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The role of project management discipline within the environment of medium-size civil engineering consulting firms

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THE ROLE OF PROJECT MANAGEMENT WITHIN THE ENVIRONMENT OF MEDIUM-SIZE CIVIL ENGINEERING CONSULTING FIRMS

STAVROS PANARETOS

JOHANNESBURG 1991

THE ROLE OF PROJECT MANAGEMENT DISCIPLINE WITHIN THE ENVIRONMENT OF MEDIUM-SIZE CIVIL ENGINEERING CONSULTING FIRMS

STAVROS PANARETOS

'A project report submitted to the Faculty of Engineering, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science in Engineering'

JOHANNESBURG, 1991

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DECLARATION

I declare that this project report is my own, unaided work. It is being submitted for the Degree of Master of Science in Engineering in the University of the Witwatersrand, Johannesburg. It has not be submitted before for any degree or examination in any other University.

S Panaretos

S PANARETOS

27th day of JUNE 1991

INTRODUCTION

The rapid advances in technology and the greater complexity of projects generate an ever-changing environment within which the civil engineering consulting firms have to survive and grow.

This changing environment increases the necessity both for greater specialisation (differentiation) and for tighter co-ordination (integration).

There is a tendency in civil engineering consulting firms to place more emphasis on specialisation (functional management) than on integration (project management).

The purpose of this research project is to enhance the role of project management discipline within the environment of medium-sized civil engineering consulting firms.

This purpose will be achieved by using the ability of the project management discipline to integrate various objectives into one common goal.

This is an ability which has been inherited from the evolution of the discipline to solve problems and exploit opportunities through inter-disciplinary efforts.

But, in order to define these 'objectives' the 'systems approach' a management tool extensively used by the project management discipline, will be adopted.

Through the 'systems approach', the organisation will be considered as an 'open system' divided into the following number of sub-systems:

a) Top management sub-system
b) The project sub-system
c) The organisational sub-system

d) The people's sub-system

e) The project management sub-system

The specific objectives of each sub-system will be identified and discussed in isolation, and some problems encountered during the implementation of these objectives will be highlighted.

For each problem, a solution will be suggested and the role of the project management discipline to the implementation of the solutions will be discussed. Finally, the tools and methods used by the Project Management discipline will be used to define the common ground between the different sub-systems and will provide the common link by integrating and balancing all these objectives into one common goal, for the benefit of the organisation.

CHAPTER 1: TOP MANAGEMENT SUB-SYSTEM

INTRODUCTION

Companies exist to accomplish objectives.

These objectives are related to the external (environmental) system within which the company operates, as well as to the internal (company) system.

Top management usually deals with the external environment and its main objectives are predominantly business-orientated, such as:

a) new opportunities
b) profit

On the other hand, functional management deals mainly with the internal environment of the organisation and the objectives may be:

a) productivity
b) cost control
c) utilisation of resources

The role of the top management sub-system is to formulate strategies which can achieve these objectives.

But, for the strategies to be successful, the inter-relationships between the various objectives must be fully understood, especially when objectives are in conflict.

Since Project Management is management within a dynamic environment, the tools and methods used by the discipline can easily provide the mechanism for the 'integration' of all these objectives and assist top management in the formulation of the most appropriate strategies.

1.1 THE MISSION OF THE ORGANISATION

The starting point in the task of managing an organisation is the definition of the organisation's basic purpose or 'mission'. This definition is the critical first act of strategic planning.

The definition of an organisation's mission is not adequate by simply stating what business, industry, or field the organisation is in. What is required, is a more specific statement which will provide the character or personality of the organisation and its basic direction and purpose.

Peter Drucker observes: "Few companies have any clear idea of what their mission is and that is one of the major causes of their worst mistakes" (Business Week, February 9, 1974, P.55).

Managers are often so involved in immediate tasks and problems that they never formulate their organisation's deep central purposes. They forget them once formulated, or they fail to modify them as circumstances change.

For civil engineering consulting firms, the purpose can be broadly defined as to 'Provide services of a civil engineering nature to the community'. This purpose is also defined as the mission of the organisation.

Cleland & King (1983, P.157) show the elements of strategic choice in the form of a triangle which illustrates that the mission and objectives are the highest level elements.

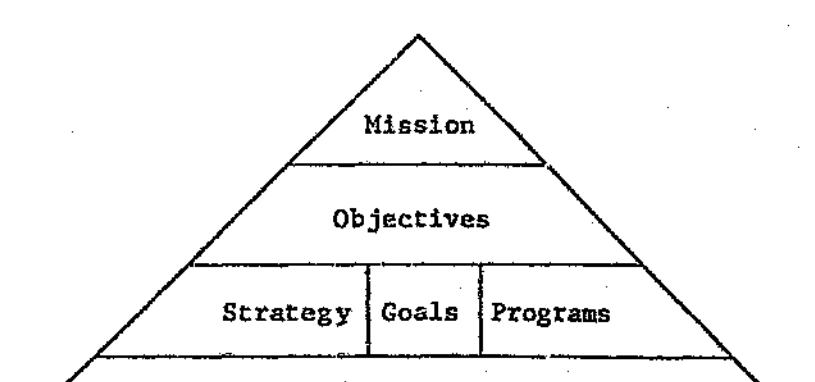


FIG.1.1 RELATIONSHIP OF STRATEGIC CHOICE ELEMENTS (FROM CLELAND AND KING, 1983, P.157)

Mission is the 'business' that the organisation is in.
Objectives are the desired future positions or roles for the organisation.
Strategy is the general direction in which the objectives are to be pursued.
Goals are the specific targets to be sought at specified points in time.
Programs/Projects are resource consuming sets of activities through which strategies are implemented and goals are pursued.
Resource Allocation is allocation of funds, manpower, etc. to various units, objectives, strategies, programs and projects.

Once the mission is defined, additional specific statements are required to clarify the specialisation and direction of the organisation.

For civil engineering consulting firms, these statements can be:

a) Geographic areas in which the firm will operate.

b) Types of structures or civil engineering works that the organisation will seek to design and manage.

c) Types of services that the firm will offer (e.g. Project management, design).

d) Type of client the firm will favour (e.g. Local Authorities, Central Government, Private Bodies)

e) Timing of any changes in these aspects of the business.

All the above will indicate the "mission" of the company and if properly formulated can set the direction for an organisation.

1.2 FROM MISSION TO OBJECTIVES

For the mission to become truly useful in managing organisations, it must be translated into what managers call "objectives". Hampton, Summer and Webber (1978, P.101) support the idea that objectives should not be vague hopes but concrete commitments with the following characteristics:

a) Specific
b) Reality orientated
c) Ability to be verified.
d) Achieved within specific time.

An example of organisational objectives can be illustrated as follows:

1. Increase our share of the design of water purification plants market by 5% by 1990.

2. Reduce short-term loans by 20%.

3. Earn 25% on investment (after taxes) in the next fiscal year.

4. Reduce overtime by 20% below last year's levels.

5. Penetrate into the market of the design and management of shopping centres.

1.3 SYSTEMATIC STRATEGIC PLANNING

To achieve the objectives, certain strategies must be developed.

The role of the Project Management discipline is not, of course, to provide methods for strategic planning development of strategies and their implementation, but the Project Manager must be familiar with these methods in order to incorporate them within his effort for the success of the project.

These strategies may be existing strategies, expansion strategies or diversification strategies.

The decision by top management not to change the strategy is a clear strategic decision. Such a decision does not preclude growth or greater profitability for the firm.

Expansion strategies imply moving into new geographic areas, types of work, or type of client markets using the existing set of services, or alternatively offering an extended range of services in the existing markets.

Diversification strategies involve marketing new products or services in new markets.

The sequence by which construction firms explore strategic alternatives is well illustrated in Figure 1.2 as presented by Gringer in his paper 'Systematic Strategic Planning for Construction Firms'. (Graduate Business Centre, The City University).

The same sequence can be applied for civil engineering consulting firms.

A firm has to search for a strategy which will permit its objectives to be met.

Adopting the sequences shown in Figure 1.2, it is obvious that the degree of risk rises rapidly as the firm moves from the existing, through expansion, to diversification strategies.

The risk of failure may increase for many reasons e.g. the efficient use of existing resources, sometimes called 'synergy', may decline as the firm passes from the existing strategy, to expansion and then to diversification.

But whatever the set of objectives sought by the company, it is clear that strategy formulation is of considerable importance.

An enthusiastically and well executed poor strategy may sometimes be better than an unenthusiastically and badly executed good strategy, but this can never be better than a good strategy which is carried out well and energetically.

The search by a firm for a strategy which will lead to the achievement of its objectives is a very complex process.

The 'objectives' may be very complex and are likely to include financial and economic, political, as well as social objectives.

Prioritization of objectives according to their importance and their impact on the future of the company is also a critical factor.

	Existing services, type of construction or design	New but related services, type of construction, or design	New and largely unrelated projects
Existing clients in same geographic area	Existing strategy	Expansion	Expansion
Existing clients in new geographic area	Expansion	Expansion	Diversification
New clients in same geographic area	Expansion	Diversification	Conglomerate diversification
New clients in new geographic area	Expansion	Diversification	Conglomerate diversification

FIG. 1.2 ALTERNATIVE STRATEGIES (FROM P H GRINGER, GRADUATE BUSINESS CENTRE, THE CITY UNIVERSITY, P.3)

The relative weight attached to each objective of the firm may vary, not only with the composition of the Board of Directors, but also with the general position of the firm. If the firm is fighting to survive, short term economic objectives become of paramount importance. Such a firm is unlikely to move from existing strategies. On the other hand, a flourishing firm may decide to diversify in order to reduce the changes in its annual earnings that result from the stop-go cycle of economic policy.

Therefore, the complexity of the process of strategy formulation, makes it essential that further examination is undertaken.

1.4 PROCESS FOR STRATEGIC DECISION TAKING

Individual styles of decision making vary from highly intuitional to systematic or 'rational'. (P H Gringer, P.3).

The writer believes in a process which combines both intuition and a systematic approach.

Intuition is vital for the perception of an opportunity while the systematic approach will help to check that the opportunity satisfies the objectives of the firm.

The top management of the firm finds itself confronted by a complex set of factors.

These factors may cover, for example:

1) Technical skills and experience of management
2) Specialist staff
3) Financial resources
4) Organisational structure
5) Market strengths relative to competitors
6) Efficiency of procedural and management information systems
7) Prospects of future development of the opportunity.

The combination, therefore, of the intuitive phase together with a systematic approach is of paramount importance.

The process for strategic decisions can be shown diagramatically as follows:

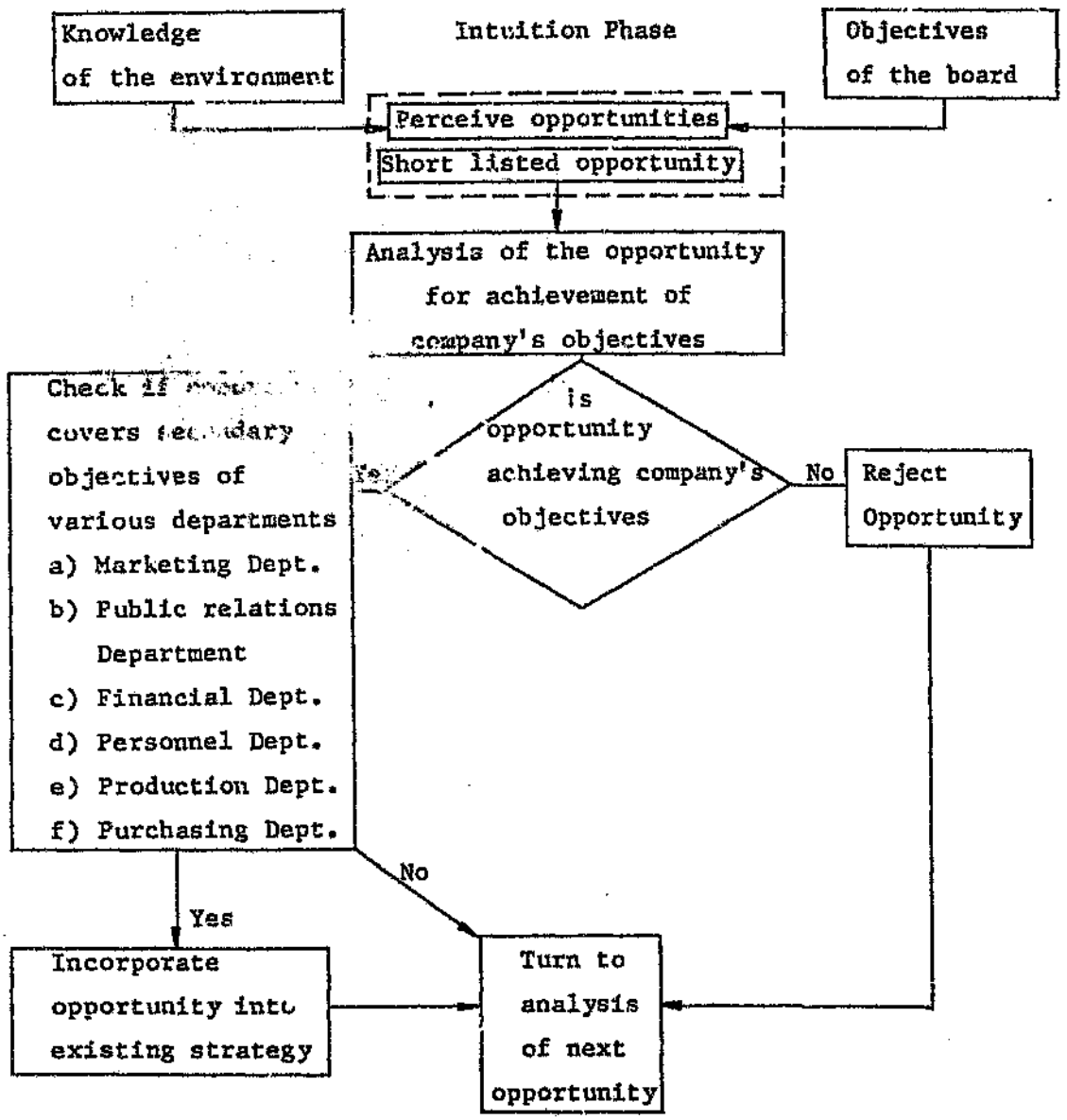


FIGURE 1.3 THE PROCESS FOR STRATEGIC DECISIONS (MODIFIED FROM P H GRINGER, APPENDIX II).

The process for strategic decisions reveals that the formulation of the primary or integrated objectives of the enterprise as a whole and the secondary objectives of each department, necessitates meticulous planning on the part of the top management in conjunction with the middle and lower management.

Vegter (1980, P.58) illustrates the above relationship and congruency of primary and secondary objectives with the following diagram:

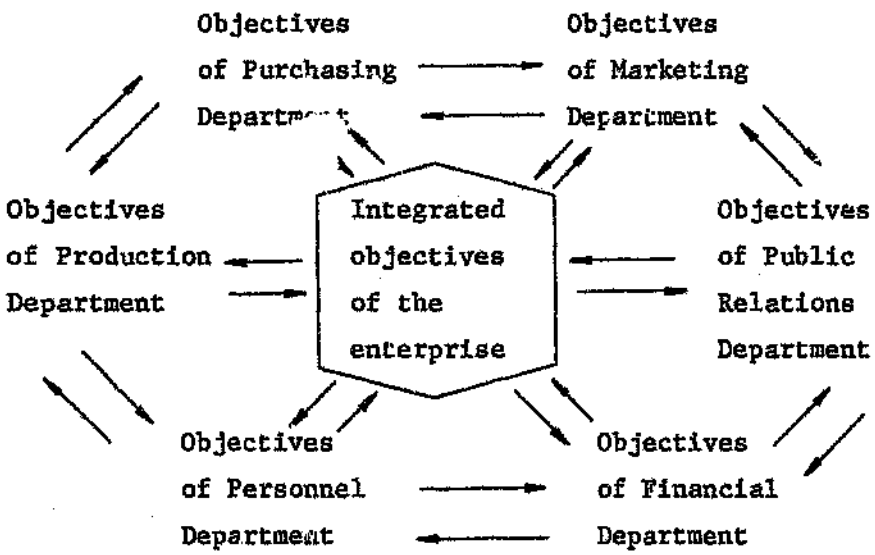


FIGURE 1.4 THE SYSTEMS APPROACH OF THE PRIMARY OR INTEGRATED OBJECTIVES OF THE ENTERPRISE AS A WHOLE AND OF EACH DEPARTMENT (FROM VEGTER, 1980, P.58)

Profitability is the most essential business objective. For top executives, profitability tends to be the most important concern since shareholders are most likely to evaluate them by that standard. Top executives realise that shareholders will evaluate them by their ability to generate good profits.

For civil engineering consulting firms where top executives usually are the shareholders, the profitability concept is of paramount concern.

At lower levels in the organisational structure, managers often guide their decisions by objectives of improvement in productivity and controlling costs.

But improving the productivity of a particular department may require the use of additional resources which may have a negative impact on the corporate profit.

From the above discussion, it is therefore obvious that the process for strategic decisions should not be confined to the perception of business opportunities and their implementation at any cost.

The impact of each opportunity to the company must be scrutinised carefully using the objectives as the sieve which will separate bad opportunities from good ones.

The perception of opportunities and the formulation of the company's primary objectives are primarily the duty of top management.

The company's secondary objectives lie with the functional managers of the various functional departments.

For project-orientated companies such as civil engineering consulting firms, project and company's objectives are closely inter-related.

The role of the project management discipline at this level is to balance project and company objectives to an appropriate mix from which both the project and the company will enjoy the maximum benefit.

But the project belongs to the external environment while its success will benefit the internal (company) environment.

The project management discipline therefore can provide the link between top management and functional management by integrating different objectives for the success of the project.

The term 'success' of the project within the scope of this chapter is more general than the classical definition of the project to be completed "on time, within budget, at an acceptable quality and to the satisfaction of the client". 'Success' is also related to the implementation of specific strategies for achieving companies objectives.

A classical example for medium size civil engineering firms is how the success of a project in a relatively new field of engineering for the firm can open the doors for further business opportunities within that particular field.

CONCLUSION

Organisations exist to accomplish purposes. These purposes must be translated to what manager's call the company's objectives.

The company's objectives vary both in nature and complexity and are classified into primary and secondary objectives.

Company's primary objectives deal with the company as a whole, while company's secondary objectives deal with the purposes set by individual departments within the organisation.

For the achievement of these objectives, certain strategies must be developed by the top management of the company.

The implementation of these strategies should involve middle and lower management, especially for project-orientated firms, while project management may be used to integrate all these objectives into one entity.

The argument supporting this statement is directly related to the effects which the company's objectives have on the success or failure of a project.

These effects will be discussed in detail in Chapter 2.

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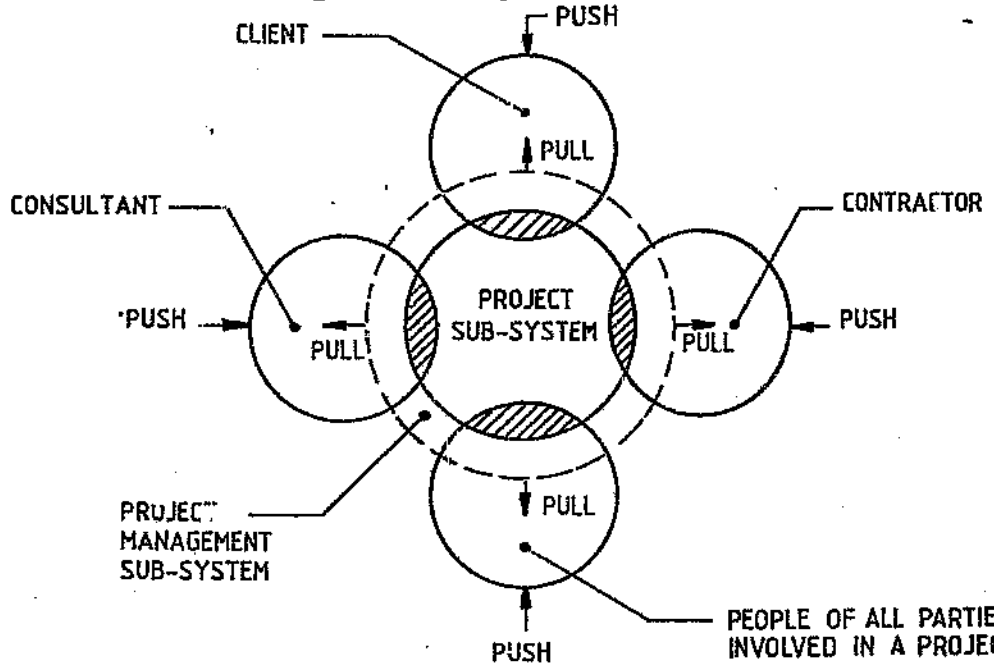
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CHAPTER 2 : PROJECT SUB-SYSTEM

INTRODUCTION

The project sub-system depends heavily on various other sub-systems involved in a project.

