. On the other hand, most of remaining factors in the strategy map were linked to various relevant functional departments and branches through the existing work processes directly in the light of Huada's development strategy. This method not only differs from the way of Zotye, in which linked the factors on the strategy map to each department and plant through the existing work processes, but also from the way of Tosan, in which firstly the SSM CMs were established for each factor on the strategy map, and the optimization of processes and structure were stressed. Then the driving processes to support the tasks of the CM were identified, and further composed to the various departments related.

The Zotye project was conducted in that way because its organizational structure and management are relatively simple, and it can meet the current development needs as long as to identify the existing business processes that drive the elements on the strategy map to success. The reason why Tonsan project laid stress on constructing the SSM CMs, and optimizing the organizational structure and operation processes is that Tonsan has a delicated and solid management system, and comprehensive functions as well. Moreover its strong executive force guarantees smooth process optimization.

For Huada project, comprehensive functions and rich management experience can facilitate the application of an approach, which is similar as Tonsan project. The approach is to establish SSM CMs at first and then link the tasks of CMs to the existing work procedure. However, as a large state-owned enterprise, Huada sets up more comprehensive functional departments than Tonsan, but executive force is relatively weak. Huada as a technology-based corporation, to meet customers' needs for products timely is the basic guarantee of its long-term development, and thus research & development is a top priority. So the consulting team only builds SSM CMs for some research & development factors on the strategy map.

In phase III, the promotion team developed the KPIs on the basis of the decompositions of the objectives and tasks to the middle-level management, and discussed with the managers of each department, so as to abstract the feasible indicators, and finally developed the complete KPI system for each department manager. Tonsan applied SSM as the core method of strategy decomposition, so the final indicator system was based on the 3E indicator theory mentioned in Chapter 4. In Huada project, all of the indicators were developed by 3E theory.

Phase IV is to design performance planning system. Since for a long time Tonsan's top management has been sparing no effort to strengthen modern management education, Tonsan boasts higher level overall management, and greater executive force, so its mental preparation and skills base are ready for in-depth implementation of the performance planning system. The performance plan is designed based on the KPs and KPIs already extracted from the tasks stemmed from the strategy decomposition, so that the content of performance plan is relatively specific and systematic, avoiding the performance plan from becoming a mere formality due to the lack of specific content of conversations and negotiations. The executive force of Huada is not excellent, so performance planning system is faced with difficulty in obtaining comprehensive promotion and effective implementation. Therefore, we only carried out training for the basic principles of performance plans to the senior and middle-level managers, and didn't propose to implement performance planning system. Whether a performance planning system is to be created in Huada depends on its performance management devleopment in the future.

All the details of the implementation of Huada Performance Management System will be discussed as follows.

8.2 Introduction to Huada

Shanxi Huada Science and Technology Co., Ltd. (the State-owned No. 853 Plant) is a large key factory of research and production of electrical connectors and cable assemblies (mainly RF coaxial connectors). It was founded in 1966 by the former Ministry of Electronic Industry of China in order to meet the needs of the national key projects. As the largest core business of military RF coaxial connectors, the enterprise has been committing for many years to supporting all kinds of military key construction projects. After experienced a centralized design, and international standards implementation, and so on, in 2000, it conducted a complete business reconstruction. Now the enterprise has 1,100 odd employees, including 291 engineers, and 56 of them have senior professional titles. The production and research area of the enterprise covers 20,000 odd square meters. Its main production facilities are more than 860 pieces (sets), of which 56 sets are imported ones, with an annual production capacity of more than 20 million pieces. The main products fall into ten categories which are RF coaxial connectors and RF micro-electrical connectors, printed circuit connectors, and circular, rectangular, and miniature rectangular connectors.

8.2.1 Development strategies of Huada

Leading in technology strategies: through technological innovation and improvement, strengthening standardized management and R & D, to upgrade its product quality and technology level, and ride into first-class enterprise with top technologies.

Talent strategies: further develop the role of its R & D center, and build its own R & D team. The talents will be mainly trained within the company and complemented by external import, to provide opportunities of improving business and skill levels for staffs, and establish stimulative salary system and long-term incentive mechanisms which are in keeping with modern principles of enterprise and market, so as to maintain the existing talent' creativity, and to gradually attract outside talents.

Management upgrading strategies: further perfect the salary system, and establish a mechanism where labor elements are in the combination of duty, which fully embodies the principle of reciprocity of responsibility, contribution and interest. For its management, the annual salary system is applied together with profit incentives, and stock dividend distribution. For the R & D personnel, their income is made up of project royalty, stock dividends and job position salary. For the engineering designers, their income is composed of profit royalty of their counterpart areas (or products) and position structure salary. For marketers, their income depends on a basic income, stock dividends plus their performance royalties. The general staffs' income depends on the piece work. Huada's salary system adheres to the principles of "to give priority to efficiency with due consideration to fairness" and "two lower than" ,that is, the growth in total salary amount of the company is lower than that in economic returns, and the employee' average income growth is lower than the labor productivity growth.

Huada strengthens the integration of production, education and research. Huada actively cooperates with technology colleges and universities such as Xi'an Jiaotong University, Xi'an Technological University, and Xidian University, and with scientific research institutes of aviation, aerospace and information industry systems. On the one hand, it attracts experts and scholars to join business and product development. On the other hand, Huada takes the way of integrating production, education, and research. It becomes a base where advanced achievements of universities and institutes are transferred into productivity, enjoying the priority to reach high-tech fronts, and increases the science and technology content and competitiveness of products, thus achieving the Huada's sustainable development.

Huada constantly enhances its capacity of independent innovation. High-frequency products are to become highly advanced and sophisticated component class or device class products, to competitively replace imported products in the domestic market. For low-frequency products, marketable ones are to be further invested and improved, and their market is to be strengthened and expanded in the near future. In accordance with characteristics of electrical connectors in the future, that is, of high-density, being small-sized, combined, at high speed, in low-volume, and with multi-species, Huada, in the "Eleventh Five-Year" period will strive to develop ultra-high frequency coaxial connectors, fine-pitch micro connectors, multi-pitch micro connectors, high and low

frequency connectors with mixed contact, broadband connectors, high-current high-voltage connectors, interference filter connectors, composite shell connectors, and microwave devices, etc..

Market development strategies: the first one is to bring advantages of military industry into full play, by taking advantage of the opportunity of domestication of high-end military products, strengthening and improving the quality of military products. The second one is to continue expanding the civilian market, and develop new products for civilian use, while aiming at the development of major state industries, and requirements of large enterprises. The third strategy is to take efforts to open up the export market, and expand export business with the Import and Export Department of Chuanglian Corporation as a platform.

8.2.2 Objectives & assignments

Main Financial Indicators: the main financial indicators and specific sub-indicators of the Huada Headquarter for "Eleventh Five-Year" are listed as follows:

Objectives of Technological Innovation:

1) Government investment grants and interest subsidies will be actively sought. The technological transformation will be accelerated, to replace old equipment and automate product processing and assembling, so as to push the total industrial output to grow by 15%.

2) Supported by Xijing Electronic Components Industry Base and Export Processing Base for Electrical Connectors, Huada will optimize its internal industry structure, and give full play to its own strengths and potential, and improve technology and management level, and reduce the cost of product by 20% per unit.

3) Huada will continue to maintain and expand its lead in technologies of RF coaxial connectors and other products, and highlight the development of low frequency connectors and miniature rectangular connectors, so that sales of low-frequency

connector products constitutes 40% of total sales.

4) While ensuring the scale of production, Huada will constantly enrich the product line, increase the variety of specifications, with 500 more new members each year, and strive to make income from new species occupy 30% of total sales.

5) The percentage of products conforming to international standards will surpass 60%, among which 100% of new species and RF products will be manufactured in accordance with international standards and advanced standards.

The Growth Target of Staff Revenue: Staff income (consolidated) will account for more than 15% of corporate income, with personal income growth rate around 10%.

Huada will establish a scientific research team, a production team with high skill levels, a marketing team with versatile abilities, and also a management team with high qualities.