This can be shown diagrammatically as follows:



Each sub-system overlaps with the project sub-system through a number of common objectives.

The project management sub-system must recognise the congruency of all these objectives and link them in order to eliminate the various pushes.

This link will provide what is called the 'factor of safety' for the success of the project.

On the other, hand the project management sub-system must also push the various sub-systems until a balance is reached.

This balancing situation consists of a number of objectives which will contribute to the success of the project.

2.1 A SET OF OBJECTIVES ACTING AS A 'SAFETY FACTOR' FOR EVERY PROJECT

Modern management attitudes for project-orientated organisations entail the development of a dynamic environment where the creation of the final product (the project) is the result of a harmonious interaction between technical and managerial skills.

As a rule, top management takes for granted that the above goals are achievable through the efforts of a team of people working together for the creation of the required results under the guidance of a project leader.

Certain assumptions are made by the management at this stage regarding people's behaviour and their abilities.

These assumptions usually are:

a) Through clear personal agreements, the group will achieve efficient team performance. (National Development, P.12).

b) The team is properly qualified to achieve all technical and managerial requirements in order to fulfill the project's objectives.

The above assumptions are frequently not met satisfactorily for various primary or secondary reasons.

Some of these reasons are related directly to the organisational structure of the firm as well as to the systematic approaches with which the firm manages its projects.

These reasons can easily be identified and corrected by reviewing each project on completion and relating its success and failure to possible flaws within the organisational structure or to inadequate procedures by which the project was managed.

The ultimate success or failure of a project depends on a large number of variables. In a project environment, the management of these variables is even more difficult than in a manufacturing environment due to the very basic concept that each project is 'unique'. These variables are generally related to cost, time and quality.

But, besides all these variables, in each organisation certain 'hidden objectives' should be absolutely clear before getting into the examination of all other variables which also affect the success or failure of a project.

These hidden objectives are related to the behaviour of a greater system within which the project is developed.

This greater system is composed of a number of sub-systems such as the client, the contractor, the consultants, the project itself, as well as the people involved.

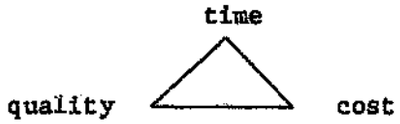
Each sub-system has its own hidden objectives usually related to specific gains which, if correctly detected, prioritized and communicated to the people involved, will provide an in-built 'safety factor' which may counteract a lot of the secondary factors which are not easily foreseen.

The role of the project management sub-system at this stage is to balance all these objectives for the success of the project.

The objectives of the project manager can be summarised as follows:

a) Project objectives
b) His own objectives
c) His people's objectives
d) Company's objectives
e) Client's objectives etc.

In broad terms, the project manager's duties are primarily to cover the project objectives which are summarized by the triangle.



i.e. the project must be finished on time, within budget and to the satisfaction of client.

These objectives are part of his duties and usually, he tries hard to meet them in order to succeed in his own individual objectives.

But these project objectives cannot always succeed in isolation. The 'safety factor' mentioned above will be developed only if all objectives previously described act together. The role of the project management discipline can therefore be defined as the mechanism which integrates all these objectives into one entity, and provides the right balance.

2.2 COMPANY'S OBJECTIVES AND GENERAL POLICY

Most companies, especially in the highly competitive environment of the civil engineering industry, keep their objectives, especially those related to their general policies, highly secretive. These policies are their means of survival and of flourishing.

There is no doubt that certain policies must be kept secret, especially those leading to new avenues of development, but many others should be revealed to the project manager and he should have the right to reveal them to his subordinates in order to be able to generate the motivation and teamwork required within an organisation.

The company will decide on its policies but the implementation should be left to the project managers, who should act as the link between the company and the project objectives.

The following example will describe a very common situation occurring in practice.

A senior employee is called in by the Chairman of the company and is told that he will be the project manager for project 'A' which is for a new client and gives some diversification to the firm's services.

The project manager looks at the situation enthusiastically presuming that if he succeeds, he may be in line for a promotion.

The Chairman knows that since a 'new client' and 'diversification' are involved, this may well develop into a high risk project and therefore he expects only a low level of profit or even no profit at all, but he prefers to keep silent.

The perception of each person in relation to long, medium and short term policy can be summarised as follows:

Chairman		Project Manager	
Long term	new client	Long term	?
Medium term	diversification	Medium term	get promoted
Short term	no profit	Short term	make profit

These differences of perception generate many problems. The project manager, being misled, plans for time, cost and quality but after a while, he realises that the project is bringing in no profit. His motivation diminishes and the project heads for failure. The 'safety factor' referred to earlier is lost. Most probably, after that stage, every one in the firm will try on an ad hoc basis to save the project and keep the client satisfied at any cost, but the enthusiasm and motivation of the project manager takes a hard knock from which it is difficult to recover.

Simple examples such as the above indicate that the project manager should be fully aware of the company's objectives, not only in general terms, but for each particular project.

It is only then that he can perform his duty to the best benefit of the company, of the client, of the project, and of his personal ambitions.

2.3 PROJECT OBJECTIVES

A successful project is one which produces a completed facility that satisfies the client, is within budget, and is completed on time. Although these objectives are related only to the project sub-system, their implementation is very difficult.

Two aspects make the objectives difficult to obtain:

i) Each project is 'unique'. Therefore the objectives are different for each particular project.

ii) The relevant importance between these objectives may change rapidly and often during the project period.

The project is 'unique' because it has a unique life cycle and it involves a unique multi-disciplinary team. For each project, therefore, the effectives may vary depending on the nature of the project.

The best way to identify the project objectives is through the preparation of a scope of work as early as possible. The earlier it is made and the more complete the definition of the scope, the better the chances will be for the success of the project.

This initial stage of the project is very difficult because one is so involved in getting the project 'going', that one forgets to stop and decide exactly where one needs to go.

Planning the project effectively is very important.

Good planning, keeping in mind the project objectives, adds to the previously described 'factor of safety' for the successful project.

Checking and re-planning at regular intervals is a necessity. This is the definition of project control i.e. measuring actual progress against planned progress and taking corrective actions to keep a project within its objectives.

The success of the project manager in accomplishing the project objectives provides him with the second element of the abovementioned 'factor of safety'.

2.4 PEOPLE'S OBJECTIVES

A very basic definition of a manager is one who achieves objectives through people. People are the driving productive force on a project and the project manager should possess enough knowledge to develop an understanding of the personality and behaviour of the individuals working on a project.

Through that understanding, he should be able to recognise each individual's personal objectives and he should eventually try to satisfy these objectives to the best of his ability.

Once people realise that their leader can be trusted, it is only then that the synergetic attitude will be developed - a very important aspect for the success of a project.

People comprising the project team should be as homogeneous as possible, but this statement is unrealistic. It is a fact of life that people are different. The project manager should possess an ability to deal with every person individually. A very good classification of people is given in the book 'Cutting edge of tomorrow' by Beck and van Heerden (1987, P.36).

The people, according to the authors, are categorised according to a psychological map. The psychological map charts how people think about their world, not what they think about it, or even what they do. The psychological map is a tool to improve the project manager's perception of individuals, organisations and cultures in order to deal with them effectively.

A summary of the map is given on the following page.

Stations in which people are Categorised		Bottom line objective
1.	Reactive, autistic	Survival
2.	Tribalistic, animistic	Safety and security
3.	Egocentric, power driven	Power and action
4.	Absolutistic, saintly	Stability and salvation
5.	Materialistic, multiplistic	Success and material gain
6.	Personalistic, relativistic	Human development and relationships
7.	Systemic, existential	Quality of life on the planet.

FIGURE 2 PSYCHOLOGICAL MAP (SIMPLIFIED FROM THE ORIGINAL WORK OF DR C W GRAVES, UNION COLLEGE, SCHENECTADY, NY).

2.5 CLIENT'S OBJECTIVES

Client's objectives are very closely related to project objectives, i.e. quality/cost/time. The most important impact that the client has on a project, is his tendency to change the importance of the objectives. A client can have a major developing impact on a project if he tends to change his mind on them.

High quality is usually the primary objective of the client in the initial phase of a project i.e. during feasibility studies and design.

During construction, there is usually a compromise on quality and cost becomes the primary objective.

Towards the end of construction phase, time usually becomes the client's primary objective. But for the rest of the life cycle of the project, quality becomes once more the judging criterion for the success of the project.

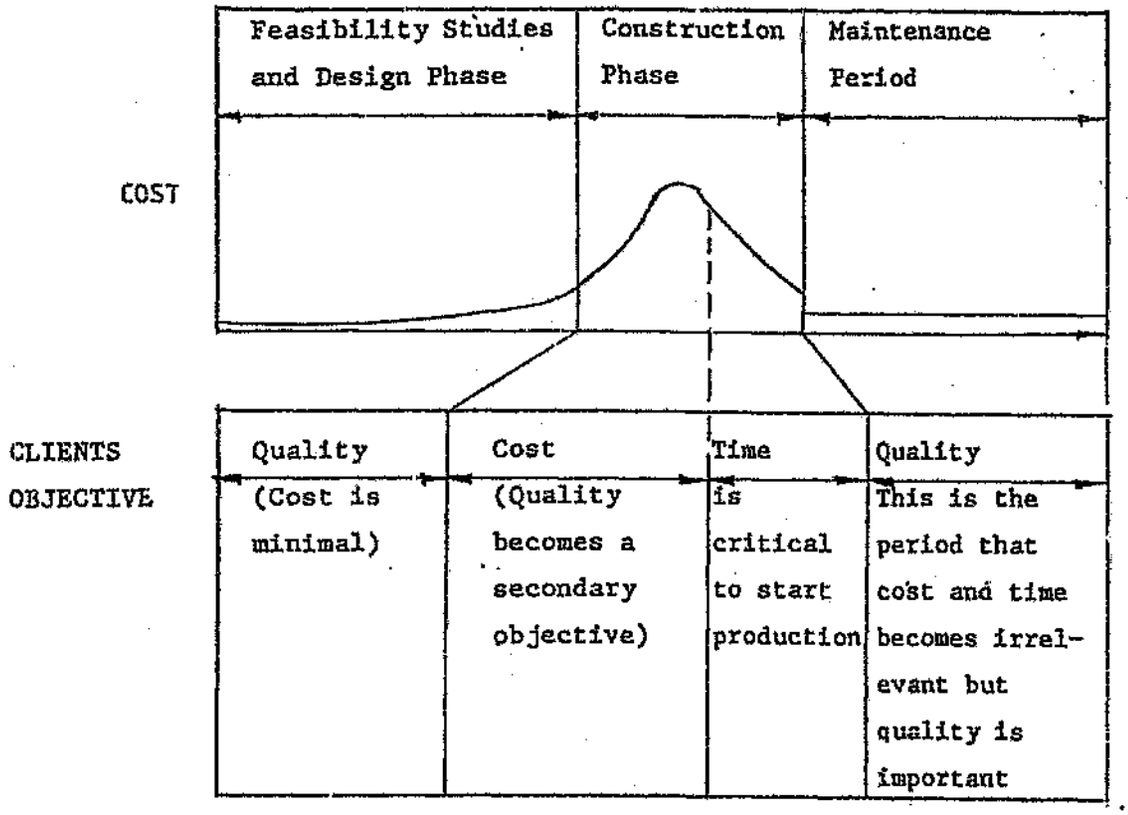


FIGURE 2 IMPACT OF COST ON CLIENT'S OBJECTIVES

Management of the client, therefore, is one of the more difficult tasks for the project management discipline mainly due to this ongoing process of changing the priorities of objectives by the client.

The client therefore needs to be convinced that his project is relatively successful i.e. the project is of a certain quality achieved within a realistic budget and time and that the project is neither superior nor inferior to the relative standards applicable in the environment of that particular place or country. Quality achieved in West Germany cannot be achieved in South Africa within the same cost or time parameters.

2.6 PROJECT MANAGER'S OBJECTIVES

The project manager also has his own objectives which many times are very similar to those of his subordinates, but usually he has very little control over their success.

His objectives may be related to power and action within the organisation or success and promotion or material gains.

The project manager's objectives must be recognised by top management and corrective action must be taken. The project manager should concentrate on the success of the other objectives which fall under his jurisdiction.

He must possess the ability to give clear instructions himself, to realise his own strengths and his own shortcomings. He must be able to take hard decisions not based on people's needs but he must not forget that his work succeeds through people and this should be his 'motto' in life. He must be able to blend with his colleagues from the lowest to the highest level and in this, he must provide an example to others. Eminence alone is not important; participation is the nature of the new management techniques.

Through people, he will succeed in realising his company's objectives, his project objectives and finally his own and his people's objectives.

The synergetic attitude will then have been developed and the motivation and harmonious work will create the final good results: those of the success of the project.

2.7 A FORMULA FOR THE 'FACTOR OF SAFETY'

The mathematical formula describing the 'factor of safety' of the project is:

(PO) x (PRO) x (PMO) x (CO) x (CLO) = Factor of Safety

where PO = People's objectives
PRO = Project's objectives
PMO = Project Manager's objectives
CO = Company's objectives
CLO = Client's objects

All variables have an equal weight in the end result.

The results can be summarised as follows:

		Causes	Result	Corrective Action
a)	(P,O)—o	Low salaries Inferior environment No future	People resign Productivity falls due to demotivation	Increase salaries Improve environment Develop opportunities. Replace people
b)	(PRO)—o	Inferior quality Low productivity Bad planning Delays	Poor project execution	Introduction of quality assurance and quality control procedures. Improvement of planning methods. Introduction of motivating schemes e.g production bonuses, profit participation schemes.

c)	(PMO)→o	Poor support from the organisation Too much interference from top management. Not enough power delegation	P.M resigns	Top management to provide the necessary support and authority to the project manager
d)	(CO) →o	Failure of the project	Low profits Loss of client	Top management to examine general policy
e)	(CLO)→o	Failure of the project according to client's criteria	Financial losses Conflict with contractors or consultants	Early education of client of what he should expect in terms of quality relative to his allocation of funds and time

If any one of the variables drops to zero, the project has a high risk of failure predominantly for the firm which will try to hide or absorb losses, as well as for the client.

CONCLUSION

Five objectives have been discussed in detail and their contribution towards the success or failure of a project have been examined.

However, the accumulation of these objectives depends on various parameters outside the project sub-system.

Parameters of the greater environmental system and their influence on top management in the formulation of various objectives were examined in Chapter 1.

Two other parameters which have a significant influence on these objectives are:

) the structuring of the organisation
b) the people of the organisation

The organisation must have the right 'structure' and the right 'people' in order to succeed in the correct formulation and implementation of the various objectives.

The organisational structure for medium size civil engineering consulting firms will be examined in Chapter 3. The people employed in this type of firm and their behaviour will be discussed in Chapter 4.

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CHAPTER 3 - ORGANISATION SUB-SYSTEM

INTRODUCTION

The main objective of the organisational sub-system is the development of the most appropriate organisational structure which can effectively implement the various objectives of the other sub-systems.

Since objectives are constantly changing, the structure to be adopted must be flexible in its nature and able to adapt to the various 'sociotechnical' changes (Sadler 1971, P.19-33) of the environment.

The problem arising in the formation of the ideal organisational structure is the 'conflict' generated between the type of structure whose objective is the tasks to be achieved with minimum cost and the structure whose objectives are human beings to have their needs satisfied (Sadler, 1971, P.19-33,.

The use of the project management tools can participate in the formation of the right organisational structure through its ability to balance objectives and fair allocation of work activities to individuals and groups.

These objectives are directly related to:

a) The age and growth of the organisation.
b) The characteristics of the people in civil engineering consulting firms.

3.1 TYPICAL CHARACTERISTICS OF ORGANISATIONAL GROWTH

Organisations start their lives at the entrepreneurial stage. The entrepreneur makes all the important decisions by himself and co-ordinates their execution by direct supervision.

The entrepreneur usually tries to maintain central control until he encounters a bottleneck in the flow of information and decision making. Mintzberg (1979, P.293) concludes that survival for such organisations means the adoption of formal patterns of behaviour and co-ordination and the construction of a more elaborate administrative component: in other words, the shift from organic to bureaucratic structure.

In Bos's (1969, P.21) words, the bureaucratic stage is the antithesis of the entrepreneurial stage and is described as follows:

In the entrepreneurial stage, the tactics to achieve the objectives of the organisation are intuitive, organic and personal while in the bureaucratic stage they are national, mechanistic and impersonal.

As Scott (1971) notes, in the bureaucratic structure, the focus is on internal operating control more than on market effectiveness.

To improve both internal operation and market effectiveness, the divisionalised structure was developed.

In this structure, the overgrown functional bureaucracy splits itself into distinct divisions. Each division has its own operating core and serves its own market.

Chandler (1962) (P385) describes the evolution of an organisation in four stages.

"The initial expansion and accumulation of resources; the rationalisation of the use of resources; the expansion into new markets and lines to help assure the continuing full use of resources; and finally, the development of a new structure to make possible continuing effective mobilization of resources to meet both changing short-term market demands and long-term market trends".

This new structure is the divisionalised structure.

This type of structure is favoured by many civil engineering consulting firms. Their divisions are then named according to their specialisation:

Structural Division
Civil Division
Hydraulic Division
Roads Division
etc.

But the divisionalised structure is based on the principle of unity of command. The head of each division has full responsibility for his section and is accountable to the Chief Executive.

As a result, communication between divisions is difficult and for multi-disciplinary projects where input from several divisions is required, the co-ordination becomes extremely difficult. This observation is also mentioned by Stopford and Wells (1972, P.27) for large multi-national firms. They also mention that:

'A few firms have attempted to build new structures where managers operate with dual or multiple reporting relationships'. This new structure is the matrix structure.

From the above discussion, we can conclude that within an organisation there first grows a managerial hierarchy, then a technostructure which in turn eventually splits into divisions and is finally synthesised into the more complex matrix organisation.

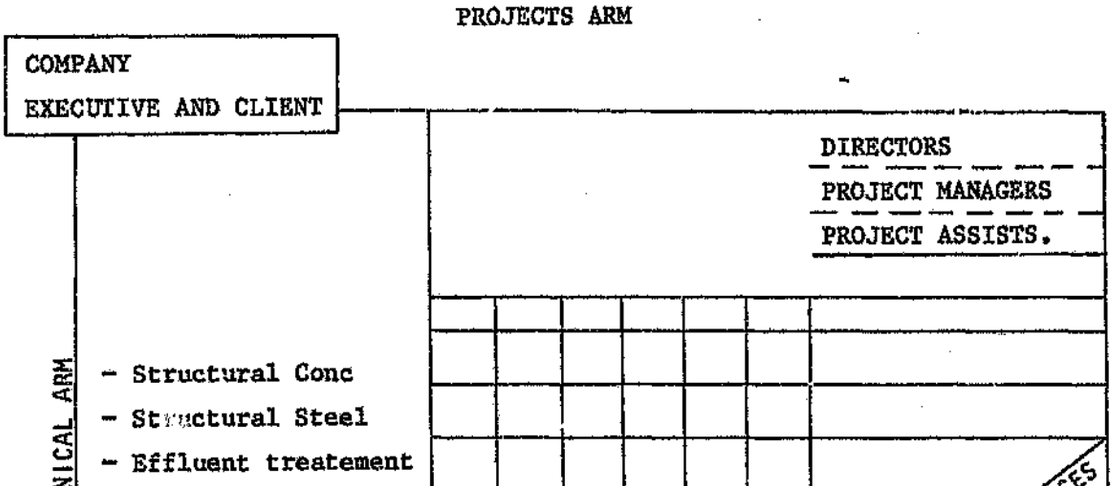


FIGURE 3.1 MATRIX ORGANISATION - (ADAPTED FROM BERGMAN & PARTNERS MANUAL FOR OFFICE PRACTICE)

3.2 MATRIX ORGANISATION

The matrix organisation is a highly organic structure with a minimum amount of formalisation of its behaviour.

The horizontal job specialisation is based on formal training.

The specialists are usually grouped together in functional units for housekeeping purposes, but they are grouped together in small market-based project terms to do their work.

The co-ordination mechanism is by mutual adjustment within and between these teams.

The key issue for the success of the matrix system is the innovation of means to break away from established patterns.

The innovative organisation cannot rely on any form of standardisation for co-ordination.

Civil engineering consulting firms believe that they are highly innovative organisations. On the other hand, the training of their people as well as the obligation of these people to follow standard methods of designs, standard specifications, code of ethics etc, eliminate every aspect of innovation.

But people within these organisations have to be trained to separate their behaviour towards their jobs from their behaviour within the organisation.

Their behaviour towards their job can stay bureaucratic if this provides them with security, peace of mind and happiness, but their perception of their behaviour within the organisation must change.

This perception of an organisation is well presented by Hedberg et al (1976 P41-65) who describe an organisation as a 'tent' instead of a 'palace'. A tent can be dismantled and moved at will. Toffler (1970) notes that organisations change their internal shape with a very high frequency.

These changes must be fully understood and accepted by professionals who are characterised by conservatism.

Civil engineering consulting firms usually deal with projects. Chandler and Sayles (1971 - P201) note that organisations dealing with project work lack the advantages of those that do repetitive work. Since project work is usually being done for the first time, precedents and policies are somewhat irrelevant and it is difficult to draw neat jurisdictional lines.

In matrix organisations, therefore, the specialists must join forces in multi-disciplinary teams, each formed around a specific project.

Khandwala (1976, P.70) notes "the job of co-ordination is not left to a few charged with the responsibility, but assumed by most individuals in the organisation, much in the way members of a well-knit hockey or cricket team all work spontaneously to keep its activities focused on the goal of winning".

The project teams must be relatively small in order to encourage mutual adjustment among their members and each team needs a manager that from now on, will be called 'the project manager'.

The project manager does not manage in the usual sense, that is, give orders, supervise and allocate resources. Instead, the project manager spends his time in liaising, negotiating and co-ordinating the work laterally among the different teams and also does this between them and the functional teams.

3.3 CHARACTERISTICS OF THE PEOPLE IN CIVIL ENGINEERING CONSULTING FIRMS AND A TENDENCY TOWARDS PROFESSIONAL BUREAUCRACY

Civil engineering consulting firms rely on the skills and knowledge of their professional people.

The training of these professionals usually starts in a university or technical college and is only completed after a period of on-the-job training.

On completion of this training, the trainee enters his profession as a full member.

The core of his training is the systematic knowledge of design procedures, established techniques for problem solving, as well as thorough application of codes of practices.

This knowledge, which has built up over years of experience, coupled with the complexity of his work provides him with a certain degree of mobility, which enables him to insist on a considerable amount of autonomy in his work and power.

Another tendency of professionals is to identify themselves with their profession rather than with their organisation.

As far as their work is concerned, Simon (1977, P.98) comments 'the pleasure that the good professional experiences in his work is not simply a pleasure in handling difficult matters; it is a pleasure in using skillfully a well-stocked kit of well-designed tools to handle problems that are comprehensible in their deep structure but unfamiliar in their detail'.

This tendency of isolation shown by professionals provides some difficulties when grouped together to form an organisation.

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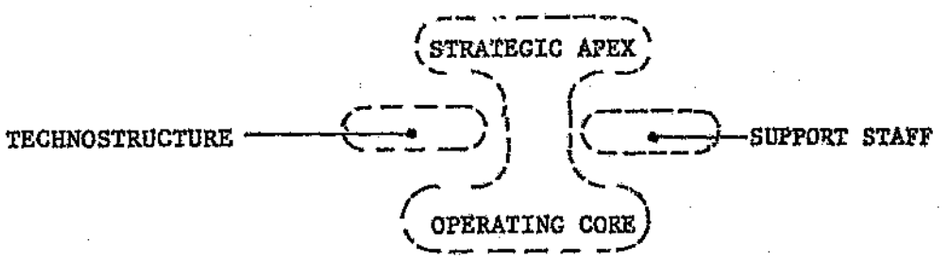
This tendency of isolation shown by professionals provides some difficulties when grouped together to form an organisation.

The professionals therefore tend to seek an organisational structure where:

a) autonomy
b) power
c) indpendance
d) job satisfaction

are provided at the operational level.

Mintzberg (1979, P.348) presents this type of organisation in terms of his logo, as a flat structure with a thin middle line, a tiny technostructure, and a fully elaborated support staff.



FIGRE 3.2 THE PROFESSIONAL BUREAUCRACY (FROM MINTZBERG, 1979, P.355)

From Figure 3.2, it is obvious that most of the power rests at the bottom of the structure i.e. with the professionals of the operating core.

This power is derived from the fact that the professional's work is too complex to be supervised by managers or standardised by analysts.

This description of power explains the thin middle line and the tiny technostructure.

It appears so far that civil engineering consulting firms are highly democratic structures, at least for the professionals of the operating core.

It is very difficult to distinguish the term "professional" in civil engineering firms.

The term "professional" is legally allocated to university graduates with a minimum of three years appropriate training and registered with the South African Council for Professional Engineers (SACPE).

But a new breed of professionals has recently emerged through the ranks of technicians and a new title has emerged: that of Professional Technologist.

Draughtspersons also insist that they are professionals in their fields.

It appears, therefore, that the term "professional" is applicable to various levels of the operating core within the civil engineering consulting firms. These levels are:

Title Terminology	Professional Terminology	Legal Justification	Behavioural Justification
Engineers	Pr Eng	Yes	Yes
Technician	Pr Tech.	Yes	Yes
Draughtsman	N/A	N/A	Yes
Tracers	N/A	N/A	Debatable

FIG. 3.3 PROFESSIONAL CATEGORISATION

The division of professionals into various categories destroys the idea of the democratic structure as described by Mintzberg.

In fact, there is a tendency for competition between the various categories relative to their contribution to the overall organisation.

Each of the above categories has certain strengths as well as weaknesses when in competition with each other.

The tendency of each group is to control its own work and to seek collective control of the administrative decision that affects that particular group.

To control these administrative decisions requires control of the middle line of the organisation. Professionals try to ensure that this middle line is occupied by staff of their own group.

At this point, we can reverse the disadvantage of a professional working for two bosses in a matrix organisation into a distinct advantage.

A technician, for example, can still keep his autonomy and power reporting to his permanent boss in middle line while he is temporarily working for a project manager for whom he may have no respect. But he considers his relationship with the project manager as temporary and of no consequence to his career, his autonomy or his power within the organisation.

In civil engineering consulting firms, power is closely related to expertise, knowledge and skills. Based on the above perception of power, a different scenario may be developed. The technician referred to above may be impressed by the project manager and develop a respect for him, which will indirectly influence his productivity and participation to the success of the project.

In this way, the project manager who also belongs to the middle line, can influence the behaviour of temporary project employees.

In fact, the project manager can generate the impression to the professional employees that their aspirations can be achieved more easily through him rather than through the actual middle line representative of their discipline.

The knowledge, therefore, of the project manager relating to the behaviour of the professional organisation is of paramount importance in helping him to achieve his goals.

3.4 SIZE OF CIVIL ENGINEERING CONSULTING FIRMS AND ITS EFFECT ON THE ORGANISATIONAL STRUCTURE

Apart from size and age, medium size civil engineering consulting firms are faced with a relatively high degree of diversification and decentralisation.

Both diversification and decentralisation increase the need for a job specialisation and the introduction of a hierarchy of authority to co-ordinate through direct supervision.

Then, as work becomes more specialised and the decentralised units larger, the organisation turns to standardisation for co-ordination.

The work force is divided between designing the work and supervising it and a technostructure is added to plan and formalise the work.

Given the high cost of the professionals, it makes sense that whatever routine work can be formalised ought to be delegated to supporting staff.

The splitting of the organisation into different elements, namely the operating core, the technostructure and the supporting staff, results in a number of problems. These problems are mainly related to co-ordination and innovation.

Co-ordination is an internal problem for the organisation, while innovation is related mainly to the outside environment.

There is a tendency for the employees within the organisation to try to solve the co-ordination problem predominantly through standardisation of skills and knowledge.

But excessive standardisation kills innovation and the adoption of elements of the operating adhocracy as the de-stabilising factor against standardisation within the organisation becomes necessary. The recommended model named "Professional bureau/ adhocracy" will be fully examined and discussed in the next chapter.

Bigger consulting engineering organisations have more resources available and they can develop more complex hybrids of organisational structures.

But all these structures have something in common: The tendency by people to influence the organisation for their own comfort and benefit.

This influence is described by Mitzberg in the following diagram:

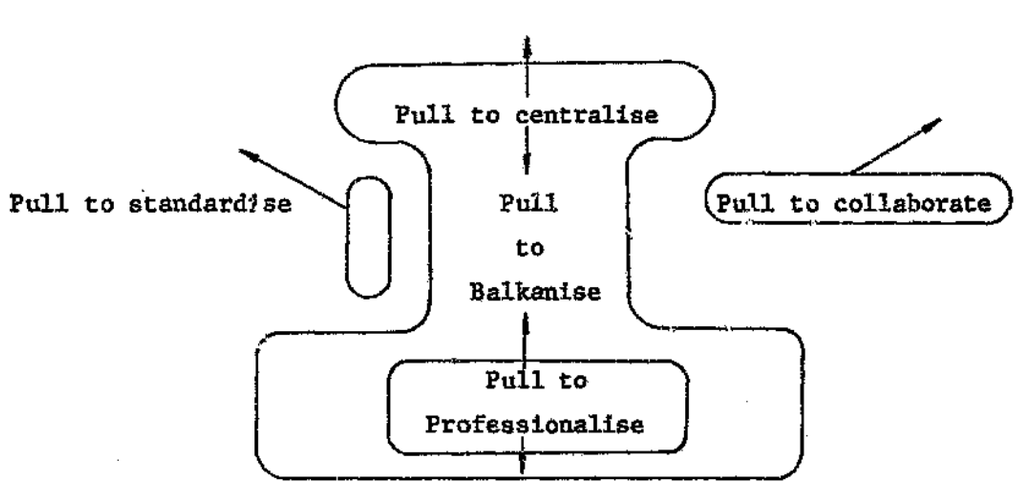


FIG 3.5 FIVE PULLS ON THE ORGANISATION (FROM MINTZBERG, 1979, P.302)

These pulls must not be allowed to achieve their hidden purposes at any cost, since their result is a highly bureaucratic structure.

These pulls must be paralyzed through the effect of the adhocracy which must be cultivated within the people of the organisation.

People must believe that the organisation is more like a 'country' and a 'battlefield'.

The shape of the organisation must be characterised by unity and not divisionalisation. The following logo describes the above model.

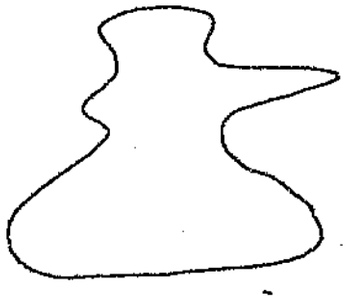


FIG. 3.6 A MODEL FOR CIVIL ENGINEERING CONSULTING FIRMS

The above model will provide both the standardisation and innovation required for the survival of civil engineering consulting firms where both standardisation and innovation are required.

Some recommended organisational structural configurations are summarised in the following table:

Organisation	Size (No. of People)	Structure
Small	1 to 20	Entrepreneurial Adhocracy
Small to Medium	20 to 100	Entrepreneurial Adhocracy and Professional Bureaucracy
BSB & P Medium	300 +	Professional Bureau/Adhocracy
Medium to Large	200 to 400	Professional Bureaucracy with elements of both operating and administrative adhocracy and a divisionalised form
Big Consulting Organisation	400	Divisionalised Adhocracy with a fully established matrix organisation

FIG. 3.7 RECOMMENDED ORGANISATIONAL STRUCTURES FOR CIVIL ENGINEERING CONSULTING FIRMS

3.5 PROFESSIONAL BUREAU/ADHOCRACY A MODEL FOR THE OPERATION OF MEDIUM SIZED CIVIL ENGINEERING CONSULTING FIRMS

The operating adhocracy innovates and solves problems directly on behalf of its clients. Its multi-disciplinary teams of experts often work directly for a particular project. Managers of the middle line and members of the support staff all work together alongside specialists on the project team.

In the execution of project work, it is difficult to differentiate the planning and design of the work from its actual execution. All stages require the same specialised skills on a project-by-project basis.

The administrative adhocracy also functions with project teams, but the operating core is truncated from the administrative component. The general belief is that social tensions in the operating core can overflow into the administrative component, generate conflict and harm innovation.

Ansoff and Brandenburg (1971) refer to this kind of structure in corporations as the 'innovative form'. An innovative group concerns itself with diversification and expansion of the enterprise. It takes projects to full implementation and then turns them over to a current business group that manages them.

In fact, activities done by the operating core can be contracted out to other organisations.

For civil engineering consulting firms it is extremely difficult for the operating core to be truncated from the administrative component.

The work executed by the people in the operating core is related directly to the success or failure of the project. Even during the production of drawings, the nature of the work is such that quality is better achieved through mutual adjustment between engineers and draughtsmen during the development of the drawing.

During this development period, every member of the team is contributing and innovating according to his level.

Operating adhocracy is therefore more suitable for the civil engineering consulting firm. But, as we have already discussed, civil engineering consulting firms are predominantly composed of professionals.

Having examined the characteristics of these professionals we have concluded that they tend to feel more comfortable within an organisation such as the professional bureaucracy.

So we have two organisational systems suitable for the medium size civil engineering consulting firms. The one is the professional bureaucracy which is people-orientated; the other is the operating adhocracy which is company orientated.

The system envisaged should, therefore, be an appropriate mixture of both the professional bureaucracy and the adhocracy. We shall refer to it as the professional bureau adhocracy.

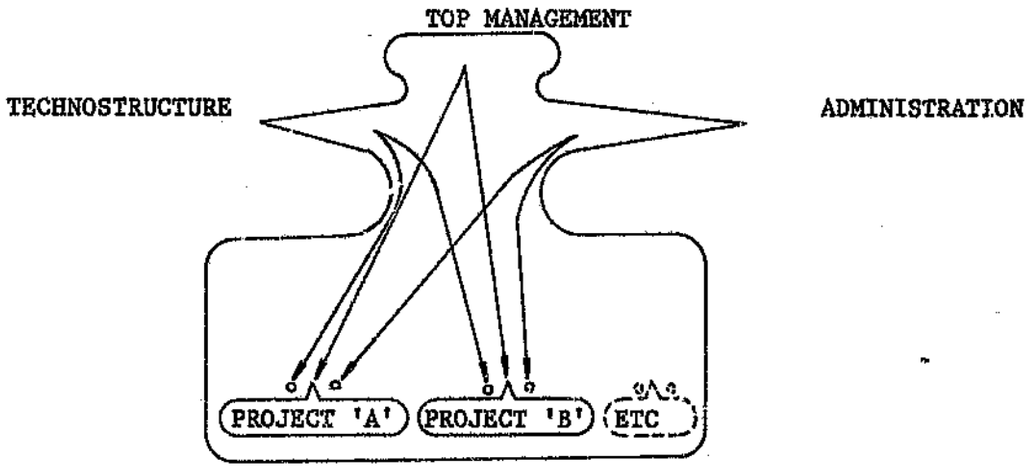


FIG. 3.7 PROFESSIONAL BUREAU ADHOCRACY

The general shape is that of an amorphous, ever changing adhocratic organisation within which each project is treated as a professional bureaucracy of changing configuration. In fact, we have a number of mini-systems of professional bureaucracies comprising the overall system of the adhocracy.

The mini-systems which, in fact, represent the different projects rated by the company, draw their members from the upper system. Each of these mini-systems will follow two separate behaviours. For the execution of work, the convergent thinking of the professional bureaucracy will be the predominant factor.

Co-ordination, communication and management will follow the principles of the matrix organisation, but for the overall firm, the adhocracy must be the predominant system that will cause the de-stabilisation or the tendency for formation of standard organisational systems, which in the long run, destroy the continuous adjustment of the higher systems according to the prevailing circumstances.

The system can be likened to a drop of water on a piece of glass where surface tension forces keep the molecules under a certain configuration. By applying an external force, the shape will be damaged but the molecules will still reach a new equilibrium stage.

The concept of this organisational system may appear abstract, but this is, in fact, how real organisations behave.

People should therefore realise that within the environment of medium size civil engineering firms, they have to live with two standards.

They can standardise their skills if they like, but they must be flexible in their techniques within their organisation.

CONCLUSION

Medium size civil engineering consulting firms are faced with a number of organisational problems.

These problems are related to the age and growth of the organisation.

The company is mature and ready to grow further but resources (people) are limited.

Two policies may be adopted at this stage:

a) The company employs people to establish its organisational capacity to absorb future growth or

b) The company decides to remain static.

Policy (a) is very risky financially, while policy (b) is the real route of slow failure.

Professional bureau adhocracy is an organisational structure which may help the company to smooth its transition from small to big.

Structuring the organisation correctly will provide the right environment within which the objectives discussed in Chapter 2 can be properly formulated and implemented.

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CHAPTER 4 - PEOPLE'S SUB-SYSTEM

INTRODUCTION

The objectives of the people's sub-system is the improvement of human and social values of individuals within an organisation.

The main problem is that in most organisation development programmes, more emphasis is given to the objectives of the organisation rather than to the objectives of individuals.

The solution to this problem is the development of an organisational 'culture' to link people and company through common objectives.

The project management discipline can effectively participate in the development of this right culture through an effort of elevating the knowledge, skills, interests and team work of the various people participating in the different projects handled by the organisation.

4.1 ORGANISATION DEVELOPMENT THROUGH THE IMPROVEMENT OF THE ORGANISATION'S CULTURE AND ITS HUMAN AND SOCIAL PROCESSES

The goals of organisation development are to make the organisation more effective and better able to achieve both the objectives of the organisation as an entity, as well as the objectives of the individuals within the organisation.

French and Bell (1978) (Preface) express the idea that 'it is possible for the people within an organisation collaboratively to manage the culture of that organisation in such a way that the goals and purposes of the organisation are attained at the same time that human values of individuals within the organisation are

furthered. In behavioural science, organisation development is a long range effect to improve an organisation's problem-solving through a more effective and collaborative management of organisation culture'.

To develop the right culture, superiors and subordinates must collaborate continuously for the renewal and revitalisation of the organisation.

The right culture can be developed through renewal of both the 'formal' and 'informal' systems of the organisation. The formal system includes goals, technology structure, policies and procedures, products and financial resources.

The renewal of the formal system can be done by problem-solving workshops where both management and work force participate effectively. The problems discussed during these workshops should cover aspects such as 'The Boss', 'meetings', 'administrative services', 'customer relations', 'relations between functional departments', 'solution to technical problems', 'computer application' etc.

The informal system includes feelings, attitudes, perceptions, values, informal interactions and group norms of the working groups.

The informal system is often the suppressed domain of organisational life, the submerged part of the 'organisational iceberg' as illustrated below:

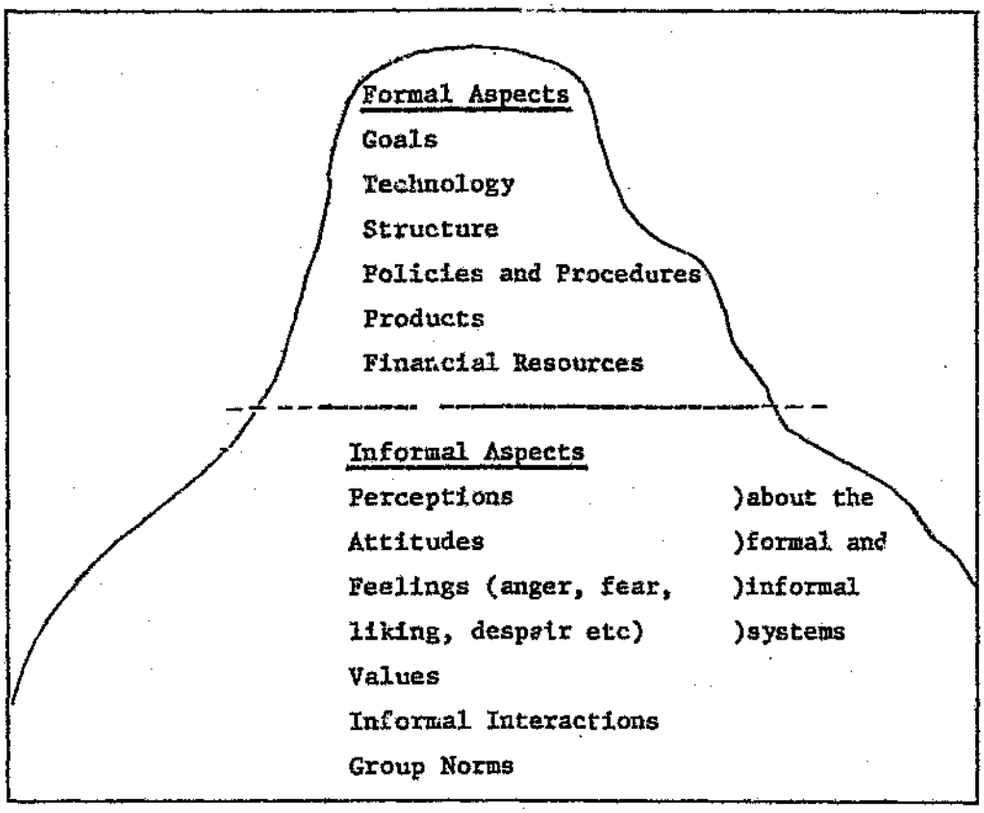


FIG. 4.1 ORGANISATIONAL ICEBERG (FROM STANLEY N HERMAN, 1970)

Both Argyzis (1971 - P IX) and Gardner (1965 - PP1-2) stress that the heart of organisation development is the renewing of organisations through technical and human resources and the avoidance of organisational decay through the establishment of conditions that encourage individual motivation, development, and fulfillment.