8.2.3 Organizational structure of Huada

The senior management in Shanxi Huada Science and Technology Co., Ltd. includes the board of directors, general manager and deputy general managers. Functional departments and production units administrated by the senior management are General Office, Sales Department, Human Resources Department, Financial Department, Enterprise Management Department, Supply Department, R & D Center, Department of Military Industry and Technology, Quality Control Department, Production Planning Department, and all divisions and subsidiaries. Each deputy general manager is directly in charge of several departments or production plants or subsidiaries. A chart of Huada's organizational structure is as follows (Figure 8.1):
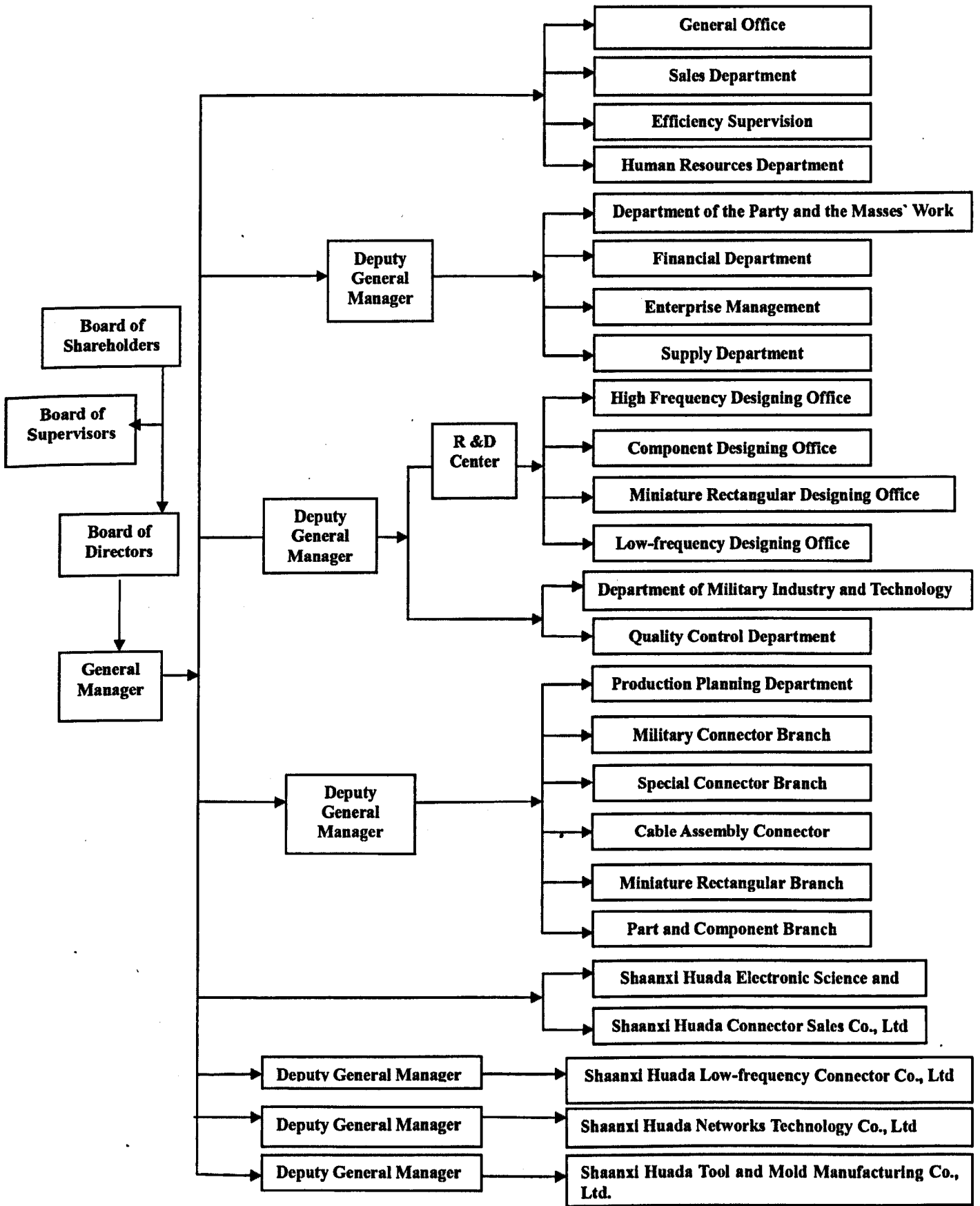
Figure 8.1: A chart of Huada's organizational structure

8.2.4 Main functions of departments

Main functions of various departments and units managed by Huada are described in Table 8.1:

Table 8.1: Main functions of various departments of Huada

Department	Main Functions
General Office	Corporate executives, network, security guarding, fire fighting, sanitation and greening
Enterprise Management Department	Rules and regulations, management regime, structure organization and functioning, development strategies, economic responsibility systems, outside investment, affairs management of Board of Shareholders and Board of Directors, affairs of business administration and High-technology enterprises, management judgment and auditing, etc.
Sales Department	Market exploration, marketing net development, product sales, product and fund returning, after-sale service.
Production Planning Department	General planning and statistics, production planning, management and assessment
Department of Military Industry and Technology	Management of military industry, scientific management, and production qualification; and daily work of R &D Center
Quality Control Department	Management in military and civilian quality system, quality plans, product delivery inspection, and quality assessment, etc.
Supply Department	The purchasing, qualified supplier identification and management of raw material, out-components, and equipment, etc.
Efficiency Supervision Department	Supervision and assessment of the enforcement of laws, rules, regulations, orders and systems, and working efficiency and style as well
Human Resources Department	Management of human resources, salaries and wages, social security, medical insurance, public reserve fund, work quota; evaluation of positional titles; training.
Department of the Party and the Masses` Work	Daily work of general Party branch, general branch of the Communist Youth League, and the labor union of the company
Financial Department	Financial and accounting management, financial budget and control, Financial accounting and accounts, plans and statements of financial accounting, financial auditing and

	audit, financing, and management of funds, assets and prices
R &D Center	Development, designing and shaping of new products, technical processing in product designing
Branches	Organization of production, management of production sites, production safety, technical information, production equipment and fixtures, raw materials and parts, products in-process, and finished product before storing, etc.
Subsidiaries	Working independently in different markets concerned

8.2.5 Responsibility allocation under previous performance appraisal system of Huada

Table 8.2: Responsibility allocation under previous performance appraisal system of Huada

Name	Responsibilities
General Manager of Huada	Exercising a comprehensive leadership and decision-making in assessment of the economic responsibility system; evaluating deputy general managers and chief officials in branches, subsidiaries and various departments charged; approving payrolls.
Deputy General Manager of Huada	Evaluating branches, subsidiaries and various departments charged and their chief officials.
Deputy General Manager of Finance	Assessing the results of monthly company assessment and employees' payroll.
Enterprise Management Department	Centralized management of the assessment under the economic responsibility system.
Quality Control Department	Being responsible for the normal operation of the quality management system, first-level management of inspection personnel, product testing and measuring, and approving the centralized functional management.
Financial Department	Assessing centralized management of sales income, total profits, charges and fees handed in and turn-over rates of stocks.
Production Planning Department	Assessing monthly production items, contract booking of the sales departments and centralized functional management in branches.
Department of Military Industry and Technology	Developing "A Regulation of How to Assess Designing and Craft Personnel" and assessing R &D of new products, craft management and centralized functional management.

Other departments	Assessing centralized management of the department concerned.
All units	Assessing its staff respectively.

8.2.6 An overview of previous performance appraisal of Huada

a) Appraisal of branches by the headquarter

Assessment items and percentages of branches are listed in the table below (Table 8.3):

Table 8.3: Assessment items and percentages of branches

Assessment	Percentage (%)
Production	20
Sales Revenue	18
Total profits	13
Charges and fees paid to Headquareter	13
Inventory turnover	13
New product R & D and key techniques	13
Functional management	10

Sales revenue, total profits and charges and fees are composed, counted and appraised by Financial Department on a monthly basis. Charges and fees include workshop rents, utilities, property costs, a variety of social insurance paid for staff by units, employee welfare, union funds, taxes and fees such as education surcharge regulated by policies and regulations, vehicle use fees, printing and copying costs, depreciation fees, and various social insurances withheld by individual employees, and personal income tax and so on.