For medium-size civil engineering firms where short, medium and long term objectives depend nearly entirely on people, both top and project management should be fully conversant with the underlying assumptions and values in the behaviour of people.

These assumptions relate to:

a) People as individuals
b) People in groups
c) People in organisational systems

4.2 PEOPLE AS INDIVIDUALS

Tannenbaum and Davis (1969) P.41-49) state that the traditional view of individuals is that they can be defined in terms of given interests, knowledge, skills and personality characteristics. Individuals can gain new knowledge, acquire additional skills, and even at times change their interests, but it is rare that people really change.

This view, when buttressed by related organizational attitudes and modes, ensures a relative fixity of individuals with crippling effects.

Thus, one can view people as fixed entities, or one can view them as potentially 'in process'.

Both top and project management must view people as individuals with potential personal growth and a desire for a higher level of contribution to the attainment of organisational goals.

The implementation of the above theories especially at project management level, presents great difficulties. The project manager, in the process of formulating his organisation chart for a particular project, allocates duties to individuals, viewing people as fixed entities for his project.

It is therefore important for both top and project management to educate people in accepting the reality that they will be considered as 'fixed' entities to help for the short-term project or company's objectives. On the other hand, people must be informed that this help will be recognised by the company as their contribution which entitles them to further advancement at a later stage.

The promise of advancement at a later stage is a managerial technique which may work for a limited period of time. Basically, it is a manipulation of people's expectations for advancement. For medium-size civil engineering firms, the above scenario is very common and the reason behind it is the ability of the company to grow.

Personal growth depends on the company's growth and vice versa.

The company's growth has been examined in the previous chapter, but on the assumption that the company enjoys an acceptable degree of growth, people should definitely be viewed as 'growing' and not as 'fixed' entities.

4.3 PEOPLE IN GROUPS

The importance of teamwork, for civil engineering consulting firms, has long been recognised. To improve the concept of teamwork within the project environment, the project manager must understand the underlying factors which affect the teamwork concept. These factors are clarified by three assumptions given by French and Bell (1978, P.31).

The first assumption is that people need to belong to at least one group and, for most people, psychologically this group is the work group.

The second assumption is that for a group to optimise its effectiveness, the project manager must delegate some of his powers to various subordinates in order to improve participation.

The third assumption is that suppressed feelings affect job satisfaction negatively.

The culture of most organisations tends to suppress the expression of feelings and the attitudes of people.

By releasing this suppression of people's feelings, the project manager can open up many avenues for improved group performance, goal setting, conflict resolution, group collaboration and morale.

Finally, the objective of people participating in a group must be, not how each individual performs, but how all members can work together for a better performance.

This can be achieved not by how the supervisor can get the subordinates to perform, but how the supervisor and the subordinates can work together to modify their interactions towards becoming more mutually effective.

This last objective, if achieved, will have a very positive impact on the success of the project and the organisation as a whole.

4.4 PEOPLE IN ORGANISATIONAL SYSTEMS

Organisations are composed of a number of work groups. These are overlapping groups with the manager of each group serving as the 'linking pin'.

Thus the project manager belongs to two work teams: He is the head of his project team and also a member of another higher, organisational team, as shown in the following diagram:

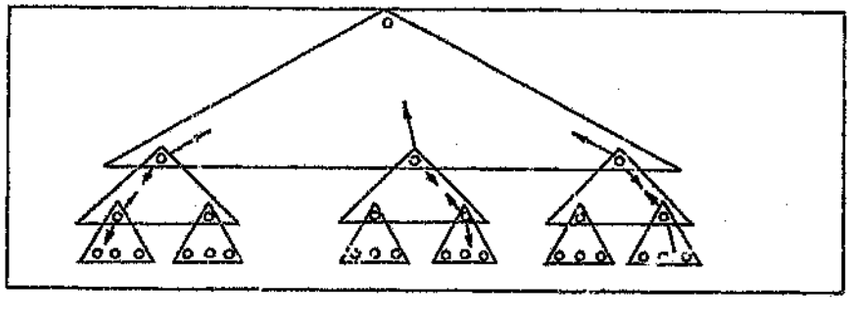


FIG. 4.2 THE LINKING PIN FUNCTION (FROM R LINKET, 1961, P.133)

The manager as the 'linking pin' has a powerful effect on the attitudes and behaviour of people in both groups.

In general, the behaviour of the higher teams tends to be transmitted to the lower teams.

This transfer of attitudes and behaviour of people between groups is extended within the project team which draws members from several work groups.

The culture of the more permanent work teams carries over into the culture of the project team.

The project manager, at this stage, can deliberately develop a set of norms different from those in the formal system.

If the project team becomes more effective, then the organisation can adopt some of the new norms.

This approach is similar to the collateral organisation as described by Dale Zand (1974) P.63-89. According to Zand, 'the collateral organisation is a supplemental organisation existing with the usual, formal organisation'. It is created to deal with "ill-structured" problems that have high priority. In the collateral organisation, a deliberate effort is made to develop a set of norms different from those in the formal system. In particular attention is paid in 'careful questioning and analysis of goals, assumption, methods, alternatives, and criteria for evaluation'.

In a sense, the collateral organisation described by Zand is an organisation development effort in microcosm.

It appears, therefore, that for civil engineering consulting firms, the continuous development of project teams can simultaneously be used as the collateral organisation which can affect the culture of the organisation.

CONCLUSION

For medium size civil engineering consulting firms where short, medium and long term objectives depend entirely on people, successful organisation development tends to be a total system effort.

It is a process of planned improvement of the culture of the organisation so that people work together to improve their mutual effectiveness in attaining their mutual objectives.

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CHAPTER 5 : THE PROJECT MANAGEMENT SUB-SYSTEM

INTRODUCTION

The main objective of the project management sub-system is the development of an environment suitable for the 'success of a project'.

This environment is influenced by all other sub-systems as has already been discussed in previous chapters 1,2,3, and 4.

These sub-systems can be classified into two basic categories:

a) Sub-system within the organisation (Chapter 1,3,4)
b) Sub-system outside the organisation (Chapter 2).

For each category, we have already examined specific objectives and their interaction with the project management sub-system.

In this chapter we will examine the ways and means by which the project management discipline will achieve its main objective in the 'success of a project' by providing the link between the sub-systems within and outside the organisation. This concept is shown in the following figure:

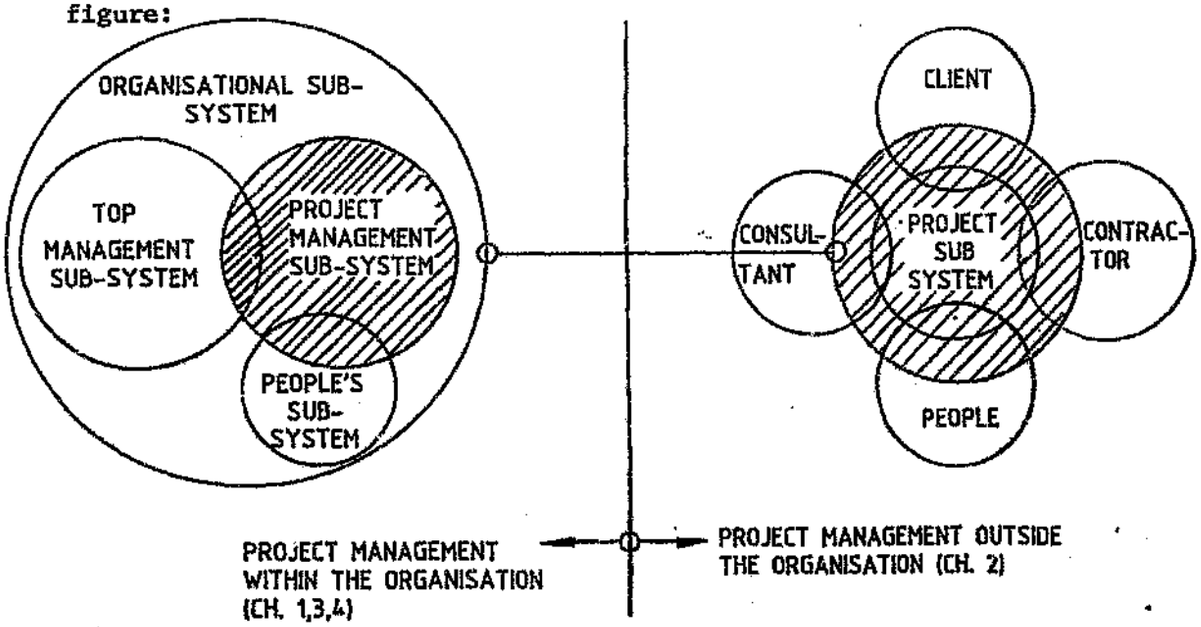


FIG 5.1 THE 'DUAL ROLE' OF PROJECT MANAGEMENT SUB-SYSTEM

5.1 THE RELATIONSHIP BETWEEN CORPORATE AND PROJECT MANAGEMENT

As has been already discussed, company's objectives constitute a significant element in the 'factor of safety' for the success of a project.

It is therefore important for the project managers to be fully aware of these objectives.

Every company spends a lot of time in thinking and planning to create the successful mix of a policy/strategy/tactics formula in order to satisfy its long, medium and short term objectives.

It is in the common interest of both the company and the project manager to work along parallel lines.

A gap in communication at this level between the company and the project manager may have detrimental effects on the success of a project.

A project manager who is not properly informed, may follow his own mix of policy/strategy/tactics formula.

The methods used by the project manager may not be compatible with the company's procedures and this will definitely generate 'conflict'.

Communication between the company and the project manager is very important, even at this high level.

All the minds within the organisation should follow parallel and not divergent lines of thought in order for the company's objectives to succeed.

In medium-size civil engineering consulting firms, project managers and directors are generally technically-orientated.

Their ability to grasp concepts at policy and strategy levels is usually limited, while they are very competent at the operational or tactics level.

Managing the projects at operational level requires the matching of existing resources to project requirements, but managing the company as a whole is the required process of the matching company resources to trading opportunities.

For the company objectives to be achievable, top management must prepare a corporate plan. The development of a corporate plan is by no means easy because:

a) The future is unpredictable
b) Predictions are subject to large errors.
c) The decision reached will be subjective

By the same reasoning, the project manager has to develop his project plan to accomplish project objectives.

The project plan must describe the scope of work, methods and procedures that have to be used for the execution of a particular project, as well as methods for planning and control of the various activities applicable to the different stages of the life of the project. An organisation chart allocating people and resources to each activity must also be developed.

There is a big difference between corporate planning and project planning. The difference is shown in the following table:

	CORPORATE PLANNING	PROJECT PLANNING
STRATEGIC LEVEL	Planning systematically the total resources of a company for the achievement of quantified objectives within a specific period of time	Understanding the project objectives and their relationship to overall corporate objectives
TACTICAL LEVEL	a) Improve coordination between divisions b) Achieve successful diversification c) Ensure a rational allocation of resources d) Anticipate and deal with technological changes	a) Statement of work b) Project specifications c) Project plan which: i) assigns responsibility ii) establish schedules and budgets d) Milestone schedule where all major events and dates must be clearly identified

FIG. 5 CORPORATE AND PROJECT PLANNING OBJECTIVES (FROM: H KERZNER, 1979, P.287 AND B TAYLOR AND P IRVING 1971)

It is obvious from the above figure that top management and project management must co-operate for the success of both the company's and the project objectives.

A successful project is one which produces a completed facility that satisfies the client, is within budget and is completed in time. But, in addition to the above minimum set of project objectives, the project must be managed efficiently in order to generate profit for the company.

Two elements therefore appear to form the link between the external and internal roles of the project management sub-system.

a) profit
b) success

These two elements have opposite effects on the balancing process of the project management sub-systems.

The link 'profit' pulls towards the organisation while the link 'success' pulls towards the external environment.

The project management sub-system has to balance the situation and this can only be achieved through a mutual understanding and agreement with top management of the definition of the word 'success' and its relationship with 'profit'.

Kharbanda and Stallworthy (1986) relate "success" to "quality" and they recognise that quality can be enhanced at the expense of cost or time or both. There is a continuous conflict between these three basic elements and the successful project must be the one for which none of the three objectives can dominate at the expense of the others.

This idea is illustrated in the following diagram, first introduced by Snowdon (1977).

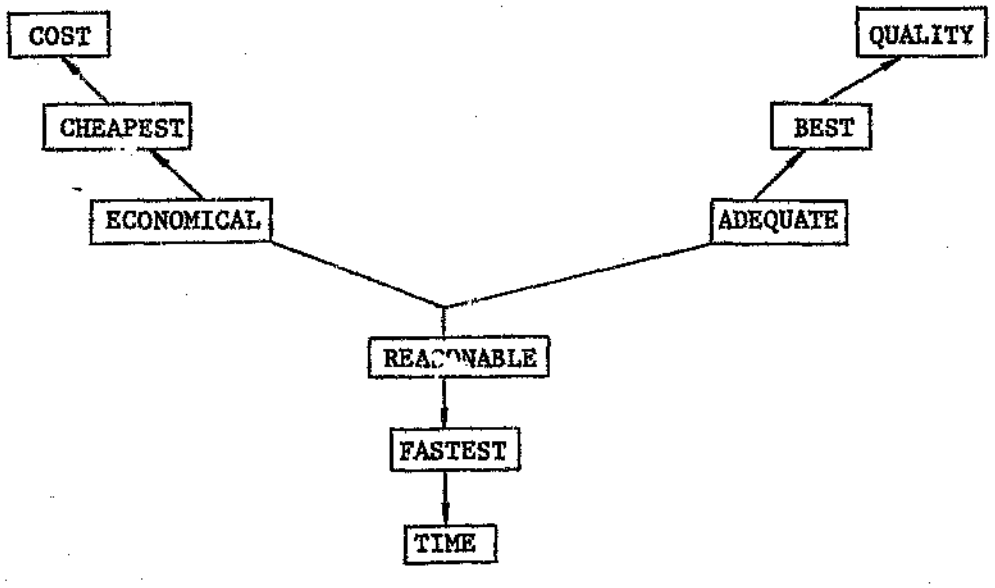


FIG. 5 THE TUG-OF-WAR (FROM: SNOWDON, 1977)

The conclusion is that cost, quality and time are essentially incompatible. The art of project management is to maintain a proper balance among the three.

In looking for a successful project, we are not looking for excellence. What we are looking for is competence. This can be illustrated as in the following page:

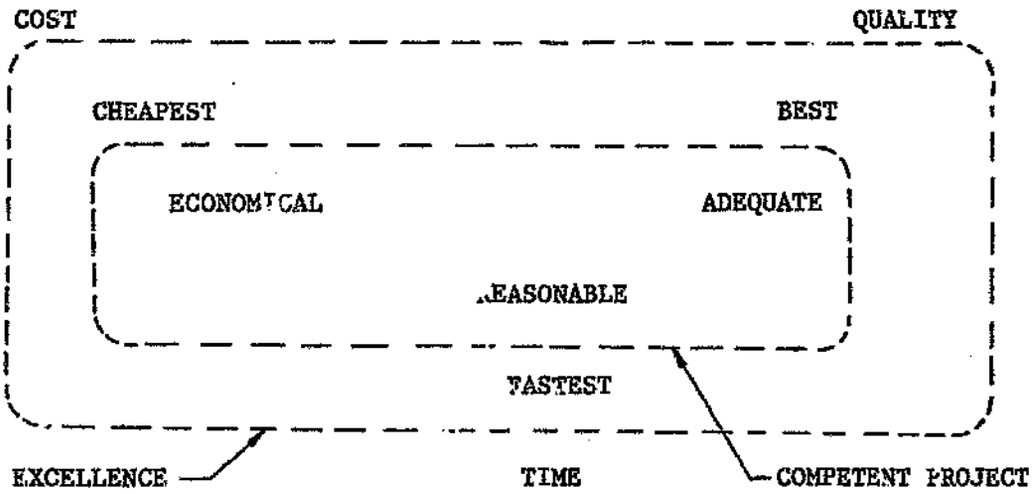


FIG. 5 COMPETENCE VERSUS EXCELLENCE FOR PROJECT 'SUCCESS'

The Optimum for the 'success' of a project should be the objective:

'A project built in reasonable time economic in terms of cost and adequate in terms of quality.

This is not to say that project management should stop striving for excellence. Any project manager and his team who become satisfied with 'second best' are on the road to mediocrity, but it becomes necessary for both the company and the project manager to come into a mutual agreement and to what the meaning of 'success' is, in order to satisfy both the projects and the company's objectives.

Having examined the relationship between top and project management sub-system, we now have to examine two other relationships where conflict may occur due to diversification of objectives.

These relationships are between:

a) The project management and people's sub-system.
b) The project management and project sub-system.

5.2 THE RELATIONSHIP BETWEEN THE PROJECT MANAGEMENT AND THE PEOPLE'S SUB-SYSTEM

For medium-size civil engineering consulting firms, the implementation of the concept of teamwork or a task force is different from that of the large organisations.

Limited resources (people) and the variety in the size and nature of projects requires that the whole firm must work together as a team.

For this concept to be achieved, both top management and project managers must understand human behaviour and must both try to motivate people in the company through the gradual implementation of each individual's objectives.

Management must accept the fact that individuals can grow in their jobs, accept even greater responsibility, and thrive, if they are working in a team-orientated environment.

Bennett, in his book 'Successful Team Building Through TA' Amacon New York 1975 describes the situation as follows:

"The task is not to change people. People are perfectly alright the way they are. The task is not to motivate people, people are inherently self-starting. The task is to remove those things that de-motivate them, to get them out of their way, or more

precisely, to create those kinds of organisational structures that allow workers to get at problems and act in some independent ways so they can develop their skills solving problems related to their own jobs".

For the team spirit to be developed within a medium-size organisation, certain factors become a pre-requisite.

These factors are:

a) People must trust each other
b) People must be able to express their feelings freely.
c) People are open with each other
d) Company's objectives and people's objectives must be common
e) Commitment to projects must be high
f) Conflict must be defused quickly
g) Decisions must be taken by consensus

All these factors can be achieved only through the development of the right organistional culture as discussed in Chapter 4.

5.3 THE RELATIONSHIP BETWEEN THE PROJECT MANAGEMENT AND THE PROJECT SUB-SYSTEM

Even if we assume that within a medium size company, there is a congruency of company's/project manager's/people's objectives, we must be careful not to perceive this environment as a closed system. Each project, by its nature, breaks the boundaries of a closed system and operates within an open system.

Each project has a client, a consultant, and a contractor, therefore there are at least three teams working for the same purpose. Each team may perform superbly within its sub-system, but the objectives between the systems may not be common.

Some perceptions of objectives may be shown as follows:

	Primary Objective	Secondary Objective
Client	Within budget	On time/good quality
Consultant	Quality	On time/within budget
Contractor	Profit	On time/quality

From the above hypothetical example, it is obvious that there is a difference in objectives. It is the duty of the project manager to develop a spirit of co-operation between the various teams coming from different backgrounds in order to achieve a common objective i.e. the completion of the project.

Co-operation is effective only if personal objectives (which are often 'company feelings') are subjugated to the common objective and there is a trust and an openness between the several parties.

For the project management sub-system to achieve effective co-operation between the various teams, an understanding of the personality and behaviour of the individuals comprising each team must be developed.

The project manager may have no difficulties in dealing with people of his organisation, but he must have the ability to adapt with the people of the other teams - those of the client and the contractor.

In his books, Daniel D Roman (Chapter 12) examines the effects of the human factor on the project objectives.

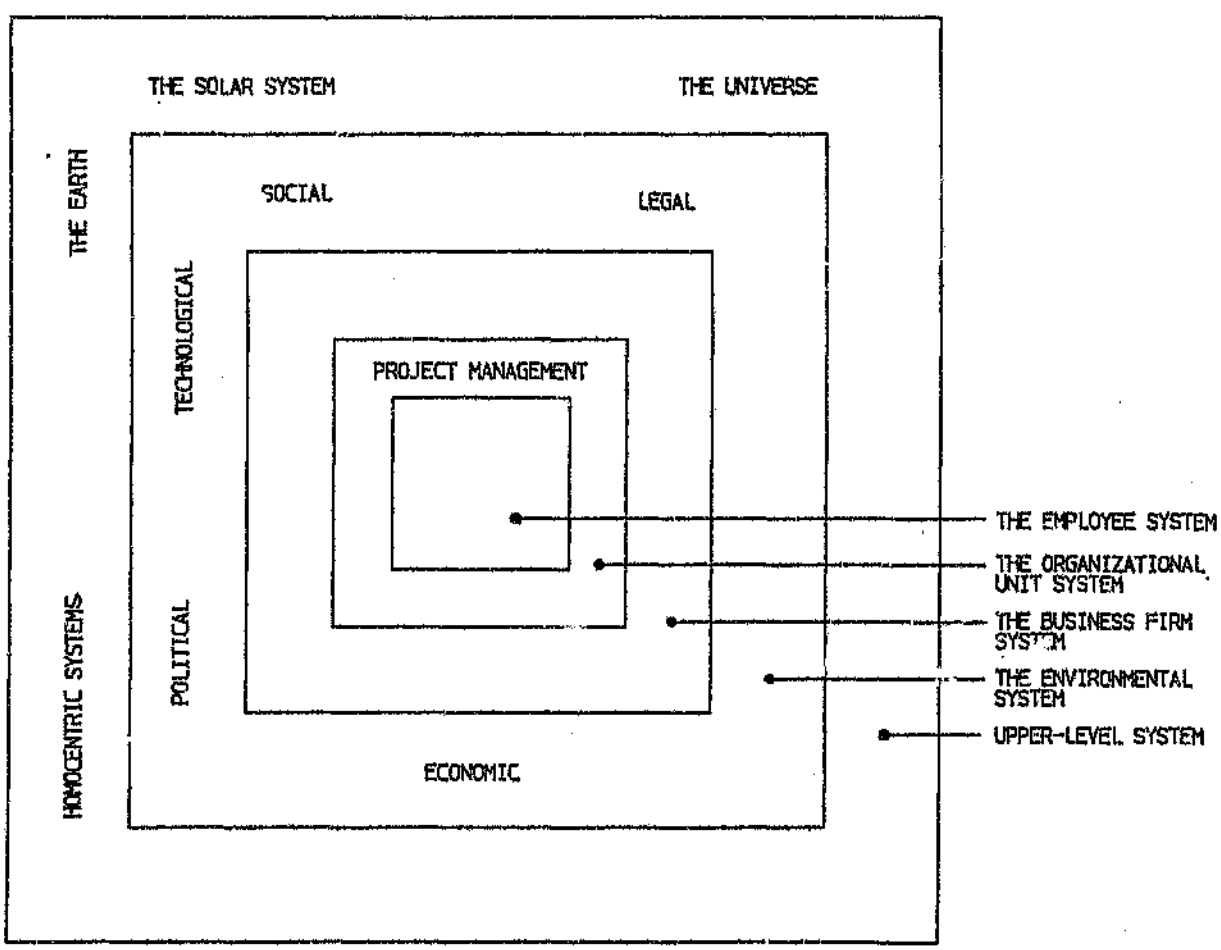
People are the driving productive force on a project. The project teams can be in possession of many diverse skills and specialities.

The dependence of the project manager on unpredictable human skills and inputs compounds the difficulty in project management.

5.4 THE PROJECT MANAGER AND THE THEORY OF SYSTEMS

It has already been stated that the project should be looked at as an open system composed of a number of sub-systems that of client/consultant/contractor.

In his book, Harold Kerzner (Chapter 2) provides a hierarchy of systems with boundaries which separate each system from it's environment.



THE HIERARCHY OF SYSTEMS

In project management, the study of 'systems' is an increasingly popular activity. Its popularity is a response to the need for synthesizing and analysing complexities. By understanding systems, the project manager can develop the ability to cross over boundaries to achieve his project objectives.

Matteson and Ivancevich (1986) (Chapter 5) argue that even though we preach a general systems approach, we often practice sub-systems thinking. The above statement is true because even if project managers try to apply an open system approach, they often ignore variables outside their interest or competence as being irrelevant and only accept inputs which they can handle and understand.

The project manager must not develop the feeling that open systems are good and closed systems are bad. He must be able to realise that, for example at technical level in an organisation, a closed-system concept is more appropriate since it reduces uncertainty and increases performance.

For the project manager to be able to cross through boundaries of the various sub-systems, he must possess or develop certain skills and attitudes.

In his book Victor G Hajeck (Chapter 9) expresses the idea that the project manager should camouflage his real objectives to the greatest possible extent if the objectives are of vital concern to the success of the project. He must also be a good negotiator. Negotiation is a vital tool for the project manager in order to break the boundaries of the sub-systems within which the various organisations are operating.

ince negotiations are a battle of wits, the use of certain tactics by the project manager to confuse the other parties in order to achieve his project objectives, must not be considered unethical. The project manager must always conduct himself and his tactics in such a manner so as to command the respect of the other members of the team.

Another ability that the project manager must possess, is to be objective and impersonal in his discussions, as well as to subdue the impulse to speak up when other members of the team are [illegible] his proposal, especially if the basis of the attack is [illegible]e must realise that in the very act of speaking, the [illegible] exposing its position, giving valuable information, [illegible] weakening its position.

Up to now, we have examined the ability of the project manager to cross the boundaries of the sub-systems affecting his project objectives and achieving a congruency of objectives through his ability to understand organisation behaviour, human behaviour, strategic planning, team dynamics etc.

All these objectives belong to a sub-system of a broader environmental system. In their book Schoderbek, Kefalas and Schoderbek (Chapter 6) point out that in management literature, the term "environment" is generally loosely defined as 'those things surrounding the organisation'. Typical factors noted are government, organised labour, competition, technology, the economy and ecology.

The project manager must be able to generate an 'image' of the broader environment and study the environment - project interaction. He must try to perceive the effect that the environmental factors would have on his project objectives. His perception must be neither pessimistic nor optimistic. In other

words, must be realistic, taking into consideration that both the project system and the environmental system are in a state of change.

For projects of short duration, changes may not be of importance, but for projects spanning over a period of 1 year and more, the impact of the changes on the project from the environment must be carefully monitored and corrective action be taken.

From the above discussion of systems, it is obvious that there are myriads interactions among company's objectives, project objectives and the environment.

The main role of the project manager is to plan and control a set of activities, as well as to provide a solution to problems arising during the various phases of his project.

In his book James M Lyneis (Chapter 1) express the idea that many companies do not meet performance expectations because the planning process uses tools that are particularly inadequate for our present-day environment of complexity and rapid change.

Project managers in medium-size consulting firms usually try to achieve their project objectives by setting goals arbitrarily and then taking actions based on intuition and experience to achieve these goals.

Planning by means of intuition and experience, however, is not sufficient. The human mind is incapable of evaluating the implications of more than a few interactions between project objectives and the external environment, a phenomenon which becomes more obvious as projects become continuously bigger and more complex.

The project manager is faced continuously with problems which require knowledge and information from many disciplines and, as people from different backgrounds, values and perspectives are brought together to provide the information and to resolve the problems, it becomes clear that methods to help such team effort are needed.

5.5 REVIEW OF PROBLEM-SOLVING METHODS AVAILABLE TO THE PROJECT MANAGER

Shirley A Olsen in her book provides a number of methods for problem-solving for those who see the need for a more co-operative attitude and participative approach. These methods incorporate the knowledge, values, and experiences of those parties affected by the outcome of a problem-solution and those responsible for its implementation.

These methods, in contrast to pure quantitative methods, deal with social issues, product systems, communications, and environments and have far-reaching effects on large segments of society.

The methods described in the book are:

Brainstorming (Chapter 3)
Delphi Method (Chapter 4)
Interpretive Structural Modelling (ISM) (Chapter 5)
Issue - Based Information System (IBIS) (Chapter 6)
Kane Simulation (KSIM) (Chapter 7)
Nominal Group Technique (NGT) (Chapter 8)
Programme Planning Method (PPM) (Chapter 9)
A Role - Oriented Approach to Problem Solving (Chapter 10)
Synetics (Chapter 11)
Value Engineering (Chapter 12)

All the above methods provide the mechanisms for identifying and promoting or evaluating project objectives, which must eventually be synthesized by the project manager.

In their books David I Cleland and William R King (Chapter 1) express the idea that the day of the manager who gets by on personality alone or solely on technical expertise, is probably past. In today's business environment, successful managers of complex systems must possess:

a) An understanding of the technology of their 'business'.
b) An understanding of the 'basic' concepts of management
c) An interpersonal style which facilitates their ability to get things done through others.
d) An ability to conceptualise and to operate using a system approach.

Efficiency alone is not enough any more for the successful project manager. 'Innovation', 'creativity' and 'lateral thinking' as well as an understanding of human behaviour are more important skills needed for him to handle modern sophisticated and complex projects successfully.

CONCLUSION

In previous chapters we have examined the various objectives governing independently a number of different sub-systems and we have also mentioned the ability of the project management discipline to integrate these objectives.

The various sub-systems were divided into two broad categories:

a) sub-systems within the organisation
b) sub-systems outside the organisation

In this chapter, (5) we have examined the 'dual role' of the project management sub-system as the interconnecting link between itself and the various sub-systems, as well as the interconnecting link between the internal and external sub-system.

The mechanics used by the project management sub-system to provide these links are summarised as follows:

	SUB-SYSTEM	LINK	MECHANICS
a)	Within the organisation Top ←——→ P.M	Congruency of company's and project management objectives	Development of compatible corporate and project planning
	People ←→ P.M	Team work	Successful team building Human motivation factors
b)	Outside the organisation Client-contractor-consultant People - Project - P.M	The co-operation between teams of different backgrounds	Successful team building Human motivation
c)	Internal - external	Profit Success	Definition of 'success' of a project and a compromise between the sub-systems

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CHAPTER 6 - THE NEED FOR THE DEVELOPMENT OF A PROJECT MANAGEMENT DEPARTMENT IN A MEDIUM SIZE CIVIL ENGINEERING CONSULTING FIRM

INTRODUCTION

Using the models presented previously, we now evaluate medium size consulting firms and suggest how they should structure themselves to manage their projects.

6.1 THE EFFECT OF ECONOMIC CYCLES ON CIVIL ENGINEERING CONSULTING FIRMS

The recent economic recession in South Africa has created a different way of thinking with regard to organisations. The effects of the recession have been quite significant in creating the collapse of traditional organisational structures and have created a climate of management for survival in most medium-size civil engineering consulting firms.

Labour forces have been slimmed down. A similar problem has occurred at director level and has also influenced middle management. When business declines, the matrix organisation becomes the scapegoat for poor management and is discarded (Dans and Laurence, 1977).

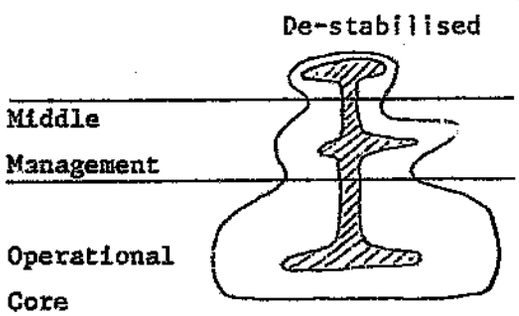
In Chapter 3, we examined the professional Bureau/Adhocracy as the ideal model of the medium-size civil engineering consulting firm. This model can replace the matrix organisation during periods of economic downturn.

This organisational model appears to be more lean and more competent in using the talents of the workforce; is more flexible, is more responsive to the market; more conscious of the environment and also more democratic.

For organisations which have been de-stabilised by the recession, the revival is much more difficult.

The de-stabilised organisation can be described visually in the following diagram:

Original Organisation



Skeleton organisation not effective any longer.
Unable to develop organic growth, due to lack of human resources.
Unable to penetrate markets, due to lack of skills.
Unable to handle present assignments, due to lack of motivation.

It is obvious from the above diagram of the skeleton organisation, that the major reduction has occurred in the operation core, as well as in middle management.

The reason that less reduction is happening at the top management sub-systems is because people are:

a) too old to be able to move out into the open market for new jobs; there is a tendency by companies to recruit younger personnel.
b) their knowledge has been confined to the experience of their particular organisation for too many years with the result of minimising the ability to adapt to the requirements of another organisation.
c) their technical knowledge is outdated due to specialisation for many years within the same organisation.
d) their productivity is reduced due to age but they can still successfully fulfill their role within the top management sub-system as discussed in Chapter 1.

The scenario discussed above can be summarised in the following diagram:

Stage 1: During booming economic conditions



Initial Organisation

Stage 2: During a recession



Skeleton Organisation

Stage 3: At the beginning of the next economic upswing



Simple or entrepreneurial Structure

Stage 4: Back to normal economic conditions.



Initial Organisation

It is generally accepted within the civil engineering industry that these economic cycles have a de-stabilising effect on the organisations.

For medium size firms, the impact of an economic downturn on the organisation may be extremely dangerous, and the effect on each sub-system can be summarised in the following table:

SUB-SYSTEM	IMPACT DUE TO ECONOMIC DOWNTURN	ACTION
Top management	Collapse of long and medium term strategic planning	Fight for survival
Project sub-system	Projects becomes small	Improve the management and productivity
Organisation sub-system	Collapse of existing systems	Develop new systems
People's sub-systems	Reduction of staff	Improve morale
Project management sub-system	May disappear due to lack of appropriate commissions	Directors must work as project managers or even as project engineers

The above economic cycles develop over long time periods.

Most of the the time, the organisation is in a relatively stable condition and it is during this period that the development of the project management department and the various systems must commence.

The project management department has to be developed, taking into consideration:

a) The problems of the company as envisaged by top management
b) The present organisational structure of the company
c) The present techniques applied in the management of projects
d) The people and their interests within the organisation.

The company which will be taken as an example is B S Bergman & Partners Inc, and the investigation will be confined to the Johannesburg branch only, which appears to be the most diversified.

6.2 B S BERGMAN & PARTNERS AND THEIR PROBLEMS AS PROJECT MANAGERS

B S Bergman & Partners is a medium-sized professional firm of consulting engineers and project managers. The type of projects handled by the firm varies from the grass-roots planning of low cost housing to sophisticated highways, railways, mining and industrial complexes.

The clients of B S Bergman & Partners include Government Departments, Provincial Authorities, City Councils, Private Corporations and Individuals.

The function of the firm is to provide services in the form of:

1. Professional advice
2. Technical experience
3. Independence and objectivity
4. Optimum solutions
5. Control of time and finances
6. Initial studies
7. Detail design
8. Management of construction
9. Project management
10. Assistance in operation

STATEMENT OF THE PROBLEM

The problem that has been experienced in the firm, as defined by the Chairman of the company, is that not all commissions are being successfully project-managed, in spite of the following being in place:

a) Appropriate Commissions
b) Organisational Structure
c) Procedures
d) Availability of Staff

The problem will be analysed using the approach of sub-systems as described in Chapters 1 to 5 and their independence with the economic cycles of the industry.

a) Appropriate Commissions

This heading is misleading. From 1981, the economic downturn in the industry had caused a shift in the nature of commissions from big industrial projects of a multi-disciplinary nature to smaller government and private projects.

The amount of project management required for these later projects is significantly less, although the overall turnover of the company remains satisfactory.

The effect of this shift in the nature of commissions can be justified by the fact that there is no project management department within the organisation in 1991.

The project management activities are diffused between the various senior staff members, while top management appears reluctant to accept the generation of a project management department.

The lack of a project management department appears obvious in that major clients do not trust Bergman & Partners to manage their projects any longer and allocate this portion of work to external specialising firms.

The cause, therefore, attributed by the Chairman in his statement that not all commissions are being successfully project-managed, is true and the reason behind it is that there is no project management department within the firm.

This observation is also borne out by the answers to questions 1 and 2 in the questionnaire recently circulated within the firm.

b) Organisational Structure

In LSB & P, although the matrix system is the required company organisational structure, its application is usually unclear in the minds of the employees.

In the management office manual, the matrix system is adequately described but most people show a reluctance in attempting to understand it. Many directors and senior personnel are also avoiding its full implementation since they consider it to be rather complicated and unprofitable.

The reasons are:

a) Jobs handled by the company are not of the appropriate size nor complexity.

b) The absence of a project management department confuses the issue of who has the overall responsibility for a particular project.

c) The main responsibility of consulting firms is to ensure technical quality while completion of project within budget and on time are cosmetic parameters.

d) The matrix system is more suitable for application within larger organisations.

The deviation from the matrix organisation can be noticed from the negative answers to question No. 10 of the questionnaire.

PROCEDURES

There are two types of procedures:

a) operating procedures.
b) management procedures.

Operating procedures, which actually constitute a major part of the project management sub-system, are well described within the office manual. But all these procedures are related to the execution of work at operating level such as:

a) Contract administration
b) Quality assurance and quality control
c) Measurements and payments
d) Tender and contract documentations
e) Tender adjudication
f) Reporting
g) Programming, planning and controlling

Management procedures which admittedly cannot be included within an office manual, relating to:

a) People
b) Allocation of resources
c) Conflict resolution
d) Risk analysis
e) Development of business attitudes
f) Human behaviour

are not properly developed within the organisation. This is obvious by the low rating of the management procedure question, No. 9, in the questionnaire.

This second set of procedures can only be developed through a continuous education of people to management matters as well as by developing an organisational 'culture' and by treating people as 'growing' and not as 'fixed' entities as was discussed in the people's sub-system (Chapter 4).

Management procedures cannot be developed outside the project management department which provides the link between operating and management procedures.

d) Availability of Staff

The staff required to establish a project management department is virtually non-existent both at management and operational level.

From the negative answers to question 7, it appears that no person within the Johannesburg Office has any formal qualification in project management.

The negative answer to question 10 shows that people do not know how the matrix organisation operates.

The low rating of management functions in question 9 shows the weaknesses in the Johannesburg Office from a project management point of view. Finally, the consistent answer 'both types of work' to question No. 5 shows the tendency of people to diffuse project management and technical activities.

The statement by the Chairman, therefore, reporting the availability of the staff is not correct. There are a few staff members who perform certain project management duties but in an undefined way, unsystematically and without proper training.

The present organisation of BSB & P is shown in the following organigram:

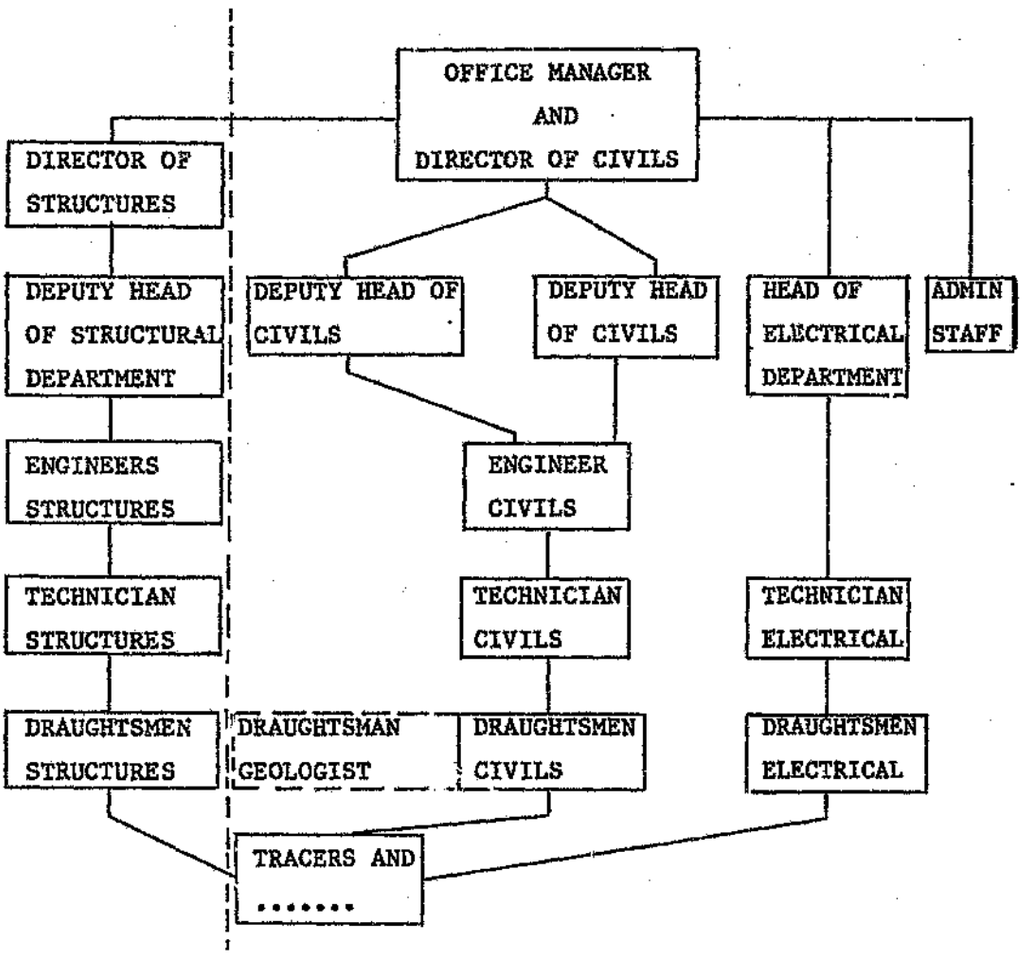


FIGURE 6 ORGANIGRAM OF THE JOHANNESBURG OFFICE OF B S BERGMAN AND PARTNERS

6.3 PRESENT ORGANISATION OF B S BERGMAN & PARTNERS

Every single employee falls under a functional department at this moment in time.