Production items are counted and assessed by Production Planning Department on a monthly base.

Centesimal systems are practiced in monthly assessment for new product R & D and craft key technologies. The appraisal scoring rules are formulated by Department of Military Industry and Technology, approved by the competent leadership, and recorded in Enterprise Management Department.

Functional management is appraised in accordance with centesimal systems, and marked by functional departments according to their authority at a monthly appraisal rate.

b) Appraisal to functional departments

. Assessment items and percentages of functional departments are listed in the table below (Table 8.4):

Table 8.4: Assessment items & percentages of functional departments

Assessment item	Functional management	Cooperative tasks
weight （%）	80	20

Functional managements are appraised with centesimal system. Every month each department does self-examination by certain scoring criteria with its results regulated and confirmed by company executives.

Cooperative tasks are evaluated by other functional departments and branches in accordance with or by reference to certain standards, and points are deducted on a monthly basis in the way of lodging complaints

c) Appraisal to Sales Department

Appraisal contents and weights are shown in the table below (Table 8.5):

Table 8.5: Appraisal contents & weights

Appraisal item	Contract order	Sales revenue	Receivable return rate	Functional management
Weights（%）	25	30	35	10

In addition to these appraisal items, appraisal of the increase of new users is also carried out.

The target value of appraisal is composed and evaluated by month.

Functional management is appraised and scored according to manners of functional departments.

d) Appraisal to individual employees (including managers)

While each unit (departments and branches) is appraised by the headquarter, Deputy General Managers are appraised by General Manager, major managers of departments and branches by the deputy general manager in charge of them, deputy leaders by chief leaders in their departments or branches, and the staff by the respective departments or branches.

For management of functional departments and assistant staff of management and production in branches are appraised and scored every month in accordance with assignment completion (70 points), working attitudes and service consciousness (10 points), disciplines (10 points), and collaborative tasks (10 points).

In branches, production workers appraised and scored in accordance with production projects (40 points), product passing ratio under first acceptance check (40 points), work attitudes (10 points), labor disciplines and safety (10 points) monthly.

For appraisal of product passing ratio, "Standards for Product Qualification Ratios of Each Batch", "Targets for Monthly Average Product Qualification Ratios", "Scoring Standards for Monthly Product Qualification Ratios of Workers" are instituted by Quality Control Department, and then reported to and recorded at Enterprise

Management Department after the approval of the company' chief leaders who are directly in charge of product quality.

In accordance with the requirements above, branches record product passing ratios of production workers by batch and summarized at the end of each month. Production workers are scored in the light of "Scoring Standards for Monthly Product Qualification Ratios of Production Workers". The scores are reported to Quality Control Department for inspection, statistics and recording. The workers with low product qualification are reported to Human Resource Department.

8.2.8 Huada's salary & incentive system

The annual salary system is applied for management on and above the middle level, technology-oriented salary system for science and technology personnel, and salary system linked with factory's profits among other personnel.

8.2.9 Staff training in Huada

As for the training mode, the Human Resources Department takes the lead to train new employees. Trainning includes job qualifications for a position, job descriptions, and then the company's rules and regulations.

For training of the existing staff, the demand is put forward by a specific department or branch. Human Recourses Department will take into consideration its necessity, and the issues of training content, time, trainees, venues, and fund, etc. If the proposal is approved by the Huada's top management, training fund will be issued. In addition to the training assisted by Huada like quality for job position, work content, regulations, the branches and subsidiaries also organize some skill training with the main content as operational skills needed by workers in daily work.

Human Resources Department tracks, monitors and evaluates the process of training and the training effectiveness. For example, forums of trainers and trainees are held to solicit opinions in the training effectiveness.

8.3 Major problems of the current performance appraisal system of Huada

Based on a systematic analysis of the results of interviews and field researches, and comparison with theories and practices of advanced performance management theory, we conduct an extensive analysis and discussion with Huada's management and relevant international experts about major problems in current performance management and issues concerned. Summing up the results of discussion, we come to the conclusion that there are five main problems, which are listed in the follows, in Huada' current performance assessment system and management methods:

1) **Performance appraisal was not linked with the company's current strategy for development;**

Firstly, the essence of modern performance management is to deploy the enterprise development strategy level by level to each employee's daily work. Huada's main strategic objectives are not specifically composed as management's performance indicators were mostly built on managers' responsibilities for routine management work.

Secondly, KPIs of production plants or subsidiaries are imcomplete, and there are no KPIs for the departments. Appraisal contents of all the departments are the same, except that of Sales Department.

2) **Compared with the employee's on frontline, payment of the middle-level management and above is not closely related to the appraisal results;**

For the long-term development, Huada should realize that the management's salary should be closely related to their performance.

3) **Training to R & D, technical and sales personnel need to be strengthened;**

The training of technology and R & D personnel should be substantially strengthened,

and measures should be diversified. Sales personnel should ultimately take the path of developing into 'sale engineers'. That is they should be a kind of experts on their products.

4) R & D and technical personnel need to be effectively assessed and motivated;

R & D staff's daily work, including solving customers' problems on the scene and the R & D small projects, should be appraised effectively and motivated appropriately.

5) There isn't an effective bi-direction communication mechanism between managers and subordinates.

A key concept that modern performance management advocates is top-down and bottom-up bi-direction communication. It emphasizes communication in every link of performance management, focuses on the participation of managers and subordinates at all levels, and takes into account on balancing interests of all parties. Employees' involvement in performance management is critical for the success of individuals and organizations. Although there is a wide range of communication in Huada, it needs to be furthered standardized with proper procedures.

8.4 Framework to improve performance management of Huada

The consulting team sought to improve and build Huada's performance management system still basically on the basis of the practical steps for performance management projects developed in Chapter 5. In the implementation of the project, not all the tasks prescribed in the framework were carried out due to the limitations of Huada's conditions and circumstances.

8.4.1 Phase I

In this step, as the commissioned external consultants, we tried to collect much information and data for a clear picture of Huada, and helped to establish the performance management system construction promotion team, which consists of

Huada's key stakeholders. We interviewed Huada's decision-makers, dicussing Huada's mission, its main long-term targets, and its development strategies in full detail. The specific contents introduced in Sections 8.2-8.3 were actually the tasks we performed in this step. Here some further descriptions were given as follows.

After reaching a consensus on this with the top and middle-level managers, we describe Huada's main development strategies with refined words. They are the key works to achieve Huada's major economic goals in the 'Eleventh Five-Year Plan':

➢ To be the leader with advanced and sophisticated technologies and professional and hybrid sales management;

➢ To support customer with friendly and swift technological service;

➢ To guide Huada's development in producing fine products in military market and expanding civilian market;

➢ To highlight modern management;

➢ To bolster Huada with product research and development by innovation;

➢ To guarantee Huada's development with high and stable product quality;

➢ To base Huada on the corporate culture of innovation, integrity, diligence, and hard-working.

All of these are the basis of the strategy map we draw afterwards for Huada.

In interviewing with Huada's top and middle-level executives, we got to know in much detail Huada's business operation processes (there were room and realistic need for improvement in some processes, and most of which would be exploited in breaking down of strategy afterwards), the circumstances of the organization (see Section 8.3.1), the organizational structure (see Section 8.2.3), the current performance management system (see Section 8.3.1), and the expectations of Huada's executives and employees.

The process of interviewing with the top and middle-level executives also served as the training of modern performance management concept for them, which facilitated them to gain an all-around and systematic understanding of the modern performance management, expand their horizons and exchange their experience. We also had

casual communications with some employees in functional departments and the production frontline.

8.4.2 Phase II

First of all, Huada's organizational strategy was still described by strategy map. Secondly, we constructed SSM CMs only for the strategy elements that are related to R & D, highlighting optimization of R & D process and organizational structure, and then identified driving process to support the success of work items in the CMs related to R & D. On the other hand, most of the strategy elements are directly linked (decomposed) to various relevant functional departments and branches through the existing work processes based on the consideration of Huada's development strategies.