These directors tend to act in both the vertical, (functional) as well as the horizontal (P.M) direction, with emphasis on the vertical model of management, since they are mainly technically orientated.

The allocation of personnel to a project is done unsystematically, based on the criterion of which employee is the most suitable for the job, or who is the least occupied at that particular moment in time.

Very often, people change the scope of their work from being concrete designers, to draughtsmen, to tracing road drawings, to measuring quantities, to collecting information, to acting as messengers and even to being temporary Resident Engineers.

Most of the younger members of staff and some senior personnel are satisfied with this attitude, since this diversifies and enhances the scope of their work. Furthermore, this approach diminishes the responsibilities associated with any specific duties.

This approach irritates the more enlightened members of the staff who want to develop some initiative but are restricted by, the confusion of the organisational structure.

Although job descriptions do exist within BSB & P, as does a definition of duties for every person, these have been drawn up to cover the objectives of the firm and many people find themselves either not completely suitable for the execution of their duties, or unhappy in executing them.

The authority and status of each person, with the exception of Directors, does not appear in the office manual and the staff feel that they belong to a pool from which top management can draw personnel at its discretion, as and when required. This has a de-motivating effect on people, as well as crippling effects on the productivity of the company.

This is a serious problem within the firm which is classified as a medium-sized firm and according to the personal experience of the writer, it is a problem encountered by most medium-sized firms which do not specialise in any specific field. In this type of firm, the emphasis is placed on production and not on training of staff, hence, on maximum utilisation of staff rather than on progress. In ESB & P (Johannesburg) there are four basic clearly-defined departments:

a) The Civil Department
b) The Structural Department
c) The Administration Department
d) Electrical Department

There are also a number of smaller departments, that are not effectively organised, namely a mechanical department, traffic engineering, geotechnical etc.

The distribution of the projects is done according to the nature of the projects. If it is a predominantly civil project, it will fall under the civil department. If it is a predominantly structural project, it will fall under the structural department. If it is a multi-disciplinary job, a person with the most appropriate all-round experience will act as a co-ordinator between the various disciplines.

There is a notable lack of such persons in the firm due to the absence of the project management department. Often, the directors fulfill these roles with the assistance of a senior staff member.

The senior staff member acting as the deputy project manager of the project is acting within an unstructured environment surrounded by specialists, designers, draughtsmen with very limited interest in the execution of that particular project, and the real problems arise during the construction stage, when most of the original designers are, by that stage, involved with other projects.

During construction, the person appointed as Project Manager usually acts in semi-isolation, asking for assistance from persons who are engaged in other activities and do not wish to be disturbed from their current duties.

In this regard, the Project Manager also functions as a designer, a quantity surveyor, a clerk of works, and as a resident engineer, in addition to his normal duties of manager of the project.

Under these circumstances, it is quite obvious that the matrix system as proposed by the firm, is in jeopardy and does not function as envisaged.

The firm has spread the activities of the project management department across the entire staff. Although it may appear that this is the cheapest way of handling projects, it has detrimental effects on the performance of the firm. The following activities have suffered on various multi-discipline projects:

a) Tender documentation
b) Contract administration

c) Constructional details missing from drawings
d) No in-house programming of the works
e) No regular updating of cost estimates
f) No proper co-ordination of the various phases of the project.

From the above discussion, it would appear that from the multi-discipline Project Management point of view, the firm appears weak. This is further confirmed by the negative answers to questions 1 to 3 of the questionnaire.

The author has isolated the following problems in the execution of his duties:

1. Non-co-operation by the functional department after completion of the design stage.

2. The Project Manager belongs to no specific department and, in fact, spends most of his time sorting out problems which are actually the responsibility of the functional departments.

3. In a case where the Project Manager does not also happen to be the Project Director, the absence of a recognised status creates for him numerous difficulties in the execution of his duties.

4. The absence of the notion of teamwork within the company as a whole results mainly due to confusion of the organisational structure.

6.4 PRESENT TECHNIQUES APPLIED IN THE MANAGING OF PROJECTS

There are a number of different techniques which are applied to the management of every project. These techniques are based upon the intuitive feeling of each director and senior staff member involved and do not necessarily adhere to the overall strategy of the firm, as described in the manual.

The projects can be said to be handled in the following forms:

a) Grouping people according to project type
b) Grouping people according to subject type
c) Grouping people according to phases type

The grouping of people according to project is not suitable for all projects. It is a technique which is applied to a limited number of projects which are unfamiliar, complex and critical.

The grouping according to subject is also used in BSB & P on certain single disciplinary jobs e.g. design of roads, design of bridges etc. Specialising in a subject and becoming an expert in a particular field is the means through which know-how can be accumulated. But it is very seldom that a continual flow of work can keep groups specialising in subjects occupied over an extended period of time.

Grouping by Phase

This is also applicable to BSB & P. Certain employees specialise in feasibility studies, whilst others work on the design phase and yet another group is occupied with the drawing phase. A further group concerns itself with tenders and finally site supervision and administration.

The disadvantage of this system is that its success depends upon efficient linking from phase to phase. Decisions taken in an earlier phase may not be successful because of failures in one phase to foresee problems that arise in a later phase, or because of human uncertainty about accepting the risks of inheriting the consequences of decisions made by others.

The role of the Project Management Department in this type of organisation is obvious.

An example of a typical management approach engaged in by the firm and problems which arise from its application are discussed below.

A Project Director is appointed to handle the initial liaising with the client. A very simplified brief is generated and passed down to the Project Engineer.

It appears that a "grouping by phase" technique is applied.

The Project Engineer starts to collect all necessary information from the client and from the local authorities and then passes this information on to the various specialists for the design phase.

Phase 1 - Brief
Phase 2 - Collection of Information and Planning
Phase 3 - Design Phase
Phase 4 - Drawings Phase
Phase 5 - Review of Design with Client
Phase 6 - Finalisation of Design

Although the above procedure is not according to the matrix system as per the firm's policy, there is nevertheless a great tendency to apply it. The Project Engineer, in most cases, is also the Project Co-ordinator as well, since nobody else is available to cover this function.

During the design phase, which is dealt with by a group of specialists, the co-ordinating mechanism breaks down since the Project Engineer is either involved in the design or alternatively, is still accumulating information.

The project engineer eventually becomes the acting project manager.

Some problems are created during each particular phase. These problems are related to:

a) Lack of experience of the project manager to the execution of his new duties.

   i) due to lack of proper training
   ii) due to lack of proper qualifications

b) Lack of authority
   Specialists refuse to accept him as their temporary boss.

c) lack of managerial skills especially in relation to people, resource allocation and ability to balance the various objectives as discussed in the previous chapters.

All the above problems can be eliminated by the creation of a project management department within which the project manager can develop:

a) The necessary experience
b) The authority and identity
c) The required managerial and administrative skills.

All the above will be developed by the project manager through the continuous participation and interaction with the environment of the project management sub-system as discussed in Chapter 5.

6.5 CLASSIFICATION OF PEOPLE ACCORDING TO THEIR INTERESTS

From an overall appraisal of the firm, based on the questionnaire/ Appendix A, the staff can be classified into 3 broad categories from management's point of view:

1. Staff interested only in the design aspect of a project.

2. Staff interested only in management aspects of a project.

3. Staff interested in both the design and management of a project.

Staff belonging to category (1) show no management interests.

In the third category of staff, we have the people who want to design and manage their own work. This type of person usually enjoys working on his own, and being kept busy on a smaller type of project.

This type of employee usually lacks organisational abilities when he is confronted with larger projects where team work is very important.

In BSB & P we have a considerable number of employees falling into category (3).

These are either young engineers or senior technicians who run their jobs independently and enjoy a relative degree of freedom:

The attitude of such personnel, when faced with larger sized projects, is to provide an input and subsequently to withdraw from the project as quickly as possible.

From the above discussion, it is obvious that people falling into categories 1 and 3 are not suitable for a Project Management department.

I shall now analyse people falling into category 2:

The approach of some of these people towards management is very bureaucratic. They can offer certain valuable contributions to the project management department, but they are not project managers.

Some of these people are so deeply involved and specialised in either financial or legal aspects of contract administration and project correspondence, that they misunderstand the real meaning of Project Management. They totally confuse the limiting aspects of contract administration with the broader scope of project management.

Others show a keen interest in production and co-ordination of drawings; they can also be effective members of the Project Management Department as the skills which they possess facilitate activities such as planning, scheduling and co-ordination which are essential to the smooth running of any such department and to the company as a whole.

Figure 6 shows areas where improvement is needed. These areas have been detected through extensive personal interviews of the writer with staff members of the Johannesburg Office, based on the questionnaire included in Appendix A. The weaknesses can be attributed to two broad reasons:

a) The non- existence of a recognised project management department, hence there is a lack of the environment of the project management sub-system (Chapter 5).

b) The attitude of technical people toward using their skills to solve specific well defined problems (Chapter 3.3).

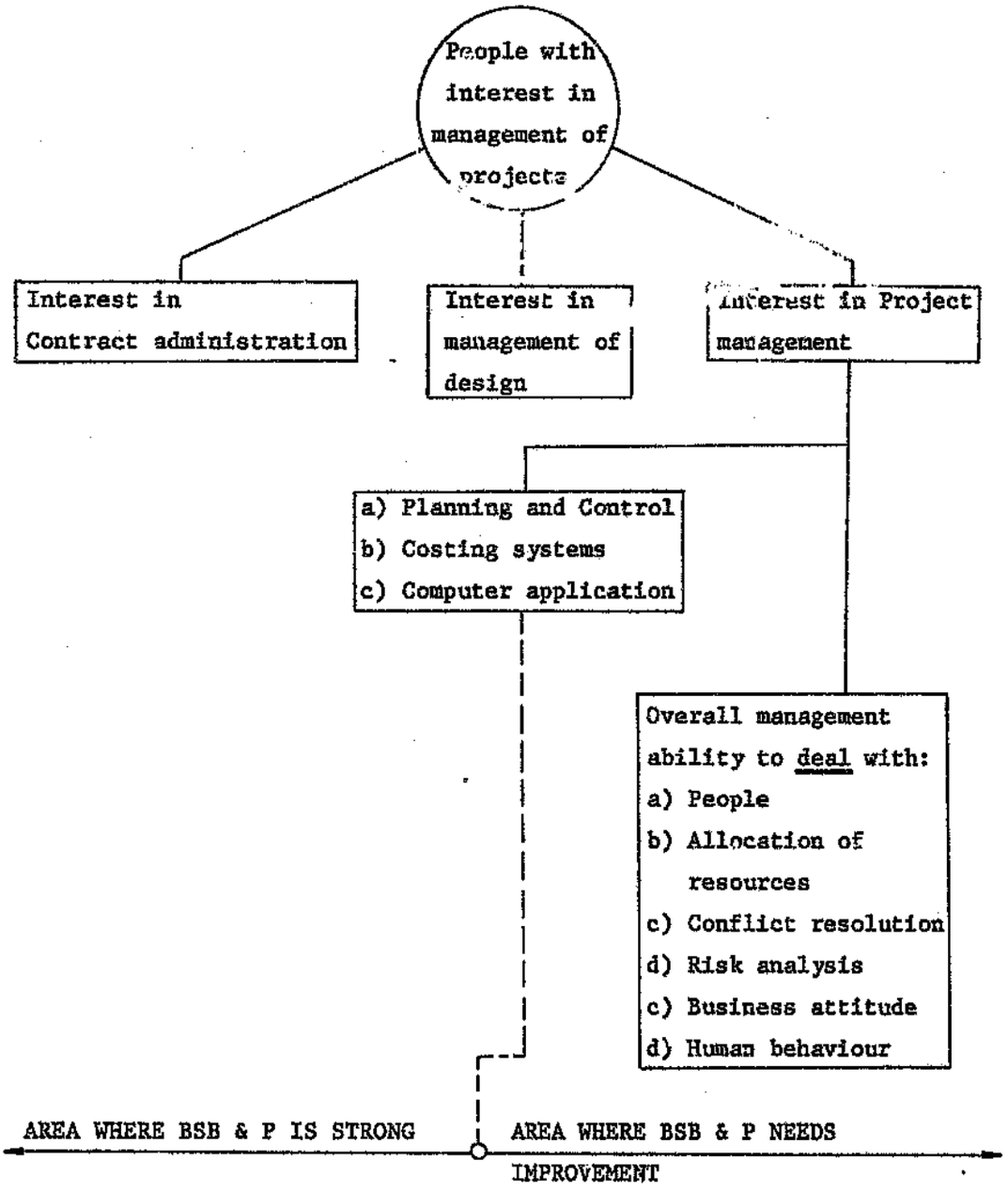


FIG.6 IDENTIFICATION OF BSB & P WEAKNESS BY EXAMINING PEOPLE'S INTERESTS

CONCLUSION

The project management services for medium-size consulting firms should not be underestimated. A tendency of this type of firm is to concentrate its activities on technical matters and contract administration alone. This appears to be insufficient. Clients require much more information in terms of financial and planning services.

Medium-size consulting firms must develop their ability to provide project management services to their clients from the inception phase of a project all the way to its implementation and perhaps to also help clients with maintenance and running problems.

This approach will enhance the image of the medium-size consulting firms and will provide them with the ability to be real leaders in the market. If the engineering profession neglects this aspect of the work, others will become involved with detrimental effects to the consultants. Engineers are the creators of any project and it is depressing to allow others to be the leaders of their creations.

CHAPTER 7 - GUIDELINES FOR THE GENERATION OF A PROJECT MANAGEMENT DEPARTMENT WITHIN BSB & P

INTRODUCTION

In most medium-sized Civil Engineering Consulting firms, the Project Management Department appears to be either entirely non-existent or not properly defined in function. The person bearing the title of "Project Manager" is most often a mature engineer, who can chair a site meeting, who can give a number of quick answers which are related to technical matters, to the contractor; who has the ability to check quantities and rates and who is also usually fairly well acquainted with certain clauses of the General Conditions of Contract. In addition, he can perform some contract administration work.

All these are integral parts of the discipline of Project Management, but they comprise only a very limited portion of the real meaning and potential of the discipline.

7.1 A MODEL FOR THE PROJECT MANAGEMENT DEPARTMENT IN BSB & P

There is a tendency in the medium-size consulting firms for the project managers to take too many decisions at the operational level and too few regarding the overall planning, scheduling and control of the project.

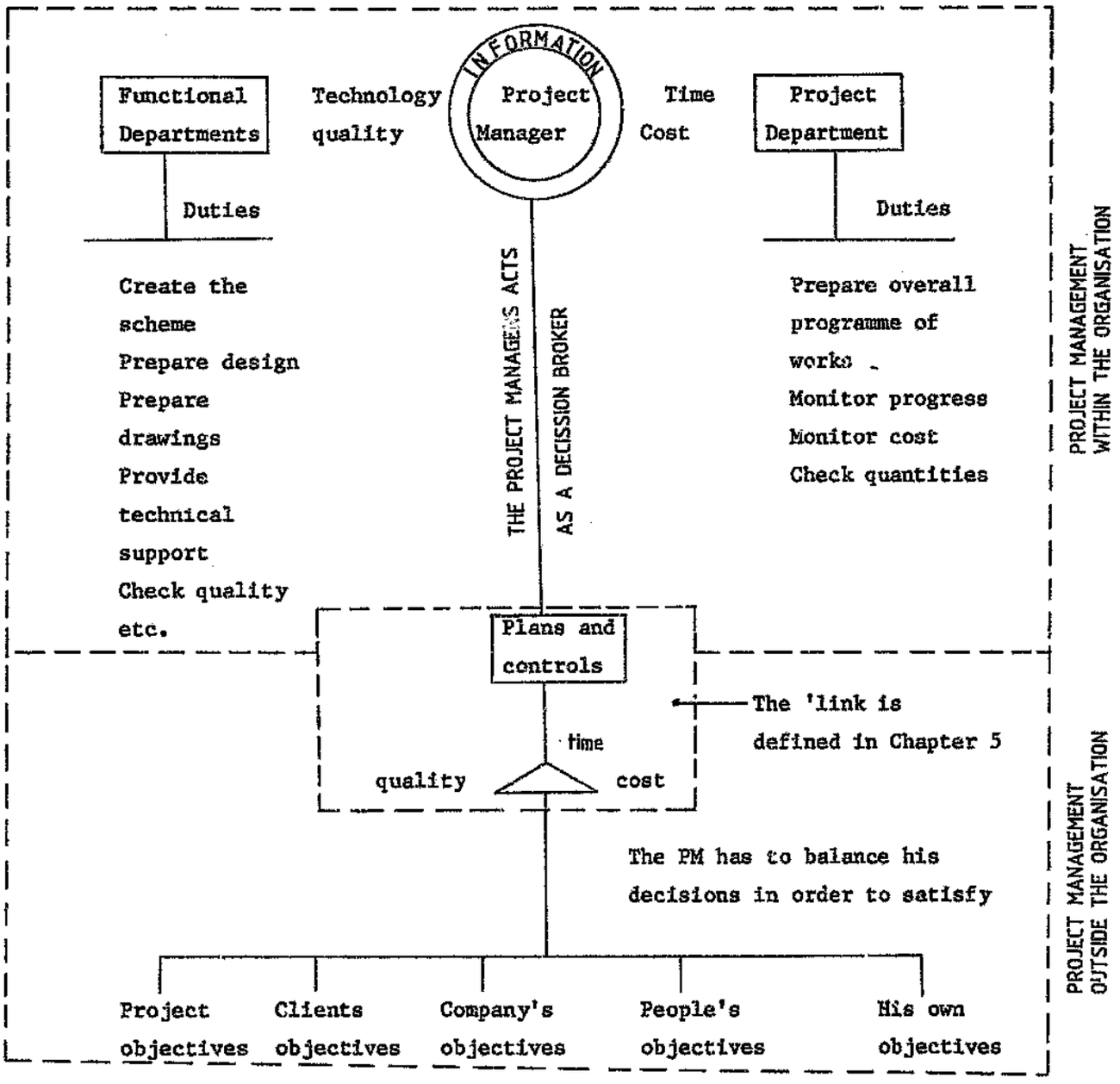
This tendency frequently creates the perception in the client that his project is poorly managed and he may ask the advice of professional project management firms which are able, through the creation of impressive programmes of work and financial models, to persuade the client that they act on his behalf, while the routine work is left to the consultants.

In modern society, the creation of a project is not represented adequately through a contract document and a set of drawings. A detailed programme of works, as well as some financial models, is equally necessary for the satisfaction of the client.

Even if top engineers may consider this portion of work as bureaucratic, they should understand that clients do not have their special abilities and they want to see on paper not only the quality of work, but also the planning of time and cost.

For the medium-sized consulting firm to satisfy the client fully, another functional department must be created. This will be the project department and its main role is to provide information of time and cost control of the project to the project manager.

The model envisaged by the writer is summarised as follows:



In a large consulting organisation the support of the project manager is usually adequate, since there are properly defined functional and project departments able to provide the information.

In a small firm, there is usually no formal organisation. The work is conducted on an informal approach, based on the spirit of teamwork. Normally, the projects are of a smaller nature or the firm has a specialisation in a particular type of work.

In a medium-sized firm, the situation is more complicated. The size of the projects varies both in magnitude and complexity.

For the small projects of a multi-disciplinary nature or the single-disciplinary project, an informal approach can be applied.

But for the large projects which may be assigned to the company from time to time, the support of the project manager by the project department is a necessity.

It is common knowledge that people reaching the position of project manager in medium-sized firms are above average and they can manage the client satisfactorily up to a certain degree.

But there are always minor defaults that occur, relative to cost, time planning and control, which irritate the client and which usually reflect directly on the project manager and eventually on the project director. Every medium-sized company, before blaming the project manager or project director for the partial failure of a project, must look at its organisation. If they don't have a properly organised project department, then the project manager loses at least half of his support to control the project and this will eventually generate some sort of dissatisfaction in the client.

Once the client's objectives are not satisfied then the factor of safety as discussed in Chapter 2 will be lost, causing a high probability of failure for the project as a whole.

The cost involved in forming and maintaining a project management department is minimal in comparison with the benefit derived by the company if he persuades the clients that they can be the real leaders of the project and not just the technical advisors.

7.2 THE MISSION AND THE OBJECTIVES OF THE PROJECT MANAGEMENT DEPARTMENT

As already discussed in Chapter 5, the dual role of the project management sub-system is to provide the link between the organisation and the environment.

This link has been defined as the 'success' of the project through balancing of objectives.

In Chapter 6 a model Fig 6 has been presented for the operation of the project management department.

It is obvious from Chapter 6 that operationally this link is achieved by the project manager through planning and control of the various objectives and parameters.

The mission, therefore, of the project management department is to provide information of time and cost to the project manager.

Due to the non-productive nature of this department, financial justification is difficult. But marketing, productivity, planning and control as well as co-ordination reasons are quite enough to support the idea of such a department.

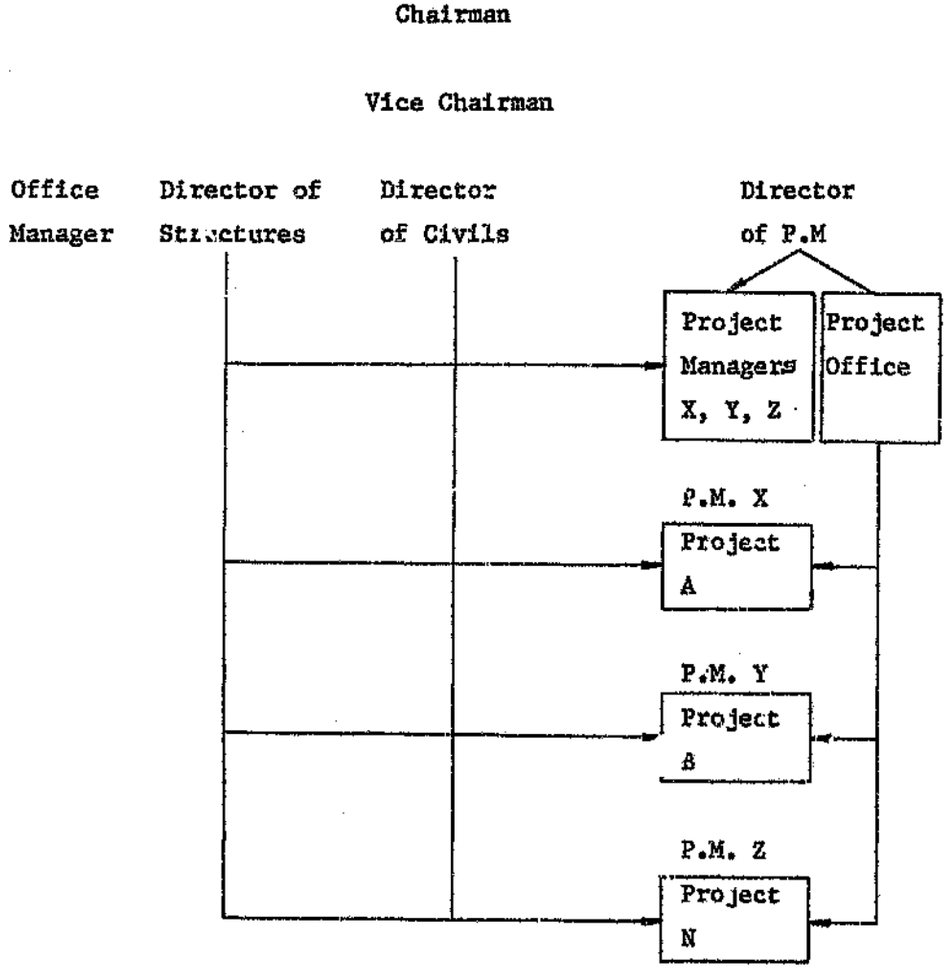
In any case, matrix organisations or professional bureau-adhocracy do not exist without the presence of a project management department.

The objectives of the project management department will be the most effective resource utilisation of manpower, equipment, facilities, money, information and technology so that the project objectives and goals can be achieved, while adhering to the everchanging environmental factors such as legal, social, political, economical and technological factors.

The project management department must be developed in such a manner that it will emerge as a dynamic and creative department that will provide the driving force behind the firm's activities, enabling it to execute projects of quality, on time, within budget and to the satisfaction of the client.

The department will be viewed as a dynamic open system that will operate effectively with both the internal company organisation and the external market or the client's environment, as described in Chapter 5.

The organisational structure envisaged is:



The project office should be compiled of the following personnel:

a) A person familiar with tender documentation of all disciplines.
b) A person familiar with measurement of quantities, costing and certificates of payments.
c) A technician with computer interests to run the various project management programmes.

The responsibility and the quality of work should be carried by the people working in the project office.

In fact, the project office should be another functional department.

The head of the project office should carry the overall responsibility of his department.

The responsibilities of the project office must include:

1. Collecting, generating and circulating of information for both in-house control and customer reporting.

2. Controlling time, cost and performance to adhere to contractual requirements.

3. Ensuring that all work required is properly documented and distributed to all key personnel.

4. Ensuring that all work performed is both authorised and funded by contractual documentation.

The major responsibility of the project manager and the project office personnel is the integration of work across the functional lines of the organisation.

7.3 THE PROJECT OFFICE

From the analysis of the previous chapters and questionnaire, it appears that the creation of a project controls department is a necessity rather than another cosmetic department in B S Bergman & Partners. This department should have equal status with the other functional departments.

The development of the department should start with an assessment of the present size of B S Bergman & Partners and must develop further as the company expands.

The department should be divided into two sections, as is shown in the following simplified diagram.



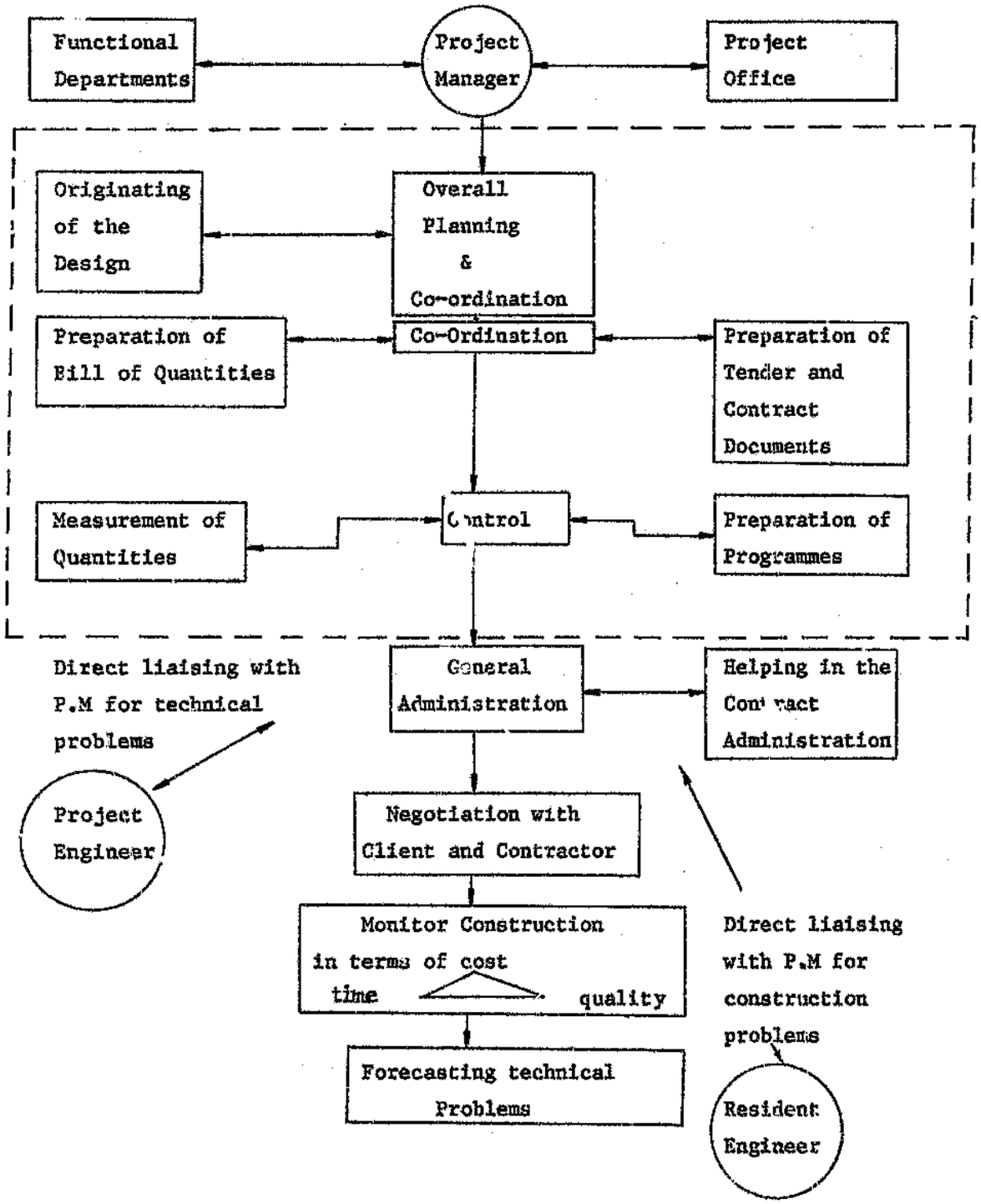
The project office will be a self-sufficient organisation in order to assist and support the project managers in the execution of their duties, as described in the model in Chapter 6.

People working in this office must have an in-built dedication to the project as a whole, and must be people who can develop good working relationships with both the project managers as well as the functional managers.

The responsibilities of the project office personnel must include:

a) To familiarize themselves with the details of the projects.
b) To control time, cost and quality.
c) To report to the functional managers on the above items.
d) To develop construction programmes.
e) To assist with the routine of the contract administration.

The project office should not be considered to be a high clerical department. The people working in this office should realise that their duty will be to assist the project managers in the implementation of his duties. The following diagram will clarify the role of the project office and will divide the work between the project and functional departments.


Functional Departments
Project Manager
Project Office
Originating of the Design
Overall Planning & Co-ordination
Preparation of Bill of Quantities
Co-Ordination
Preparation of Tender and Contract Documents
Measurement of Quantities
Control
Preparation of Programmes
Direct liaising with P.M for technical problems
General Administration
Helping in the Contract Administration
Project Engineer
Negotiation with Client and Contractor
Monitor Construction in terms of cost time quality
Direct liaising with P.M for construction problems
Forecasting technical Problems
Resident Engineer

7.4 BALANCE OF POWER BETWEEN THE PROJECT AND FUNCTIONAL MANAGERS A PRE-REQUISITE FOR THE SUCCESS OF A PROJECT MANAGEMENT DEPARTMENT

In medium sized civil engineering consulting firms, the position of the project manager is frequently under-estimated.

His position is often perceived as being bureaucratic, and functional managers and even people at the level of technologist, pretend to possess the ability to manage their own work without the advantage of the view of a project manager.

In medium-sized civil engineering consulting firms, there is always a struggle for power among technical and project management staff.

Due to the nature of their business, technical staff with limited managerial capabilities can advance higher than their counterparts with strong managerial abilities but who have less competent technical knowledge.

This is exactly the opposite of what is happening in the more commercially-orientated firms like contractors etc., where the emphasis is more on the managerial, rather than the technical aspects.

Organisations, like societies, are systems of status and power and they are class systems. For the project manager to be able to succeed, he must first examine what power actually is.

The little boxes on the organisation chart showing management hierarchy, have power. The people in these boxes exercise the power allocated in the position, but if they leave that position, they lose the power.

The project manager has temporary power allocated to him for a particular project. He is usually allocated the top box of the organisation chart but after the completion of the project, the power disappears.

Yet, as an individual the project manager can have power, but it is a different kind of power from that enjoyed by someone in a formal management position. It is a power which is the result of a game whose rules say, "If I do something for you, then you must do something for me, when and if I ask". Sociologists call that the norm of 'reciprocity'.

Functional managers or even technologists can glorify a project manager but they can also destroy him.

The project manager should therefore develop his individual power in order to succeed in his objectives. Let's call this informal power.

To begin with, the project manager should realise that if he succeeds in making the organisation believe that he can make things happen, there are big chances that the organisation will be willing to do what the project manager is asking for. There are several factors necessary for the above situation to be achieved.

In their book Ritti and Fusskhouser, (1987) (P.196), describe these factors as follows:

a) Recognition by the organisation that you have knowledge or expertise in some necessary activity.

b) A friendship network i.e. people for whom you have done things and who, in turn, are willing to do things for you. To generate this network, it may be necessary for the project manager to have the ability to find things to do for people in order to make their jobs a little easier.

c) Get a position in the organisation critical for the success of a day-to-day operation, especially a position whereby "bending the rules" the project manager can be of major benefit to some distressed fellow worker.

Finally, the project manager should make it clear that punishment of the 'disloyal' should come sooner or later and that attitude may be very important in establishing informal power.

In all organisations, the formal power relationship is described using the term authority. "Authority" is used to denote that the superior is authorised to issue directives for designated subordinates within the legal, written rules and regulations of the organisation.

In a matrix system, the maximum authority is designated to the project manager for a particular project.

Large organisations believe that by allocating full responsibility and maximum authority to the project manager, they maximise the possibility for the success of a project.

This concept may not be applicable to medium-sized civil engineering consulting firms.

In the personal experience of the writer, there is always a power struggle between the project manager and the functional managers on the subject of maximum authority for a project.

This conflict is generated as a result of two different objectives of the company which may be stated as follows:-

a) Technical excellence is a marketing tool for the company.
b) Project management is the profit-making sector of the company.

Technical excellence is a long term objective of the company, while profit making is a short term objective.

The conflict is therefore generated from the opportunity for upward mobility between the project and functional managers.

The mere statement by the company that there is an equal opportunity for advancement to top management is not enough.

Both functional and project managers can realise the hidden tendency of the firm to promote certain types of people.

If the directors are strong technical people, the company may lose the project managers with the result of diminishing profitability.

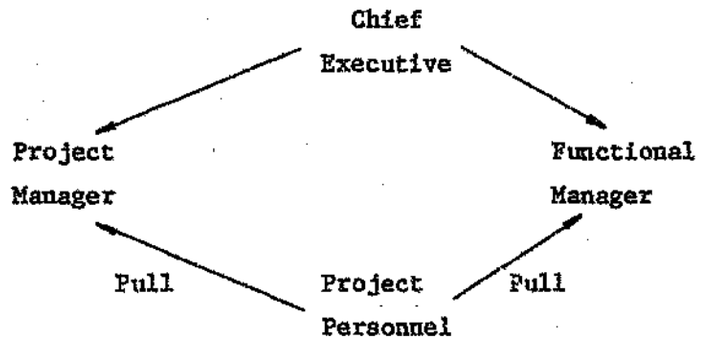
On the other hand, if the directors are mainly from the ranks of profit-makers, then the company may start losing its top functional managers with the result of diminishing technical excellence.

Top management should be a balanced mix of both technical and managerial staff, spreading the opportunity for upward mobility to all subordinates and becoming a great motivation factor for the organisation.

Strong top management support of the project manager is necessary for the project's success, even though he may not be perceived as the actual boss.

Conflict will naturally arise from the adversary roles between the project manager and the functional manager who participates in the project.

This relationship can be described as a balance of power between the two managers involved.



Various authors have attempted to delineate the authority and responsibilities of both project and functional management in order to assure a balance of power.

In their book Cleland and King (1975, P.237) Table 11-1 provide the Project - Functional Interface.

Project Manager	Functional Manager
What is to be done?	How will the task be done?
When will the task be done?	Where will the task be done?
Why will the task be done?	Who will do the task?
How much money is available to do the task?	How well has the functional input been integrated into the project?
How well has the total project been done?	

Certainly such a delineation can indicate where major responsibilities lie, but it cannot guarantee a balance of power. Balance of power is almost impossible because the organisation consists of people, and all people, including managers, are different.

In most medium-sized civil engineering consulting firms, the balance of power is tilted towards the functional managers. The main reason is that project success is not simply confined to whether the project has been completed on time, within budget and of acceptable quality.

Cleland and King (1983, P.670), relate success to the perception of people involved in a project. They state that if the project meets the technical performance specification and/or mission to be performed, and if there is a high level of satisfaction concerning the project outcome among key people in the parent organisation, key people in the client organisation, key people on the project team and key users or clientele of the project effort, the project is considered an overall success.

This definition of project success is not compatible with the project manager's perception of success.

Kolodny (1979) concludes that power must shift with the environment.

When economic times are tough, the power must shift to the project manager who has the short-term profit and loss orientation necessary for survival.

When the environment is prospering, the power is shifted towards the functional managers who control the skills and knowledge necessary for the long-term survival of the organisation.

The organisation can therefore survive and accomplish its objectives only if the balance of power between project and functional departments is adjusted according to the prevailing conditions within the broader environmental system.

CONCLUSION

In medium-size civil engineering consulting firms the project management department appears to be neglected due to the perception by people that its activities can be easily absorbed by the senior staff members of the various functional departments. In this chapter a model for the project management department was presented.

This model can be summarised by the following diagram:

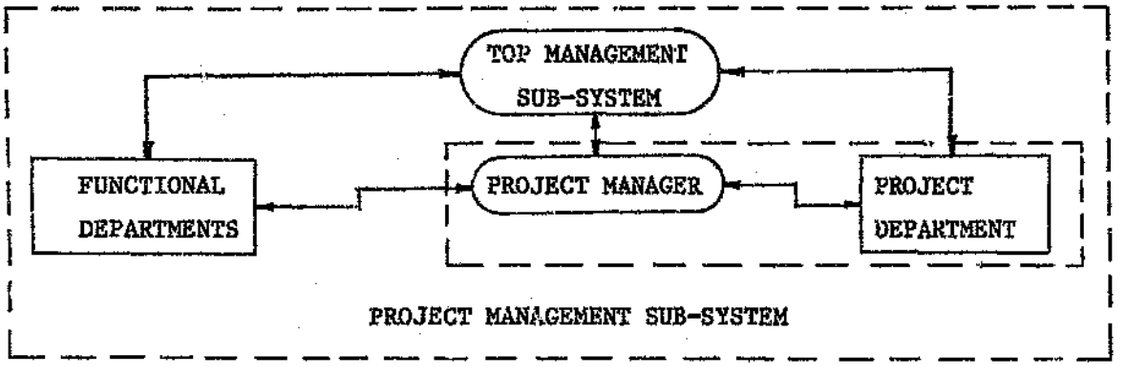


FIG. 7 ORGANISATION SUB-SYSTEM

According to Chapter 7 and 7.2 the mission of the project department is to provide information of time and cost to the project manager.

But since the project manager belongs to the project management sub-system the balance of power between the functional and project management departments has to be accomplished by the top management.

This balance of power will provide the necessary pre-requisites for the success of the project management department within the environment of the organisational sub-system.

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APPENDIX A

QUESTION NO.	YES (NO. OFF)	NO (NO. OFF)
1	-	9
2	-	9
3	9	-
4	8	1
5	Most people prefer to be involved in both technical and managerial activities	
6	9	-
7	-	9
8	9	-
9	Refer to Figure 6, Page 103	
10	-	9

1. Purpose of questions 1 & 2 is to show that there is no project management department within the company.

2. Purpose of question 3 is to show that the project management activities are defused between various staff members.

3. Purpose of question 4 is the need for the generation of a project management department.

4. Purpose of questions 5,6,7 is the identification of people suitable for management.

5. Purpose of question 8 is a statistical investigation if the idea of the project management department is supported.

6. Purpose of question 9 is to identify BSB & P weaknesses by examining people's attitudes (See Figure 6).

7. Purpose of question 10 is to show that matrix system is not applied although it is part of the general policy of the company.

QUESTIONNAIRE FOR ALL STAFF INCLUDING

THE DIRECTORS OF B S BERGMAN & PARTNERS

NAME: N A BURKE

POSITION: DIRECTOR/OFFICE MANAGER

		YES	NO
1.	Can you identify the Project Management department within your firm as a whole?		✓
2.	Can you identify the Project Management department in your Particular branch?		✓
3.	Can you identify any persons dealing with Project Management activities?	✓	
4.	Do you think that such a department would provide any assistance to your branch?	✓	
5.	Do you personally prefer technical work?	2	
	Management work?	3	
	Both types of work?	1	
6.	Can you provide, very briefly, any ideas relating to the usefulness or uselessness of having such a department?	✓	
7.	Have you got any formal qualifications in project management?		✓

8. If your answer in question 1 and 2 is NO would you support the idea of a project management department? ✓ ___

9. Rank the activities listed below according to your personal perception of importance in a project.

a)	Management of Design	2 =
b)	Contract Administration	2 =
c)	Planning and Control	1
d)	Costing	4
e)	Computer Applications	11
f)	Management of People	6
g)	Allocation of Resources	7
h)	Conflict Resolution	9
i)	Risk Analysis	10
j)	Business Attitude	5
k)	Human Behaviour	8

NOTE: If you don't understand the importance of any activity relative to your work mark '?'.