The strategy map

In this phase the promotion team decomposes the strategies after the consensus on the organizational objectives, the development strategy and the core operational processes. The breakdown of the strategy can be carried out utilizing the BSC and the strategy map, or the SSM illustrated in Chapter 4, or the BSC combined with SSM, depending on the features of the organization.

As the way in Zotye and Tonsan, we selected to use the BSC & strategy map to describe top level development strategies of Huada. For the strategy map at the company level, the strategic elements in the financial perspective, the customer market perspective, the internal operation perspective, and the learning & growth perspective have been described in Section 8.4.1. We have drawn the strategy map for Huada based on its main development strategies, see Figure 8.2 below. Detailed further strategy decomposition will be introduced later.
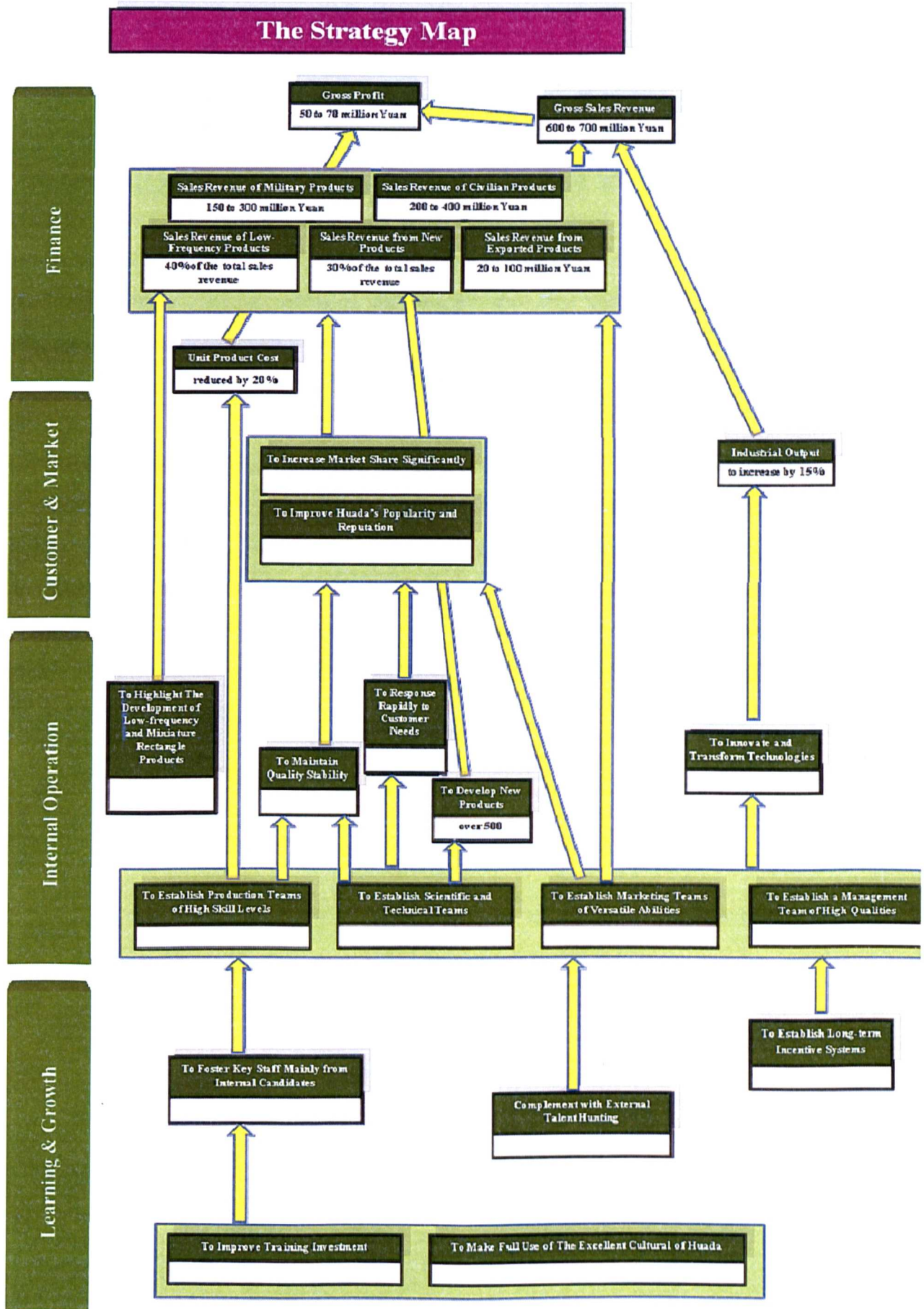
The Strategy Map

Finance

Gross Profit
50 to 70 million Yuan

Gross Sales Revenue
600 to 700 million Yuan

Sales Revenue of Military Products
150 to 300 million Yuan

Sales Revenue of Civilian Products
200 to 400 million Yuan

Sales Revenue of Low-Frequency Products
40% of the total sales revenue

Sales Revenue from New Products
30% of the total sales revenue

Sales Revenue from Exported Products
20 to 100 million Yuan

Unit Product Cost
reduced by 20%

Customer & Market

To Increase Market Share Significantly

To Improve Huada's Popularity and Reputation

Industrial Output
to increase by 15%

Internal Operation

To Highlight The Development of Low-frequency and Miniature Rectangle Products

To Response Rapidly to Customer Needs

To Maintain Quality Stability

To Develop New Products
over 500

To Innovate and Transform Technologies

To Establish Production Teams of High Skill Levels

To Establish Scientific and Technical Teams

To Establish Marketing Teams of Versatile Abilities

To Establish a Management Team of High Qualities

Learning & Growth

To Foster Key Staff Mainly from Internal Candidates

Complement with External Talent Hunting

To Establish Long-term Incentive Systems

To Improve Training Investment

To Make Full Use of The Excellent Cultural of Huada

Figure 8.2 Strategy Map of Huada

Specifically, in the financial perspective, Huada stresses profits and gross sales revenue. Correspondingly, in the customer & market perspective, Huada hopes to increase market share through improving its popularity and reputation. To achieve this goal, the internal operation perspective aims to maintain stable product quality, and response rapidly to customer demand, develop new products timely to meet markets' need for new products and technology innovation. Therefore, the establishment of production teams with high technologic level, science and technology teams with high skill levels, and marketing teams of versatile abilities, and management teams with modern management concepts and principles comes to priority. For this goal, Huada has formulated the strategy of its talent strategy.

On the one hand, the decomposition method for elements of quality management, production and operation, and sales management aspects, is to link each element to all relevant departments by the existing operational processes directly. On the other hand, the decomposition method for elements product R & D management is to build SSM CMs in connection with the strategic elements, then identify the driving processes, which support the success of each tasks listed in the CMs, and finally further break them down to each department.

The decomposition of each task of quality management, production & operation, and sales management

In the following, let us take quality management as an example. The Figure 8.3 is drawn based on the existing processes of quality management in Huada.
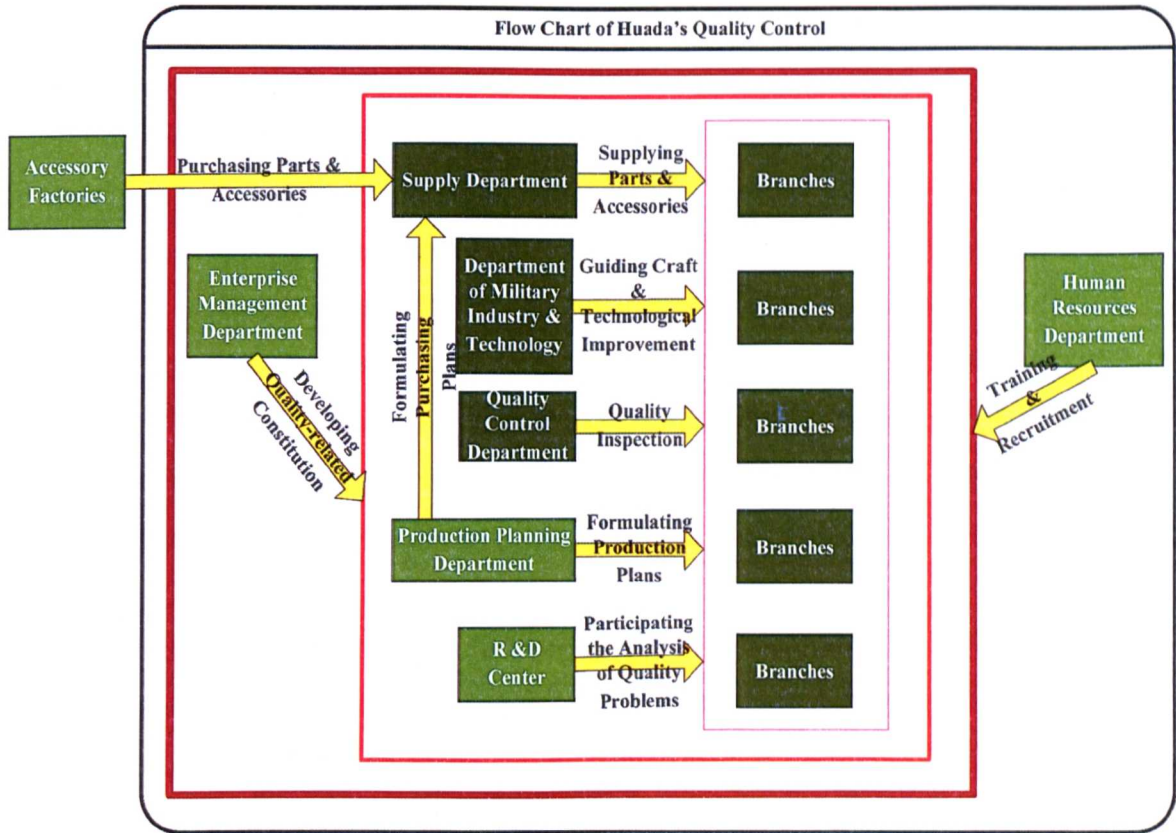
Flow Chart of Huada's Quality Control

Figure 8.3: Flow chart of Huada's quality control

In the internal operation perspective of the strategy map, the factor related to quality management is 'to maintain quality stability'. From the Figure 8.3 above, we can see the work contents of departments and branches in quality management area, and then find out what kind of achievement of the tasks in the quality management each department or branch needs to obtain for the objective of quality management 'to maintain product quality stability'.

To take Procurement & Supply Department as an example, one of its tasks related to quality management is 'purchasing parts and accessories' while the requirement of the strategic element 'to maintain product quality stability' for this task demands 'to improve the quality of parts and accessories purchased'. Thus that becomes one of the tasks on Procurement & Supply Department. We will develop indicators through measuring these tasks with 3E dimensions, such as E2: 'the costs increased for improving the quality of parts and accessories', 'the first acceptance rate of parts and accessories' by the E3 dimension and so on. Then, we feedback these indicators to persons who take responsibility for the tasks and discuss with them. These will be

carried out in the third phase.

Another task of quality management of Procurement & Supply Department is 'supplying parts and accessories to branches'. This task is composed of two parts, one is "warehousing", and the other one is 'delivering parts and accessories to production lines'. To take the former one as an example, the requirement of the strategic elements 'to maintain product quality stability' demands that 'warehousing' is 'to ensure all goods and materials are well stored', which becomes one of the main tasks for the department. The indicators are developed in the third phase by 3E theory; for example: 'the cost for ensuring the good storage of parts and accessories' by E2 dimension and 'rate of the goods and materials in good condition' from E3 dimension, etc.

Examples above are to explain the basic idea how we broke down the elements (on the strategy map) of production & operation, and quality management: to link various elements of organizational strategies to relevant departments by existing operational processes directly.

Figure 8.4 and Figure 8.5 are the flow charts of production management and sales management of Huada respectively, which will not be explained in any details.
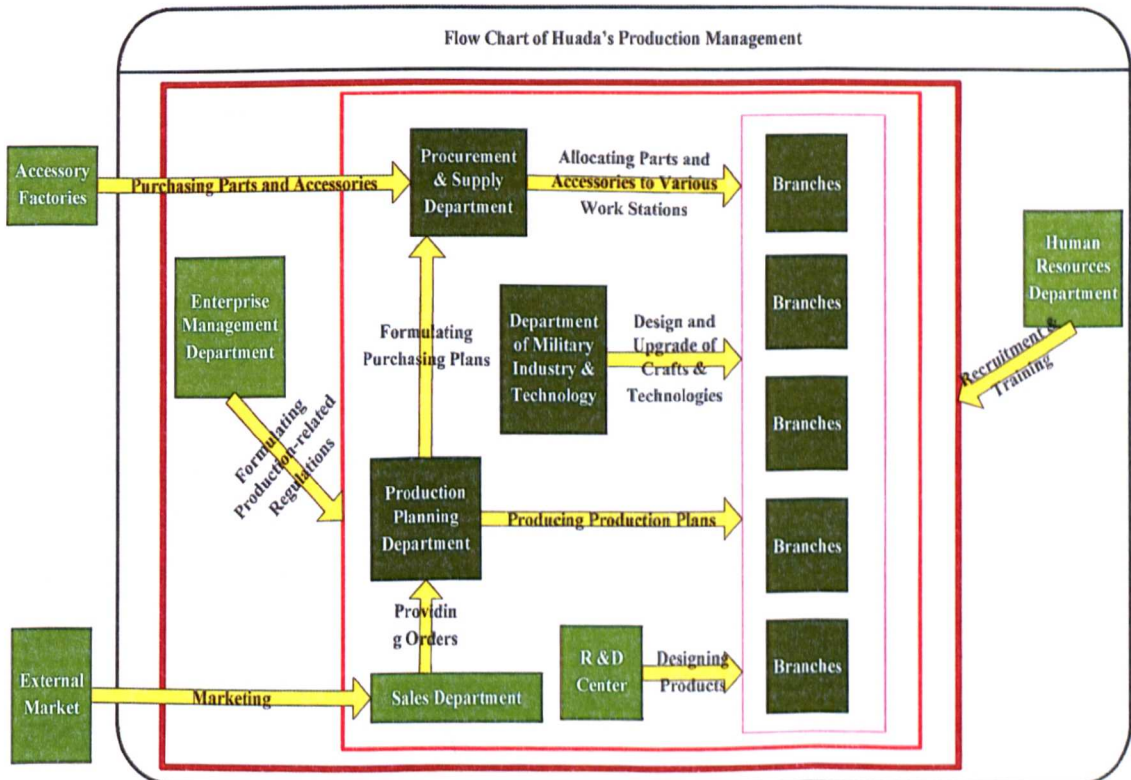