10. Do you think that the matrix organisation is fully applied to BSB & P? ___ ✓

QUESTIONNAIRE FOR ALL STAFF INCLUDING

THE DIRECTORS OF B S BERGMAN & PARTNERS

NAME: L DREW

POSITION: DIRECTOR

		YES	NO
1.	Can you identify the Project Management department within your firm as a whole?	___	✓
2.	Can you identify the Project Management department in your Particular branch?	___	✓
3.	Can you identify any persons dealing with Project Management activities?	✓	___
4.	Do you think that such a department would provide any assistance to your branch?	✓	___
5.	Do you personally prefer technical work?	2	___
	Management work?	3	___
	Both types of work?	1	___
6.	Can you provide, very briefly, any ideas relating to the usefulness or uselessness of having such a department?	✓	___
7.	Have you got any formal qualifications in project management?	___	✓

8. If your answer in question 1 and 2 is NO would you support the idea of a project management department? ✓ ___

9. Rank the activities listed below according to your personal perception of importance in a project.

a)	Management of Design	-
b)	Contract Administration	2
c)	Planning and Control	1
d)	Costing	3
e)	Computer Applications	11
f)	Management of People	6
g)	Allocation of Resources	7
h)	Conflict Resolution	9
i)	Risk Analysis	10
j)	Business Attitude	5
k)	Human Behaviour	8

NOTE: If you don't understand the importance of any activity relative to your work mark '?'.

10. Do you think that the matrix organisation is fully applied to BSB & P? ___ ✓

QUESTIONNAIRE FOR ALL STAFF INCLUDING

THE DIRECTORS OF B S BERGMAN & PARTNERS

NAME: M S GABRU

POSITION: SENIOR DESIGN ENGINEER

		YES	NO
1.	Can you identify the Project Management department within your firm as a whole?		✓
2.	Can you identify the Project Management department in your Particular branch?		✓
3.	Can you identify any persons dealing with Project Management activities?	✓	
4.	Do you think that such a department would provide any assistance to your branch?	✓	
5.	Do you personally prefer technical work?	1	
	Management work?	3	
	Both types of work?	2	
6.	Can you provide, very briefly, any ideas relating to the usefulness or uselessness of having such a department?	✓	
7.	Have you got any formal qualifications in project management?		✓

8. If your answer in question 1 and 2 is NO would you support the idea of a project management department? ✓ ___

9. Rank the activities listed below according to your personal perception of importance in a project.

a)	Management of Design	2
b)	Contract Administration	6
c)	Planning and Control	5
d)	Costing	3
e)	Computer Applications	4
f)	Management of People	1
g)	Allocation of Resources	11
h)	Conflict Resolution	7
i)	Risk Analysis	9
j)	Business Attitude	8
k)	Human Behaviour	10

NOTE: If you don't understand the importance of any activity relative to your work mark '?'.

10. Do you think that the matrix organisation is fully applied to BSB & P? I don't know

QUESTIONNAIRE FOR ALL STAFF INCLUDING

THE DIRECTORS OF B S BERGMAN & PARTNERS

NAME: T BALIDIS

POSITION:

		YES	NO
1.	Can you identify the Project Management department within your firm as a whole?		✓
2.	Can you identify the Project Management department in your Particular branch?		✓
3.	Can you identify any persons dealing with Project Management activities?	Part Time YES	
4.	Do you think that such a department would provide any assistance to your branch?	✓	
5.	Do you personally prefer technical work?	3	
	Management work?	1	
	Both types of work?	2	
6.	Can you provide, very briefly, any ideas relating to the usefulness or uselessness of having such a department?	✓	
7.	Have you got any formal qualifications in project management?		✓

8. If your answer in question 1 and 2 is NO would you support the idea of a project management department? ✓ ___

9. Rank the activities listed below according to your personal perception of importance in a project.

a)	Management of Design	1
b)	Contract Administration	2
c)	Planning and Control	3
d)	Costing	4
e)	Computer Applications	6
f)	Management of People	5
g)	Allocation of Resources	7
h)	Conflict Resolution	11
i)	Risk Analysis	8
j)	Business Attitude	10
k)	Human Behaviour	9

NOTE: If you don't understand the importance of any activity relative to your work mark '0'.

10. Do you think that the matrix organisation is fully applied to BSB & P? ___ ✓

QUESTIONNAIRE FOR ALL STAFF INCLUDING

THE DIRECTORS OF B S BERGMAN & PARTNERS

NAME: N KNOTZER

POSITION: CHIEF DRAUGHTSMAN

		YES	NO
1.	Can you identify the Project Management department within your firm as a whole?		✓
2.	Can you identify the Project Management department in your Particular branch?		✓
3.	Can you identify any persons dealing with Project Management activities?	✓	
4.	Do you think that such a department would provide any assistance to your branch?	✓	
5.	Do you personally prefer technical work?	3	
	Management work?	2	
	Both types of work?	1	
6.	Can you provide, very briefly, any ideas relating to the usefulness or uselessness of having such a department?	✓	
7.	Have you got any formal qualifications in project management?		✓

8. If your answer in question 1 and 2 is NO would you support the idea of a project management department? ✓ ___

9. Rank the activities listed below according to your personal perception of importance in a project.

a)	Management of Design	5
b)	Contract Administration	2
c)	Planning and Control	1
d)	Costing	11
e)	Computer Applications	6
f)	Management of People	3
g)	Allocation of Resources	4
h)	Conflict Resolution	9
i)	Risk Analysis	10
j)	Business Attitude	8
k)	Human Behaviour	7

NOTE: If you don't understand the [illegible]nce of any activity relative to your work mark '

10. Do you think that the matrix organisation is fully applied to BSB & P? ___ ✓

QUESTIONNAIRE FOR ALL STAFF INCLUDING

THE DIRECTORS OF B S BERGMAN & PARTNERS

NAME: G VOYIAS

POSITION: SENIOR STRUCTURAL ENGINEER

		YES	NO
1.	Can you identify the Project Management department within your firm as a whole?		✓
2.	Can you identify the Project Management department in your Particular branch?		✓
3.	Can you identify any persons dealing with Project Management activities?	✓	
4.	Do you think that such a department would provide any assistance to your branch?		✓
5.	Do you personally prefer technical work?	3	
	Management work?	2	
	Both types of work?	1	
6.	Can you provide, very briefly, any ideas relating to the usefulness or uselessness of having such a department?	✓	
7.	Have you got any formal qualifications in project management?		✓

8. If your answer in question 1 and 2 is NO would you support the idea of a project management department? ✓ —

9. Rank the activities listed below according to your personal perception of importance in a project.

a)	Management of Design	2
b)	Contract Administration	4
c)	Planning and Control	1
d)	Costing	6
e)	Computer Applications	10
f)	Management of People	3
g)	Allocation of Resources	5
h)	Conflict Resolution	9
i)	Risk Analysis	11
j)	Business Attitude	7
k)	Human Behaviour	8

NOTE: If you don't understand the importance of any activity relative to your work mark '?'.

10. Do you think that the matrix organisation is fully applied to BSB & P? Don't know

QUESTIONNAIRE FOR ALL STAFF INCLUDING

THE DIRECTORS OF R S BERGMAN & PARTNERS

NAME: N BROMLEY

POSITION: TECHNICIAN

		YES	NO
1.	Can you identify the Project Management department within your firm as a whole?		✓
2.	Can you identify the Project Management department in your Particular branch?		✓
3.	Can you identify any persons dealing with Project Management activities?	✓	
4.	Do you think that such a department would provide any assistance to your branch?	✓	
5.	Do you personally prefer technical work?	2	
	Management work?	3	
	Both types of work?	1	
6.	Can you provide, very briefly, any ideas relating to the usefulness or uselessness of having such a department?	✓	
7.	Have you got any formal qualifications in project management?		✓

8. If your answer in question 1 and 2 is NO would you support the idea of a project management department? ✓ ___

9. Rank the activities listed below according to your personal perception of importance in a project.

a)	Management of Design	1
b)	Contract Administration	5
c)	Planning and Control	?
d)	Costing	7
e)	Computer Applications	8
f)	Management of People	3
g)	Allocation of Resources	6
h)	Conflict Resolution	4
i)	Risk Analysis	10
j)	Business Attitude	11
k)	Human Behaviour	9

NOTE: If you don't understand the importance of any activity relative to your work mark '?'.

10. Do you think that the matrix organisation is fully applied to BSB & P? Don't know

QUESTIONNAIRE FOR ALL STAFF INCLUDING

THE DIRECTORS OF B S BERGMAN & PARTNERS

NAME: MIKE MILLS

POSITION: CIVIL ENGINEERING TECHNICIAN

		YES	NO
1.	Can you identify the Project Management department within your firm as a whole?		✓
2.	Can you identify the Project Management department in your Particular branch?		✓
3.	Can you identify any persons dealing with Project Management activities?	✓	
4.	Do you think that such a department would provide any assistance to your branch?	✓	
5.	Do you personally prefer technical work?	3	
	Management work?	2	
	Both types of work?	1	
6.	Can you provide, very briefly, any ideas relating to the usefulness or uselessness of having such a department?	✓	
7.	Have you got any formal qualifications in project management?		✓

8. If your answer in question 1 and 2 is NO would you support the idea of a project management department? ✓ ___

9. Rank the activities listed below according to your personal perception of importance in a project.

a)	Management of Design	1
b)	Contract Administration	8
c)	Planning and Control	7
d)	[illegible]	2
e)	[illegible]ications	6
f)	[illegible] People	4
g)	[illegible] Resources	3
h)	Conflict Resolution	9
i)	Risk Analysis	10
j)	Business Attitude	11
k)	Human Behaviour	5

NOTE: If you don't understand the importance of any activity relative to your work mark '?'.

10. Do you think that the matrix organisation is fully applied to BSB & P? Don't know

THE DIRECTORS OF B S BERGMAN & PARTNERS

NAME: R NELL

POSITION: CIVIL ENGINEERING TECHNICIAN

		YES	NO
1.	Can you identify the Project Management department within your firm as a whole?		✓
2.	Can you identify the Project Management department in your Particula anch?		✓
3.	Can you identify any persons dealing with Project Management activities?	✓	
4.	Do you think that such a department would provide any assistance to your branch?	✓	
5.	Do you personally prefer technical work?	3	
	Management work?	2	
	Both types of work?	1	
6.	Can you provide, very briefly, any ideas relating to the usefulness or uselessness of having such a department?	✓	
7.	Have you got any formal qualifications in project management?		✓

8. If your answer in question 1 and 2 is NO would you support the idea of a project management department? ✓ ___

9. Rank the activities listed below according to your personal perception of importance in a project.

a)	Management of Design	1
b)	Contract Administration	8
c)	Planning and Control	7
d)	Costing	2
e)	Computer Applications	6
f)	Management of People	4
g)	Allocation of Resources	3
h)	Conflict Resolution	9
i)	Risk Analysis	10
j)	Business Attitude	11
k)	Human Behaviour	5

NOTE: If you don't understand the importance of any activity relative to your work mark '?'.

10. Do you think that the matrix organisation is fully applied to BSB & P? ___ ✓

APPENDIX B

PROJECT MANAGEMENT PLAN

1. Introduction and Project Scope

2. Modus Operandi

3. Project Organisation Chart

4. Finance

5. Operations involved in Construction Stage

6. Progress Report

7. Site Meetings

8. Communication

9. Site Contract Administration

1. INTRODUCTION

1.1 PURPOSE OF PROJECT MANAGER PLAN (PMP)

The purpose of this PMP is to describe the scope, methods and procedures to be used on this project, such as:

* Scope of BSB & P Services
* BSB & P Project Organisation
* Client Interfacing
* Contractor Interfacing
* Applicable Discipline Procedures
* Project Control Systems
* Project Communications System
* Project Records System
* Project Programme
* Project Monitoring and Client Reporting

1.2 CONTROL OF MANUAL

This PMP will be controlled by assigning a specifically numbered manual to each designated recipient. Recipients of the Project Management Plan (PMP) are required to return a receipt acknowledgement to the Project Manager (PM). In addition, all revisions sent to PMP holders will also require return of receipt acknowledgement.

The PM will review this manual periodically during the course of implementation to ensure that it reflects current requirements and developments.

Revisions to the PMP will be numbered and dated. To indicate the area of the page revised, the margin will be marked with a vertical line and the revision number. After revisions have been approved by the PM they will be circulated to all designated PMP holders.

1.3 SCOPE OF SERVICES

The client wishes BSB & P to undertake all project responsibility for the construction of the works as described below:

Description of works
The specific sections of the project are as follows:-

1.3.1 Design, prepare tender drawings and documents.

1.3.2 Issue tender enquiries, hold site inspection, issue addenda if required.

1.3.3 Adjudicate tenders required, make report and recommendations for acceptance to client.

1.3.4 Notify successful contractor and implement the contracts.

1.3.5 Supervise construction, administer contracts and act as the Engineer in charge of the contracts.

1.3.6 Accept the completed works on behalf of the client at end of construction and end of maintenance period.

2. MODUS OPERANDI

Based on the scope and timing of the project the suggested project organisation is shown on the accompanying organisational chart and a target programme of consultancy tasks is included.

2.1 The client is ..... and is represented by .....

He will be the sole interface with our professional team.

2.2 The BSB & P Project Director is Mr ..... who is responsible to the board of BSB & P for the overall performance of BSB & P on this commission, to achieve a successfully completed project.

2.3 BSB & P Project Manager is Mr ....., he will be responsible for the obligations of BSB & P for:

a) Managing the design
b) Managing the construction

Depending on the size of the project he will be assisted by various persons as indicated in the organisation chart.

2.4 The PM will lead regular progress meetings between BSB & P and the contractors and will assist and accompany the Project Director in regular review and report back meetings with the client.

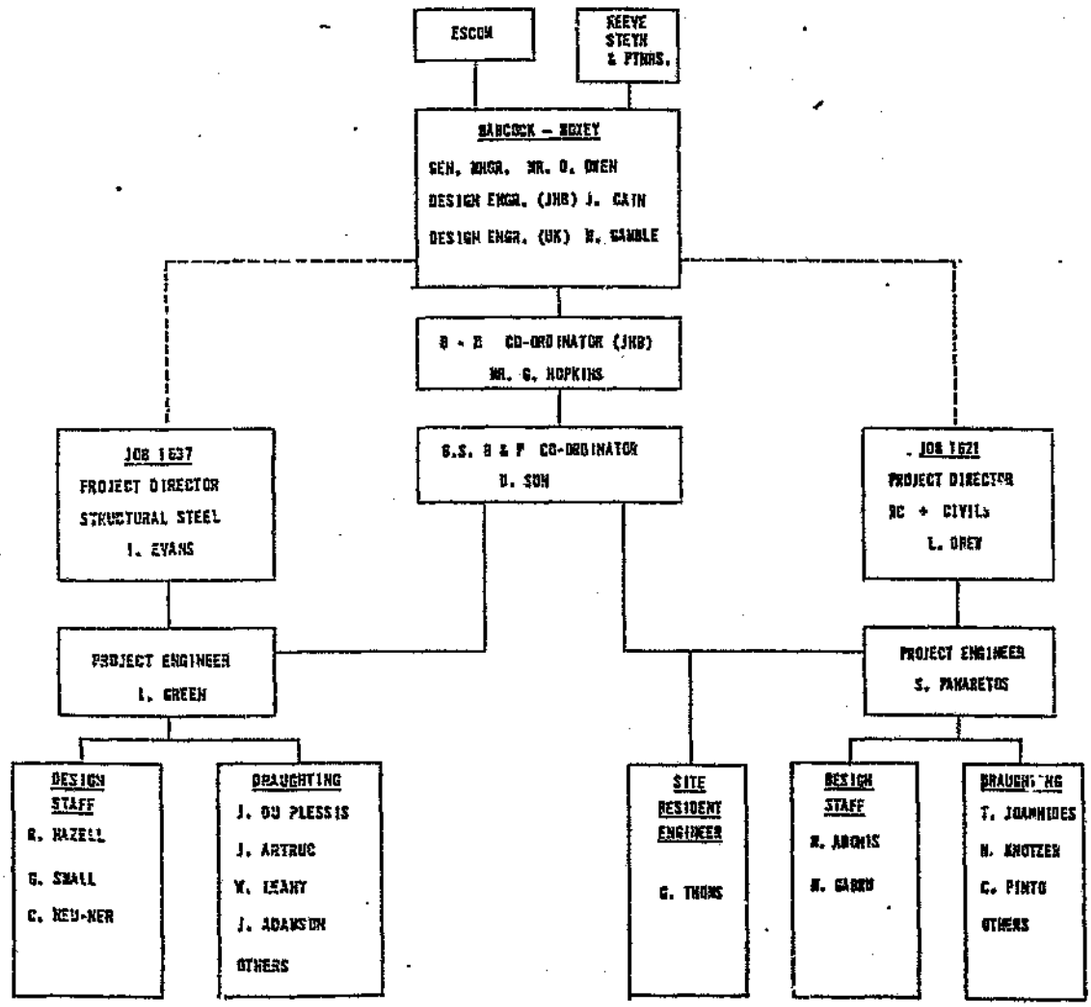
3. PROJECT ORGANISATION CHART

This chart will be developed by the Project Manager for each particular project.

A typical example is shown below.

ESCOM LETHABO COAL STOCKYARD CONVEYOR SYSTEM

B.S. BERGMAN & PARTNERS - MOXEY ORGANISATION CHART



4. FINANCE

4.1 Professional fees accounts will be prepared and rendered by the Project Director.

4.2 Payments to contractors will be by the client based on payment certificates prepared by the Project Manager who will be assisted by the Resident Engineer and his assistants, as per the project organisation chart, in the compilation of the monthly measurement and scheduling of quantities.

Payment certificates will be signed by the Project Manager and approved by the Project Director before transmission to the client's agency.

4.3 Claims under the contract will be ruled upon by the Project Manager as the Engineer assisted by his staff.

Variations adopted in the contract shall be recorded on BSB & P variation order forms and numbered, and approved by the Project Manager before inclusion on a payment certificate.

5. OPERATIONS INVOLVED IN CONSTRUCTION STAGE

5.1 Complete design calculations
5.2 Complete drawings for construction
5.3 Issue tender documents
5.4 Arrange site inspection
5.5 Issue addenda (if required) before tender closing date
5.6 Receive tenders and check them
5.7 Prepare adjudication report and recommend to the client the successful contractor to your opinion

5.8 Award contract officially to the contractor selected by the client

5.9 Issue order to contractor to commence the works

5.10 Prepare BSB & P construction programme

5.11 Approve contractor's programme if feasible

5.12 Check contractor's documentation required

a) Insurances

b) Surety Bonds

c) Certificate of Plant Ownership

5.13 Inform contractor formally of any extra authority or power delegated to the Resident Engineer not described in the Blue Book or other legal document.

5.14 Supervise construction w.r.t quality, time and cost

5.15 Conduct site meetings at regular intervals

5.16 Try to avoid contractual claims but if they are necessary give ruling

5.17 Process variation orders

5.18 Keep measurement of quantities up to date

5.19 Prepare budget and cash flow

5.20 Submit regular progress and financial reports

5.21 Issue certificate of completion at end of construction

5.22 Issue final certificate at end of maintenance period

6. PROGRESS REPORT

The Project Manager should prepare a progress report when considered necessary as a formal reporting to the client.

The progress report should include:

* Progress of construction

* Expenditure vs budget

* Cost to completion

* Claims - dealt with and expected

7. SITE MEETINGS

Site meetings between BSB & P and contractors must be held at least monthly.

The meeting will be chaired by the BSB & P Project Manager.

It shall be made clear that minutes do not form part of the contract documentation, but constitute a record of the Engineer and contractor interface during the construction period.

The minutes must include:

* Progress
* Delays
* Information required
* Technical queries and resolutions
* Quality of Works
* Payment matters
* Claims or disputes
* External influences on contract (e.g. weather)
* Employers special requirements

8. COMMUNICATION

8.1 All decisions must be confirmed by letter, telex or site instructions.

8.2 All documents e.g drawings, reports, minutes etc., must be transmitted under a document receipt/issue voucher.

8.3 Telephone conversations of project importance shall be backed up with a telex.

8.4 All official letters generated by BSB & P on the project will be signed by the Project Director or Project Manager.

8.5 All BSB & P generated communications shall be held in the project file.

8.6 All incoming communications shall be received by the project manager and then passed to the staff for further action.

9. SITE CONTRACT ADMINISTRATION

The Project Manager will be assisted by the Resident Engineer (RE) to administer the contracts for the works on site.

The RE will act as the Engineer's Representative (ER) in terms of each contract. The Project Manager will, in accordance with the General Conditions of Contract (SAICE form, Clause 2) set out the duties and powers of the Engineer's Representative. These shall be approved by the Project Director and formally advised to the ER, Employer, Contractors and Office Staff.

This Project Management Plan does not include detailed procedures and guidelines for the Site Resident Engineer - reference is made to relevant sections of the BSB & P Manual of Office Procedure for these items. It forms part of this Project Management Plan however to include here the relevant documentation to be used by the Site Resident Engineer and Project Manager when interfacing with each other and with contractors:

Site Meeting Minutes
Site Instruction
Inspection and Release
RE's Weekly Report
Variation Order
Payment Certificate
Schedule of Quantities
Completion Certificate

The forms shown in Appendix .... shall be used on this project.

Author: Panaretos Stavros.

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