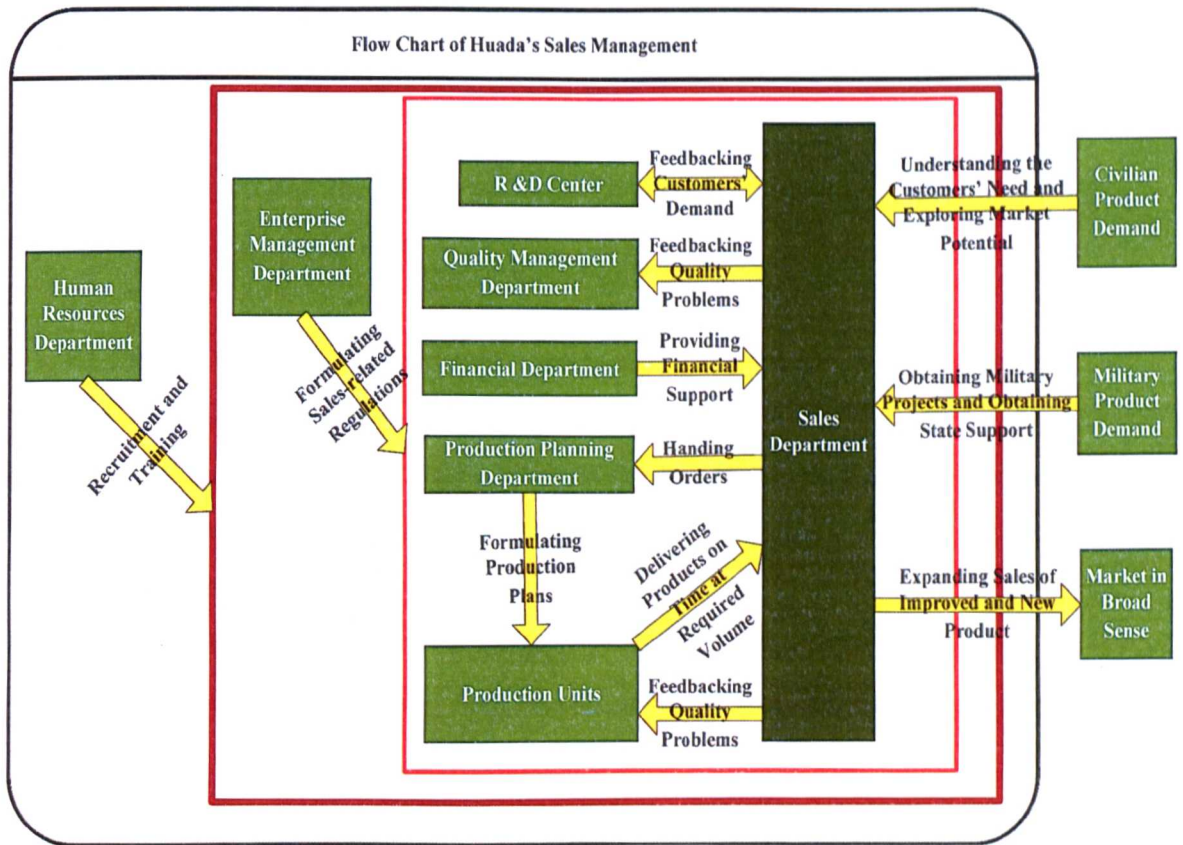**Figure 8.4: Flow chart of Huada's production management**

Figure 8.5: Flow chart of Huada's sales management

Strategy decomposition of R & D management

Firstly, SSM CMs were constructed for various elements on the strategy map, to highlight optimization of management and management contents. Then the driving processes to support the success of each task in the CMs were identified, and further the driving processes were decomposed into the various departments linked with the processes.

For supporting the objectives in the customer & market perspective of the strategy map so as to realize the financial targets, elements in R & D Management are: developing new products (including improved products), highlighting the development of low-frequency and miniature-rectangular products, and responding rapidly to customer demand (primarily technical support to external customers), etc..

The CMs, which were established to achieve the elements mentioned above for R & D management were not SSM CMs in the strict sense, but the collection of tasks

constructed adhering to innovation and optimization of the CM with approval of senior and middle levels of the management, which are shown as follows:

In R & D management, the CM to support the realization of the element 'responding rapidly for customer demand' is:

> ➤ To select a small number of designers to concentrate on research and development exclusively;

> ➤ To direct most designers to focus on technical support and product improvement;

> ➤ To select designers to set in each sales region (one rotation every three months) for fast technical service;

> ➤ To provide customers with reassuring and satisfactory technical support;

> ➤ To lay stress on the *effective* time that designers spend in guiding production in product lines;

> ➤ The R & D centre recorders past cases and stores them properly for later uses.

This CM proposes the optimized process, organization and management structure, in which a small number of the designers carry out research and development exclusively, and most of the designers focus on technical support and product improvement, while in the past the designers didn't separate prospective R & D from technical support. In the past, if customers needed technical support, Sales Department requested R & D Centre to send designers to solve customer problems on site. In contrast, as proposed in the CM, an appropriate number of the researcher teams are set in each sales region. This can not only provide technical support to customers quickly, but also increase the research team practical experience through the rotation. The previous situation was that the designers and researchers solved technical problems, but without leaving any records, and if the other designers encountered the same problem, they had to repeatedly consume time and energy to resolve it. If the R & D centre can recorder the information of technical support each time, it may save much time later.

Based on the SSM models we give the following suggestions for process changes:
Table 8.6 summarizes the recommendations for improvement.

Table 8.6: The recommendations for improvement

No.	Improved items suggested	How to improve	Significance & effectiveness
1	R & D personnel will be divided into two parts	A small number of designers do research and development exclusively, while most of the designers focus on technical support and product improvement.	The designers of prospective R & D can focus on research without being involved in technical chores. The most designers can focus on technical support, with access to adequate opportunity to gain experience.
2	Designers set in each sales region.	An appropriate number of designers are set in each sales region.	It can not only provide technical support to customers quickly, but also build up experience of the research team through the rotation.
3	Reports and references of technical support are well piled and managed.	The R & D centre piles and preserves the detailed reports and information of technical support each time, and provide easy access to later inspection	It is conducive to the accumulation of experience, and it can not only greatly improve efficiency, but also raise skill levels.
4	Designers' performances are linked with the sales revenue of the products they developed.	The increased sales rate of products after being improved is regarded as an indicator to measure the designers' performance.	It can encourage designers to understand the state of market, contact clients, and actively resolve products' technical problems for customers.

After discussion on feasibility of process optimization and management adjustment with relevant managers in Huada, we needed to further break down various tasks listed in the CMs. As discussed before, the breakdown was conducted by the existing processes of Huada. The existing support processes that achieve the key works listed in the CMs were identified.

Here is another CM which supports the achievement of different strategic elements in R & D management, whose specific decomposition methods were the same with the one mentioned above and were not repeated.

In the R & D management, the CM which supports the achievement of element 'highlighting the development of low-frequency and miniature-rectangular products' was described in the follows:

> To position the development direction of low-frequency and miniature-rectangular products;

> To develop and promote low-frequency and miniature-rectangular products;

> To improve R & D capability of low-frequency and miniature-rectangle products;

> To shorten R & D cycles of low-frequency and miniature-rectangle products, and improve the success rate of research and development;

> To provide R & D institutes of low-frequency and miniature-rectangle with high-technology talents.

The CMs above are the results of the discussions with the top and middle-level management of scientific research in light of their actual experience, and reach consensus with the key stakeholders.

In summary, in Zotye we expressed its strategies simply with the BSC strategy map, and then decomposed the strategy basically in accordance with the existing operation processes. In Tonsan, the strategy decomposition combined BSC and SSM, and took into account the possible optimization. Huada had the both ways.

8.4.3 Phase III

In the third phase, the promoting team has a set of tasks and goals decomposed into departments. The promoting team measured these actions' performance by 3E dimensions (efficacy, efficiency, effectiveness, see Chapter 4 for details), so as to establish performance indicator systems. Then we discussed these indicators with the corresponding managers, and selected the most needed and feasible indicators, and finally form KPIs of each department and its managers.

Here we will take Procurement & Supply Department and the R & D institutes mentioned above as examples. The strategic element 'to maintain product quality

stability' requires Procurement & Supply Department 'to improve the quality of parts and accessories' and 'to ensure all goods and materials are well stored in good conditions'. Then how good the performance of these two actions is? We can come to the corresponding indicators by measuring them with 3E dimensions. Similarly, in R & D management, the R & D institutes' tasks listed in the CM to support 'to respond rapidly to customer demand' are also measured by the E1, E2, E3 dimensions, which are shown in the following Table 8.7.

Table 8.7: KPIs of relevant departments

Department related	Relevant departments' supporting processes for achievement of strategies	KPIs of relevant departments
Procurement & Supply Department	To improve the quality of parts and accessories purchased	The increased cost for improving the quality of parts and accessories (E2); The first acceptance rate of parts and accessories (E3)
	To ensure all goods and materials are well stored	The cost for ensuring the good storage of parts and accessories (E2); The rate of the goods stored in good condtions (E3)
R & D Institutes	To direct most designers to focus on technical support and product improvement	The sales growth rate of the product within one year after it was improved (E3)
	To provide customers with reassuring and satisfactory technical support	The solving rate and speed of customers' technical problems (E1); The satisfaction degree of customers with quality of technical support service (E3)
	To lay stress on the effective time the designers spend in guiding production in product lines	The time the designers spend in a week in production lines to be at least X hours (E1); The satisfaction degree of operators in production lines towards the performance of designers who solve practical problems on site (E3)
	R & D institute to collect and file reports and references, which describe technical support to customers for later	The finishing rate of reports and references (E1); The satisfaction degree of R & D Center towards the R & D institutes' management to technical reports and

	inspection.	references (E3)

We discussed with the managers of relevant departments regarding to the possible KPIs, which were developed as above. The modern performance management theory emphasizes bi-direction communication, which includes selecting feasible and reasonable KPIs from the set of indicators, and finally forming KPIs of each department's managers, after full communication with the stakeholders. Taking this as a starting point, after a clear understanding of their (managers) own KPI and KP, the managers of each department decomposed the sub-processes which drive the managers' KPI to be achieved to the staff at the next level, and ultimately formed KPIs and KPs of the staff at required levels. For the employees at the bottom level, because most of their works are simple and repetitive, so the KPs may be omitted. Generally speaking, KPs are used for performance planning, as the base and/or material of performance plans. In Huada, the performance planning system is difficult to be promoted systematically and implemented effectively, because Huada management does not have enough execution power as a state-own company. Therefore, we only conducted basic training of the performance plan concept among its senior and middle-level managers, and didn't propose to implement the performance planning system for the time being.

8.4.4 Phase IV

Phase IV is for designing performance plans. The content, roles, significance, and implementation methods of the performance plan have been introduced with much detail in Chapter 5, and implemented systematically and comprehensively in the Tonsan Case in Chapter 7. Thus they won't be described here.

8.4.5 Phase V

In Phase V, we suggest how in due time (usually in the middle of a year or at the end of a year), the results of performance appraisal are used for performance feedback or organizational response: reward or penalty, including building reasonable salary

system. Generally, these tasks are executed by the Human Resource Department. However we omit the details here as they are similar to those given before.

8.5 Performance management handbook

At the end of this project, we compiled two detailed handbooks, which are 'General Principles of the Performance Management System in Shanxi Huada Science and Technology Co., Ltd' and 'Key Performance Appraisal Indicators for all Functional Departments and Branches', and presented them to Huada, as the whole set of the performance management system documents.

'General Principles' include:

1) Purposes, concepts and principles of Huada's performance management.

2) Organizational structures, relationship and division of responsibilities of Huada's performance management.

3) Contents and requirements of the four steps of Huada's performance management cycle, that is, performance planning, performance tracking and counseling, performance appraisal, contents and requirements of performance feedback.

4) Purposes, roles, and principles of Huada's performance appraisal.

5) Applicable objects, indicator classification, appraisal indicators for employees at various levels, application ranges, appraisal characteristics, methods, and period of Huada's performance appraisal.

6) Target values and weights of Huada's performance appraisal indicators.

7) Procedures and specific rules of Huada's performance appraisal.

8) Meanings, conditions, forms and handling procedures of complaints about Huada's performance appraisal.

9) Uses and keeping of, and access to the documents of Huada's performance appraisal.

10) Provisions of implementation and of amendments to Huada's performance management system, adjustment of the indicators of the performance appraisal, and enforcement time of Huada's performance management system.

'Key Performance Assessment Indicators for all Functional Departments and Branches' includes the contents, indicator and scoring criteria of KPIs of each department.

Chapter 9

Conclusions & Future Research of

Performance Management

The aim of this thesis is to study theoretical frameworks and their applications in some "classic" organizations.

This work first reviews history of performance management research and relevant literature. It then classifies the existing theoretical frameworks for performance management and takes further detailed reviews for the most relevant research work. It is fair to say that the above work is non-trivial as there is a vast body of accumulated research for very diverse sources.

It then points out that the effective forms and structures of performance management for an organization are likely to depend on type of the organization, among other important variables like ownership and environment. Performance management needs to coordinate well with other management activities (such as production and operation management, human resource management, strategic management, and logistics management) in the organization. It requires a deep understanding of the organizational structure and operating environment to identify the effective forms and structures of performance management for a specific type of organizations.

Furthermore by applying SSM, this thesis logically derives some main function blocks of performance management in 'classic' organizations, and clarifies the relationships between performance management and other management activities. Also it discusses the relationship between our theoretical framework and the existing theoretical research of performance management. Furthermore it develops the tools and frameworks, which can hierarchically decompose organizational strategies innovatively and produce the practical model of specific implementation steps for the 'classic' organization. Our approach integrates the popular types of performance management models.

Then our framework and practical procedures are applied in real case studies. This thesis illustrates three major cases, which are three quite different 'classic' organizations. Due to the actual circumstances, the specific tasks of performance management system construction for each organization are quite different, though all of them were based on same theoretical framework and practical procedures. In Tonsan case we applied a full SSM based methodology and implement performance

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planning system successfully, while Zotye and Huada were not able to achieve this due to the weaker excuteing power or the weaker existing management skills. On one hand, this illustrates flexibility of our framework. On the other hand, this may illustrate that there is still room for further refinement of our framework even for the "classic" organizations. In the near future we will keep tracing and monitoring progress of the established performance management system in these organizations. In particular, we were now happy to learn that the turnover of Tonsan was increased by 50% in 2009, despite of the economical crisis.

Our theoretical framework is based on some important assumptions of organizational structures. However, in many practical situations, such assumptions are not always applicable. According to changes in organizational goals and environment, organizational structures may also change. Thus it is important and difficult to study performance management in such organizations.

According to our current empirical studies, there may be huge differences in effective forms of performance management between 'non-classic' and 'classic' organizations. For example, some organizations may not have clear or stable strategic block, or their operational structures constantly change. The performance management of these 'non-classic' organizations is not in scope of this thesis. However, the theoretical studies and practices of performance management modes developed for such organizations are clearly very important further research. In this regard we think that Henry Mintzberg's organizational structure theory could provide a theoretical basis in organizational structure perspective for the future research.

Here we give a brief overview of Mintzberg's organizational structure theory, which can be used as an important part of the basis for our future research. Mintzberg proposed that an organization has six basic components, as in Figure 9.1 in the follows:
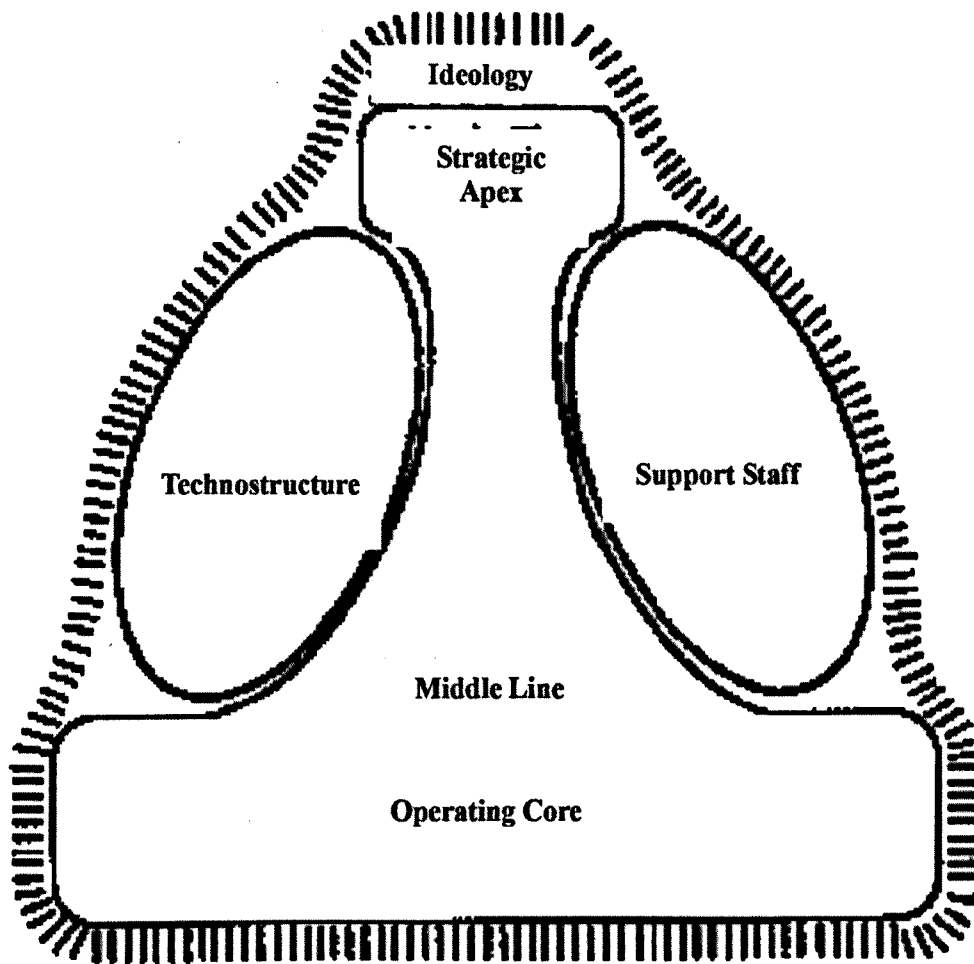
Figure 9.1: The six basic components of an organization (Mintzbergs, 1989)

The staffs who conduct basic tasks like the production and services compose **Operating Core**; Full-time managers who can overlook the whole system are **Strategic Apex**; the level between the Operating Core and Strategic Apex is **Middle Line**; Those that implement administrative functions, formally plan and control other employees' work, beside straight power levels, compose the so-called **Technostructure**. Different types of departments which provide various internal services are called **Support Staff**. At last, in each existing organization exists the sixth parts, which distinguish one organization from others.

Strategic Apex joints Middle Line and Operating Core through a formal power chain. Technostructure and Support Staff are on each side respectively, which implies both of them are separated from this main power chain, and only indirectly affecting Operating Core.

Mintzberg divides organizations into seven types: Simple Structure, Machine Bureaucracy, Professional Bureaucracy, Divisionalized Form, Innovative Organizations, Missionary Organization, and Political Organization. The seven organizations have different characteristics in the prime coordinating mechanism, key part of organization, and type of decentralization and so on.

Simple Structure's strategic apex is located directly above the Operating Core with almost no positions for managers or specialists at other levels in the middle, as in Figure 9.2:
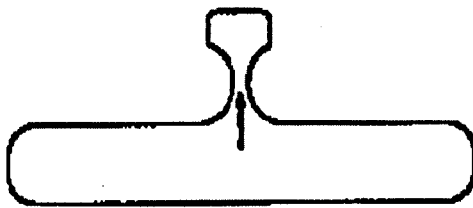
Figure 9.2: Simple Structure (Mintzbergs, 1989)

Machine Bureaucracy focus on the standardization of work processes, and the structure is simple and stable, and conducts centralized control and protection towards Operating Core, as in Figure 9.3 below:
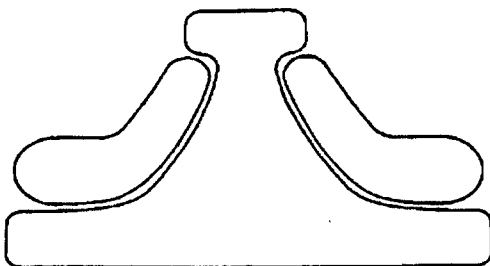

Figure 9.3: Machine Bureaucracy (Mintzbergs, 1989)

Professional Bureaucracy only has a small-scaled Technostucture, and a very narrow Middle Line area. For the former, the operation of professional bureaucracy organizations cannot rely on standardization; for the latter, there is little necessity of administrative control. However, they have large Support Staff, which is afford to its high specialization, see Figure 9.4 below:
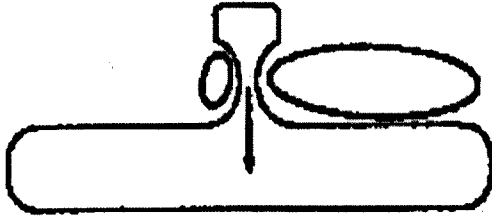
Figure 9.4: Professional Bureaucracy (Mintzbergs, 1989)

In order to effectively serve different markets, the organization is divided into different units, and conduct control to these units with the greatest efforts through standardizing outputs, so it comes to changeable organizational structures, that is, **Divisionalized Form**. As shown in Figure 9.5, supported by small-scaled Support Staff, the 'commander' small Strategic Apex monitors a group of departments, which often have the characteristics of mechanical organizations.
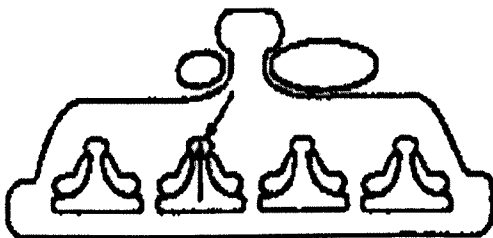

Figure 9.5: Divisionalized Form (Mintzbergs, 1989)

Innovative Organizations need to combine expert groups which include all kinds of employees, and achieve co-ordination among and between them through mutual adjustment. With the disappearance of many differences among traditional organizations, various components of traditional organizations combine into a single, selective vertical and horizontal decentralization system, see Figure 9.6 below:
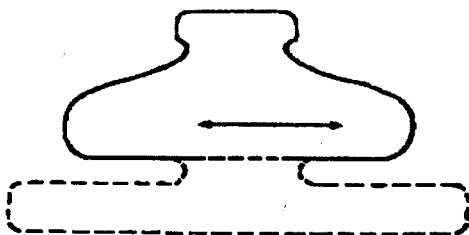

Figure 9.6: Innovative Organization (Mintzbergs, 1989)

Ideology is dominant in **Missionary Organization**, which incentives people in the

organization to make concerted effort, and achieves a form of completed decentralization. In the organization, each member is totally trusted, and the decisions are made and actions are taken for the overall interest of the organization, see Figure 9.7 below:
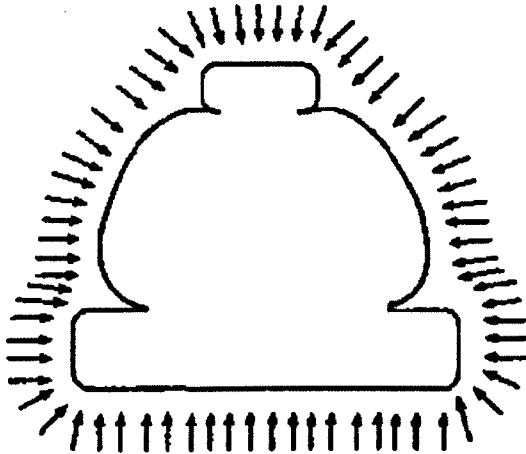

Figure 9.7: Missionary Organization (Mintzbergs, 1989)

In **Political Organization**, there is no dominant organizational part or coordinating body. A political organization has no stable centralization of authority, or decentralization form, see Figure 9.8 below:
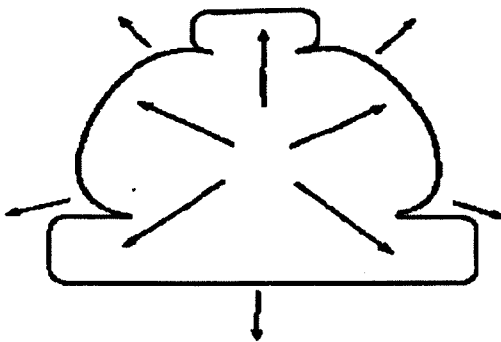

Figure 9.8: Political Organization (Mintzbergs, 1989)

These seven types of organizations above have distinctive characteristics in structures. Therefore, according to different types of organizations, the corresponding effective performance management modes can be further studied as we did in Chapter 5. In reality, an organization may not fall into one category of organizations mentioned above, but be a mixed type, with features of more than one type of organizations. Even so, the development of specific performance management modes for different

types of organizations is still of great benefit.

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